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## CHAPTER XII. APPENDICES



**Appendix A.** Aquatic SGCN Habitat Associations By Order and Watershed.

**Table A-1.** Aquatic SGCN Habitat Associations By Order and Watershed.

X = Occurrence, EX = Extirpated/Historical Occurrence

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems		
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage					Oxbows, backwaters, soughs, embayments	Lake Michigan		Other Natural Lakes	
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland						
									Head-waters	Wade-able/Large Rivers	Head-waters	Wade-able/Large Rivers					
Carps and Minnows	<i>Clinostomus elongatus</i>	Redside Dace							X	X							



Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems	
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes		
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Rhinichthys cataractae</i>	Longnose Dace	X	X	X									X		
Catfish	<i>Noturus stigmosus</i>	Northern Madtom						X								
Cavefish	<i>Amblyopsis spelaea</i>	Northern Cavefish								X						X

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine			
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes	Subterranean Systems	
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey		X	X	X	X		X	X						
Mussels	<i>Cyrogenia stegaria</i>	Fanshell						X		X						



Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems		
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes			
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland						
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers	
	<i>Epioblasma torulosa torulosa</i>	Tubercled Blossom						EX									
	<i>Epioblasma triquetra</i>	Snuffbox			EX			EX		X							
	<i>Fusconaia subrotunda</i>	Longsolid	EX		EX			EX		EX							

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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Lampsilis abrupta</i>	Pink Mucket						EX								
	<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel			X					X					X	
	<i>Obovaria subrotunda</i>	Round Hickorynut	EX		EX			EX		X		X				

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine			
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes	Subterranean Systems	
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Plethobasus cicatricosus</i>	White Wartyback						EX								
	<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback						EX								
Mussels	<i>Plethobasus cyphyus</i>	Sheepnose					EX	X		X						

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems		
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes			
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland						
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers	
	<i>Pleurobema clava</i>	Clubshell	EX		X					EX		X					
	<i>Pleurobema cordatum</i>	Ohio Pigtoe								X		X					

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems	
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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Pleurobema plenum</i>	Rough Pigtoe						X		EX						
	<i>Pleurobema rubrum</i>	Pyramid Pigtoe						EX		EX						
	<i>Potamilus capax</i>	Fat Pocketbook						X			X					

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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Ptychobranchus fasciolaris</i>	Kidneyshell	EX		X			X			X					
	<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	EX		EX			EX			X					



Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems	
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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Venustaconcha ellipsiformis</i>	Ellipse	X	X	X	X	X									
	<i>Villosa fabalis</i>	Rayed Bean	EX		X			EX		X					X	



Group	Scientific Name	Common Name	Riverine Systems									Lacustrine					
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes			
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland						
									Head-waters	Wade-able/Large Rivers	Head-waters				Wade-able/Large Rivers		
	<i>Etheostoma maculatum</i>	Spotted Darter						X									
	<i>Etheostoma proeliare</i>	Cypress Darter									X	X	X				
	<i>Etheostoma tippecanoe</i>	Tippecanoe Darter						X									
																	Subterranean Systems

Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems	
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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
	<i>Etheostoma variatum</i>	Variagate Darter						EX		X						
	<i>Percina copelandi</i>	Channel Darter						X								
	<i>Percina evides</i>	Gilt Darter			EX			EX		X						

Group	Scientific Name	Common Name	Riverine Systems									Lacustrine					
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage				Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes			
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland						
									Head-waters	Wade-able/Large Rivers	Head-waters				Wade-able/Large Rivers		
Subterranean Systems																	
Pikes	<i>Esox masquinongy ohioensis</i>	Ohio River Muskellunge						X		X							
Pygmy Sunfish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish									X	X	X				



Group	Scientific Name	Common Name	Riverine Systems										Lacustrine		Subterranean Systems	
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			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland					
									Head-waters	Wade-able/Large Rivers	Head-waters					Wade-able/Large Rivers
Sturgeons	<i>Acipenser fulvescens</i>	Lake Sturgeon						X						X	X	
Suckers	<i>Catostomus catostomus</i>	Longnose Sucker												X		
	<i>Moxostoma valenciennesi</i>	Greater Redhorse	X		X			X		X						



Group	Scientific Name	Common Name	Riverine Systems									Lacustrine			
			Great Lakes Drainage			Kankakee River Drainage		Ohio River Drainage							
			Great Rivers	Headwaters	Wade-able/Large Rivers	Headwaters	Wade-able/Large Rivers	Great Rivers	Eastern Corn Belt Plains /Interior Plateau		Interior River Lowland		Oxbows, backwaters, soughs, embayments	Lake Michigan	Other Natural Lakes
									Head-waters	Wade-able/Large Rivers	Head-waters	Wade-able/Large Rivers			
Trouts and Salmons	<i>Coregonus artedii</i>	Cisco										X	X		
	<i>Coregonus clupeaformis</i>	Lake Whitefish										X			

Subterranean Systems

**Appendix B.** Crosswalk Tables for Habitat Classifications.

**Table B-1.** Crosswalk table for classification schemes used to classify habitats for SGCN in 2005 and 2015.

2005 Major Habitat	2005 Subhabitat	2015 NatureServe Value
<b>Agricultural Lands</b>	Cereal Grains	Cropland/Hedgerow
<b>Agricultural Lands</b>	Feedlots	Cropland/Hedgerow
<b>Agricultural Lands</b>	Row Crops	Cropland/Hedgerow
<b>Aquatic Systems</b>	Lake Michigan	None – Retained as Subhabitat
<b>Aquatic Systems</b>	Rivers and Streams	Big Rivers
<b>Aquatic Systems</b>	Rivers and Streams	Medium Rivers
<b>Aquatic Systems</b>	Rivers and Streams	Creeks
<b>Aquatic Systems</b>	Rivers and Streams	Springs/Spring Brooks
<b>Aquatic Systems</b>	Oxbows, Backwaters, Sloughs, Embayments	Riverine Systems (special case)
<b>Aquatic Systems</b>	Natural Lakes	Lakes – Deep water
<b>Aquatic Systems</b>	Natural Lakes	Lakes – Shallow water
<b>Aquatic Systems</b>	Impoundments	Lacustrine Systems (special case)
<b>Barren Lands</b>	Active Quarries	Bare Rock/Talus (special case)
<b>Barren Lands</b>	Cliffs	Cliffs/Rock Outcrops
<b>Barren Lands</b>	Rock Outcrops	Cliffs/Rock Outcrops
<b>Barren Lands</b>	Bare Dunes	Sand/Dunes
<b>Developed Lands</b>	Golf Courses	Suburban Areas (feature)
<b>Developed Lands</b>	Industrial Lands	Urban Areas
<b>Developed Lands</b>	Roads/Rails/Bridges	Urban/Suburban Areas (features)
<b>Developed Lands</b>	None	Suburban Areas
<b>Forest Lands</b>	Deciduous Forest	Hardwood Forest
<b>Forest Lands</b>	Evergreen Forest	Conifer Forest
<b>Forest Lands</b>	None	Mixed Forest
<b>Forest Lands</b>	None	Hardwood Woodland
<b>Forest Lands</b>	None	Conifer Woodland
<b>Forest Lands</b>	None	Mixed Woodland
<b>Forest Lands</b>	Pre-forest	Old Fields
<b>Forest Lands</b>	Early Forest Stage	Shrubland
<b>Forest Lands</b>	Pole Stage	Forests (stage)
<b>Forest Lands</b>	Mature High Canopy Stage	Forests (stage)
<b>Forest Lands</b>	Old Forest Stage	Forests (stage)
<b>Forest Lands</b>	Floodplain Forests	Riparian Zones
<b>Forest Lands</b>	Forested Wetlands	Forested Wetland
<b>Forest Lands</b>	Riparian Wooded Corridors/Streams	Riparian Zones
<b>Grasslands</b>	Early Successional	Old Fields
<b>Grasslands</b>	Farm Bill Programs	Herbaceous Grasslands (special case)
<b>Grasslands</b>	Fescue	Herbaceous Grasslands (special case)
<b>Grasslands</b>	Haylands	Herbaceous Grasslands
<b>Grasslands</b>	Pasture	Herbaceous Grasslands

2005 Major Habitat	2005 Subhabitat	2015 NatureServe Value
Grasslands	Prairies	Herbaceous Grasslands
Grasslands	Savannah	Savannas
Grasslands	Vegetated Dunes and Swales	Herbaceous Grasslands (special case)
Grasslands	Shrub/Scrub	Shrubland
Subterranean Systems	Cave Entrances	Subterrestrial
Subterranean Systems	Caves	Subterrestrial
Subterranean Systems	None	Subaquatic
Wetlands	Emergent	Ephemeral/Temporary Wetlands
Wetlands	Ephemeral	Ephemeral/Temporary Wetlands
Wetlands	Forested	Forested Wetland
Wetlands	Herbaceous Marsh	Herbaceous Wetland
Wetlands	None	Bogs/Fens
Wetlands	Mudflats	None – Retained as Subhabitat
Wetlands	Permanent	None
Wetlands	Shrub/Scrub	Shrub Wetland

**Table B-2.** Crosswalk table for land cover data used to access changes in habitat and the major habitat types described in the CWS.

Major Habitat Type	NLCD Land Cover Class	NLCD Land Cover Value
Agricultural Lands	Planted/Cultivated	Cultivated Crops
Aquatic Systems	Water	Open Water
Barren Lands	Barren	Barren Land
Developed Lands	Developed	Developed, Open Space
Developed Lands	Developed	Developed, Low Intensity
Developed Lands	Developed	Developed, Medium Intensity
Developed Lands	Developed	Developed, High Intensity
Forest Lands	Forest	Deciduous Forest
Forest Lands	Forest	Evergreen Forest
Forest Lands	Forest	Mixed Forest
Grasslands	Herbaceous	Grassland/Herbaceous
Grasslands	Herbaceous	Hay/Pasture
Grasslands	Shrubland	Shrub/Scrub
Wetlands	Wetlands	Woody Wetlands
Wetlands	Wetlands	Emergent Herbaceous Wetlands

**Appendix C. Full Landscape-level Modeling Results.**

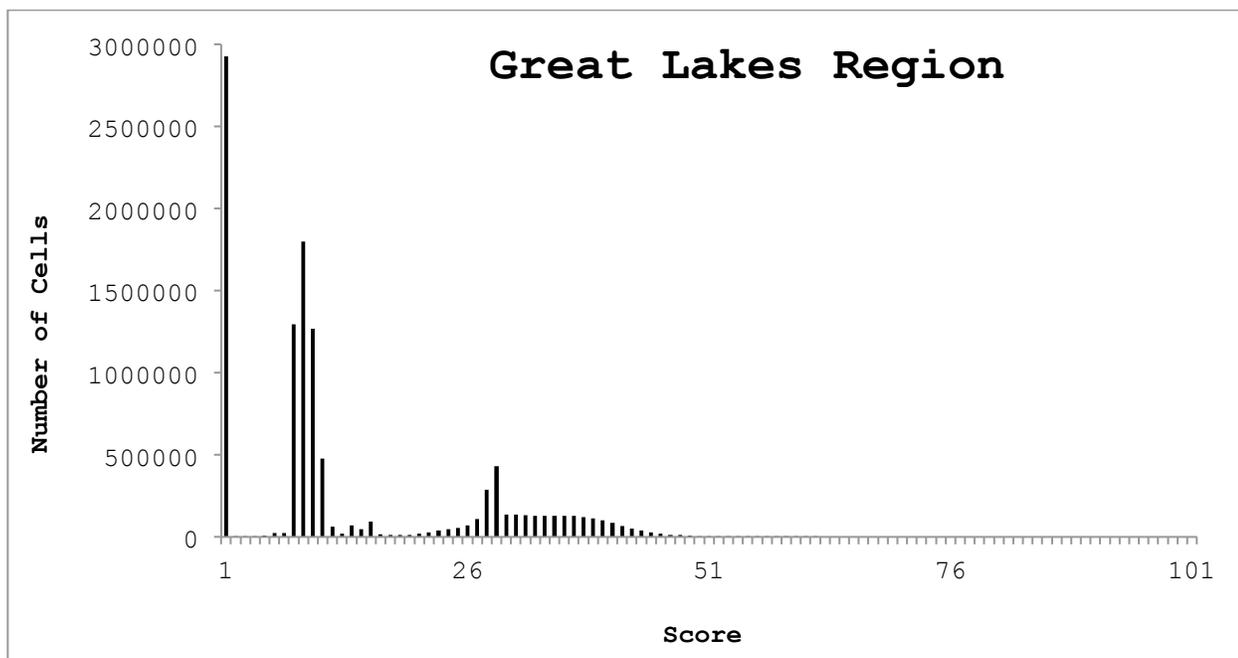
**Table C-1.** Raw landscape-level modeling scores for seven species representing the Great Lakes Region. The number of cells assigned to each score ranges from 1-100.

Score	Blanding's Turtle	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	Red-headed Woodpecker	American Woodcock	Average
0	10450432	10459380	8782898	3917684	10164267	9278963	8847544	2925628
1	18	0	11	0	20	0	0	40
2	100	0	12	0	11	9492	0	869
3	157	0	13	0	13	0	0	3320
4	181	0	8	0	14	0	0	7682
5	249	81465	26	1	43	0	0	22800
6	420	0	30	0	77	0	0	25557
7	577	0	88	7	70	114755	0	1295950
8	672	0	84	6	86	0	0	1800930
9	807	16510	87	30	81	0	0	1266709
10	950	18281	154	63	93	130916	0	475362
11	862	20052	157	51	124	0	0	61835
12	851	16036	125	107	133	0	0	21425
13	1090	13542	178	179	132	0	0	70460
14	1623	9850	208	70329	139	0	0	47560
15	1816	12985	161	29765	185	0	0	93583
16	2000	8797	162	26561	164	0	0	16937
17	2281	10481	237	25523	187	0	0	13944
18	3295	7746	299	24690	210	0	0	12116
19	5040	7015	489	24634	218	0	5878	13994
20	6348	7814	410	24492	232	0	6370	19737
21	10690	7467	397	23296	270	0	6604	26163
22	26295	5121	663	21393	287	0	8298	37402
23	77281	7256	447	19530	281	0	13175	46758
24	25693	4824	888	18007	311	0	13091	55576
25	778	7088	859	16858	312	90510	17813	69299
26	667	5162	719	16388	355	0	20765	110910
27	812	6201	662	16206	346	0	22565	288639
28	908	5172	715	15752	372	0	25162	430193

<b>Score</b>	<b>Blanding's Turtle</b>	<b>Henslow's Sparrow</b>	<b>Northern Leopard Frog</b>	<b>Northern Bobwhite</b>	<b>Eastern Red Bat</b>	<b>Red-headed Woodpecker</b>	<b>American Woodcock</b>	<b>Average</b>
29	1092	2773	626	14902	387	0	33174	135003
30	1076	2720	868	14246	403	0	29888	136067
31	1134	3418	807	13318	439	0	37669	131591
32	1070	4118	1074	11721	419	0	40951	127073
33	1180	2685	1399	10316	432	0	43731	128194
34	1369	2579	1243	8854	510	0	46554	128467
35	1332	4324	1383	6816	520	0	47500	127591
36	1584	2199	1563	5118	566	0	55305	127230
37	1837	1352	1666	3684	603	0	50264	121925
38	1944	3218	1952	2745	671	0	53721	114760
39	2000	2646	2347	1949	729	0	52739	102216
40	2739	1726	2424	1894	825	0	55266	85937
41	3045	2822	2621	1657	824	0	59494	68034
42	3222	2205	2773	1568	849	0	57536	52226
43	4577	2061	3085	2144	849	0	63512	40362
44	6451	1410	2948	3539	911	0	51367	29187
45	9160	506	3070	7137	931	0	31530	19718
46	17366	3722	3676	10040	1034	0	31703	13717
47	32852	2794	4355	13430	3045	0	31214	10376
48	19273	1403	4334	16673	4343	0	29843	7335
49	2603	1083	3937	20243	6467	0	29234	5699
50	991	3703	4055	23252	7618	0	29450	4699
51	1013	2038	3985	25523	9419	0	28042	3862
52	1007	965	4166	200311	10804	0	27990	3228
53	1167	599	4434	289853	12004	0	27560	2202
54	1280	2644	4845	464154	13548	0	26883	1481
55	1307	2542	4855	437732	14256	0	26420	1032
56	1605	1705	5254	373471	15724	0	26793	579
57	1595	3277	5631	334384	16847	0	27054	268
58	1610	1693	6274	314253	17524	0	28009	105
59	1819	512	6817	295599	18351	0	28091	31
60	2119	2973	6950	276035	18837	0	26100	8
61	2269	1383	7142	265783	22063	0	26980	1
62	2485	3489	7260	253690	28310	0	28713	0
63	2625	1766	7476	248092	36045	0	26789	0
64	3027	2837	7732	253240	39861	0	26594	0

Score	Blanding's Turtle	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	Red-headed Woodpecker	American Woodcock	Average
65	4431	683	8031	261280	41119	0	27799	0
66	4896	2794	8705	269296	41762	0	26819	0
67	6711	1669	8946	251077	39256	0	26931	0
68	9667	1678	9514	227230	38118	0	26206	0
69	13275	1948	10172	200236	36021	0	27122	0
70	18638	1379	10406	177550	33184	0	27244	0
71	24957	2467	11260	155449	30311	0	24783	0
72	15258	2249	12322	136148	27553	0	26924	0
73	4639	2206	13494	118413	25988	0	25876	0
74	1689	1821	13949	105463	22946	0	24482	0
75	1635	1944	15363	96431	19695	714398	24747	0
76	1359	3518	17116	92691	17838	0	24065	0
77	1340	2287	19018	79639	16197	0	23117	0
78	1567	1888	21481	66209	15121	0	23062	0
79	1719	2316	23960	55324	14078	0	22904	0
80	2049	377	26636	45684	12384	0	26368	0
81	2042	3039	29771	38416	11590	0	24378	0
82	2170	2096	32860	30457	10549	0	23791	0
83	2675	1272	37404	23137	9435	0	23081	0
84	3014	2323	44354	17147	8127	0	22694	0
85	3399	2357	52221	12065	7152	0	22428	0
86	3503	2742	60059	8486	6663	0	22356	0
87	4075	3219	67132	6101	6473	0	22829	0
88	4602	1452	76204	4285	6195	0	21891	0
89	5202	2991	86395	3052	6182	0	19408	0
90	6208	3395	99748	1886	5864	0	13747	0
91	6977	4706	113497	1160	5179	0	10139	0
92	8787	1862	126690	721	4076	0	7661	0
93	11517	4724	145984	415	3145	0	5652	0
94	15331	2647	164285	238	2437	0	4207	0
95	19827	4227	188407	92	1725	0	3157	0
96	15529	5676	213261	65	1165	0	2194	0
97	7368	3861	215641	5	685	0	1462	0
98	2348	8280	87679	0	406	0	844	0
99	440	11649	4450	0	146	0	284	0
100	204	78889	2137	0	0	665732	2	0

**Figure C-1.** Landscape-level modeling scores for the Great Lakes Region averaged across species.



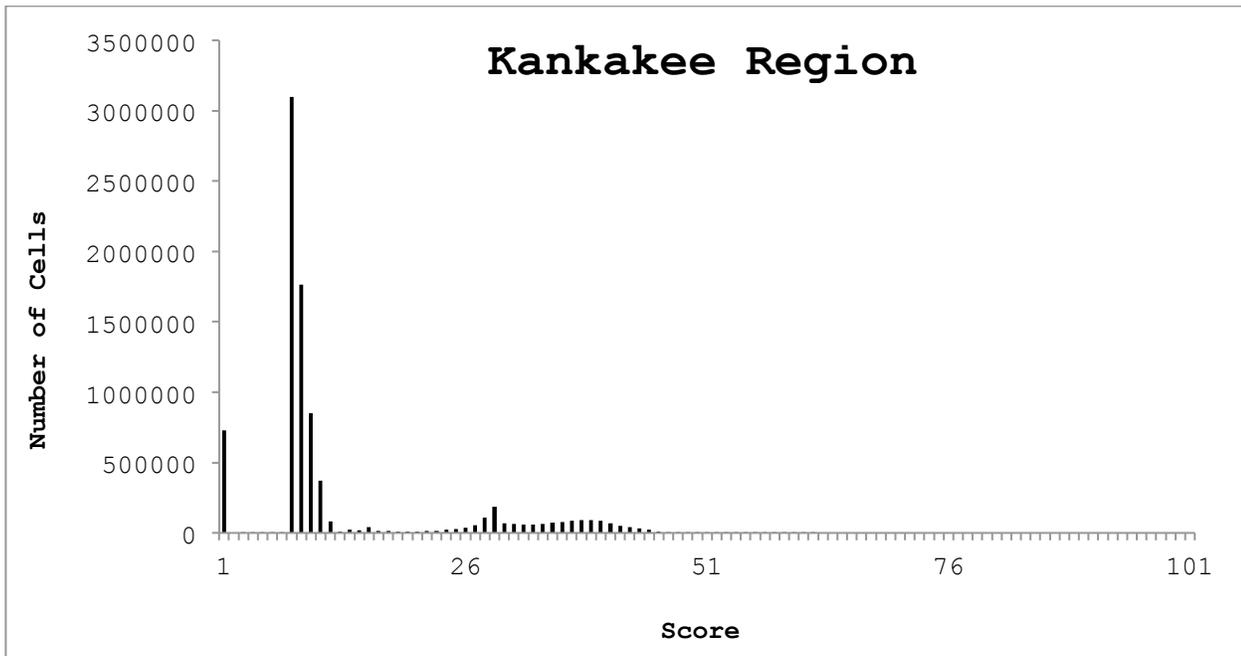
**Table C-2.** Raw landscape-level modeling scores for seven species representing the Kankakee Region. The number of cells assigned to each score ranges from 1-100.

Score	Blanding's Turtle	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	Red-headed Woodpecker	American Woodcock	Average
0	8300265	8415002	7802846	1026040	7842789	7485722	7303060	727858
1	337	0	43	0	33	0	0	0
2	1353	0	47	0	62	5451	0	57
3	760	0	29	0	48	0	0	687
4	59	0	40	0	43	0	0	2208
5	181	40452	92	0	97	0	0	4987
6	1109	0	72	0	163	0	0	4616
7	1115	0	118	0	269	122243	0	3097530
8	325	0	134	0	348	0	0	1764732
9	422	8338	177	0	305	0	0	850159
10	1035	10929	117	8	367	41357	0	370569
11	847	10279	181	27	369	0	0	82458
12	1697	9054	143	56	427	0	0	8092
13	543	6208	189	54	509	0	0	22793
14	965	6025	264	38216	536	0	0	17378
15	704	4866	294	13916	598	0	0	39382
16	1077	3701	192	15307	563	0	0	13895
17	908	4551	288	15298	657	0	0	12432
18	1283	3822	287	15047	672	0	0	10681
19	1938	3393	394	16371	701	0	2230	9479
20	3495	2650	284	16707	753	0	1958	10169
21	4559	3282	335	17032	807	0	1530	12571
22	7190	1864	464	16962	826	0	2133	16181
23	15452	2532	351	17197	880	0	3259	21741
24	8678	1921	406	17105	920	0	3049	28855
25	776	1690	518	17272	1016	48857	3836	38349
26	988	2072	435	17348	1032	0	4377	56055
27	733	896	481	17769	1124	0	4871	106992
28	1074	1702	576	18247	1112	0	5278	187106
29	1494	1311	539	18097	1236	0	7300	69688
30	1239	1612	676	18072	1286	0	6549	65029
31	991	1761	538	18206	1341	0	8421	59992
32	1332	1654	732	17233	1428	0	9384	60937
33	1366	882	666	15457	1489	0	10511	64719

Score	Blanding's Turtle	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	Red-headed Woodpecker	American Woodcock	Average
34	1212	1234	767	13142	1570	0	11612	72747
35	1270	673	813	11260	1654	0	12049	78573
36	1072	963	907	9102	1728	0	14788	84900
37	1142	1031	930	6787	1781	0	13801	91184
38	1074	279	1033	4620	1914	0	15083	92061
39	1362	235	1098	3101	1899	0	14522	85580
40	1608	1002	1152	2159	2131	0	19319	68822
41	1611	447	1160	1630	2152	0	22215	50973
42	2177	238	1261	1157	2238	0	18798	41555
43	2655	591	1286	1748	2320	0	20256	34070
44	2768	1453	1393	3155	2497	0	17486	22398
45	3586	567	1484	5203	2629	0	13052	11750
46	3902	637	1477	7625	2719	0	13435	6960
47	7907	314	1578	9343	3849	0	13273	5156
48	6694	523	1618	11467	4418	0	13446	3948
49	2051	1229	1612	13464	5157	0	13661	2314
50	1553	1017	1852	16110	5787	0	14049	1362
51	1640	984	1890	17624	6380	0	13985	812
52	1746	330	2025	899240	7344	0	14581	498
53	1664	301	2103	786860	7688	0	14952	374
54	1586	926	2194	892258	8414	0	15157	297
55	1325	295	2419	603637	8737	0	15826	243
56	1383	1034	2628	420801	8986	0	16123	170
57	1521	807	2870	344049	9690	0	16745	161
58	1848	0	3127	302166	10370	0	17250	59
59	1843	358	3365	262463	11039	0	18613	19
60	1701	403	3534	233786	11292	0	17376	6
61	2011	349	3570	213841	11773	0	18593	2
62	2238	0	3841	194897	13331	0	18881	0
63	2240	289	4279	181531	16761	0	19121	0
64	2442	425	4443	177671	20522	0	19441	0
65	2385	0	4692	168097	23265	0	20467	0
66	2801	416	5204	157947	23604	0	20788	0
67	3445	1627	5596	138728	26161	0	20382	0
68	4157	1227	6194	124513	26092	0	21011	0
69	4719	0	6580	111104	26758	0	21732	0

Score	Blanding's Turtle	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	Red-headed Woodpecker	American Woodcock	Average
70	6314	0	7156	101960	25723	0	22024	0
71	10831	467	7684	93506	25062	0	20975	0
72	9435	451	8199	84543	24747	0	22610	0
73	4340	259	8609	75364	23130	0	22583	0
74	2205	0	9351	74223	21667	0	21959	0
75	1836	560	10240	67920	21273	695699	22965	0
76	1524	874	11336	63031	20187	0	22484	0
77	1350	904	12092	54592	18456	0	22472	0
78	1628	0	12923	45251	17582	0	22716	0
79	1743	0	13473	37364	16803	0	22851	0
80	2129	476	14778	31078	16191	0	31350	0
81	2175	868	15793	26961	15553	0	28977	0
82	2141	0	16205	22584	14282	0	29311	0
83	2438	0	16964	18343	13744	0	28806	0
84	2134	545	18068	14959	12977	0	29586	0
85	2598	1018	19182	12201	12479	0	30146	0
86	2669	299	20733	9710	11912	0	30368	0
87	2668	577	23095	8342	11704	0	31066	0
88	3017	1558	25571	6455	11954	0	30518	0
89	3119	1079	26773	5089	12234	0	28333	0
90	4055	589	28176	3618	11232	0	22821	0
91	5894	503	27976	2553	10027	0	18017	0
92	7005	464	30059	1704	9013	0	14402	0
93	8038	666	30602	933	8200	0	11430	0
94	10312	1213	31300	489	7027	0	8691	0
95	13618	1108	38996	193	5870	0	7080	0
96	14542	2308	57643	62	4411	0	5064	0
97	8967	1305	73807	22	3125	0	3535	0
98	4579	649	62395	3	1797	0	1978	0
99	1867	1482	14207	0	565	0	637	0
100	583	3508	74	0	0	199054	1	0

**Figure C-2.** Landscape-level modeling scores for the Kankakee Region averaged across species.



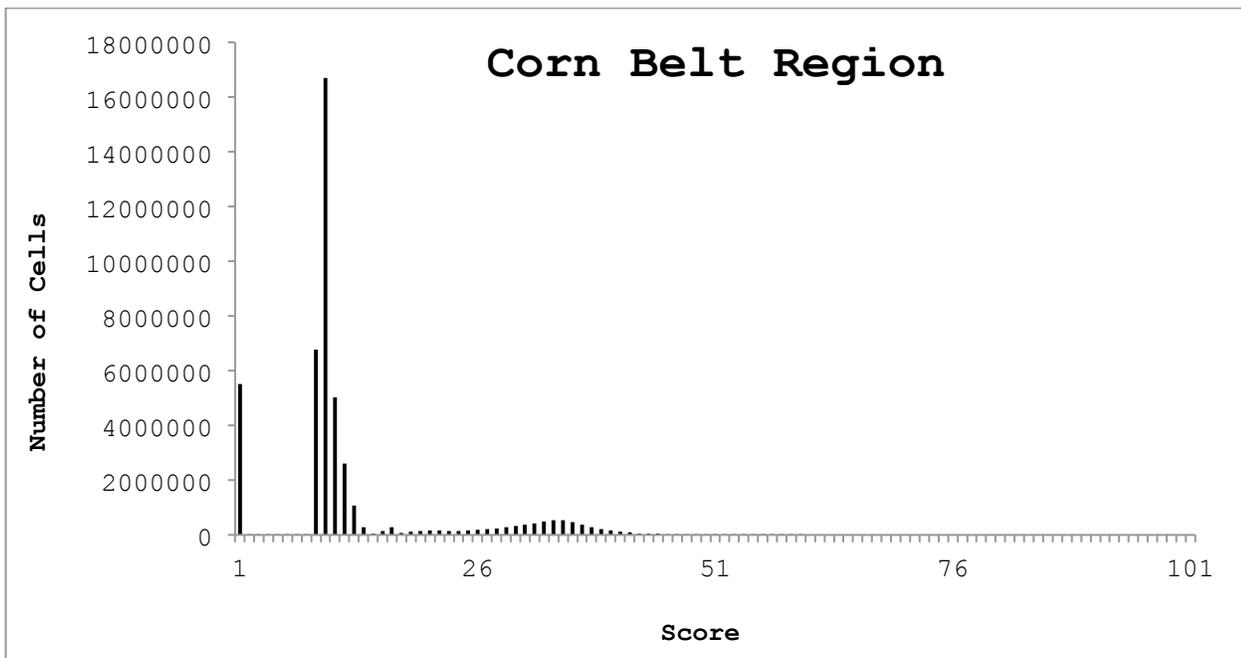
**Table C-3.** Raw landscape-level modeling scores for six species representing the Corn Belt Region. The number of cells assigned to each score ranges from 1-100.

Score	Cerulean Warbler	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	American Woodcock	Average
0	40953022	44261677	42616119	6057971	41533184	38594719	5506190
1	0	0	339	0	340	0	121
2	0	0	444	0	462	0	908
3	0	0	248	0	334	0	4666
4	0	0	394	0	496	0	9382
5	0	93700	827	0	930	0	14059
6	3246088	0	733	1	1639	0	20205
7	0	0	1195	2	2149	0	19506
8	207527	0	1288	12	2531	0	6778231
9	133862	33172	1677	30	2775	0	16699503
10	100589	51316	1194	46	3176	0	5032353
11	88561	50637	1811	123	3321	0	2602024
12	56517	39940	1514	203	3500	0	1077043
13	45266	37678	1880	357	4166	0	279538
14	34512	38348	2504	226518	4499	0	53620
15	16453	29869	2666	62215	4658	0	144072
16	4391	27401	2079	59993	4975	0	284373
17	4895	24806	2953	61998	5239	0	71182
18	10233	25139	2880	66456	5642	0	110212
19	10497	19926	3538	71445	6212	13210	138527
20	16607	14947	3243	75568	6422	13510	155195
21	22975	18923	3405	79425	6679	12571	157585
22	11861	14560	4707	80312	7047	17162	143618
23	6147	17006	3742	80794	7709	24095	144703
24	19455	13779	4333	80544	8057	23293	164330
25	19850	12498	5216	80216	8562	29276	192636
26	0	15905	4565	80911	8882	33658	217059
27	14040	11916	5125	81589	9214	34495	242000
28	7300	9513	5926	82808	9638	37762	280142
29	0	7797	5281	82613	10113	48192	321840
30	0	7901	6577	81775	10585	43703	370299
31	0	9675	5812	80985	10923	53797	424285
32	0	9105	6833	77344	11654	58612	480912
33	8115	5661	6846	72253	11994	63110	530985
34	8215	9346	7218	65487	12488	69042	538554
35	0	9525	7584	55293	13034	71261	473879
36	8549	5532	8224	43997	13488	84237	370375

Score	Cerulean Warbler	Henslow's Sparrow	Northern Leopard Frog	Northern Bobwhite	Eastern Red Bat	American Woodcock	Average
37	0	5895	8603	31278	14188	77081	284116
38	0	5982	9143	21700	14968	81050	222030
39	0	7243	9372	15578	15265	78320	170509
40	0	6869	10580	11690	15978	103233	123580
41	0	5934	10353	9706	16499	115105	85015
42	9473	8074	11543	8105	17615	95653	59066
43	9539	4499	11726	12236	18161	95721	45260
44	9733	4671	12355	23267	18706	78888	41830
45	9779	6146	13836	39848	19667	63311	35194
46	0	7921	13877	56263	20357	66358	31667
47	0	5546	14981	70221	24067	66336	25869
48	0	3565	15547	80892	26916	63418	21595
49	0	2969	15498	90261	29694	69727	17488
50	0	5909	16274	98878	33059	73299	11811
51	0	4578	16964	106234	35943	74687	7032
52	0	6171	17403	3356899	39002	77701	3911
53	0	4109	18069	3633321	40714	78931	2749
54	0	3215	19282	5168386	43815	81237	2850
55	0	2375	20488	4018507	44925	82163	2572
56	0	3445	21879	2845142	48172	85035	1516
57	0	3462	22546	2166698	49624	87530	422
58	0	3205	23530	1797319	50653	99227	65
59	0	5430	24708	1503430	52389	95681	4
60	0	2711	25455	1277264	55572	92024	1
61	11806	4288	26813	1120886	58143	98829	0
62	0	3265	28150	989973	63049	110553	0
63	0	2806	29591	899928	69262	99738	0
64	0	3403	31060	860186	78852	100863	0
65	0	3998	32575	821557	88251	112386	0
66	0	2280	34415	777352	99121	105602	0
67	0	2964	36267	669884	106113	112114	0
68	0	1887	37845	583054	114236	104732	0
69	0	2864	39657	511965	116605	113682	0
70	25954	4650	40808	456881	119902	116338	0
71	13140	2038	42204	408885	116485	99993	0
72	13219	1079	44478	365854	117132	116041	0
73	0	2267	46018	327973	111277	115236	0
74	0	2071	48019	318051	105666	103364	0
75	0	2780	49745	294831	100086	111582	0
76	0	2004	51656	281479	93800	109631	0

<b>Score</b>	<b>Cerulean Warbler</b>	<b>Henslow's Sparrow</b>	<b>Northern Leopard Frog</b>	<b>Northern Bobwhite</b>	<b>Eastern Red Bat</b>	<b>American Woodcock</b>	<b>Average</b>
77	0	3600	53080	236463	89197	108645	0
78	0	3116	54692	190417	84443	108634	0
79	0	3935	56476	156551	80513	107776	0
80	0	3215	57688	130935	77234	221098	0
81	0	2243	59642	109400	72291	152280	0
82	0	2005	61241	89004	67349	143163	0
83	0	1848	61629	72410	63663	141969	0
84	0	4108	62995	57243	60444	141635	0
85	0	4238	64439	45139	58222	142810	0
86	0	4271	65941	36721	56812	147523	0
87	0	3710	67044	29457	54969	151905	0
88	0	4761	68342	23152	54225	146186	0
89	0	3665	69303	18028	53030	123608	0
90	16627	4918	69771	14102	52146	83311	0
91	0	4966	69780	10133	50338	64076	0
92	17196	4981	70109	6967	47805	53068	0
93	0	4511	71815	4422	43600	44326	0
94	0	5384	73785	2531	38481	37276	0
95	0	8382	76877	1354	32588	31582	0
96	0	3694	96471	542	25664	25089	0
97	0	7517	128476	174	18735	18898	0
98	0	7618	48991	26	11088	12492	0
99	23359	25621	3402	1	3689	4808	0
100	34912	42245	96	0	0	1	0

**Figure C-3.** Landscape-level modeling scores for the Corn Belt Region averaged across species.



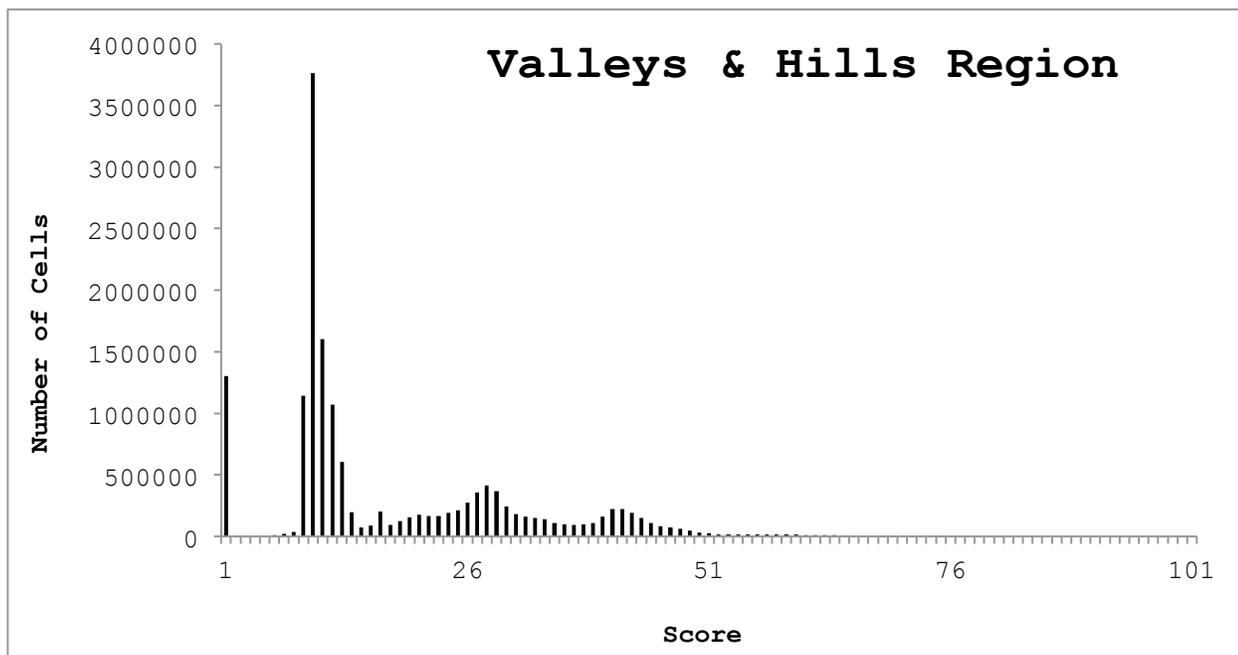
**Table C-4.** Raw landscape-level modeling scores for six species representing the Valleys and Hills Region. The number of cells assigned to each score ranges from 1-100.

Score	Cerulean Warbler	Copper-bellied Watersnake	Henslow's Sparrow	Northern Bobwhite	Swamp Rabbit	American Woodcock	Average
0	12056439	13071754	15331831	2016412	11594681	11064538	1301771
1	0	0	0	0	3280	0	17
2	0	0	0	0	10657	0	170
3	0	0	0	0	12608	0	1033
4	0	0	0	0	13756	0	5405
5	0	1	65892	0	14876	0	11898
6	1487841	9	0	0	17630	0	21109
7	0	3	0	5	17227	0	38638
8	127835	2	0	9	14819	0	1143906
9	151899	2	12577	17	17987	0	3760718
10	119935	3	16463	44	16904	0	1602104
11	80999	7	15745	106	17164	0	1067929
12	82924	39	12119	203	20043	0	603686
13	46103	17	11762	355	21338	0	198727
14	34812	19	10108	304123	23005	0	75397
15	33320	23	8394	122792	24890	0	87296
16	58247	34	9834	118053	27558	0	201542
17	42691	33	8822	117682	29186	0	95766
18	29977	70	7499	117445	31804	0	123615
19	10624	92	7132	118091	35353	8420	153469
20	22085	122	5326	118296	38471	6459	174103
21	17347	157	6159	117693	41437	5953	163717
22	36142	158	4925	113993	43749	6879	167834
23	6194	227	6097	108508	48380	8758	193339
24	25691	273	4442	101381	52389	9072	213807
25	26298	305	3220	93867	55369	12466	274486
26	0	391	3932	85526	61190	13344	358230
27	6946	529	4568	81732	67876	13853	416490
28	14433	766	4208	77655	73457	14756	368421
29	0	775	3167	72764	79082	17834	244733
30	7572	883	4752	68328	84373	16082	179843
31	0	1083	5100	64182	89398	18260	158413
32	7862	1199	2248	58876	97978	19437	148299
33	0	1626	2425	53087	102627	20195	140354
34	8203	1775	2685	44921	110571	21376	109311
35	8451	2112	2275	36048	119276	21485	96427
36	0	2637	1838	28294	125807	24355	93822

<b>Score</b>	<b>Cerulean Warbler</b>	<b>Copper-bellied Watersnake</b>	<b>Henslow's Sparrow</b>	<b>Northern Bobwhite</b>	<b>Swamp Rabbit</b>	<b>American Woodcock</b>	<b>Average</b>
37	8679	2854	3228	20790	136127	23509	96777
38	26563	3232	2248	13500	139441	23979	109877
39	18011	3509	2008	8659	150791	23922	158820
40	9128	4350	1784	6699	159680	23985	220424
41	0	5465	2129	5490	159337	24595	221328
42	0	6504	2270	4947	170001	24692	190375
43	19049	8493	3314	6012	177629	29224	150892
44	9650	11383	1862	8415	191282	25960	110988
45	0	18805	3876	13728	186964	27520	84409
46	19802	34762	1860	20257	212929	28891	74954
47	0	90667	2993	28886	199177	29718	63720
48	0	211732	1147	36602	246250	27270	47348
49	10387	132107	1724	46068	209148	32701	33082
50	0	18261	2612	53211	3930	33621	24455
51	10578	1415	1690	61705	5595	34662	17294
52	21389	1673	2186	635286	4888	35572	14344
53	0	1839	1967	611270	3705	37333	14143
54	10910	2056	1430	1010147	3687	38039	14894
55	22169	2351	679	932093	4539	39674	15347
56	11242	2635	1968	766293	5810	40747	15630
57	22754	2878	1740	617540	4475	42350	16886
58	0	3451	992	544360	3894	51117	18448
59	0	4115	2851	492702	5810	45287	13959
60	0	4902	2307	453558	4720	45267	12083
61	11813	5567	706	425658	7192	47198	10950
62	0	7219	1239	397455	4195	57734	10739
63	0	8626	1177	380764	3747	49705	9908
64	0	13210	1439	365543	4398	50753	6767
65	12300	18724	1438	347217	4920	62519	4146
66	0	28621	1261	336198	3809	54786	2181
67	12579	59692	726	312470	5186	65564	768
68	0	95631	933	291220	5840	56879	272
69	0	93395	1301	270007	3362	70033	182
70	0	54711	3373	254501	2709	71472	98
71	0	5467	2171	238929	2927	60513	75
72	0	6344	568	221123	1827	75504	44
73	13374	6082	3196	203904	2182	77220	18
74	0	7103	657	186025	3074	66604	2
75	13710	7050	858	163018	3289	80509	0

<b>Score</b>	<b>Cerulean Warbler</b>	<b>Copper-bellied Watersnake</b>	<b>Henslow's Sparrow</b>	<b>Northern Bobwhite</b>	<b>Swamp Rabbit</b>	<b>American Woodcock</b>	<b>Average</b>
76	0	7648	2089	142097	2571	83413	0
77	14008	8869	1216	118744	4042	83803	0
78	0	10605	2001	95365	2324	86874	0
79	0	12965	507	75654	2300	89181	0
80	0	15626	2065	62195	1512	342777	0
81	0	21725	1555	50536	2659	192319	0
82	0	33251	1969	41950	1329	173680	0
83	0	53902	2103	34675	895	171031	0
84	0	62898	1677	28112	2463	173713	0
85	0	54195	2227	23837	834	177532	0
86	0	34247	2418	19740	2351	190964	0
87	0	7992	1018	16480	2860	195066	0
88	16004	9755	3381	13488	2127	182877	0
89	0	12372	2400	11119	1513	141841	0
90	0	15065	1454	8480	1642	88462	0
91	16951	20207	3328	6237	2291	73677	0
92	0	28237	2872	4192	3251	63815	0
93	0	39698	1545	2787	2025	54333	0
94	18267	66992	3825	1682	1994	45964	0
95	0	109431	1560	881	1793	39247	0
96	0	176588	4840	353	2692	31200	0
97	20428	255279	5398	113	2378	22374	0
98	0	255717	7171	13	1922	13755	0
99	0	228715	14763	0	0	4403	0
100	861837	165482	60633	0	37038	1	0

**Figure C-4.** Landscape-level modeling scores for the Valleys and Hills Region averaged across species.



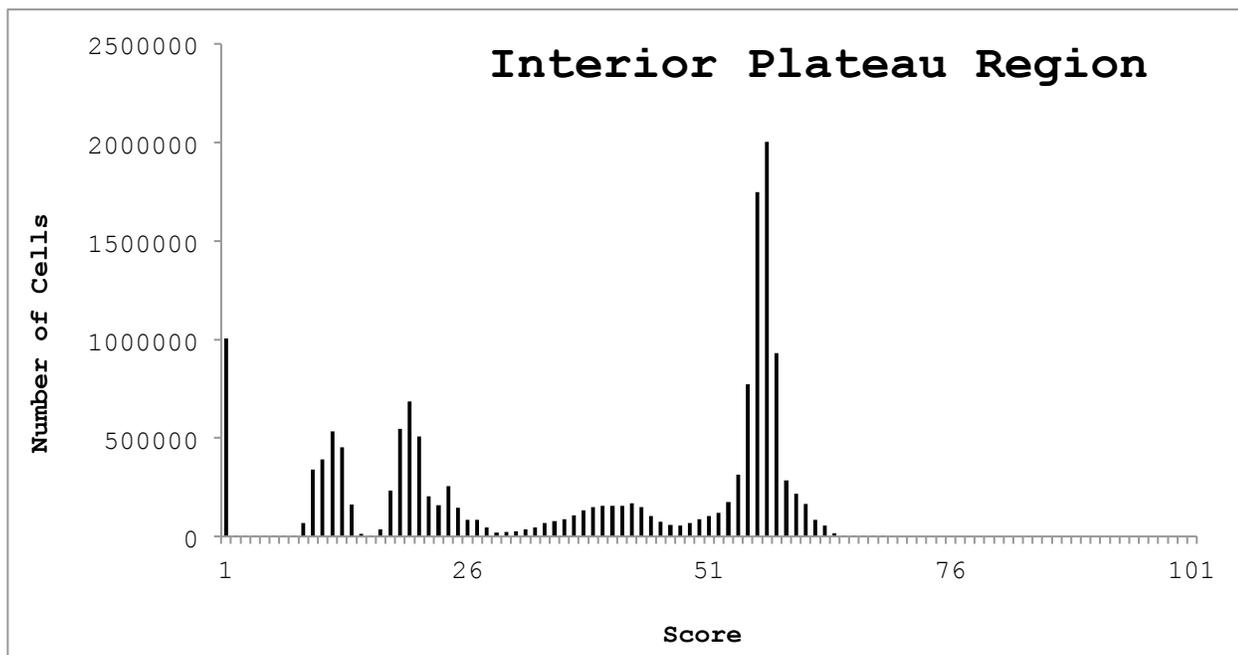
**Table C-5.** Raw landscape-level modeling scores for six species representing the Interior Plateau Region. The number of cells assigned to each score ranges from 1-100.

Score	Cerulean Warbler	Eastern Box Turtle	Northern Bobwhite	Prairie Warbler	Ruffed Grouse	Timber Rattlesnake	Average
0	6232432	2964799	1010160	5764895	14884016	5984872	1005398
1	0	0	0	0	136	0	2
2	0	0	0	0	82	0	15
3	0	0	0	9938	43	8	17
4	0	0	0	0	66	496	2
5	0	0	0	8333	58	1047	6
6	749351	0	4	0	70	1632	14
7	0	0	30	8024	32	3044	74
8	81108	0	81	6933	23	4256	68006
9	74558	0	181	6002	707	5760	339083
10	58017	0	362	5982	1952	7214	389778
11	58477	0	662	5024	2422	9101	532432
12	30722	0	1149	4853	1229	10776	452591
13	24467	0	2075	4761	765	13468	160735
14	34585	2	2216903	4807	991	15445	12538
15	20858	0	559028	7560	1137	18352	3267
16	35202	20	494148	3694	1531	21198	37013
17	9347	0	442497	6666	1401	22786	231796
18	10034	0	420033	6275	1245	24231	547636
19	0	39	404522	6832	2769	25824	683798
20	11060	0	394837	2938	2458	28865	508615
21	11495	91	383169	5337	2134	31572	202486
22	6088	0	348767	7579	2774	36171	158751
23	18506	174	303605	5200	2657	41738	256949
24	19470	3	245077	5126	2284	43362	146553
25	0	326	175671	4033	1918	36665	85909
26	6763	0	105954	6274	1862	21159	83133
27	0	486	82089	1897201	1881	21868	44659
28	7313	799	69925	136	1512	23842	21265
29	0	0	58740	15	1777	25494	23687
30	0	1160	50752	114	1399	27190	26880
31	0	1690	42958	164	1307	30125	36784
32	23704	2474	36163	152	1247	33892	45058
33	8107	142	29582	11	1089	36647	68367
34	8187	3667	24303	201	1162	39052	79083
35	8410	6291	19654	207	1153	40953	89055
36	8612	8880	15709	224	1038	37601	107767

Score	Cerulean Warbler	Eastern Box Turtle	Northern Bobwhite	Prairie Warbler	Ruffed Grouse	Timber Rattlesnake	Average
37	0	12578	12879	216	928	37406	132750
38	0	354	11191	266	838	39391	149793
39	0	20782	10131	298	739	41919	156019
40	0	27685	10690	15	769	44916	155458
41	18529	37131	12093	299	642	49163	155301
42	0	68516	14619	336	680	52041	169451
43	0	78495	18657	317	599	55928	150472
44	0	92301	23705	273	582	59744	105239
45	0	108413	38580	687	567	63034	73339
46	0	55454	57669	325	514	67367	57046
47	10084	54822	79416	456	465	71140	56804
48	10207	55859	104738	440	455	75666	68724
49	0	136804	131614	445	466	78925	87379
50	0	1511720	157416	15286	427	83683	102792
51	0	549	180757	351	457	82849	118421
52	10733	12	224883	715	445	85898	173817
53	10804	959	224905	497	413	87579	312355
54	0	910	235624	7082588	358	91454	773263
55	0	1922	211057	0	277	95638	1748670
56	0	2985	176657	0	306	99192	2004118
57	11394	1237	174018	2	304	96738	930770
58	0	4678	182002	0	328	99220	286117
59	0	9142	189682	0	327	103147	215566
60	0	1459	196562	0	342	106448	163838
61	11847	12308	206225	0	288	110288	82847
62	11955	14953	212192	0	337	115578	54183
63	0	2083	219449	0	332	119906	16306
64	12266	18176	228352	2	287	123800	2001
65	0	15502	238356	0	317	129515	516
66	12481	11871	253301	0	269	134129	62
67	0	407	259804	0	257	138860	9
68	0	14873	266162	2	266	146028	8
69	0	23110	271483	0	226	150062	0
70	0	367525	275937	6	262	155255	0
71	0	6517	278665	0	269	156687	0
72	0	66	273340	0	258	247477	0
73	0	9545	255538	0	213	295971	0
74	0	62	224115	0	206	325643	0
75	0	15591	178390	0	244	348006	0
76	0	18008	130235	0	274	367393	0

<b>Score</b>	<b>Cerulean Warbler</b>	<b>Eastern Box Turtle</b>	<b>Northern Bobwhite</b>	<b>Prairie Warbler</b>	<b>Ruffed Grouse</b>	<b>Timber Rattlesnake</b>	<b>Average</b>
77	0	0	107990	0	256	373193	0
78	14124	49664	90357	0	271	373008	0
79	0	5	75686	0	278	377584	0
80	14452	60594	62445	2	321	388219	0
81	0	55811	50572	0	294	389459	0
82	14885	28027	40155	0	325	391468	0
83	0	73962	31746	1	305	393900	0
84	15181	44219	25198	0	266	404792	0
85	15387	144565	19944	0	313	159811	0
86	0	6720349	15878	0	327	66929	0
87	0	0	12598	3	332	35244	0
88	0	72236	10012	0	361	19223	0
89	0	0	7852	0	347	11533	0
90	16733	81055	5976	3	384	6691	0
91	0	0	4324	0	348	3932	0
92	17240	66985	2941	0	338	2371	0
93	0	0	2034	4	253	1403	0
94	0	61113	1236	0	183	235	0
95	0	0	613	4	149	19	0
96	0	52060	259	3	70	0	0
97	40054	0	83	0	32	0	0
98	42131	81043	6	1	18	0	0
99	22586	0	2	0	5	0	0
100	7062690	1559691	0	53302	0	0	0

**Figure C-5.** Landscape-level modeling scores for the Interior Plateau Region averaged across species.



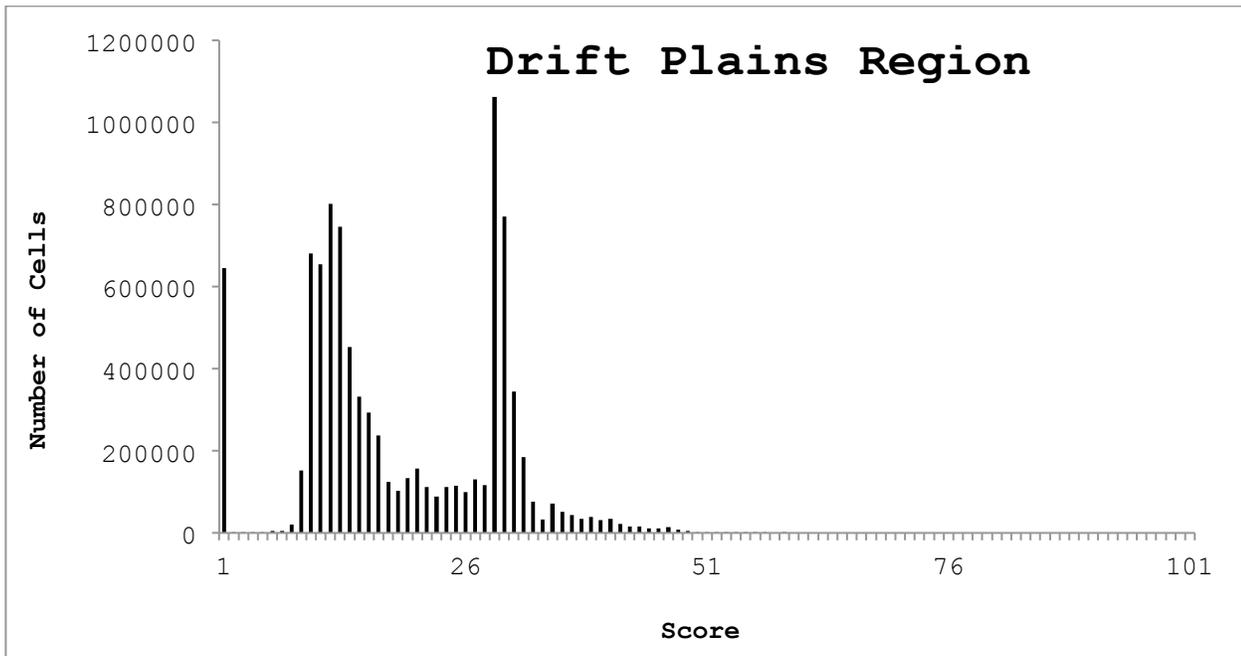
**Table C-6.** Raw landscape-level modeling scores for six species representing the Drift Plains Region. The number of cells assigned to each score ranges from 1-100.

Score	Cerulean Warbler	Copper-bellied Watersnake	Henslow's Sparrow	Northern Bobwhite	Prairie Warbler	Ruffed Grouse	Average
0	5163628	7982440	8647394	823623	4901441	9169623	645392
1	0	0	0	0	0	54	63
2	0	16	0	0	0	18	160
3	0	1	0	0	7340	17	1054
4	0	3	0	0	0	13	2462
5	0	0	81630	0	6289	11	4722
6	723610	9	0	0	0	45	5580
7	0	5	0	4	5956	20	20000
8	56652	11	0	13	5405	30	151779
9	71136	8	14621	25	4700	143	680199
10	40017	10	19304	76	4539	346	653851
11	39131	19	19971	176	4402	665	801228
12	21392	20	16091	361	3963	318	746368
13	27613	16	12770	696	4068	169	452591
14	23059	17	12655	506612	3675	162	332212
15	12293	17	12604	177759	6648	268	293500
16	0	28	13180	175803	3118	377	236939
17	19019	54	8755	173729	5645	289	123592
18	5026	63	10415	174207	4591	302	102783
19	5329	82	8523	174196	5325	526	133946
20	5540	94	7565	172759	2257	640	156140
21	11661	94	9241	172054	5077	523	112168
22	0	100	5766	166450	5618	584	87896
23	6169	167	7983	153240	4337	696	111163
24	19439	268	5626	128312	4135	576	114314
25	13389	242	6646	100774	4011	485	99659
26	6848	357	3435	73181	5142	608	130224
27	7071	421	5199	63760	1163165	497	116566
28	14482	600	5876	58636	119	457	1062129
29	0	663	5546	54610	61	470	770158
30	7652	832	4859	50463	74	404	344139
31	7750	1065	4360	48115	168	419	184083
32	0	1115	4497	44243	185	389	75653
33	0	1246	3688	39516	43	317	32352
34	8205	1362	3044	35241	210	333	70850
35	0	1359	3007	29555	216	296	51289
36	0	1604	3607	23733	203	310	43917

Score	Cerulean Warbler	Copper-bellied Watersnake	Henslow's Sparrow	Northern Bobwhite	Prairie Warbler	Ruffed Grouse	Average
37	8764	1632	3684	17509	242	280	34742
38	0	1646	3132	12095	261	275	39590
39	8988	2041	3661	8924	272	414	31147
40	0	2486	2271	7606	71	302	33569
41	0	2854	2603	7098	296	291	22613
42	0	3463	1835	6948	312	272	15682
43	0	4722	2658	8027	334	294	15658
44	0	7906	2498	10151	243	261	11321
45	0	11281	1365	14592	518	245	11478
46	0	22246	2672	22042	421	292	13842
47	0	73141	3008	31448	316	226	8294
48	0	211140	1441	44249	326	247	4999
49	0	182237	3364	57049	337	215	1100
50	0	23870	3236	70553	17679	231	109
51	0	903	1615	82189	371	198	102
52	0	995	2091	140294	681	195	14
53	0	1326	1326	152263	529	204	6
54	11027	1299	1967	195875	2975435	220	10
55	0	1411	2514	196809	0	233	8
56	0	1441	2153	181771	0	199	3
57	0	1481	3363	178134	2	190	0
58	0	1778	526	181179	0	138	2
59	0	1919	1432	187489	0	172	0
60	0	2464	1848	191233	0	201	0
61	0	3270	2068	194558	0	187	0
62	0	3187	1366	197433	3	225	0
63	0	3798	1326	200329	0	228	0
64	0	5476	1758	202766	0	196	0
65	0	8290	2180	203431	0	221	0
66	0	15003	1537	206731	2	245	0
67	12554	34903	3171	203913	0	237	0
68	0	63129	1957	202167	0	236	0
69	12871	77669	1637	198935	0	227	0
70	0	46667	2694	197942	0	234	0
71	13167	1438	1308	196273	0	246	0
72	0	1711	2214	192082	12	228	0
73	0	1786	1785	182946	0	255	0
74	0	2081	1382	167337	8	241	0
75	13642	2311	3202	143007	0	261	0
76	0	2433	1643	119658	2	282	0

<b>Score</b>	<b>Cerulean Warbler</b>	<b>Copper-bellied Watersnake</b>	<b>Henslow's Sparrow</b>	<b>Northern Bobwhite</b>	<b>Prairie Warbler</b>	<b>Ruffed Grouse</b>	<b>Average</b>
77	0	2697	2504	102928	0	246	0
78	0	3082	3009	85334	4	253	0
79	0	3608	2270	71375	0	204	0
80	0	4562	2452	59652	3	217	0
81	14586	7114	1130	49426	0	232	0
82	0	11305	1339	40196	0	246	0
83	0	20466	1192	32290	2	223	0
84	15312	31461	2365	25705	0	234	0
85	0	30935	1731	21120	0	229	0
86	0	19222	338	16942	0	230	0
87	15800	2196	2100	14376	0	229	0
88	16194	2710	1170	11967	0	247	0
89	0	3177	2537	9857	0	288	0
90	0	3342	3150	7798	8	275	0
91	0	4303	1518	5710	0	241	0
92	0	4979	4639	4215	1	203	0
93	0	6895	3945	2509	2	185	0
94	0	11362	4184	1519	0	130	0
95	18691	19050	4508	716	0	133	0
96	0	28552	7604	316	0	106	0
97	0	43423	6586	87	0	69	0
98	64483	42174	9403	17	0	39	0
99	173015	38021	17617	1	0	7	0
100	2480205	23135	58373	0	24591	0	0

**Figure C-6.** Landscape-level modeling scores for the Drift Plains Region averaged across species.



## Appendix D. Habitat Classification Schemes and Definitions.

### Description of Procedures

The NatureServe Explorer (<http://explorer.natureserve.org/index.htm>) online database was used to update habitat information for SGCN. For consistency with the 2005 CWS, the NatureServe habitat values were categorized under the eight major habitat types as subhabitats. The eight major habitats are described using the definitions given in the 2005 CWS. The subhabitats are described using the definitions given in the NatureServe database.

For some habitat features or special cases of habitats that were designated as their own subhabitat types in the 2005 CWS (e.g., reclaimed mine lands, which may be considered a special case of herbaceous grasslands), use by SGCN is noted in the comments on the habitat tables in the regional chapters.

Two unique habitats of interest in Indiana (mudflats and Lake Michigan) were added to NatureServe's subhabitat list. These unique subhabitats are not already covered in a NatureServe habitat type. Data on use of these habitats by SGCN was collected from Whitaker and Amlaner's *Habitats and Ecological Communities of Indiana* (2012) and from the 2005 CWS.

### Habitat and Subhabitat Definitions

1. **Agricultural Lands:** Lands devoted to commodity production, including intensively managed nonnative grasses, row crops, and fruit and nut-bearing trees.
  - A. Cropland/Hedgerow: Cultivated fields and field borders.

2. **Aquatic Systems:** All water habitats, both flowing and stationary, but not including wetlands.

- A. Lacustrine Habitats

- I. Lakes: All naturally occurring stationary water body contained in a basin. Can vary widely in habitat and eutrophication. Less fertile lakes may be deep well-oxygenated, with marl or sandy substrate. More fertile lakes may be shallow, with muck bottoms and dense stands of aquatic vegetation.

1. Deep Water: Open, non-vegetated aquatic habitats, extending beyond the littoral zone (shore or shallow water).

2. Shallow Water: The littoral zone: characterized by the frequent presence of rooted aquatic plants, disturbance by wave action, and periodic exposure during drawdown (during drought, for example). Some lakes and ponds are all shallow water; in some others, shallow water is restricted to shores and bays.

- II. Additional Unique Subhabitats in Indiana:

1. Lake Michigan: Indiana's largest natural lake, the southern tip of which forms the State's extreme northwest border.

- B. Riverine Habitats: A broad, deep inland body of water with a steady, directional current.

- I. Big Rivers: The largest streams, generally characterized by large perennial flows, large quantities of nutrients and organic matter, high turbidity, and fine sediments.

- II. *Medium Rivers*: Perennial tributaries of big rivers (or flowing directly into other water bodies) with coarse-to-fine sediments. Riparian vegetation does not heavily dominate the community through shading and organic inputs.
- III. *Creeks*: Smaller streams, sometimes characterized by heavy influence (e.g., shading, organic detritus) from adjacent terrestrial habitats; variable flow, sometimes intermittent.
- IV. *Springs/Spring Brooks*: Points of concentrated groundwater discharge, either concentrated (at a distinct orifice) or diffuse (at a seep). The outflow channel is classified as a spring brook as far downstream as the spring waters' characteristics (i.e., relatively constant temperature, nutrient-poor) are maintained.

V. *Features of Riverine Habitats*

- 1. Riffles: Shallow area where water passing over the bottom causes visible disturbances (ripples) at the water surface.
- 2. Pools: Discrete areas where the water is relatively still and usually deeper than adjacent waters.
- 3. High Gradient: Streams with a fall of more than two meters per kilometer, characterized by riffles, pools, rock outcrops, and coarse sediments.
- 4. Moderate Gradient: Streams with a fall between 0.2 and two meters per kilometers; bottom sediments are a mosaic of sand, gravel, and silt.
- 5. Low Gradient: Streams with a fall fewer than 0.2 meters per kilometer; there may be sand bars, but the sediments are mostly silt.

3. **Barren Lands**: Lands dominated by exposed rock or minerals with sparse vegetation.

- A. Sand/Dunes: Open sandy beaches above high tide, barren active dunes, and similar areas of barren, largely unvegetated sand. Does not include stabilized thickly vegetated dunes.
- B. Cliffs/Rock Outcrops: Vertical or nearly vertical rock outcrops.
- C. Bare Rock/Talus: Unvegetated expanses of bedrock or broken rock.

4. **Developed Lands**: Highly impacted lands intensively modified to support human habitation, transportation, commerce, and recreation.

- A. Urban Areas: Human-maintained habitats dominated by buildings, with little vegetation.
- B. Suburban Areas: Human-maintained habitats generally characterized by open-grown trees, lawns, and small buildings; does not include rural residential areas where human dwellings are scattered within or widely adjacent to more or less natural ecosystems or cropland.

5. **Forest Lands**: A plant community extending over a large area and dominated by trees—the crowns of which form an unbroken covering layer or canopy.

- A. Forests

- I. *Hardwood Forest*: Angiosperms comprise over two-thirds of the canopy—woody vegetation at least six meters tall (usually much taller) with a fairly continuous and complete (two-thirds or greater) canopy closure.
- II. *Conifer Forest*: Gymnosperms comprise over two-thirds of the canopy—complete (two-thirds or greater) canopy closure.
- III. *Mixed Forest*: Forest composed of both hardwood and conifer trees, neither dominating as much as two-thirds of the canopy.

B. Woodlands

- I. *Hardwood Woodland*: Angiosperms comprise over two-thirds of the canopy; open stands of trees at least six meters tall, with crowns often not interlocking; tree canopy discontinuous (often clumped), averaging between two-thirds and 40% overall cover (at 40%, the average diameter of a tree crown equals the average distance between crowns); shrub layer often poorly developed or present only in gaps in the canopy.
- II. *Conifer Woodland*: Gymnosperms comprise over two-thirds of the canopy; forest edge species (i.e., those dependent on a break in the canopy rather than on forest per se) are included in this category; pine barrens are either conifer or mixed woodlands.
- III. *Mixed Woodland*: Woodland composed of both hardwood and conifer trees, neither dominating as much as two-thirds of the canopy.
- IV. *Early Successional Forest*: See old fields (Grasslands).

6. **Grasslands**: Open areas dominated by grass species.

- A. Herbaceous Grasslands: Habitat dominated by grasses or forbs; trees and shrubs very widely scattered, if present; includes pastures and hayfields.
- B. Old Fields (early successional): A successional habitat composed of a mosaic of shrubs, scattered trees, and herbaceous vegetation.
- C. Shrubland: Vegetation composed of shrubs (many-stemmed woody plants, generally fewer than six meters tall).
- D. Savannas: Mosaic of trees or shrubs and grassland; between 40% and 10% cover by trees and shrubs.

7. **Subterranean Systems**: Connected underground rooms and passages beyond natural light penetration.

- A. Subaquatic: Subterranean aquatic. Underground waters, above, and below the water table.
- B. Subterrestrial: Subterranean terrestrial (air-filled) habitats, ranging from large caves to interstitial crevices below soil horizons.

8. **Wetlands**: Temporarily or permanently flooded habitats, often supporting aquatic vegetation.

- A. Bogs/Fens: Wetlands with peat or muck substrate resulting from unusual water chemistry, including areas of highly mineralized groundwater discharge (e.g., many fens) as well as sterile rainwater catch basins (e.g., many bogs) and other peatlands.
- B. Herbaceous Wetland: Vegetated areas characterized by emergent herbaceous aquatic plants, excluding mosses and lichens (e.g., freshwater marsh).

- C. Forested Wetland: Wetland dominated by woody vegetation six meters tall or taller.
- D. Shrub Wetland: Wetland dominated by woody vegetation fewer than six meters tall.
- E. Ephemeral/Temporary Wetlands: Small depressions in which surface water is present for extended periods (especially early in the growing season) but is absent by the end of the season in most years; seasonally flooded.
- F. Riparian Zones: A narrow zone of habitat, which may or may not be vegetated, directly associated with streamsides, lakeshores, or a similar immediately adjacent habitat. Note: this refers to any riparian zone such as forested, shrubby, grassy, etc.
- G. Additional Unique Subhabitat in Indiana:
  - I. Mudflats: Moist unvegetated soil often produced in shallow wetlands by advance and retreat of water levels (2005 CWS).

### **Additional Special Cases or Habitat Features**

The following special cases or habitat features used in 2005 that were already covered in the NatureServe habitat classifications are noted in the comments section of the habitat tables in the regional chapters. These classifications include: recovering mine lands (special case of herbaceous grassland), quarries (special case of bare rock), roads (feature), rights-of-way (feature), hay lands (herbaceous grassland), vegetated dunes (herbaceous grassland), Farm Bill program lands (herbaceous grassland), prairies (herbaceous grassland), impoundments (lacustrine), borrow pits (lacustrine), and oxbows/backwaters/sloughs/embayments (riverine).

#### **1. Aquatic Systems**

- A. Oxbows/Backwaters/Sloughs/Embayments: A series of riverine habitats varying in structure and permanency that are associated with large rivers in the southwest portion of Indiana along the Ohio River. They often have muck bottoms and function as important nursery areas for large river fish species. These areas may be natural or manmade: for example, embayments along the Ohio River are the result of a series of locks and dams, and many oxbows are the result of stream channelization.
- B. Impoundments: Artificially constructed or maintained standing or flowing water bodies.
- C. Borrow Pits: Areas where soil has been removed for transport and used elsewhere, which can then fill with water.

#### **2. Barren Lands**

- A. Quarries: Areas where vegetative cover has been removed to extract mineral, stone, gravel, or sand.

#### **3. Developed Lands**

- 1. Roads: Corridors, paved strips and connecting structures for the moving of goods, services and people by cars, trucks, and trains.
- 2. Rights-of-Way: Grassy areas of land along railroad tracks, highways, and utility lines.

#### **4. Grasslands**

- A. Reclaimed Mine Lands: Open areas created by total soil disturbance related to surface mining activities and re-vegetated with warm or cool season grasses.

- B. Haylands: Open areas maintained in mixed grass and forb covers or predominated by legumes and periodically harvested during the growing season to produce forage for livestock.
- C. Vegetated Dunes: Ridge and valley topography developed by wind-blown sand deposits near Lake Michigan. Vegetative cover progresses the further the dunes are from the lakeshore.
- D. Farm Bill Program Lands: Grasslands developed in a predominately agricultural landscape to promote soil and water conservation and wildlife habitat values.
- E. Prairies: An open, usually treeless area, with its vegetation composed primarily of native grasses, forbs, and wildflowers.

### **Definitions of Habitats Used to Analyze Changes in Land Cover**

Changes in land cover were analyzed using the National Land Cover Database (NLCD) in 2001 and 2011. The NLCD classifies land cover in the following categories:

#### **1. Planted/Cultivated**

- A. Cultivated Crops: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops, such as orchards and vineyards. Crop vegetation accounts for more than 20% of total vegetation. This class also includes all land being actively tilled.

#### **2. Water**

- A. Open Water: Areas of open water, generally with less than 25% cover of vegetation or soil.

#### **3. Barren**

- A. Barren Land: Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.

#### **4. Developed**

- A. Developed, Open Space: Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot, single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- B. Developed, Low Intensity: Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of total cover. These areas most commonly include single-family housing units.
- C. Developed, Medium Intensity: Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
- D. Developed, High Intensity: Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80% to 100% of the total

cover.

## 5. Forest

- A. Deciduous Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
- B. Evergreen Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
- C. Mixed Forest: Areas dominated by trees generally more than five meters tall and with more than 20% of total vegetation cover. Neither deciduous nor evergreen species are more than 75% of total tree cover.

## 6. Herbaceous

- A. Grassland/Herbaceous: Areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management, such as tilling, but can be utilized for grazing.
- B. Hay/Pasture: Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/Hay vegetation accounts for more than 20% of total vegetation.

## 7. Shrubland

- A. Shrub/Scrub: Areas dominated by shrubs fewer than five meters tall with shrub canopy typically more than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.

## 8. Wetlands

- A. Woody Wetlands: Areas where forest or Shrubland vegetation accounts for more than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- B. Emergent Herbaceous Wetlands: Areas where perennial herbaceous vegetation accounts for more than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

**Appendix E.** Indiana’s Invertebrate (not including Freshwater Mussels) SGCN: Status, Distribution, and Associations.

**Table E-1.** Status and rank of Indiana’s invertebrate (not including Freshwater Mussels) SGCN.

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Arachnids	Actinedida	<i>Hamohalacarus subterraneus</i>	Donaldson Cave Water Mite	NA	NA	SE*	S1
Arachnids	Araneae	<i>Anahita punctulata</i>	Southeastern Wandering Spider	NA	NA	SE	S1
Arachnids	Araneae	<i>Porrhomma cavernicola</i>	Cavernicolous Sheet-web (Appalachian Cave) Spider	NA	SE	SE	S1
Arachnids	Araneae	<i>Talanites echinus</i>	Sac-web Spider	NA	NA	SE	S1
Arachnids	Opiliones	<i>Erebomaster flavescens</i>	Golden Cave Harvestman	NA	NA	ST	S2
Arachnids	Pseudoscorpiones	<i>Apochthonius indianensis</i>	Indiana Cave Pseudoscorpion	NA	SE	SE	S1
Arachnids	Pseudoscorpiones	<i>Chthonius virginicus</i>	A Pseudoscorpion	NA	SE	SE	S1
Arachnids	Pseudoscorpiones	<i>Hesperochernes mirabilis</i>	Southeastern Cave Pseudoscorpion	NA	NA	SW	S4
Arachnids	Pseudoscorpiones	<i>Kleptochthonius packardi</i>	Packard's Cave Pseudoscorpion	NA	NA	SE	S1S2
Crustaceans	Branchiopoda	<i>Lynceus brachyurus</i>	Holarctic Clam Shrimp	NA	NA	SW*	S1?
Crustaceans	Copepoda	<i>Bryocamptus morrisoni morrisoni</i>	Morrison's Cave Copepod	NA	SE	SE*	S1
Crustaceans	Copepoda	<i>Cauloxenus stygius</i>	Northern Cavefish (Commensal) Copepod	NA	NA	SW	SNR
Crustaceans	Copepoda	<i>Diacyclops jeanneli</i>	Jeannel's Groundwater Copepod	NA	SE	ST	S2

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Crustaceans	Copepoda	<i>Megacyclops donaldsoni</i>	Donaldson's Cave Copepod	NA	SE	SE	S1
Crustaceans	Malacostraca	<i>Caecidotea jordani</i>	Jordan's Groundwater Isopod	NA	SE	SE	S1
Crustaceans	Malacostraca	<i>Caecidotea rotunda</i>	Northeastern (Frost) Cave Isopod	NA	SE	SR	S3
Crustaceans	Malacostraca	<i>Caecidotea teresae</i>	Indiana University Southeast Groundwater Isopod	NA	SE	SE	S1
Crustaceans	Malacostraca	<i>Crangonyx packardii</i>	Packard's Groundwater Amphipod	NA	SC	SW	S4
Crustaceans	Malacostraca	<i>Crangonyx sp. 1</i>	Undescribed Cave Amphipod	NA	SC	ST	S2
Crustaceans	Malacostraca	<i>Gammarus bousfieldi</i>	Bousfield's Spring Amphipod	NA	SE	SE	S1
Crustaceans	Malacostraca	<i>Miktoniscus barri</i>	Barr's Terrestrial Isopod	NA	NA	SW	SNR
Crustaceans	Malacostraca	<i>Orconectes indianensis</i>	Indiana Crayfish	NA	SC	SR	S2
Crustaceans	Malacostraca	<i>Orconectes inermis inermis</i>	Ghost Crayfish	NA	NA	SW	S4
Crustaceans	Malacostraca	<i>Orconectes inermis testii</i>	Unarmed (Troglobitic) Crayfish	NA	SE	SR	S3
Crustaceans	Malacostraca	<i>Stygobromus mackini</i>	Mackin's (Southwestern Virginia) Cave Amphipod	NA	SE	SE*	S1
Crustaceans	Malacostraca	<i>Stygobromus sp. 2</i>	Devil's Graveyard Cave Amphipod	NA	SE	SE	U
Crustaceans	Malacostraca	<i>Synurella dentata</i>	Dentate Amphipod	NA	NA	SW	S4
Crustaceans	Ostracoda	<i>Dactylocythere susanae</i>	An Ostracod	NA	NA	SW	S3
Crustaceans	Ostracoda	<i>Pseudocandona jeanneli</i>	Jeannel's Groundwater Ostracod	NA	SE	SE	S1
Crustaceans	Ostracoda	<i>Pseudocandona marengoensis</i>	Marengo Cave Ostracod	NA	SE	SE	S1
Crustaceans	Ostracoda	<i>Sagittocythere barri</i>	Barr's Commensal (Ectocommensal) Cave Ostracod	NA	NA	SW	S3S4

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Diplopods	Diplopoda	<i>Conotyla bollmani</i>	Bollman's Cave Millipede	NA	SC	SW	S4
Diplopods	Diplopoda	<i>Pseudopolydesmus collinus</i>	A Millipede	NA	SE	SE	S1
Diplopods	Diplopoda	<i>Pseudotremia conservata</i>	TNC Cave Millipede	NA	NA	SE	S1
Diplopods	Diplopoda	<i>Pseudotremia indiana</i>	Blue River Cave Millipede	NA	NA	SW	S4
Diplopods	Diplopoda	<i>Pseudotremia nefanda</i>	Clark Cave (Indian Cave) Millipede	NA	SE	SE	S2
Diplopods	Diplopoda	<i>Pseudotremia salisae</i>	Salisa's Cave Millipede	NA	NA	SE	S1
Diplurans	Diplura	<i>Campodea plusiochaeta</i>	A Dipluran	NA	NA	SE	S1
Ellipurans	Collembola	<i>Anurida harti</i>	Hart's Springtail	NA	NA	SE	U
Ellipurans	Collembola	<i>Arrhopalites ater</i>	Black Medusa Cave Springtail	NA	NA	ST	S2
Ellipurans	Collembola	<i>Arrhopalites benitus</i>	A Springtail	NA	NA	SW	S1
Ellipurans	Collembola	<i>Arrhopalites bimus</i>	Two Year Cave Springtail	NA	SE	SE	S1
Ellipurans	Collembola	<i>Arrhopalites lewisi</i>	Lewis's Cave Springtail	NA	NA	ST	S2
Ellipurans	Collembola	<i>Dicyrtoma flammea</i>	Flaming Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Folsomia prima</i>	Primitive Springtail	NA	NA	SW	S4
Ellipurans	Collembola	<i>Folsomides americanus</i>	A Springtail	NA	NA	SE	S1
Ellipurans	Collembola	<i>Hypogastrura gibbosus</i>	A Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Hypogastrura helena</i>	Helen's Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Hypogastrura horrida</i>	Bristly Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Hypogastrura lucifuga</i>	Wyandotte Cave Springtail	NA	NA	SE	S1

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Ellipurans	Collembola	<i>Hypogastrura maheuxi</i>	Maheux Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Hypogastrura succinea</i>	Girded Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma anglicana</i>	A Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma caeruleatra</i>	Blue Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma christianseni</i>	Christiansen's Springtail	NA	NA	SW	S1
Ellipurans	Collembola	<i>Isotoma nigrifrons</i>	Dark Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma nixonii</i>	Nixon's Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma torildae</i>	A Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Isotoma truncata</i>	Truncated Springtail	NA	NA	SE	S1
Ellipurans	Collembola	<i>Isotomiella minor</i>	Petit Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Onychiurus casus</i>	Fallen Springtail	NA	NA	SW	S4
Ellipurans	Collembola	<i>Onychiurus reluctus</i>	A Springtail	NA	NA	SW	S4
Ellipurans	Collembola	<i>Onychiurus subtenuis</i>	Slender Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Pseudosinella aera</i>	A Cave Obligate Springtail	NA	NA	SE	S1
Ellipurans	Collembola	<i>Pseudosinella argentea</i>	A Springtail	NA	NA	SE	S1
Ellipurans	Collembola	<i>Pseudosinella collina</i>	Hilly Springtail	NA	NA	SR	S2?
Ellipurans	Collembola	<i>Pseudosinella fonsa</i>	Fountain Cave Springtail	NA	NA	ST	S2
Ellipurans	Collembola	<i>Sensillanura barberi</i>	Barber's Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Sensillanura caeca</i>	Blind Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Sinella alata</i>	Indiana Cave Springtail	NA	SE	SW	S4
Ellipurans	Collembola	<i>Sinella avita</i>	Ancestral Springtail	NA	NA	SE	S1
Ellipurans	Collembola	<i>Sinella barri</i>	Barr's Cave Springtail	NA	NA	SE	S1

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Ellipurans	Collembola	<i>Sinella cavernarum</i>	A Springtail	NA	NA	SW	S4
Ellipurans	Collembola	<i>Sminthurides hypogramme</i>	A Springtail	NA	NA	SW	S1
Ellipurans	Collembola	<i>Sminthurides weichseli</i>	Weichsel's Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Tomocerus elongatus</i>	Elongate Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Tomocerus lamelliferus</i>	Layered Springtail	NA	NA	SW	SNR
Ellipurans	Collembola	<i>Tomocerus missus</i>	Relict Cave Springtail	NA	NA	SW	S1
Insects	Coleoptera	<i>Aleochara lucifuga</i>	A Rove Beetle	NA	NA	SW	S4
Insects	Coleoptera	<i>Atheta annexa</i>	A Rove Beetle	NA	NA	SW	S4
Insects	Coleoptera	<i>Atheta trogliphila</i>	Cave-loving Rove Beetle	NA	NA	SR	S2
Insects	Coleoptera	<i>Batrisodes krekeleri</i>	Krekeler's Cave Ant Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	NA	SE	SE	S2
Insects	Coleoptera	<i>Cicindela patruela</i>	Northern Barrens Tiger Beetle	NA	NA	SR	S3
Insects	Coleoptera	<i>Dryobius sexnotatus</i>	Six-banded Longhorn Beetle	NA	SE	ST	SNR
Insects	Coleoptera	<i>Dynastes tityus</i>	Eastern Hercules (Unicorn) Beetle	NA	SC	SR	S2
Insects	Coleoptera	<i>Lissobiops serpentinus</i>	A Rove Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Necrophilus pettiti</i>	Small Scavenger Beetle	NA	NA	ST	S1?
Insects	Coleoptera	<i>Nicrophorus americanus</i>	American Burying Beetle	FE	NA	SX	SH
Insects	Coleoptera	<i>Ochthebius putnamensis</i>	Indiana Ochthebius Minute Moss Beetle	NA	SC	SR	SH
Insects	Coleoptera	<i>Pseudanophthalmus barri</i>	Barr's Cave Ground Beetle	NA	SE	SE	S1

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Insects	Coleoptera	<i>Pseudanophthalmus chthonius</i>	A Cave Ground Beetle	NA	SE	SR	S3
Insects	Coleoptera	<i>Pseudanophthalmus emersoni</i>	Emerson's Cave Ground Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Pseudanophthalmus eremita</i>	Wyandotte Cave Ground Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Pseudanophthalmus jeanneli</i>	A Cave Beetle	NA	SE	U	U
Insects	Coleoptera	<i>Pseudanophthalmus leonae</i>	Leona's Cave Ground Beetle	NA	SE	SE*	S1
Insects	Coleoptera	<i>Pseudanophthalmus shilohensis</i>	Shiloh Cave Ground Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Pseudanophthalmus shilohensis mayfieldensis</i>	Monroe Cave Ground Beetle	NA	SE	SE	S1
Insects	Coleoptera	<i>Pseudanophthalmus stricticollis</i>	Marengo Cave Ground Beetle	NA	SE	SW	S3
Insects	Coleoptera	<i>Pseudanophthalmus tenuis</i>	Blue River Cave Ground Beetle	NA	SE	SW	S4
Insects	Coleoptera	<i>Pseudanophthalmus youngi</i>	Young's Cave Ground Beetle	NA	SE	SR	S3
Insects	Coleoptera	<i>Stenelmis douglasensis</i>	Douglas Stenelmis Riffle Beetle	NA	SC	SR	SNR
Insects	Diptera	<i>Mydas brunneus</i>	Golden Mydas Fly	NA	NA	SE	S1S2
Insects	Diptera	<i>Mydas tibialis</i>	Golden-legged Mydas Fly	NA	NA	ST	S1S2
Insects	Ephemeroptera	<i>Epeorus namatus</i>	A Mayfly	NA	SE	SE	S1
Insects	Ephemeroptera	<i>Ephemerella argo</i>	Argo Ephemerellan mayfly	NA	SE	SE	SNR
Insects	Ephemeroptera	<i>Homoeoneuria ammophila</i>	A Sand-filtering Mayfly	NA	SE	SE*	S1

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Insects	Ephemeroptera	<i>Paracloeodes minutus</i>	A Small Minnow Mayfly	NA	SC	SR*	S2
Insects	Ephemeroptera	<i>Pentagenia robusta</i>	Robust Pentagenian Burrowing Mayfly	NA	NA	SX	SX
Insects	Ephemeroptera	<i>Pentagenia vittigera</i>	A Pentagenian Burrowing Mayfly	NA	SE	ST*	S2
Insects	Ephemeroptera	<i>Pseudiron centralis</i>	White Sand-river Mayfly	NA	SE	SE*	S1
Insects	Ephemeroptera	<i>Raptoheptagenia cruentata</i>	A Flatheaded Mayfly	NA	SE	SE	S1
Insects	Ephemeroptera	<i>Siphloplecton basale</i>	A Sand Minnow Mayfly	NA	SE	SE	S2
Insects	Ephemeroptera	<i>Siphloplecton interlineatum</i>	A Sand Minnow Mayfly	NA	NA	SE	S1
Insects	Ephemeroptera	<i>Spinadis simplex (wallacei)</i>	Wallace's Deepwater Mayfly	NA	SE	SE	SNR
Insects	Ephemeroptera	<i>Tortopsis primus</i>	A Mayfly	NA	SE	ST	S2
Insects	Homoptera	<i>Bruchomorpha dorsata</i>	A Planthopper	NA	NA	SR	S2
Insects	Homoptera	<i>Bruchomorpha extensa</i>	Long-nosed Elephant Hopper	NA	NA	SR	S2S3
Insects	Homoptera	<i>Bruchomorpha oculata</i>	A Planthopper	NA	NA	SR	SNR
Insects	Homoptera	<i>Chlorotettix dentatus</i>	A Leafhopper	NA	NA	SR	SNR
Insects	Homoptera	<i>Chlorotettix fallax</i>	A Leafhopper	NA	NA	SR	S2
Insects	Homoptera	<i>Chlorotettix vacuna</i>	Vacant Chlorotettix	NA	NA	SR	S1S2
Insects	Homoptera	<i>Cicadetta calliope</i>	Small Prairie Cicada	NA	NA	SE	U
Insects	Homoptera	<i>Cicadula straminea</i>	A Leafhopper	NA	NA	ST	SNR
Insects	Homoptera	<i>Cosmotettix bilineatus</i>	Two-lined Cosmotettix	NA	NA	ST	S1S2
Insects	Homoptera	<i>Dorydiella kansana</i>	A Leafhopper	NA	NA	ST	S1

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Insects	Homoptera	<i>Fitchiella robertsonii</i>	Robertson's Flightless Planthopper	NA	NA	SE	S1
Insects	Homoptera	<i>Flexamia pyrops</i>	Long-nosed Three-awn Leafhopper	NA	NA	SR	S1S3
Insects	Homoptera	<i>Flexamia reflexus</i>	Indiangrass Flexamia	NA	NA	ST	S2S3
Insects	Homoptera	<i>Graminella mohri</i>	A Leafhopper	NA	NA	SR	SNR
Insects	Homoptera	<i>Laevicephalus acus</i>	A Leafhopper	NA	NA	SR	S2S3
Insects	Homoptera	<i>Lepyronia angulifera</i>	Angular Spittlebug	NA	SE	ST	S1
Insects	Homoptera	<i>Lepyronia gibbosa</i>	Hill-prairie Spittlebug	NA	NA	SE	S1
Insects	Homoptera	<i>Limotettix divaricatus</i>	A Leafhopper	NA	NA	ST	SNR
Insects	Homoptera	<i>Mesamia nigradorsum</i>	A Leafhopper	NA	NA	SR	S2S3
Insects	Homoptera	<i>Mesamia stramineus</i>	Helianthus Leafhopper	NA	SC	SE	S1
Insects	Homoptera	<i>Paraphilaenus parallelus</i>	A Spittlebug	NA	NA	ST	S1
Insects	Homoptera	<i>Paraphlepsius lobatus</i>	A Leafhopper	NA	NA	ST	S1S2
Insects	Homoptera	<i>Paraphlepsius maculosus</i>	Peppered Paraphlepsius Leafhopper	NA	NA	ST	S1
Insects	Homoptera	<i>Philaenarcys killa</i>	Great Lakes Dune Spittlebug	NA	NA	SR	S2S3
Insects	Homoptera	<i>Polyamia caperata</i>	Little Bluestem Polyamia	NA	NA	SR	SNR
Insects	Homoptera	<i>Polyamia dilata</i>	Short-winged Panic Grass Leafhopper	NA	NA	SE	S1
Insects	Homoptera	<i>Polyamia herbida</i>	Prairie Panic Grass Leafhopper	NA	NA	ST	S1S3
Insects	Homoptera	<i>Polyamia obtecta</i>	Sand Panic Grass Leafhopper	NA	NA	SR	S2S3
Insects	Homoptera	<i>Prairiana kansana</i>	Kansas prairie Leafhopper	NA	SE	SE	S1S2
Insects	Homoptera	<i>Prosapia ignipectus</i>	Red-legged Spittlebug	NA	NA	SR	S2
Insects	Homoptera	<i>Scaphoideus ochraceus</i>	A Leafhopper	NA	NA	SR	SNR

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Insects	Homoptera	<i>Texananus areolatus</i>	Spotted (Ivory) Texan Leafhopper	NA	NA	SE	S1
Insects	Hymenoptera	<i>Dolichoderus plagiatus</i>	An Ant	NA	NA	ST	S2
Insects	Hymenoptera	<i>Formica glacialis</i>	An Ant	NA	NA	ST	S2
Insects	Hymenoptera	<i>Formica ulkei</i>	An Ant	NA	NA	SE	S1
Insects	Hymenoptera	<i>Lasius flavus</i>	An Ant	NA	NA	ST	S2
Insects	Hymenoptera	<i>Lasius minutus</i>	An Ant	NA	NA	SE	S1
Insects	Hymenoptera	<i>Lasius specularis</i>	An Ant	NA	NA	SE	S1
Insects	Hymenoptera	<i>Myrmica lobifrons</i>	An Ant	NA	NA	SE	S1
Insects	Hymenoptera	<i>Solenopsis texana texana</i>	An Ant	NA	NA	SE	S1
Insects	Lepidoptera	<i>Achalarus lyciades</i>	Hoary Edge	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Acleris (Croesia) curvalana</i>	Blueberry Leaf-tier Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Acleris (Croesia) semipurpurana</i>	Oak Leaf-tier Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Acronicta dactylina</i>	Fingered Dagger Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Acronicta funeralis</i>	Funerary Dagger Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Aethes patricia</i>	A Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Agrotis stigmata</i>	Spotted Dart Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Agrotis vetusta</i>	Old Man Dart Moth	NA	NA	SR	S2
Insects	Lepidoptera	<i>Amblyscirtes aesculapius</i>	Lace-winged Roadside-skipper	NA	NA	SR	S1
Insects	Lepidoptera	<i>Amblyscirtes belli</i>	Bell's Roadside-skipper	NA	NA	ST	S1
Insects	Lepidoptera	<i>Amblyscirtes hegon</i>	Pepper And Salt Skipper	NA	SC	SR	S2

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Lepidoptera	<i>Amblyscirtes vialis</i>	Common Roadside-skipper	NA	SC	SR	S3
Insects	Lepidoptera	<i>Anaplectoides prasina</i>	Green Arches Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Ancylis semiovana</i>	A Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Apamea apamiformis</i>	A Noctuid Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Apamea burgessi</i>	A Noctuid Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Apamea lignicolora</i>	Wood-colored Apamea Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Apamea lutosa</i>	Opalescent Apamea Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Apamea nigrior</i>	Black-dashed Apamea	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Apamea relicina</i>	A Noctuid Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Apamea verbascoides</i>	Mullein (Boreal) Apamea Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Atrytonopsis hianna</i>	Dusted Skipper	NA	SE	ST	S1S2
Insects	Lepidoptera	<i>Autochton cellus</i>	Gold-banded Skipper	NA	SC	SR	S2
Insects	Lepidoptera	<i>Bagisara rectifascia</i>	Straight Lined (Rare) Mallow Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Bellura densa</i>	Pickerelweed Borer Moth	NA	SC	ST	S1S2
Insects	Lepidoptera	<i>Boloria selene myrina</i>	Myrina (Silver-bordered) Fritillary	NA	NA	ST	S2
Insects	Lepidoptera	<i>Boloria selene nebraskensis</i>	Nebraska (Silver-bordered) Fritillary	NA	NA	SE	S1
Insects	Lepidoptera	<i>Calephelis borealis</i>	Northern Metalmark	NA	SC	SR	S2
Insects	Lepidoptera	<i>Calephelis muticum</i>	Swamp Metalmark	NA	SC	ST	S2
Insects	Lepidoptera	<i>Callophrys gryneus gryneus</i>	Olive Hairstreak	NA	NA	SR	S2S4
Insects	Lepidoptera	<i>Callophrys irus</i>	Frosted Elfin	NA	SC	SE	S1
Insects	Lepidoptera	<i>Callophrys polios</i>	Hoary Elfin	NA	NA	SE	S1

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Insects	Lepidoptera	<i>Calycopis cecrops</i>	Red-banded Hairstreak	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Capis curvata</i>	Curved Halter Moth	NA	SC	ST	S2S3
Insects	Lepidoptera	<i>Capsula (Archanara) laeta</i>	A Noctuid Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Caradrina (Platyperigea) meralis</i>	(Rare) Sand Quaker Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Catocala abbreviatella</i>	Abbreviated Underwing	NA	NA	SE	S1
Insects	Lepidoptera	<i>Catocala amestris</i>	Three-staff (Leadplant) Underwing	NA	SE	SE	S1
Insects	Lepidoptera	<i>Catocala antinympha</i>	Sweetfern Underwing	NA	NA	SE	S1
Insects	Lepidoptera	<i>Catocala flebilis</i>	Mournful (Black-dashed) Underwing	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Catocala gracilis</i>	Graceful Underwing	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Catocala insolabilis</i>	Inconsolable Underwing	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Catocala marmorata</i>	Marbled Underwing	NA	NA	SE	S1
Insects	Lepidoptera	<i>Catocala praeclara</i>	Praeclara Underwing Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Catocala relictata</i>	White Underwing Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Catocala sordida</i>	Sordid (Huckleberry) Underwing Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Celastrina neglectamajor</i>	Appalachian Azure	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Celastrina nigra</i>	Dusky (Sooty) Azure	NA	SC	ST	S2
Insects	Lepidoptera	<i>Chlosyne harrisii</i>	Harris's Checkerspot	NA	SC	ST	S2
Insects	Lepidoptera	<i>Chrysanympha formosa</i>	Formosa (Huckleberry) Looper Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Cochylis ringsi</i>	A Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Coenochroa bipunctella</i>	Sand Dune Panic Grass Moth	NA	NA	SR	S2S3

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Insects	Lepidoptera	<i>Coenochroa illibella</i>	Dune Panic Grass Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Coenophila opacifrons</i>	(Plain-faced) Blueberry Dart Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Crambus bidens</i>	Biden's Grass-veneer Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Crambus girardellus</i>	Orange-striped Sedge Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Cryptocala acadensis</i>	Catocaline Dart Moth	NA	SC	ST	S1S2
Insects	Lepidoptera	<i>Cyclophora pendulinaria</i>	Sweetfern Geometer Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Cyrcia inopinatus</i>	Unexpected Milkweed Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Cyllopsis gemma</i>	Gemmed Satyr	NA	SC	SR	S2
Insects	Lepidoptera	<i>Dasychira cinnamomea</i>	Cinnamon Tussock Moth	NA	SC	SR	S1
Insects	Lepidoptera	<i>Dasychira dorsipennata</i>	Sharp-lined (Pitch Pine) Tussock Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Digrammia (Semiothisa) mellistrigata</i>	Yellow-lined Angle Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Digrammia (Semiothisa) eremiata</i>	Three-lined Angle Moth (Goat's Rue Looper)	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Eosphoropteryx thyatyroides</i>	Pink-patched Looper Moth	NA	SE	ST	S2
Insects	Lepidoptera	<i>Epipaschia zelleri</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Erynnis lucilius</i>	Columbine Duskywing	NA	NA	ST	S1
Insects	Lepidoptera	<i>Erynnis martialis</i>	Mottled Duskywing	NA	SE	ST	S2S3
Insects	Lepidoptera	<i>Erynnis persius persius</i>	Persius Duskywing	NA	SE	SE	S1S2

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Insects	Lepidoptera	<i>Ethmia monticola fuscipedella</i>	A Moth	NA	NA	ST	U
Insects	Lepidoptera	<i>Eubaphe meridiana</i>	A Moth	NA	NA	SR	S2
Insects	Lepidoptera	<i>Euchloe olympia</i>	Olympia Marble	NA	SE	ST	S2
Insects	Lepidoptera	<i>Eucoptocnemis fimbriaris</i>	A Noctuid Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Eucosma albiguttana</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Eucosma bilineana</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Eucosma bipunctella</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Eucosma fulminana</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Eucosma giganteana</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	NA	NA	SR	S2
Insects	Lepidoptera	<i>Euphyes bimacula</i>	Two-spotted Skipper	NA	SC	ST	S2
Insects	Lepidoptera	<i>Euphyes dion</i>	Dion (Sedge) Skipper	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Euphyes dukesi</i>	Dukes' (Scarce Swamp) Skipper	NA	SC	ST	S1S2
Insects	Lepidoptera	<i>Euphyes dukesi dukesi</i>	Dukes' Skipper	NA	NA	SR	S2
Insects	Lepidoptera	<i>Euxoa albipennis</i>	White-striped Dart Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Euxoa aurulenta</i>	Dune Cutworm Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Exyra fax (rolandiana)</i>	Pitcher Plant (Window) Moth	NA	NA	SE	S1S2
Insects	Lepidoptera	<i>Fagitana littera</i>	Marsh Fern Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Faronta rubripennis</i>	Pink Streak	NA	NA	ST	S1
Insects	Lepidoptera	<i>Feltia (Trichosilia) manifesta</i>	A Noctuid Moth	NA	NA	SR	S3S4

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Insects	Lepidoptera	<i>Gabara subnivosella</i>	A Noctuid Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Glaucopsyche lygdamus couperi</i>	Couper's (Silvery) Blue	NA	NA	SE	S1
Insects	Lepidoptera	<i>Grammia anna</i>	Anna's Tiger Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Grammia figurata</i>	Figured Tiger Moth (Grammia)	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Grammia phyllira</i>	Phyllira Tiger Moth (Sand Barrens Grammia)	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Grammia virguncula</i>	Little Virgin Tiger Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Hadena (Anepia) capsularis</i>	Starry Champion Capsule Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Hadena ectypa</i>	Starry Champion (Purple Sundew) Moth	NA	NA	ST	S1S3
Insects	Lepidoptera	<i>Hemaris gracilis</i>	Graceful Clearwing (Blueberry Clearwing Sphinx)	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Hemileuca nevadensis</i>	Nevada Buck Moth	NA	SC	ST	S2S3
Insects	Lepidoptera	<i>Hemileuca nevadensis ssp. 3</i>	Great Lakes (Midwestern Fen) Buckmoth	NA	NA	ST	S1?
Insects	Lepidoptera	<i>Hemipachnobia monochromatea</i>	Sundew Cutworm Moth	NA	NA	ST	S1S3
Insects	Lepidoptera	<i>Hermeuptychia sosybius</i>	Carolina Satyr	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Herpetogramma thestealis</i>	Zigzag Herpetogramma Moth	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Hesperia leonardus</i>	Leonard's Skipper	NA	SC	SR	S2
Insects	Lepidoptera	<i>Hesperia metea</i>	Cobweb Skipper	NA	SE	ST	S2S3
Insects	Lepidoptera	<i>Hesperia ottoe</i>	Ottoe Skipper	NA	NA	SE	S1
Insects	Lepidoptera	<i>Hesperia sassacus</i>	Indian Skipper	NA	NA	ST	S2

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Insects	Lepidoptera	<i>Himella fidelis (intractata)</i>	Intractable Quaker Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Homophoberia cristata</i>	A Noctuid Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Hypenodes caducus</i>	Large Hypenodes	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Hypocoena (Chortodes) inquinata</i>	Tufted Sedge Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Hystrichophora loricana</i>	An Olethreutine Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Iodopepla u-album</i>	White-eyed Borer Moth	NA	SC	SR	S2
Insects	Lepidoptera	<i>Lacinipolia olivacea</i>	Olive Arches Moth	NA	NA	SR	S1
Insects	Lepidoptera	<i>Lemmeria digitalis</i>	A Noctuid Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Lesmone detrahens</i>	Detracted Owlet	NA	SC	SR	S2
Insects	Lepidoptera	<i>Lethe (Enodia) anthedon</i>	Northern Pearly-eye	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Lethe (Enodia) creola</i>	Creole Pearly-eye	NA	NA	SX	SU
Insects	Lepidoptera	<i>Lethe (Satyroides) appalachia appalachia</i>	Appalachian Eyed Brown	NA	SE	SE	S1
Insects	Lepidoptera	<i>Lethe (Satyroides) eurydice</i>	Eyed Brown	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Lethe (Satyroides) eurydice fumosus</i>	Smoky-eyed Brown	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Leucania inermis</i>	Unarmed Wainscot	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Leucania linita</i>	Salt Marsh Wainscot	NA	NA	SR	S2
Insects	Lepidoptera	<i>Leucania multilinea</i>	Many-lined Wainscot Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Leucania scirpicola</i>	A Moth	NA	NA	ST	S1S2

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Insects	Lepidoptera	<i>Loxagrotis acclivis</i>	A Noctuid Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Loxagrotis grotei</i>	Grote's Black-tipped Quaker	NA	NA	ST	S2
Insects	Lepidoptera	<i>Lycaena dorcas dorcas</i>	Dorcas Copper	NA	NA	SR	S2
Insects	Lepidoptera	<i>Lycaena epixanthe</i>	Bog Copper	NA	NA	SX	SX
Insects	Lepidoptera	<i>Lycaena helloides</i>	Purplish Copper	NA	NA	SR	S2S4
Insects	Lepidoptera	<i>Lycaena xanthoides</i>	Great Copper	NA	SC	SE	S1
Insects	Lepidoptera	<i>Lytrosis permagnaria</i>	A geometrid moth	NA	SE	ST	S2
Insects	Lepidoptera	<i>Macaria (Semiiothisa) multilineata</i>	Many-lined Angle	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Macrochilo absorptalis</i>	Slant-lined Owlet Moth	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Macrochilo bivitatta</i>	Two-striped Cord Grass Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Macrochilo hypocriticalis</i>	Twin-dotted Macrochilo Moth	NA	SC	SR	S2
Insects	Lepidoptera	<i>Macrochilo louisiana</i>	Louisiana Owlet Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Melanchra assimilis</i>	Black (Shadowy) Arches	NA	SE	SE	S1S2
Insects	Lepidoptera	<i>Melanomma auricinctaria</i>	(Huckleberry) Eye-spot Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Melipotis jucunda</i>	Merry Melipotis Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Meropleon ambifuscum</i>	Newman's Brocade	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Meropleon diversicolor</i>	A Noctuid Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Mesapamea stipata</i>	Four-lined Cordgrass Borer	NA	NA	SE	S1
Insects	Lepidoptera	<i>Metanema determinata</i>	Dark Metanema Moth	NA	NA	SR	SNR

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Insects	Lepidoptera	<i>Metanema inatomaria</i>	Pale Metanema Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Metarranthis apiciaria</i>	Barrens Metarranthis Moth	NA	SC	SE*	SH
Insects	Lepidoptera	<i>Monoleuca semifascia</i>	Pin-striped Slug Moth (Zig-zag Monoleuca)	NA	NA	SR	S1
Insects	Lepidoptera	<i>Neodactria (Crambus) murellus</i>	A prairie sedge moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Neonympha mitchellii mitchellii</i>	Mitchell's Satyr	FE	SE	SE	S1
Insects	Lepidoptera	<i>Nola cilicoides</i>	Blurry-patched Nola Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Nola Pustulata</i>	Sharp-blotched Nola	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Oarisma powesheik</i>	Poweshiek Skipperling	NA	NA	SX	SH
Insects	Lepidoptera	<i>Odontosia elegans</i>	Elegant Prominent Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Oligia bridghamii</i>	Bridgham's Brocade	NA	SE	ST	S1
Insects	Lepidoptera	<i>Oligia obtusa</i>	A Noctuid Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Paectes abrostolella</i>	Barrens Paectes Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Pagara simplex</i>	Mouse-colored Lichen Moth	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Pangrapta decoralis</i>	Decorated Owlet (Multicolored Huckleberry) Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Panthea furcilla</i>	Eastern Panthea Moth	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Papaipema appassionata</i>	Pitcher Plant Borer Moth	NA	SE	SE	S1
Insects	Lepidoptera	<i>Papaipema astuta</i>	Yellow Stoneroot Borer	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Papaipema beeriana</i>	(Beer's) Blazing Star Stem Borer	NA	NA	ST	S1S3
Insects	Lepidoptera	<i>Papaipema cerina</i>	Golden Borer Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	NA	NA	SX	SX

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Insects	Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth	NA	NA	SR	S3
Insects	Lepidoptera	<i>Papaipema leucostigma</i>	Columbine Borer Moth	NA	SC	ST	S1S2
Insects	Lepidoptera	<i>Papaipema limpida</i>	Ironweed Borer Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Papaipema marginidens</i>	Brick Red Borer Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Papaipema maritima</i>	Maritime (Giant) Sunflower Borer Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Papaipema polymniae</i>	Polymnia (Cup Plant) Borer Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Papaipema pterisii</i>	Bracken Borer Moth	NA	NA	SW	SNR
Insects	Lepidoptera	<i>Papaipema rigida</i>	A borer moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Papaipema rutila</i>	Mayapple Borer Moth	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Papaipema silphii</i>	Silphium Borer Moth	NA	NA	ST	S2
Insects	Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth	NA	SE	ST	S2S3
Insects	Lepidoptera	<i>Parasa indetermina</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Peoria gemmatella</i>	Gemmed Cordgrass Borer	NA	NA	SR	S1
Insects	Lepidoptera	<i>Peoria tetradella</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Phalaenostola hanhami</i>	Hanham's Owlet (Rare Sedge) Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Phaneta ochroterminana</i>	A Moth	NA	NA	SR	SNR

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Insects	Lepidoptera	<i>Phaneta olivaceana</i>	A Moth	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Phaneta ornatula</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Phaneta striatana</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Phaneta umbrastriana</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Photodes (Chortodes) enervata</i>	Many-lines Cordgrass Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) includens</i>	Included Cordgrass Borer	NA	SE	ST	S1
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) inops</i>	Spartina Borer Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) panatela</i>	Northern Cordgrass Borer Moth	NA	NA	ST	S1
Insects	Lepidoptera	<i>Phyciodes batesii</i>	Tawny Crescent	NA	NA	SR	U
Insects	Lepidoptera	<i>Phytometra ernestinana</i>	Ernestine's Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Pieris (Artogeia) virginensis</i>	West Virginia White	NA	SC	SR	S3
Insects	Lepidoptera	<i>Pieris oleracea</i>	Eastern Veined White	NA	SE	SE	S1
Insects	Lepidoptera	<i>Plagodis kuetzingi</i>	Purple Plagodis Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Plebejus (Lycaeides) melissa samuelis</i>	Karner Blue	FE	SE	SE	S1
Insects	Lepidoptera	<i>Poanes massasoit</i>	Mulberry Wing	NA	NA	SR	S3
Insects	Lepidoptera	<i>Poanes viator viator</i>	Broad-winged Skipper	NA	SC	ST	S2
Insects	Lepidoptera	<i>Polites mystic</i>	Long Dash	NA	NA	SR	S4

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Insects	Lepidoptera	<i>Polygonia progne</i>	Gray Comma	NA	NA	SR	S2
Insects	Lepidoptera	<i>Problema byssus</i>	Byssus (Bunchgrass) Skipper	NA	SC	ST	S2
Insects	Lepidoptera	<i>Protorthodes incincta</i>	Banded (Saturn) Quaker	NA	NA	SR	S2
Insects	Lepidoptera	<i>Pygarctia spraguei</i>	Sprague's Pygarctia	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Pyla arenaeola</i>	A pyralid moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Pyrausta laticlavia</i>	Southern Purple Mint Moth	NA	SC	SR	S1S2
Insects	Lepidoptera	<i>Pyreferra ceromatica</i>	Annointed Sallow Moth	NA	SC	SR	SX
Insects	Lepidoptera	<i>Pyreferra citrombra</i>	A Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Pyreferra hesperidago</i>	Mustard Sallow	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Pyreferra pettiti</i>	A Noctuid Moth	NA	NA	SR	SNR
Insects	Lepidoptera	<i>Rhodoecia aurantiago</i>	Aureolaria Seed Borer	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Satyrium (Fixsenia) favonius</i>	Oak (Northern) Hairstreak	NA	SC	SR	S1S2
Insects	Lepidoptera	<i>Schinia indiana</i>	Phlox Moth	NA	SE	SE	S1
Insects	Lepidoptera	<i>Schinia jaguarina</i>	Jaguar Flower Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Schinia lucens</i>	Leadplant Flower Moth	NA	SE	SE	S1
Insects	Lepidoptera	<i>Schinia sanguinea (gloriosa)</i>	Bleeding (Glorious Blazing Star) Flower Moth	NA	SC	NA	S2S3
Insects	Lepidoptera	<i>Schinia septentrionalis</i>	A Noctuid Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Sciota (Nephoterix) dammersi</i>	Leadplant Leafwebber Moth	NA	NA	SE	S1
Insects	Lepidoptera	<i>Scirpophaga perstrialis</i>	A Moth	NA	NA	SR	SNR

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Lepidoptera	<i>Sitochroa dasconalis</i>	Pearly Indigo Borer	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Speyeria aphrodite</i>	Aphrodite Fritillary	NA	NA	SW	S3
Insects	Lepidoptera	<i>Speyeria diana</i>	Diana Fritillary	NA	NA	SE	S1
Insects	Lepidoptera	<i>Speyeria idalia</i>	Regal Fritillary	NA	NA	SE	S1
Insects	Lepidoptera	<i>Sphinx luscitiosa</i>	Clemens' (Luscious Willow) Sphinx	NA	NA	SR	S1S2
Insects	Lepidoptera	<i>Spilosoma latipennis</i>	Red-legged Tussock Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Sympistis (Homohadena) infixa</i>	Broad-lined Sallow Moth	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Sympistis (Oncocnemis) riparia</i>	Dune Oncocnemis Moth	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Tampa dimediatella</i>	Red-striped Panic Grass Moth	NA	NA	ST	S2S3
Insects	Lepidoptera	<i>Thorybes pylades</i>	Northern Cloudywing	NA	SC	SR	S2S3
Insects	Lepidoptera	<i>Tricholita notata</i>	Marked Noctuid	NA	NA	ST	S1S2
Insects	Lepidoptera	<i>Ufeus plicatus</i>	Folded Satyr	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Virbia (Holomelina) opella</i>	Tawny (Smoky) Holomelina	NA	NA	SR	S2S3
Insects	Lepidoptera	<i>Xestia youngii</i>	Young's Blueberry Dart	NA	NA	SR	S1S3
Insects	Lepidoptera	<i>Zomaria interruptolineana</i>	A Moth	NA	NA	SR	SNR
Insects	Mecoptera	<i>Boreus sp. 1</i>	Virginia Snow Scorpionfly	NA	NA	ST	S2
Insects	Mecoptera	<i>Merope tuber</i>	Earwig Scorpionfly	NA	SE	SE	S1
Insects	Neuroptera	<i>Climacia sp. 1</i>	A spongilla fly	NA	SE	ST	S2
Insects	Neuroptera	<i>Lomamyia banksi</i>	A beaded lacewing	NA	NA	ST	S2
Insects	Neuroptera	<i>Lomamyia flavicornis</i>	A beaded lacewing	NA	NA	ST	S2
Insects	Neuroptera	<i>Nallachus</i>	A pleasing lacewing	NA	NA	ST	S2

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
		<i>americanus</i>					
<b>Insects</b>	Neuroptera	<i>Polystoechotes punctatus</i>	A giant lacewing	NA	NA	SX	SX
<b>Insects</b>	Neuroptera	<i>Sisyra sp. 1</i>	Indiana Spongilla Fly	NA	SE	ST	S2
<b>Insects</b>	Odonata	<i>Aeshna canadensis</i>	Canada Darner	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Aeshna clepsydra</i>	Mottled Darner	NA	NA	SE*	SH
<b>Insects</b>	Odonata	<i>Aeshna tuberculifera</i>	Black-tipped Darner	NA	NA	ST	S2
<b>Insects</b>	Odonata	<i>Anax longipes</i>	Comet Darner	NA	NA	ST	S2
<b>Insects</b>	Odonata	<i>Archilestes grandis</i>	Great Spreadwing	NA	SC	SR	S3
<b>Insects</b>	Odonata	<i>Arigomphus cornutus</i>	Horned Clubtail	NA	NA	SE*	SH
<b>Insects</b>	Odonata	<i>Arigomphus furcifer</i>	Lilypad Clubtail	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Arigomphus lentulus</i>	Stillwater Clubtail	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Calopteryx aequabilis</i>	River Jewelwing	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Calopteryx angustipennis</i>	Appalachian Jewelwing	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Celithemis fasciata (monomelaena)</i>	Banded Pennant (Black Spotted Skimmer)	NA	NA	SE	S4
<b>Insects</b>	Odonata	<i>Celithemis verna</i>	Double-ringed Pennant	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Chromagrion conditum</i>	Aurora Damsel	NA	NA	SR	S2S3
<b>Insects</b>	Odonata	<i>Cordulegaster bilineata</i>	Brown Spiketail	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail	NA	NA	SE	S1
<b>Insects</b>	Odonata	<i>Cordulegaster erronea</i>	Tiger Spiketail	NA	NA	SE	S1

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Odonata	<i>Cordulegaster maculata</i>	Twin-spotted Spiketail	NA	NA	SR	S2S3
Insects	Odonata	<i>Cordulegaster obliqua</i>	Arrowhead Spiketail	NA	NA	SR	S2S3
Insects	Odonata	<i>Dorocordulia libera</i>	Racket-tailed Emerald	NA	NA	SE	S1
Insects	Odonata	<i>Enallagma annexum</i>	Northern Bluet	NA	NA	ST	S1S2
Insects	Odonata	<i>Enallagma boreale</i>	Boreal Bluet	NA	NA	ST	S1S2
Insects	Odonata	<i>Enallagma divagans</i>	Turquoise Bluet	NA	NA	SR	S3
Insects	Odonata	<i>Epitheca canis</i>	Beaverpond Baskettail	NA	NA	SE	S1
Insects	Odonata	<i>Epitheca spinigera</i>	Spiny Baskettail	NA	NA	SE	S1
Insects	Odonata	<i>Erpetogomphus designatus</i>	Eastern Ringtail	NA	NA	ST	S2
Insects	Odonata	<i>Gomphus crassus</i>	Handsome Clubtail	NA	NA	ST	S2
Insects	Odonata	<i>Gomphus externus</i>	Plains Clubtail	NA	NA	SR	S2S3
Insects	Odonata	<i>Gomphus hybridus</i>	Cocoa Clubtail	NA	NA	SE	S1
Insects	Odonata	<i>Gomphus lineatifrons</i>	Splendid Clubtail	NA	NA	ST	S2
Insects	Odonata	<i>Gomphus quadricolor</i>	Rapids Clubtail	NA	NA	ST	S2
Insects	Odonata	<i>Gomphus spicatus</i>	Dusky Clubtail	NA	NA	ST	S2
Insects	Odonata	<i>Gomphus ventricosus</i>	Sillet Clubtail	NA	NA	ST	S1S2
Insects	Odonata	<i>Gomphus viridifrons</i>	Green-faced Clubtail	NA	NA	ST	S1S2
Insects	Odonata	<i>Hagenius brevistylus</i>	Dragonhunter	NA	NA	SR	S2S3
Insects	Odonata	<i>Hetaerina titia</i>	Smoky Rubyspot	NA	NA	SR	S2S3
Insects	Odonata	<i>Ischnura kellicotti</i>	Lilypad Forktail	NA	NA	ST	S2
Insects	Odonata	<i>Ischnura prognata</i>	Furtive Forktail	NA	NA	SE	S1
Insects	Odonata	<i>Ladona julia</i>	Chalk-fronted Corporal (Skimmer)	NA	NA	SR	S2S3

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Odonata	<i>Leucorrhinia frigida</i>	Frosted Whiteface	NA	NA	ST	S2
Insects	Odonata	<i>Macromia illinoensis georgina</i>	Georgia River Cruiser	NA	NA	SR	S2S3
Insects	Odonata	<i>Macromia pacifica</i>	Gilded River Cruiser	NA	NA	ST	S1S2
Insects	Odonata	<i>Macromia wabashensis</i>	Wabash River Cruiser	NA	NA	SE	S1
Insects	Odonata	<i>Nannothemis bella</i>	Elfin (Dwarf) Skimmer	NA	NA	SE	S1
Insects	Odonata	<i>Nehalennia gracilis</i>	Sphagnum Sprite	NA	NA	SE	S1
Insects	Odonata	<i>Nehalennia irene</i>	Sedge Sprite	NA	NA	SR	S2S3
Insects	Odonata	<i>Neurocordulia molesta</i>	Smoky Shadowdragon	NA	NA	SE	S1
Insects	Odonata	<i>Neurocordulia obsoleta</i>	Umber Shadowdragon	NA	NA	ST	S1S2
Insects	Odonata	<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon	NA	NA	ST	S1S2
Insects	Odonata	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail	NA	NA	SR	S2S3
Insects	Odonata	<i>Rhionaeschna (Aeshna) mutata</i>	Spatterdock Darner	NA	NA	ST	S1S2
Insects	Odonata	<i>Somatochlora ensigera</i>	Plains (Lemon-faced) Emerald	NA	NA	SE	S1
Insects	Odonata	<i>Somatochlora hineana</i>	Hine's Emerald	FE	SE	SX	SX
Insects	Odonata	<i>Somatochlora linearis</i>	Mocha Emerald	NA	NA	SR	S2S3
Insects	Odonata	<i>Somatochlora tenebrosa</i>	Clamp-tipped Emerald	NA	NA	SR	S2S3
Insects	Odonata	<i>Stylogomphus sigmastylus</i>	Interior Least Clubtail	NA	NA	SE	S1

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Odonata	<i>Stylurus amnicola</i>	Riverine Clubtail	NA	NA	ST	S1S2
Insects	Odonata	<i>Stylurus laurae</i>	Laura's Clubtail	NA	NA	SE	S1
Insects	Odonata	<i>Stylurus notatus</i>	Elusive Clubtail	NA	NA	SE	S1
Insects	Odonata	<i>Stylurus scudderi</i>	Zebra Clubtail	NA	NA	SE	S1
Insects	Odonata	<i>Sympetrum danae</i>	Black Meadowhawk	NA	NA	SE	S1
Insects	Odonata	<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk	NA	NA	SR	S2S3
Insects	Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail	NA	NA	SR	S2S3
Insects	Orthoptera	<i>Chloealtis conspersa</i>	Sprinkled Locust	NA	NA	SR	S2S3
Insects	Orthoptera	<i>Conocephalus saltans</i>	Prairie Meadow Katydid	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Eritettix simplex</i>	Velvet-striped Grasshopper	NA	NA	ST	S1
Insects	Orthoptera	<i>Hesperotettix viridis pratensis</i>	Snakeweed Grasshopper	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Melanoplus fasciatus</i>	Huckleberry Spur-throat Grasshopper	NA	NA	SR	S2
Insects	Orthoptera	<i>Melanoplus gracilis</i>	Graceful Spur-throat Grasshopper	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Melanoplus tepidus</i>	Fearful Barrens Locust	NA	NA	SR	S1S3
Insects	Orthoptera	<i>Melanoplus viridipes viridipes</i>	Green-legged Spur-throat Grasshopper	NA	NA	SR	S2
Insects	Orthoptera	<i>Neoconocephalus exiliscanorus</i>	Slightly Musical Conehead Katydid	NA	NA	SR	SNR
Insects	Orthoptera	<i>Neoconocephalus nebrascensis</i>	Nebraska Conehead Katydid	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper	NA	NA	SR	S1S2

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
Insects	Orthoptera	<i>Pardalophora phoenicoptera</i>	Orange-winged Grasshopper	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Paroxya atlantica</i>	Atlantic Grasshopper	NA	NA	ST	S1S2
Insects	Orthoptera	<i>Paroxya hoosieri</i>	Hoosier Locust	NA	NA	ST	S1S2
Insects	Orthoptera	<i>Phoetaliotes nebrascensis</i>	Large-headed Grasshopper	NA	NA	ST	S1
Insects	Orthoptera	<i>Pseudopomala brachyptera</i>	Bunch Grass Locust	NA	NA	ST	S1S2
Insects	Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust	NA	NA	SR	S1S2
Insects	Orthoptera	<i>Stethophyma lineatum</i>	Striped Sedge Grasshopper	NA	NA	ST	S1S2
Insects	Orthoptera	<i>Trimerotropis maritima</i>	Seaside Grasshopper (Dune Locust)	NA	NA	ST	S2
Insects	Trichoptera	<i>Agapetus gelbae</i>	An agapetus caddisfly	NA	NA	ST*	S2
Insects	Trichoptera	<i>Agapetus illini</i>	An agapetus caddisfly	NA	NA	ST*	S2
Insects	Trichoptera	<i>Ceraclea sp. 1</i>	A sponge-feeding caddisfly	NA	SE	U	U
Insects	Trichoptera	<i>Diplectrona metaqui</i>	A diplectronan caddisfly	NA	NA	ST*	S2
Insects	Trichoptera	<i>Goera stylata</i>	Little Gray Sedge	NA	SE	SE	S1
Insects	Trichoptera	<i>Homoplectra doringa</i>	A homoplectran caddisfly	NA	SE	SE	S1
Insects	Trichoptera	<i>Nectopsyche pavida</i>	A long-horned casemaker caddisfly	NA	SC	SR	S2
Insects	Trichoptera	<i>Pycnopsyche rossi</i>	A northern casemaker caddisfly	NA	SE	SE	S1
Insects	Trichoptera	<i>Setodes oligius</i>	A long-horned caddisfly	NA	SE	SE	S1
Mollusks	Gastropoda	<i>Antroselatus spiralis</i>	Shaggy Cavesnail	NA	SE	SR	S3
Mollusks	Gastropoda	<i>Campeloma decisum</i>	Pointed Campeloma	NA	SC	SC	S2
Mollusks	Gastropoda	<i>Carychium exile</i>	Ice Thorn	NA	SE	NA	S5

Group	Order/Class	Scientific Name	Common Name	Federal Status <sup>1</sup>	State Status <sup>2</sup> (2005)	Current State Status <sup>2</sup>	NatureServe Rank <sup>3</sup>
<b>Mollusks</b>	Gastropoda	<i>Fontigens cryptica</i>	Hidden Springsnail	NA	SE	SE	S1
<b>Mollusks</b>	Gastropoda	<i>Lymnaea stagnalis</i>	Swamp Lymnaea	NA	SC	SC	S2
<b>Mollusks</b>	Gastropoda	<i>Xolotrema obstrictum</i>	Sharp Wedge	NA	SE	SE	S1
<b>Platyhelminthes</b>	Tricladida	<i>Sphalloplana chandleri</i>	Chandler's Cave Flatworm	NA	SE	SE	S1
<b>Platyhelminthes</b>	Tricladida	<i>Sphalloplana weingartneri</i>	Weingartner's Cave Flatworm	NA	SE	SW	S4

\*Possibly extirpated

<sup>1</sup>FE – Federally endangered, NA – No federal status

<sup>2</sup>SE – State endangered, ST – State threatened, SR – State rare, SW – State watch list, SC – Special concern, SX – State extirpated, U – Unknown, NA – No state status

<sup>3</sup>See <http://explorer.natureserve.org/nsranks.htm>. The state-level rank is the conservation status of a species from the subnational jurisdiction perspective, characterizing the relative rarity or imperilment of the species. The basic subnational conservation ranks are: SX - Presumed Extirpated, SH - Possibly Extirpated (Historical), S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 - Apparently Secure, S5 – Secure, SNR – Rank not yet assessed, SU – Unrankable, SHB – State Hybrid, SNA – State Not Applicable. U – Unknown.

**Table E-2.** Distribution of Indiana's invertebrate (not including Freshwater Mussels) SGCN by SWAP planning region.

X – Occurrence, ND – No data available, UN – Occurrence unclear

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
<b>Arachnids</b>	Actinedida	<i>Hamohalacarus subterraneus</i>	Donaldson Cave Water Mite					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Arachnids	Araneae	<i>Anahita punctulata</i>	Southeastern Wandering Spider					X	
Arachnids	Araneae	<i>Porrhomma cavernicola</i>	Cavernicolous Sheet-web (Appalachian Cave) Spider					X	X
Arachnids	Araneae	<i>Talanites echinus</i>	Sac-web Spider					X	
Arachnids	Opiliones	<i>Erebomaster flavescens</i>	Golden Cave Harvestman					X	UN
Arachnids	Pseudoscorpiones	<i>Apochthonius indianensis</i>	Indiana Cave Pseudoscorpion					X	
Arachnids	Pseudoscorpiones	<i>Chthonius virginicus</i>	A pseudoscorpion					X	X
Arachnids	Pseudoscorpiones	<i>Hesperoernes mirabilis</i>	Southeastern Cave Pseudoscorpion					X	UN
Arachnids	Pseudoscorpiones	<i>Kleptochthonius packardi</i>	Packard's Cave Pseudoscorpion					X	UN
Crustaceans	Branchiopoda	<i>Lynceus brachyurus</i>	Holarctic Clam Shrimp			X			
Crustaceans	Copepoda	<i>Bryocamptus morrisoni morrisoni</i>	Morrison's Cave Copepod					X	
Crustaceans	Copepoda	<i>Cauloxenus stygius</i>	Northern Cavefish (Commensal) Copepod					X	
Crustaceans	Copepoda	<i>Diacyclops jeanneli</i>	Jeannel's Groundwater Copepod					X	UN
Crustaceans	Copepoda	<i>Megacyclops donaldsoni</i>	Donaldson's Cave Copepod					X	
Crustaceans	Malacostraca	<i>Caecidotea jordani</i>	Jordan's Groundwater Isopod					X	
Crustaceans	Malacostraca	<i>Caecidotea rotunda</i>	Northeastern (Frost) Cave Isopod						X
Crustaceans	Malacostraca	<i>Caecidotea teresae</i>	Indiana University Southeast Groundwater Isopod					UN	UN
Crustaceans	Malacostraca	<i>Crangonyx packardi</i>	Packard's Groundwater Amphipod					X	X

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
<b>Crustaceans</b>	Malacostraca	<i>Crangonyx sp. 1</i>	Undescribed cave amphipod	ND	ND	ND	ND	ND	ND
<b>Crustaceans</b>	Malacostraca	<i>Gammarus bousfieldi</i>	Bousfield's Spring Amphipod					UN	UN
<b>Crustaceans</b>	Malacostraca	<i>Miktoniscus barri</i>	Barr's Terrestrial Isopod					X	UN
<b>Crustaceans</b>	Malacostraca	<i>Orconectes indianensis</i>	Indiana Crayfish				X	UN	
<b>Crustaceans</b>	Malacostraca	<i>Orconectes inermis inermis</i>	Ghost Crayfish					X	UN
<b>Crustaceans</b>	Malacostraca	<i>Orconectes inermis testii</i>	Unarmed (Troglotic) Crayfish					X	
<b>Crustaceans</b>	Malacostraca	<i>Stygobromus mackini</i>	Mackin's (Southwestern Virginia) Cave Amphipod					UN	UN
<b>Crustaceans</b>	Malacostraca	<i>Stygobromus sp. 2</i>	Devil's Graveyard Cave Amphipod	ND	ND	ND	ND	ND	ND
<b>Crustaceans</b>	Malacostraca	<i>Synurella dentata</i>	Dentate Amphipod					UN	UN
<b>Crustaceans</b>	Ostracoda	<i>Dactylocythere susanae</i>	An ostracod					X	UN
<b>Crustaceans</b>	Ostracoda	<i>Pseudocandona jeanneli</i>	Jeannel's Groundwater Ostracod					X	
<b>Crustaceans</b>	Ostracoda	<i>Pseudocandona marengoensis</i>	Marengo Cave Ostracod					X	
<b>Crustaceans</b>	Ostracoda	<i>Sagittocythere barri</i>	Barr's Commensal (Ectocommensal) Cave Ostracod					X	UN
<b>Diplopods</b>	Diplopoda	<i>Conotyia bollmani</i>	Bollman's Cave Millipede					X	X
<b>Diplopods</b>	Diplopoda	<i>Pseudopolydesmus collinus</i>	A millipede						X
<b>Diplopods</b>	Diplopoda	<i>Pseudotremia conservata</i>	TNC Cave Millipede					X	
<b>Diplopods</b>	Diplopoda	<i>Pseudotremia indianae</i>	Blue River Cave Millipede					X	UN
<b>Diplopods</b>	Diplopoda	<i>Pseudotremia nefanda</i>	Clark Cave (Indian Cave) Millipede					UN	UN
<b>Diplopods</b>	Diplopoda	<i>Pseudotremia salisae</i>	Salisa's Cave Millipede					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Diplurans	Diplura	<i>Campodea plusiochaeta</i>	A dipluran					UN	UN
Ellipurans	Collembola	<i>Anurida harti</i>	Hart's Springtail	ND	ND	ND	ND	ND	ND
Ellipurans	Collembola	<i>Arrhopalites ater</i>	Black Medusa Cave Springtail					X	UN
Ellipurans	Collembola	<i>Arrhopalites benitus</i>	A springtail					X	UN
Ellipurans	Collembola	<i>Arrhopalites bimus</i>	Two Year Cave Springtail					X	
Ellipurans	Collembola	<i>Arrhopalites lewisi</i>	Lewis's Cave Springtail					X	UN
Ellipurans	Collembola	<i>Dicyrtoma flammea</i>	Flaming Springtail					X	
Ellipurans	Collembola	<i>Folsomia prima</i>	Primitive Springtail					X	UN
Ellipurans	Collembola	<i>Folsomides americanus</i>	A springtail					UN	UN
Ellipurans	Collembola	<i>Hypogastrura gibbosus</i>	A springtail					X	
Ellipurans	Collembola	<i>Hypogastrura helena</i>	Helen's Springtail					X	
Ellipurans	Collembola	<i>Hypogastrura horrida</i>	Bristly Springtail					UN	UN
Ellipurans	Collembola	<i>Hypogastrura lucifuga</i>	Wyandotte Cave Springtail					X	
Ellipurans	Collembola	<i>Hypogastrura maheuxi</i>	Maheux Springtail					X	
Ellipurans	Collembola	<i>Hypogastrura succinea</i>	Girded Springtail					X	
Ellipurans	Collembola	<i>Isotoma anglicana</i>	A springtail					X	UN
Ellipurans	Collembola	<i>Isotoma caeruleatra</i>	Blue Springtail					UN	UN
Ellipurans	Collembola	<i>Isotoma christianseni</i>	Christiansen's Springtail					X	
Ellipurans	Collembola	<i>Isotoma nigrifrons</i>	Dark Springtail					UN	UN
Ellipurans	Collembola	<i>Isotoma nixoni</i>	Nixon's Springtail					UN	UN
Ellipurans	Collembola	<i>Isotoma torildae</i>	A springtail					UN	UN
Ellipurans	Collembola	<i>Isotoma truncata</i>	Truncated Springtail					X	
Ellipurans	Collembola	<i>Isotomiella minor</i>	Petit Springtail					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Ellipurans	Collembola	<i>Onychiurus casus</i>	Fallen Springtail					X	UN
Ellipurans	Collembola	<i>Onychiurus reluctus</i>	A springtail					X	UN
Ellipurans	Collembola	<i>Onychiurus subtenuis</i>	Slender Springtail					X	
Ellipurans	Collembola	<i>Pseudosinella aera</i>	A cave obligate springtail					X	
Ellipurans	Collembola	<i>Pseudosinella argentea</i>	A springtail					X	
Ellipurans	Collembola	<i>Pseudosinella collina</i>	Hilly Springtail					X	UN
Ellipurans	Collembola	<i>Pseudosinella fonsa</i>	Fountain Cave Springtail					X	UN
Ellipurans	Collembola	<i>Sensillanura barberi</i>	Barber's Springtail					X	
Ellipurans	Collembola	<i>Sensillanura caeca</i>	Blind Springtail					X	
Ellipurans	Collembola	<i>Sinella alata</i>	Indiana Cave Springtail					X	X
Ellipurans	Collembola	<i>Sinella avita</i>	Ancestral Springtail					X	
Ellipurans	Collembola	<i>Sinella barri</i>	Barr's Cave Springtail					X	
Ellipurans	Collembola	<i>Sinella cavernarum</i>	A springtail					X	X
Ellipurans	Collembola	<i>Sminthurides hypogramme</i>	A springtail					X	X
Ellipurans	Collembola	<i>Sminthurides weichseli</i>	Weichsel's Springtail					X	
Ellipurans	Collembola	<i>Tomocerus elongatus</i>	Elongate Springtail					X	
Ellipurans	Collembola	<i>Tomocerus lamelliferus</i>	Layered Springtail					X	
Ellipurans	Collembola	<i>Tomocerus missus</i>	Relict Cave Springtail					X	
Insects	Coleoptera	<i>Aleochara lucifuga</i>	A rove beetle					X	UN
Insects	Coleoptera	<i>Atheta annexa</i>	A rove beetle					X	UN
Insects	Coleoptera	<i>Atheta trogliphila</i>	Cave-loving Rove Beetle						X
Insects	Coleoptera	<i>Batrisodes krekeri</i>	Krekeler's Cave Ant Beetle					UN	UN
Insects	Coleoptera	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle			UN			X

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Coleoptera	<i>Cicindela patruela</i>	Northern Barrens Tiger Beetle					X	
Insects	Coleoptera	<i>Dryobius sexnotatus</i>	Six-banded Longhorn Beetle			X		X	X
Insects	Coleoptera	<i>Dynastes tityus</i>	Eastern Hercules (Unicorn) Beetle	ND	ND	ND	ND	ND	ND
Insects	Coleoptera	<i>Lissobiops serpentinus</i>	A rove beetle			X			
Insects	Coleoptera	<i>Necrophilus pettiti</i>	Small Scavenger Beetle				X	X	UN
Insects	Coleoptera	<i>Nicrophorus americanus</i>	American Burying Beetle						
Insects	Coleoptera	<i>Ochthebius putnamensis</i>	Indiana Ochthebius Minute Moss Beetle			UN	UN	UN	
Insects	Coleoptera	<i>Pseudanopthalmus barri</i>	Barr's Cave Ground Beetle					UN	UN
Insects	Coleoptera	<i>Pseudanopthalmus chthonius</i>	A cave ground beetle						X
Insects	Coleoptera	<i>Pseudanopthalmus emersoni</i>	Emerson's Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus eremita</i>	Wyandotte Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus jeanneli</i>	A cave beetle					ND	ND
Insects	Coleoptera	<i>Pseudanopthalmus leonae</i>	Leona's Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus shilohensis</i>	Shiloh Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus shilohensis mayfieldensis</i>	Monroe Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus stricticollis</i>	Marengo Cave Ground Beetle					X	UN
Insects	Coleoptera	<i>Pseudanopthalmus tenuis</i>	Blue River Cave Ground Beetle					X	
Insects	Coleoptera	<i>Pseudanopthalmus</i>	Young's Cave Ground Beetle					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
		<i>youngi</i>							
<b>Insects</b>	Coleoptera	<i>Stenelmis douglasensis</i>	Douglas Stenelmis Riffle Beetle	X					
<b>Insects</b>	Diptera	<i>Mydas brunneus</i>	Golden Mydas Fly	ND	ND	ND	ND	ND	ND
<b>Insects</b>	Diptera	<i>Mydas tibialis</i>	Golden-legged Mydas Fly	UN	UN	UN			
<b>Insects</b>	Ephemeroptera	<i>Epeorus namatus</i>	A mayfly	ND	ND	ND	ND	ND	ND
<b>Insects</b>	Ephemeroptera	<i>Ephemerella argo</i>	Argo Ephemerellan mayfly					X	
<b>Insects</b>	Ephemeroptera	<i>Homoeoneuria ammophila</i>	A sand-filtering mayfly				X		
<b>Insects</b>	Ephemeroptera	<i>Paracloeodes minutus</i>	A small minnow mayfly			X			
<b>Insects</b>	Ephemeroptera	<i>Pentagenia robusta</i>	Robust Pentagenian Burrowing Mayfly						
<b>Insects</b>	Ephemeroptera	<i>Pentagenia vittigera</i>	A pentagenian burrowing mayfly				X		
<b>Insects</b>	Ephemeroptera	<i>Pseudiron centralis</i>	White Sand-river Mayfly				X		
<b>Insects</b>	Ephemeroptera	<i>Raptoheptagenia cruentata</i>	A flatheaded mayfly					X	
<b>Insects</b>	Ephemeroptera	<i>Siphloplecton basale</i>	A sand minnow mayfly	ND	ND	ND	ND	ND	ND
<b>Insects</b>	Ephemeroptera	<i>Siphloplecton interlineatum</i>	A sand minnow mayfly				X		
<b>Insects</b>	Ephemeroptera	<i>Spinadis simplex (wallacei)</i>	Wallace's Deepwater Mayfly					X	
<b>Insects</b>	Ephemeroptera	<i>Tortopsis primus</i>	A mayfly				X		
<b>Insects</b>	Homoptera	<i>Bruchomorpha dorsata</i>	A planthopper	UN	UN				
<b>Insects</b>	Homoptera	<i>Bruchomorpha extensa</i>	Long-nosed Elephant Hopper	UN	UN			X	
<b>Insects</b>	Homoptera	<i>Bruchomorpha oculata</i>	A planthopper	UN	UN				
<b>Insects</b>	Homoptera	<i>Chlorotettix dentatus</i>	A leafhopper	UN	UN				
<b>Insects</b>	Homoptera	<i>Chlorotettix fallax</i>	A leafhopper	UN	UN				
<b>Insects</b>	Homoptera	<i>Chlorotettix vacuna</i>	Vacant Chlorotettix	ND	ND	ND	ND	ND	ND

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Homoptera	<i>Cicadetta calliope</i>	Small Prairie Cicada	ND	ND	ND	ND	ND	ND
Insects	Homoptera	<i>Cicadula straminea</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Cosmotettix bilineatus</i>	Two-lined Cosmotettix	UN	UN				
Insects	Homoptera	<i>Dorydiella kansana</i>	A leafhopper	X	UN				
Insects	Homoptera	<i>Fitchiella robertsonii</i>	Robertson's Flightless Planthopper	ND	ND	ND	ND	ND	ND
Insects	Homoptera	<i>Flexamia pyrops</i>	Long-nosed Three-awn Leafhopper	UN	UN				
Insects	Homoptera	<i>Flexamia reflexus</i>	Indiangrass Flexamia	UN	UN	UN		X	
Insects	Homoptera	<i>Graminella mohri</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Laevicephalus acus</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Lepyronia angulifera</i>	Angular Spittlebug	ND	ND	ND	ND	ND	ND
Insects	Homoptera	<i>Lepyronia gibbosa</i>	Hill-prairie Spittlebug		X				
Insects	Homoptera	<i>Limotettix divaricatus</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Mesamia nigradorsum</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Mesamia stramineus</i>	Helianthus Leafhopper	UN	X	UN			
Insects	Homoptera	<i>Paraphilaenus parallelus</i>	A spittlebug	UN	UN				
Insects	Homoptera	<i>Paraphlepsius lobatus</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Paraphlepsius maculosus</i>	Peppered Paraphlepsius Leafhopper	UN	UN				
Insects	Homoptera	<i>Philaenarcys killa</i>	Great Lakes Dune Spittlebug	UN	UN				
Insects	Homoptera	<i>Polyamia caperata</i>	Little Bluestem Polyamia	UN	UN	UN			
Insects	Homoptera	<i>Polyamia dilata</i>	Short-winged Panic Grass Leafhopper					X	
Insects	Homoptera	<i>Polyamia herbida</i>	Prairie Panic Grass Leafhopper	UN	UN	UN		X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Homoptera	<i>Polyamia obtecta</i>	Sand Panic Grass Leafhopper	UN	UN	UN			
Insects	Homoptera	<i>Prairiana kansana</i>	Kansas prairie leafhopper	X	X	UN			
Insects	Homoptera	<i>Prosapia ignipectus</i>	Red-legged Spittlebug	UN	UN				
Insects	Homoptera	<i>Scaphoideus ochraceus</i>	A leafhopper	UN	UN				
Insects	Homoptera	<i>Texanus areolatus</i>	Spotted (Ivory) Texan Leafhopper	ND	ND	ND	ND	ND	ND
Insects	Hymenoptera	<i>Dolichoderus plagiatus</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Formica glacialis</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Formica ulkei</i>	An Ant	X					
Insects	Hymenoptera	<i>Lasius flavus</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Lasius minutus</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Lasius speculiventris</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Myrmica lobifrons</i>	An Ant	UN	UN				
Insects	Hymenoptera	<i>Solenopsis texana texana</i>	An Ant	UN	UN				
Insects	Lepidoptera	<i>Achalarus lyciades</i>	Hoary Edge	UN	UN			X	
Insects	Lepidoptera	<i>Acleris (Croesia) curvalana</i>	Blueberry Leaf-tier Moth	UN	UN				
Insects	Lepidoptera	<i>Acleris (Croesia) semipurpurana</i>	Oak Leaf-tier Moth	UN	UN				
Insects	Lepidoptera	<i>Acronicta dactylina</i>	Fingered Dagger Moth	UN	UN				
Insects	Lepidoptera	<i>Acronicta funeralis</i>	Funerary Dagger Moth	UN	UN				
Insects	Lepidoptera	<i>Aethes patricia</i>	A Moth	UN	X				
Insects	Lepidoptera	<i>Agrotis stigmata</i>	Spotted Dart Moth	UN	UN				
Insects	Lepidoptera	<i>Agrotis vetusta</i>	Old Man Dart Moth	UN	UN				
Insects	Lepidoptera	<i>Amblyscirtes aesculapius</i>	Lace-winged Roadside-Skipper					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Amblyscirtes belli</i>	Bell's Roadside-Skipper					X	
Insects	Lepidoptera	<i>Amblyscirtes hegon</i>	Pepper And Salt Skipper			UN	UN	UN	
Insects	Lepidoptera	<i>Amblyscirtes vialis</i>	Common Roadside-skipper	UN	UN	UN		X	
Insects	Lepidoptera	<i>Anaplectoides prasina</i>	Green Arches Moth	UN	UN				
Insects	Lepidoptera	<i>Ancylis semiovana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Apamea apamiformis</i>	A Noctuid Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Apamea burgessi</i>	A Noctuid Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Apamea lignicolora</i>	Wood-colored Apamea Moth	X	UN				
Insects	Lepidoptera	<i>Apamea lutosa</i>	Opalescent Apamea Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Apamea nigror</i>	Black-dashed Apamea	X	UN	UN			
Insects	Lepidoptera	<i>Apamea relicina</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Apamea verbascoides</i>	Mullein (Boreal) Apamea Moth	X					
Insects	Lepidoptera	<i>Atrytonopsis hianna</i>	Dusted Skipper	UN	X	UN		X	
Insects	Lepidoptera	<i>Autochton cellus</i>	Gold-banded Skipper					X	
Insects	Lepidoptera	<i>Bagisara rectifascia</i>	Straight Lined (Rare) Mallow Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Bellura densa</i>	Pickereelweed Borer Moth	X					
Insects	Lepidoptera	<i>Boloria selene myrina</i>	Myrina (Silver-bordered) Fritillary	UN	X				
Insects	Lepidoptera	<i>Boloria selene nebraskensis</i>	Nebraska (Silver-bordered) Fritillary	UN	X	X			
Insects	Lepidoptera	<i>Calephelis borealis</i>	Northern Metalmark	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Calephelis muticum</i>	Swamp Metalmark	X		X		X	
Insects	Lepidoptera	<i>Callophrys gryneus gryneus</i>	Olive Hairstreak	ND	ND	ND	ND	ND	ND

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Callophrys irus</i>	Frosted Elfin	UN	X				
Insects	Lepidoptera	<i>Callophrys polios</i>	Hoary Elfin	UN	UN				
Insects	Lepidoptera	<i>Calycopis cecrops</i>	Red-banded Hairstreak					X	
Insects	Lepidoptera	<i>Capis curvata</i>	Curved Halter Moth	X	X	UN			
Insects	Lepidoptera	<i>Capsula (Archanara) laeta</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Caradrina (Platyperigea) meralis</i>	(Rare) Sand Quaker Moth	UN	UN				
Insects	Lepidoptera	<i>Catocala abbreviatella</i>	Abbreviated Underwing	UN	UN				
Insects	Lepidoptera	<i>Catocala amestris</i>	Three-staff (Leadplant) Underwing	UN	X				
Insects	Lepidoptera	<i>Catocala antinympha</i>	Sweetfern Underwing	X					
Insects	Lepidoptera	<i>Catocala flebilis</i>	Mournful (Black-dashed) Underwing					X	
Insects	Lepidoptera	<i>Catocala gracilis</i>	Graceful Underwing	UN	UN				
Insects	Lepidoptera	<i>Catocala insolabilis</i>	Inconsolable Underwing	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Catocala marmorata</i>	Marbled Underwing	X			X		
Insects	Lepidoptera	<i>Catocala praeclara</i>	Praeclara Underwing Moth	X	UN	UN			
Insects	Lepidoptera	<i>Catocala relict</i>	White Underwing Moth	UN	UN				
Insects	Lepidoptera	<i>Catocala sordida</i>	Sordid (Huckleberry) Underwing Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Celastrina neglectamajor</i>	Appalachian Azure	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Celastrina nigra</i>	Dusky (Sooty) Azure					UN	UN
Insects	Lepidoptera	<i>Chlosyne harrisii</i>	Harris's Checkerspot	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Chrysanympa formosa</i>	Formosa (Huckleberry) Looper Moth	UN	UN				
Insects	Lepidoptera	<i>Cochylis ringsi</i>	A Moth		X				

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Coenochroa bipunctella</i>	Sand Dune Panic Grass Moth	UN	UN				
Insects	Lepidoptera	<i>Coenochroa illibella</i>	Dune Panic Grass Moth	UN	UN				
Insects	Lepidoptera	<i>Coenophila opacifrons</i>	(Plain-faced) Blueberry Dart Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Crambus bidens</i>	Biden's Grass-veneer Moth	UN	UN				
Insects	Lepidoptera	<i>Crambus girardellus</i>	Orange-striped Sedge Moth	X	UN				
Insects	Lepidoptera	<i>Cryptocala acadensis</i>	Catocaline Dart Moth	X					
Insects	Lepidoptera	<i>Cyclophora pendulinaria</i>	Sweetfern Geometer Moth	UN	UN				
Insects	Lepidoptera	<i>Cyenia inopinatus</i>	Unexpected Milkweed Moth	UN	UN				
Insects	Lepidoptera	<i>Cyllopsis gemma</i>	Gemmed Satyr				X	X	UN
Insects	Lepidoptera	<i>Dasychira cinnamomea</i>	Cinnamon Tussock Moth	X	UN	UN			
Insects	Lepidoptera	<i>Dasychira dorsipennata</i>	Sharp-lined (Pitch Pine) Tussock Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Digrammia (Semiothisa) mellistrigata</i>	Yellow-lined Angle Moth	UN	UN				
Insects	Lepidoptera	<i>Digrammia (Semiothisa) eremiata</i>	Three-lined Angle Moth (Goat's Rue Looper)	UN	UN				
Insects	Lepidoptera	<i>Eosphropteryx thyatyroides</i>	Pink-patched Looper Moth			UN	UN	UN	
Insects	Lepidoptera	<i>Epipaschia zelleri</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Erynnis lucilius</i>	Columbine Duskywing	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Erynnis martialis</i>	Mottled Duskywing	UN	X	UN		X	UN
Insects	Lepidoptera	<i>Erynnis persius persius</i>	Persius Duskywing	UN	UN				
Insects	Lepidoptera	<i>Ethmia monticola fuscipedella</i>	A Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Eubaphe meridiana</i>	A Moth	UN	UN				

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Euchloe olympia</i>	Olympia Marble	UN	X				
Insects	Lepidoptera	<i>Eucloptocnemis fimbriaris</i>	A Noctuid Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Eucosma albiguttana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Eucosma bilineana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Eucosma bipunctella</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Eucosma fulminana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Eucosma giganteana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	X	UN	X		X	
Insects	Lepidoptera	<i>Euphyes bimacula</i>	Two-spotted Skipper	X	X	X			
Insects	Lepidoptera	<i>Euphyes dion</i>	Dion (Sedge) Skipper	UN	UN	UN			
Insects	Lepidoptera	<i>Euphyes dukesi</i>	Dukes' (Scarce Swamp) Skipper	X		X	X		
Insects	Lepidoptera	<i>Euphyes dukesi dukesi</i>	Dukes' Skipper	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Euxoa albipennis</i>	White-striped Dart Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Euxoa aurulenta</i>	Dune Cutworm Moth	UN	UN				
Insects	Lepidoptera	<i>Exyra fax (rolandiana)</i>	Pitcher Plant (Window) Moth	X	UN	UN			
Insects	Lepidoptera	<i>Fagitana littera</i>	Marsh Fern Moth	UN	UN				
Insects	Lepidoptera	<i>Faronta rubripennis</i>	Pink Streak	UN	X	UN			
Insects	Lepidoptera	<i>Feltia (Trichosilia) manifesta</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Gabara subnivosella</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Glaucopsyche lygdamus couperi</i>	Couper's (Silvery) Blue	X	UN				
Insects	Lepidoptera	<i>Grammia anna</i>	Anna's Tiger Moth	UN	UN			X	
Insects	Lepidoptera	<i>Grammia figurata</i>	Figured Tiger Moth (Grammia)	UN	UN	UN		X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Grammia phyllira</i>	Phyllira Tiger Moth (Sand Barrens Grammia)	X	UN	UN		X	
Insects	Lepidoptera	<i>Grammia virguncula</i>	Little Virgin Tiger Moth	UN	UN				
Insects	Lepidoptera	<i>Hadena (Anepia) capsularis</i>	Starry Campion Capsule Moth	X	UN				
Insects	Lepidoptera	<i>Hadena ectypa</i>	Starry Campion (Purple Sundew) Moth	UN	X				
Insects	Lepidoptera	<i>Hemaris gracilis</i>	Graceful Clearwing (Blueberry Clearwing Sphinx)	UN	UN				
Insects	Lepidoptera	<i>Hemileuca nevadensis</i>	Nevada Buck Moth	X	UN	UN			
Insects	Lepidoptera	<i>Hemileuca nevadensis ssp. 3</i>	Great Lakes (Midwestern Fen) Buckmoth	X	UN	UN			
Insects	Lepidoptera	<i>Hempachnobia monochromatea</i>	Sundew Cutworm Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Hermeuptychia sosybius</i>	Carolina Satyr					X	
Insects	Lepidoptera	<i>Herpetogramma thestealis</i>	Zigzag Herpetogramma Moth					X	
Insects	Lepidoptera	<i>Hesperia leonardus</i>	Leonard's Skipper	UN	X			X	
Insects	Lepidoptera	<i>Hesperia metea</i>	Cobweb Skipper		X			X	
Insects	Lepidoptera	<i>Hesperia ottoe</i>	Ottoe Skipper	UN	UN				
Insects	Lepidoptera	<i>Hesperia sassacus</i>	Indian Skipper		X				
Insects	Lepidoptera	<i>Himella fidelis (intractata)</i>	Intractable Quaker Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Homophoberia cristata</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Hyphenodes caducus</i>	Large Hyphenodes	UN	UN				
Insects	Lepidoptera	<i>Hypocoena (Chortodes) inquinata</i>	Tufted Sedge Moth	X	UN	UN			
Insects	Lepidoptera	<i>Hystrichophora loricana</i>	An olethreutine moth			X			
Insects	Lepidoptera	<i>Iodopepla u-album</i>	White-eyed Borer Moth	X	UN	UN			

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Lacinipolia olivacea</i>	Olive Arches Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Lemmeria digitalis</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Lesmone detrahens</i>	Detracted Owlet	UN	UN	UN	X	X	
Insects	Lepidoptera	<i>Lethe (Enodia) anhedon</i>	Northern Pearly-eye	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Lethe (Enodia) creola</i>	Creole Pearly-eye						
Insects	Lepidoptera	<i>Lethe (Satyrodes) appalachia appalachia</i>	Appalachian Eyed Brown				X		
Insects	Lepidoptera	<i>Lethe (Satyrodes) eurydice</i>	Eyed Brown	UN	UN	X			
Insects	Lepidoptera	<i>Lethe (Satyrodes) eurydice fumosus</i>	Smoky-eyed Brown	UN	UN	X			
Insects	Lepidoptera	<i>Leucania inermis</i>	Unarmed Wainscot	X	UN	UN		X	
Insects	Lepidoptera	<i>Leucania linita</i>	Salt Marsh Wainscot	UN	UN	UN			
Insects	Lepidoptera	<i>Leucania multilinea</i>	Many-lined Wainscot Moth	X	UN	UN			
Insects	Lepidoptera	<i>Leucania scirpicola</i>	A Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Loxagrotis acclivis</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Loxagrotis grotei</i>	Grote's Black-tipped Quaker	X	UN				
Insects	Lepidoptera	<i>Lycaena dorcas dorcas</i>	Dorcas Copper	X					
Insects	Lepidoptera	<i>Lycaena epixanthe</i>	Bog Copper						
Insects	Lepidoptera	<i>Lycaena helloides</i>	Purplish Copper	X	UN	X			
Insects	Lepidoptera	<i>Lycaena xanthoides</i>	Great Copper	UN	UN				
Insects	Lepidoptera	<i>Lyttosis permagnaria</i>	A geometrid moth	UN	UN	UN			
Insects	Lepidoptera	<i>Macaria (Semiolitha) multilineata</i>	Many-lined Angle	UN	UN				
Insects	Lepidoptera	<i>Macrochilo absorptalis</i>	Slant-lined Owlet Moth	X	X	UN			
Insects	Lepidoptera	<i>Macrochilo bivittata</i>	Two-striped Cord Grass Moth	X					

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Macrochilo hypocritalis</i>	Twin-dotted Macrochilo Moth	X	X	UN			
Insects	Lepidoptera	<i>Macrochilo louisiana</i>	Louisiana Owlet Moth	UN	X				
Insects	Lepidoptera	<i>Melanchra assimilis</i>	Black (Shadowy) Arches	X					
Insects	Lepidoptera	<i>Melanomma auricinctaria</i>	(Huckleberry) Eye-spot Moth	X	UN	UN			
Insects	Lepidoptera	<i>Melipotis jucunda</i>	Merry Melipotis Moth	UN	UN				
Insects	Lepidoptera	<i>Meropleon ambifuscum</i>	Newman's Brocade	UN	UN	UN			
Insects	Lepidoptera	<i>Meropleon diversicolor</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Mesapamea stipata</i>	Four-lined Cordgrass Borer	UN	UN	UN			
Insects	Lepidoptera	<i>Metanema determinata</i>	Dark Metanema Moth	UN	UN				
Insects	Lepidoptera	<i>Metanema inatormaria</i>	Pale Metanema Moth	UN	UN				
Insects	Lepidoptera	<i>Metarranthis apiciaria</i>	Barrens Metarranthis Moth	UN	UN				
Insects	Lepidoptera	<i>Monoleuca semifascia</i>	Pin-striped Slug Moth (Zig-zag Monoleuca)	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Neodactria (Crambus) murellus</i>	A prairie sedge moth	UN	UN				
Insects	Lepidoptera	<i>Neonympha mitchellii mitchellii</i>	Mitchell's Satyr	X	UN				
Insects	Lepidoptera	<i>Nola cilicoides</i>	Blurry-patched Nola Moth	UN	UN				
Insects	Lepidoptera	<i>Nola Pustulata</i>	Sharp-blotched Nola	UN	UN				
Insects	Lepidoptera	<i>Oarisma powesheik</i>	Poweshiek Skipperling						
Insects	Lepidoptera	<i>Odontosia elegans</i>	Elegant Prominent Moth	UN	UN				
Insects	Lepidoptera	<i>Oligia bridghamii</i>	Bridgham's Brocade	X					
Insects	Lepidoptera	<i>Oligia obtusa</i>	A Noctuid Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Paectes abrostolella</i>	Barrens Paectes Moth	UN	UN			X	
Insects	Lepidoptera	<i>Pagara simplex</i>	Mouse-colored Lichen Moth		X			X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Pangrapta decoralis</i>	Decorated Owlet (Multicolored Huckleberry) Moth	UN	UN			X	
Insects	Lepidoptera	<i>Panthea furcilla</i>	Eastern Panthea Moth	X					
Insects	Lepidoptera	<i>Papaipema appassionata</i>	Pitcher Plant Borer Moth	X	UN	UN			
Insects	Lepidoptera	<i>Papaipema astuta</i>	Yellow Stoneroot Borer	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Papaipema beeriana</i>	(Beer's) Blazing Star Stem Borer	UN	X	UN		X	
Insects	Lepidoptera	<i>Papaipema cerina</i>	Golden Borer Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth						
Insects	Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema leucostigma</i>	Columbine Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema limpida</i>	Ironweed Borer Moth	X	UN	UN			
Insects	Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema marginidens</i>	Brick Red Borer Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Papaipema maritima</i>	Maritime (Giant) Sunflower Borer Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Papaipema polymniae</i>	Polymnia (Cup Plant) Borer Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Papaipema pterisii</i>	Bracken Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema rigida</i>	A borer moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema rutila</i>	Mayapple Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer	UN	UN				
Insects	Lepidoptera	<i>Papaipema silphii</i>	Silphium Borer Moth	X	UN	UN			
Insects	Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth	X	X	UN			

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Parasa indetermina</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Peoria gemmatella</i>	Gemmed Cordgrass Borer	UN	UN				
Insects	Lepidoptera	<i>Peoria tetradella</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Phalaenostola hanhami</i>	Hanham's Owlet (Rare Sedge) Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Phaneta ochroterminana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Phaneta olivaceana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Phaneta ornatula</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Phaneta striatana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Phaneta umbrastriana</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Photodes (Chortodes) enervata</i>	Many-lines Cordgrass Moth	X	UN	UN			
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) includens</i>	Included Cordgrass Borer	X	X				
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) inops</i>	Spartina Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Photodes (Spartiniphaga) panatela</i>	Northern Cordgrass Borer Moth	UN	UN				
Insects	Lepidoptera	<i>Phyciodes batesii</i>	Tawny Crescent	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Phytometra ernestinana</i>	Ernestine's Moth	UN	UN				
Insects	Lepidoptera	<i>Pieris (Artogeia) virginensis</i>	West Virginia White					X	X
Insects	Lepidoptera	<i>Pieris oleracea</i>	Eastern Veined White	X	UN	X			
Insects	Lepidoptera	<i>Plagodis kuetzingi</i>	Purple Plagodis Moth	UN	UN				
Insects	Lepidoptera	<i>Plebejus (Lycaeides) melissa samuelis</i>	Karner Blue	X	UN				

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Poanes massasoit</i>	Mulberry Wing	UN	UN				
Insects	Lepidoptera	<i>Poanes viator viator</i>	Broad-winged Skipper	X	X	X			
Insects	Lepidoptera	<i>Polites mystic</i>	Long Dash	UN	UN				
Insects	Lepidoptera	<i>Polygonia progne</i>	Gray Comma	UN	UN	UN			UN
Insects	Lepidoptera	<i>Problema byssus</i>	Byssus (Bunchgrass) Skipper	UN	X				
Insects	Lepidoptera	<i>Protorthodes incincta</i>	Banded (Saturn) Quaker	UN	UN				
Insects	Lepidoptera	<i>Pygarctia spraguei</i>	Sprague's Pygarctia	UN	UN				
Insects	Lepidoptera	<i>Pyla arenaeola</i>	A pyralid moth	UN	UN				
Insects	Lepidoptera	<i>Pyrausta laticlavia</i>	Southern Purple Mint Moth	UN	UN			X	
Insects	Lepidoptera	<i>Pyreferra ceromatica</i>	Annoited Sallow Moth						
Insects	Lepidoptera	<i>Pyreferra citrombra</i>	A Moth	UN	UN				
Insects	Lepidoptera	<i>Pyreferra hesperidago</i>	Mustard Sallow	UN	UN				
Insects	Lepidoptera	<i>Pyreferra pettiti</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Rhodoecia aurantiago</i>	Aureolaria Seed Borer	UN	UN				
Insects	Lepidoptera	<i>Satyrium (Fixsenia) favonius</i>	Oak (Northern) Hairstreak			X			
Insects	Lepidoptera	<i>Schinia indiana</i>	Phlox Moth	UN	UN				
Insects	Lepidoptera	<i>Schinia jaguarina</i>	Jaguar Flower Moth					X	
Insects	Lepidoptera	<i>Schinia lucens</i>	Leadplant Flower Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Schinia sanguinea (gloriosa)</i>	Bleeding (Glorious Blazing Star) Flower Moth	UN	X			X	
Insects	Lepidoptera	<i>Schinia septentrionalis</i>	A Noctuid Moth	UN	UN				
Insects	Lepidoptera	<i>Sciota (Nephoterix) dammersi</i>	Leadplant Leafwebber Moth	UN	UN	UN			
Insects	Lepidoptera	<i>Scirpophaga perstrialis</i>	A Moth	UN	UN				

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Lepidoptera	<i>Sitochroa dasconalis</i>	Pearly Indigo Borer	UN	UN	UN			
Insects	Lepidoptera	<i>Speyeria aphrodite</i>	Aphrodite Fritillary	UN	UN				
Insects	Lepidoptera	<i>Speyeria diana</i>	Diana Fritillary	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Speyeria idalia</i>	Regal Fritillary	X	X	X			
Insects	Lepidoptera	<i>Sphinx luscitiosa</i>	Clemens' (Luscious Willow) Sphinx	UN	UN				
Insects	Lepidoptera	<i>Spilosoma latipennis</i>	Red-legged Tussock Moth	UN	UN			X	
Insects	Lepidoptera	<i>Sympistis (Homohadena) infixa</i>	Broad-lined Sallow Moth	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Sympistis (Oncocnemis) riparia</i>	Dune Oncocnemis Moth	X					
Insects	Lepidoptera	<i>Tampa dimediatella</i>	Red-striped Panic Grass Moth	UN	UN			X	
Insects	Lepidoptera	<i>Thorybes pylades</i>	Northern Cloudywing	UN	UN	UN		X	
Insects	Lepidoptera	<i>Tricholita notata</i>	Marked Noctuid	UN	UN	UN			
Insects	Lepidoptera	<i>Ufeus plicatus</i>	Folded Satyr	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Virbia (Holomelina) opella</i>	Tawny (Smoky) Holomelina	UN	UN				
Insects	Lepidoptera	<i>Xestia youngii</i>	Young's Blueberry Dart	ND	ND	ND	ND	ND	ND
Insects	Lepidoptera	<i>Zomaria interruptolineana</i>	A Moth	UN	UN				
Insects	Mecoptera	<i>Boreus sp. 1</i>	Virginia Snow Scorpionfly	ND	ND	ND	ND	ND	ND
Insects	Mecoptera	<i>Merope tuber</i>	Earwig Scorpionfly			X		X	
Insects	Neuroptera	<i>Climacia sp. 1</i>	A spongilla fly	ND	ND	ND	ND	ND	ND
Insects	Neuroptera	<i>Lomamyia banksi</i>	A beaded lacewing	ND	ND	ND	ND	ND	ND
Insects	Neuroptera	<i>Lomamyia flavicornis</i>	A beaded lacewing	ND	ND	ND	ND	ND	ND
Insects	Neuroptera	<i>Nallachus americanus</i>	A pleasing lacewing	ND	ND	ND	ND	ND	ND
Insects	Neuroptera	<i>Polystoechotes punctatus</i>	A giant lacewing						

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Neuroptera	<i>Sisyra sp. 1</i>	Indiana Spongilla Fly			X			
Insects	Odonata	<i>Aeshna canadensis</i>	Canada Darner	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Aeshna clepsydra</i>	Mottled Darner	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Aeshna tuberculifera</i>	Black-tipped Darner	X					
Insects	Odonata	<i>Anax longipes</i>	Comet Darner	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Archilestes grandis</i>	Great Spreadwing					X	X
Insects	Odonata	<i>Arigomphus cornutus</i>	Horned Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Arigomphus furcifer</i>	Lilypad Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Arigomphus lentulus</i>	Stillwater Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Calopteryx aequabilis</i>	River Jewelwing	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Calopteryx angustipennis</i>	Appalachian Jewelwing	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Celithemis fasciata (monomelaena)</i>	Banded Pennant (Black Spotted Skimmer)	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Celithemis verna</i>	Double-ringed Pennant	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Chromagrion conditum</i>	Aurora Damselfly	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Cordulegaster bilineata</i>	Brown Spiketail	X		X	UN		
Insects	Odonata	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Cordulegaster erronea</i>	Tiger Spiketail			X	UN		
Insects	Odonata	<i>Cordulegaster maculata</i>	Twin-spotted Spiketail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Cordulegaster obliqua</i>	Arrowhead Spiketail	X		UN		X	
Insects	Odonata	<i>Dorocordulia libera</i>	Racket-tailed Emerald	X					
Insects	Odonata	<i>Enallagma annexum</i>	Northern Bluet	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Enallagma boreale</i>	Boreal Bluet	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Enallagma divagans</i>	Turquoise Bluet			X	X	X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Odonata	<i>Epitheca canis</i>	Beaverpond Baskettail					UN	UN
Insects	Odonata	<i>Epitheca spinigera</i>	Spiny Baskettail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Erpetogomphus designatus</i>	Eastern Ringtail			X	UN		
Insects	Odonata	<i>Gomphus crassus</i>	Handsome Clubtail					X	
Insects	Odonata	<i>Gomphus externus</i>	Plains Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Gomphus hybridus</i>	Cocoa Clubtail				UN	UN	
Insects	Odonata	<i>Gomphus lineatifrons</i>	Splendid Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Gomphus quadricolor</i>	Rapids Clubtail	X					
Insects	Odonata	<i>Gomphus spicatus</i>	Dusky Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Gomphus ventricosus</i>	Skillet Clubtail	X					
Insects	Odonata	<i>Gomphus viridifrons</i>	Green-faced Clubtail					X	
Insects	Odonata	<i>Hagenius brevistylus</i>	Dragonhunter	X		UN	UN	X	X
Insects	Odonata	<i>Hetaerina titia</i>	Smoky Rubyspot	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Ischnura kellicotti</i>	Lilypad Forktail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Ischnura prognata</i>	Furtive Forktail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Ladona julia</i>	Chalk-fronted Corporal (Skimmer)	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Leucorrhinia frigida</i>	Frosted Whiteface	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Macromia illinoensis georgina</i>	Georgia River Cruiser	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Macromia pacifica</i>	Gilded River Cruiser	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Macromia wabashensis</i>	Wabash River Cruiser			X			
Insects	Odonata	<i>Nannothemis bella</i>	Elfin (Dwarf) Skimmer	X					
Insects	Odonata	<i>Nehalennia gracilis</i>	Sphagnum Sprite	X					

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Odonata	<i>Nehalennia irene</i>	Sedge Sprite	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Neurocordulia molesta</i>	Smoky Shadowdragon					X	
Insects	Odonata	<i>Neurocordulia obsoleta</i>	Umber Shadowdragon	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon					X	
Insects	Odonata	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail			X			
Insects	Odonata	<i>Rhionaeschna (Aeshna) mutata</i>	Spatterdock Darner	X	UN			X	UN
Insects	Odonata	<i>Somatochlora ensigera</i>	Plains (Lemon-faced) Emerald	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Somatochlora hineana</i>	Hine's Emerald						
Insects	Odonata	<i>Somatochlora linearis</i>	Mocha Emerald	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Somatochlora tenebrosa</i>	Clamp-tipped Emerald			X			
Insects	Odonata	<i>Stylogomphus sigmastylus</i>	Interior Least Clubtail				UN	X	
Insects	Odonata	<i>Stylurus amnicola</i>	Riverine Clubtail	X		X		X	
Insects	Odonata	<i>Stylurus laurae</i>	Laura's Clubtail	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Stylurus notatus</i>	Elusive Clubtail					X	X
Insects	Odonata	<i>Stylurus scudderi</i>	Zebra Clubtail	X					
Insects	Odonata	<i>Sympetrum danae</i>	Black Meadowhawk	ND	ND	ND	ND	ND	ND
Insects	Odonata	<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk	X	UN	X			
Insects	Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail	UN		X	UN	X	UN
Insects	Orthoptera	<i>Chloealtis conspersa</i>	Sprinkled Locust	UN	UN	UN			
Insects	Orthoptera	<i>Conocephalus saltans</i>	Prairie Meadow Katydid	UN	UN				
Insects	Orthoptera	<i>Eritettix simplex</i>	Velvet-striped Grasshopper	ND	ND	ND	ND	ND	ND
Insects	Orthoptera	<i>Hesperotettix viridis</i>	Snakeweed Grasshopper	UN	UN				

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
		<i>pratensis</i>							
<b>Insects</b>	Orthoptera	<i>Melanoplus fasciatus</i>	Huckleberry Spur-throat Grasshopper	X					
<b>Insects</b>	Orthoptera	<i>Melanoplus gracilis</i>	Graceful Spur-throat Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Melanoplus tepidus</i>	Fearful Barrens Locust					X	
<b>Insects</b>	Orthoptera	<i>Melanoplus viridipes viridipes</i>	Green-legged Spur-throat Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Neoconocephalus exiliscanorus</i>	Slightly Musical Conehead Katydid	UN	UN				
<b>Insects</b>	Orthoptera	<i>Neoconocephalus nebrascensis</i>	Nebraska Conehead Katydid	UN	UN	UN			
<b>Insects</b>	Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Pardalophora phoenicoptera</i>	Orange-winged Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Paroxya atlantica</i>	Atlantic Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Paroxya hoosieri</i>	Hoosier Locust	ND	ND	ND	ND	ND	ND
<b>Insects</b>	Orthoptera	<i>Phoetaliotes nebrascensis</i>	Large-headed Grasshopper	UN	UN				
<b>Insects</b>	Orthoptera	<i>Pseudopomala brachyptera</i>	Bunch Grass Locust	UN	UN				
<b>Insects</b>	Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust	UN	UN				
<b>Insects</b>	Orthoptera	<i>Stethophyma lineatum</i>	Striped Sedge Grasshopper	ND	ND	ND	ND	ND	ND
<b>Insects</b>	Orthoptera	<i>Trimerotropis maritima</i>	Seaside Grasshopper (Dune Locust)	UN	UN				
<b>Insects</b>	Trichoptera	<i>Agapetus gelbae</i>	An agapetus caddisfly					X	

Group	Order/Class	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Insects	Trichoptera	<i>Agapetus illini</i>	An agapetus caddisfly					X	
Insects	Trichoptera	<i>Ceraclea sp. 1</i>	A sponge-feeding caddisfly	ND	ND	ND	ND	ND	ND
Insects	Trichoptera	<i>Diplectrona metaqui</i>	A diplectronan caddisfly				UN	X	
Insects	Trichoptera	<i>Goera stylata</i>	Little Gray Sedge					X	
Insects	Trichoptera	<i>Homoplectra doringa</i>	A homoplectran caddisfly				UN	X	
Insects	Trichoptera	<i>Nectopsyche pavidata</i>	A long-horned casemaker caddisfly	X				X	
Insects	Trichoptera	<i>Pycnopsyche rossi</i>	A northern casemaker caddisfly			X		X	
Insects	Trichoptera	<i>Setodes oligius</i>	A long-horned caddisfly	X					
Mollusks	Gastropoda	<i>Antroselatus spiralis</i>	Shaggy Cavesnail					X	
Mollusks	Gastropoda	<i>Campeloma decisum</i>	Pointed Campeloma	X	UN	X			
Mollusks	Gastropoda	<i>Carychium exile</i>	Ice Thorn					X	X
Mollusks	Gastropoda	<i>Fontigens cryptica</i>	Hidden Springsnail					X	UN
Mollusks	Gastropoda	<i>Lymnaea stagnalis</i>	Swamp Lymnaea	UN	UN	UN			
Mollusks	Gastropoda	<i>Xolotrema obstrictum</i>	Sharp Wedge				X		
Platyhelminths	Tricladida	<i>Sphalloplana chandleri</i>	Chandler's Cave Flatworm					X	UN
Platyhelminths	Tricladida	<i>Sphalloplana weingartneri</i>	Weingartner's Cave Flatworm					X	X







Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Collembola	<i>Sinella cavernarum</i>	A springtail							X	
Collembola	<i>Sminthurides hypogramme</i>	A springtail							X	
Collembola	<i>Sminthurides weichseli</i>	Weichsel's Springtail							X	
Collembola	<i>Tomocerus elongatus</i>	Elongate Springtail							X	
Collembola	<i>Tomocerus lamelliferus</i>	Layered Springtail							X	
Collembola	<i>Tomocerus missus</i>	Relict Cave Springtail							X	
Copepoda	<i>Bryocamptus morrisoni morrisoni</i>	Morrison's Cave Copepod							X	
Copepoda	<i>Cauloxenus stygius</i>	Northern Cavefish (Commensal) Copepod							X	
Copepoda	<i>Diacyclops jeanneli</i>	Jeannel's Groundwater Copepod							X	
Copepoda	<i>Megacyclops donaldsoni</i>	Donaldson's Cave Copepod							X	
Diplopoda	<i>Conotyla bollmani</i>	Bollman's Cave Millipede							X	
Diplopoda	<i>Pseudopolydesmus collinus</i>	A millipede							X	
Diplopoda	<i>Pseudotremia conservata</i>	TNC Cave Millipede							X	
Diplopoda	<i>Pseudotremia indianae</i>	Blue River Cave Millipede							X	
Diplopoda	<i>Pseudotremia nefanda</i>	Clark Cave (Indian Cave) Millipede							X	
Diplopoda	<i>Pseudotremia salisae</i>	Salisa's Cave Millipede							X	
Diplura	<i>Campodea plusiochaeta</i>	A dipluran							X	
Diptera	<i>Mydas brunneus</i>	Golden Mydas Fly	U	U	U	U	U	U	U	U
Diptera	<i>Mydas tibialis</i>	Golden-legged Mydas Fly	U	U	U	U	U	U	U	U
Ephemeroptera	<i>Epeorus namatus</i>	A mayfly		X						
Ephemeroptera	<i>Ephemerella argo</i>	Argo Ephemerellan mayfly		X						
Ephemeroptera	<i>Homoeoneuria ammophila</i>	A sand-filtering mayfly		X						

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Ephemeroptera	<i>Paracloeodes minutus</i>	A small minnow mayfly		X						
Ephemeroptera	<i>Pentagenia robusta</i>	Robust Pentagenian Burrowing Mayfly		X						
Ephemeroptera	<i>Pentagenia vittigera</i>	A pentagenian burrowing mayfly		X						
Ephemeroptera	<i>Pseudiron centralis</i>	White Sand-river Mayfly		X						
Ephemeroptera	<i>Raptoheptagenia cruentata</i>	A flatheaded mayfly		X						
Ephemeroptera	<i>Siphloplecton basale</i>	A sand minnow mayfly								
Ephemeroptera	<i>Siphloplecton interlineatum</i>	A sand minnow mayfly		X						
Ephemeroptera	<i>Spinadis simplex (wallacei)</i>	Wallace's Deepwater Mayfly		X						
Ephemeroptera	<i>Tortopsis primus</i>	A mayfly		X						
Gastropoda	<i>Antroselatus spiralis</i>	Shaggy Cavesnail							X	
Gastropoda	<i>Campeloma decisum</i>	Pointed Campeloma		X						
Gastropoda	<i>Carychium exile</i>	Ice Thorn			X		X		X	
Gastropoda	<i>Fontigens cryptica</i>	Hidden Springsnail							X	
Gastropoda	<i>Lymnaea stagnalis</i>	Swamp Lymnaea		X						
Gastropoda	<i>Xolotrema obstrictum</i>	Sharp Wedge	U	U	U	U	U	U	U	U
Homoptera	<i>Bruchomorpha dorsata</i>	A planthopper	U	U	U	U	U	U	U	U
Homoptera	<i>Bruchomorpha extensa</i>	Long-nosed Elephant Hopper	U	U	U	U	U	U	U	U
Homoptera	<i>Bruchomorpha oculata</i>	A planthopper	U	U	U	U	U	U	U	U
Homoptera	<i>Chlorotettix dentatus</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Chlorotettix fallax</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Chlorotettix vacuna</i>	Vacant Chlorotettix	U	U	U	U	U	U	U	U
Homoptera	<i>Cicadetta calliope</i>	Small Prairie Cicada						X		

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Homoptera	<i>Cicadula straminea</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Cosmotettix bilineatus</i>	Two-lined Cosmotettix	U	U	U	U	U	U	U	U
Homoptera	<i>Dorydiella kansana</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Fitchiella robertsonii</i>	Robertson's Flightless Planthopper						X		
Homoptera	<i>Flexamia pyrops</i>	Long-nosed Three-awn Leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Flexamia reflexus</i>	Indiangrass Flexamia	U	U	U	U	U	U	U	U
Homoptera	<i>Graminella mohri</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Laevincephalus acus</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Lepyronia angulifera</i>	Angular Spittlebug	U	U	U	U	U	U	U	U
Homoptera	<i>Lepyronia gibbosa</i>	Hill-prairie Spittlebug						X		
Homoptera	<i>Limotettix divaricatus</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Mesamia nigradorsum</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Mesamia stramineus</i>	Helianthus Leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Paraphilaenus parallelus</i>	A spittlebug	U	U	U	U	U	U	U	U
Homoptera	<i>Paraphlepsius lobatus</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Paraphlepsius maculosus</i>	Peppered Paraphlepsius Leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Philaenarcys killa</i>	Great Lakes Dune Spittlebug			X					
Homoptera	<i>Polyamia caperata</i>	Little Bluestem Polyamia						X		
Homoptera	<i>Polyamia dilata</i>	Short-winged Panic Grass Leafhopper						X		
Homoptera	<i>Polyamia herbida</i>	Prairie Panic Grass Leafhopper						X		
Homoptera	<i>Polyamia obtecta</i>	Sand Panic Grass Leafhopper						X		

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Homoptera	<i>Prairiana kansana</i>	Kansas prairie leafhopper						X		
Homoptera	<i>Prosapia ignipectus</i>	Red-legged Spittlebug	U	U	U	U	U	U	U	U
Homoptera	<i>Scaphoideus ochraceus</i>	A leafhopper	U	U	U	U	U	U	U	U
Homoptera	<i>Texananus areolatus</i>	Spotted (Ivory) Texan Leafhopper						X		
Hymenoptera	<i>Dolichoderus plagiatus</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Formica glacialis</i>	An Ant						X		X
Hymenoptera	<i>Formica ulkei</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Lasius flavus</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Lasius minutus</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Lasius speculiventris</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Myrmica lobifrons</i>	An Ant	U	U	U	U	U	U	U	U
Hymenoptera	<i>Solenopsis texana texana</i>	An Ant	U	U	U	U	U	U	U	U
Lepidoptera	<i>Achalarus lyciades</i>	Hoary Edge						X		
Lepidoptera	<i>Acleris (Croesia) curvalana</i>	Blueberry Leaf-tier Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Acleris (Croesia) semipurpurana</i>	Oak Leaf-tier Moth					X	X		
Lepidoptera	<i>Acronicta dactylina</i>	Fingered Dagger Moth					X			
Lepidoptera	<i>Acronicta funeralis</i>	Funerary Dagger Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Aethes patricia</i>	A Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Agrotis stigmata</i>	Spotted Dart Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Agrotis vetusta</i>	Old Man Dart Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Amblyscirtes aesculapius</i>	Lace-winged Roadside-Skipper					X			
Lepidoptera	<i>Amblyscirtes belli</i>	Bell's Roadside-Skipper			X	X		X		
Lepidoptera	<i>Amblyscirtes hegon</i>	Pepper And Salt Skipper					X	X		







Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Lepidoptera	<i>Eucosma giganteana</i>	A Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Euphydryas phaeton</i>	Baltimore Checkerspot						X		X
Lepidoptera	<i>Euphyes bimacula</i>	Two-spotted Skipper								X
Lepidoptera	<i>Euphyes dion</i>	Dion (Sedge) Skipper								X
Lepidoptera	<i>Euphyes dukesi</i>	Dukes' (Scarce Swamp) Skipper								X
Lepidoptera	<i>Euphyes dukesi dukesi</i>	Dukes' Skipper								X
Lepidoptera	<i>Euxoa albipennis</i>	White-striped Dart Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Euxoa aurulenta</i>	Dune Cutworm Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Exyra fax (rolandiana)</i>	Pitcher Plant (Window) Moth								X
Lepidoptera	<i>Fagitana littera</i>	Marsh Fern Moth								X
Lepidoptera	<i>Faronta rubripennis</i>	Pink Streak			X			X		
Lepidoptera	<i>Feltia (Trichosilia) manifesta</i>	A Noctuid Moth						X		
Lepidoptera	<i>Gabara subnivosella</i>	A Noctuid Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Glaucopsyche lygdamus couperi</i>	Couper's (Silvery) Blue						X		
Lepidoptera	<i>Grammia anna</i>	Anna's Tiger Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Grammia figurata</i>	Figured Tiger Moth (Grammia)	U	U	U	U	U	U	U	U
Lepidoptera	<i>Grammia phyllira</i>	Phyllira Tiger Moth (Sand Barrens Grammia)						X		
Lepidoptera	<i>Grammia virguncula</i>	Little Virgin Tiger Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Hadena (Anepia) capsularis</i>	Starry Champion Capsule Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Hadena ectypa</i>	Starry Champion (Purple Sundew) Moth						X		
Lepidoptera	<i>Hemaris gracilis</i>	Graceful Clearwing (Blueberry Clearwing Sphinx)						X		X





Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Lepidoptera	<i>Mesapamea stipata</i>	Four-lined Cordgrass Borer	U	U	U	U	U	U	U	U
Lepidoptera	<i>Metanema determinata</i>	Dark Metanema Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Metanema inatormaria</i>	Pale Metanema Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Metarranthis apiciaria</i>	Barrens Metarranthis Moth						X		
Lepidoptera	<i>Monoleuca semifascia</i>	Pin-striped Slug Moth (Zig-zag Monoleuca)	U	U	U	U	U	U	U	U
Lepidoptera	<i>Neodactria (Crambus) murellus</i>	A prairie sedge moth						X		
Lepidoptera	<i>Neonympha mitchellii mitchellii</i>	Mitchell's Satyr								X
Lepidoptera	<i>Nola cilicoides</i>	Blurry-patched Nola Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Nola Pustulata</i>	Sharp-blotched Nola								X
Lepidoptera	<i>Oarisma powesheik</i>	Poweshiek Skipperling						X		X
Lepidoptera	<i>Odontosia elegans</i>	Elegant Prominent Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Oligia bridghamii</i>	Bridgham's Brocade	U	U	U	U	U	U	U	U
Lepidoptera	<i>Oligia obtusa</i>	A Noctuid Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Paectes abrostolella</i>	Barrens Paectes Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Pagara simplex</i>	Mouse-colored Lichen Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Pangrapta decoralis</i>	Decorated Owlet (Multicolored Huckleberry) Moth						X		
Lepidoptera	<i>Panthea furcilla</i>	Eastern Panthea Moth					X			
Lepidoptera	<i>Papaipema appassionata</i>	Pitcher Plant Borer Moth						X		X
Lepidoptera	<i>Papaipema astuta</i>	Yellow Stoneroot Borer					X	X		
Lepidoptera	<i>Papaipema beeriana</i>	(Beer's) Blazing Star Stem Borer						X		X
Lepidoptera	<i>Papaipema cerina</i>	Golden Borer Moth					X	X		

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Lepidoptera	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth						X		X
Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth			X			X		X
Lepidoptera	<i>Papaipema leucostigma</i>	Columbine Borer Moth					X	X		
Lepidoptera	<i>Papaipema limpida</i>	Ironweed Borer Moth						X		X
Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth					X	X		X
Lepidoptera	<i>Papaipema marginidens</i>	Brick Red Borer Moth					X	X		
Lepidoptera	<i>Papaipema maritima</i>	Maritime (Giant) Sunflower Borer Moth						X		
Lepidoptera	<i>Papaipema polymniae</i>	Polymnia (Cup Plant) Borer Moth					X	X		
Lepidoptera	<i>Papaipema pterisii</i>	Bracken Borer Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Papaipema rigida</i>	A borer moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Papaipema rutila</i>	Mayapple Borer Moth					X	X		
Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer					X	X		X
Lepidoptera	<i>Papaipema silphii</i>	Silphium Borer Moth						X		
Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth					X	X		X
Lepidoptera	<i>Parasa indetermina</i>	A Moth					X	X		
Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak					X	X		X
Lepidoptera	<i>Peoria gemmatella</i>	Gemmed Cordgrass Borer	U	U	U	U	U	U	U	U
Lepidoptera	<i>Peoria tetradella</i>	A Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Phalaenostola hanhami</i>	Hanham's Owlet (Rare Sedge) Moth					X	X		
Lepidoptera	<i>Phaneta ochroterminana</i>	A Moth	U	U	U	U	U	U	U	U
Lepidoptera	<i>Phaneta olivaceana</i>	A Moth						X		





Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Lepidoptera	<i>Thorybes pylades</i>	Northern Cloudywing						X		
Lepidoptera	<i>Tricholita notata</i>	Marked Noctuid						X		
Lepidoptera	<i>Ufeus plicatus</i>	Folded Satyr	U	U	U	U	U	U	U	U
Lepidoptera	<i>Virbia (Holomelina) opella</i>	Tawny (Smoky) Holomelina	U	U	U	U	U	U	U	U
Lepidoptera	<i>Xestia youngii</i>	Young's Blueberry Dart	U	U	U	U	U	U	U	U
Lepidoptera	<i>Zomaria interruptolineana</i>	A Moth	U	U	U	U	U	U	U	U
Malacostraca	<i>Caecidotea jordani</i>	Jordan's Groundwater Isopod							X	
Malacostraca	<i>Caecidotea rotunda</i>	Northeastern (Frost) Cave Isopod							X	
Malacostraca	<i>Caecidotea teresae</i>	Indiana University Southeast Groundwater Isopod							X	
Malacostraca	<i>Crangonyx packardi</i>	Packard's Groundwater Amphipod		X					X	X
Malacostraca	<i>Crangonyx sp. 1</i>	Undescribed cave amphipod							X	
Malacostraca	<i>Gammarus bousfieldi</i>	Bousfield's Spring Amphipod		X					X	
Malacostraca	<i>Miktoniscus barri</i>	Barr's Terrestrial Isopod							X	
Malacostraca	<i>Orconectes indianensis</i>	Indiana Crayfish		X						
Malacostraca	<i>Orconectes inermis inermis</i>	Ghost Crayfish							X	
Malacostraca	<i>Orconectes inermis testii</i>	Unarmed (Troglobitic) Crayfish							X	
Malacostraca	<i>Stygobromus mackini</i>	Mackin's (Southwestern Virginia) Cave Amphipod							X	
Malacostraca	<i>Stygobromus sp. 2</i>	Devil's Graveyard Cave Amphipod							X	
Malacostraca	<i>Synurella dentata</i>	Dentate Amphipod							X	
Mecoptera	<i>Boreus sp. 1</i>	Virginia Snow Scorpionfly	U	U	U	U	U	U	U	U
Mecoptera	<i>Merope tuber</i>	Earwig Scorpionfly					X			

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Neuroptera	<i>Climacia sp. 1</i>	A spongilla fly	U	U	U	U	U	U	U	U
Neuroptera	<i>Lomamyia banksi</i>	A beaded lacewing	U	U	U	U	U	U	U	U
Neuroptera	<i>Lomamyia flavicornis</i>	A beaded lacewing	U	U	U	U	U	U	U	U
Neuroptera	<i>Nallachus americanus</i>	A pleasing lacewing	U	U	U	U	U	U	U	U
Neuroptera	<i>Polystoechotes punctatus</i>	A giant lacewing	U	U	U	U	U	U	U	U
Neuroptera	<i>Sisyra sp. 1</i>	Indiana Spongilla Fly		X						
Odonata	<i>Aeshna canadensis</i>	Canada Darner		X						
Odonata	<i>Aeshna clepsydra</i>	Mottled Darner		X						
Odonata	<i>Aeshna tuberculifera</i>	Black-tipped Darner		X						
Odonata	<i>Anax longipes</i>	Comet Darner		X						
Odonata	<i>Archilestes grandis</i>	Great Spreadwing		X						X
Odonata	<i>Arigomphus cornutus</i>	Horned Clubtail		X						
Odonata	<i>Arigomphus furcifer</i>	Lilypad Clubtail		X						
Odonata	<i>Arigomphus lentulus</i>	Stillwater Clubtail		X						
Odonata	<i>Calopteryx aequabilis</i>	River Jewelwing		X						
Odonata	<i>Calopteryx angustipennis</i>	Appalachian Jewelwing		X						
Odonata	<i>Celithemis fasciata (monomelaena)</i>	Banded Pennant (Black Spotted Skimmer)		X						
Odonata	<i>Celithemis verna</i>	Double-ringed Pennant		X						
Odonata	<i>Chromagrion conditum</i>	Aurora Damselfly		X						
Odonata	<i>Cordulegaster bilineata</i>	Brown Spiketail		X						
Odonata	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail		X						
Odonata	<i>Cordulegaster erronea</i>	Tiger Spiketail		X						

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Odonata	<i>Cordulegaster maculata</i>	Twin-spotted Spiketail		X						
Odonata	<i>Cordulegaster obliqua</i>	Arrowhead Spiketail		X						
Odonata	<i>Dorocordulia libera</i>	Racket-tailed Emerald		X						
Odonata	<i>Enallagma annexum</i>	Northern Bluet		X						
Odonata	<i>Enallagma boreale</i>	Boreal Bluet		X						
Odonata	<i>Enallagma divagans</i>	Turquoise Bluet		X						X
Odonata	<i>Epitheca canis</i>	Beaverpond Baskettail		X						X
Odonata	<i>Epitheca spinigera</i>	Spiny Baskettail		X						X
Odonata	<i>Erpetogomphus designatus</i>	Eastern Ringtail		X						
Odonata	<i>Gomphus crassus</i>	Handsome Clubtail		X						
Odonata	<i>Gomphus externus</i>	Plains Clubtail		X						
Odonata	<i>Gomphus hybridus</i>	Cocoa Clubtail		X						
Odonata	<i>Gomphus lineatifrons</i>	Splendid Clubtail		X						
Odonata	<i>Gomphus quadricolor</i>	Rapids Clubtail		X						
Odonata	<i>Gomphus spicatus</i>	Dusky Clubtail		X						
Odonata	<i>Gomphus ventricosus</i>	Skillet Clubtail		X						
Odonata	<i>Gomphus viridifrons</i>	Green-faced Clubtail		X						
Odonata	<i>Hagenius brevistylus</i>	Dragonhunter		X						
Odonata	<i>Hetaerina titia</i>	Smoky Rubyspot		X						
Odonata	<i>Ischnura kellicotti</i>	Lilypad Forktail		X						
Odonata	<i>Ischnura prognata</i>	Furtive Forktail		X						
Odonata	<i>Ladona julia</i>	Chalk-fronted Corporal (Skimmer)		X						
Odonata	<i>Leucorrhinia frigida</i>	Frosted Whiteface		X						

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Odonata	<i>Macromia illinoiensis georgina</i>	Georgia River Cruiser		X						
Odonata	<i>Macromia pacifica</i>	Gilded River Cruiser		X						
Odonata	<i>Macromia wabashensis</i>	Wabash River Cruiser		X						
Odonata	<i>Nannothemis bella</i>	Elfin (Dwarf) Skimmer								X
Odonata	<i>Nehalennia gracilis</i>	Sphagnum Sprite		X						
Odonata	<i>Nehalennia irene</i>	Sedge Sprite		X						
Odonata	<i>Neurocordulia molesta</i>	Smoky Shadowdragon		X						
Odonata	<i>Neurocordulia obsoleta</i>	Umber Shadowdragon		X						
Odonata	<i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon		X						
Odonata	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail		X						
Odonata	<i>Rhionaeschna (Aeshna) mutata</i>	Spatterdock Darner		X						X
Odonata	<i>Somatochlora ensigera</i>	Plains (Lemon-faced) Emerald		X						
Odonata	<i>Somatochlora hineana</i>	Hine's Emerald								X
Odonata	<i>Somatochlora linearis</i>	Mocha Emerald		X						
Odonata	<i>Somatochlora tenebrosa</i>	Clamp-tipped Emerald		X						
Odonata	<i>Stylogomphus sigmastylus</i>	Interior Least Clubtail		X						
Odonata	<i>Stylurus amnicola</i>	Riverine Clubtail		X						
Odonata	<i>Stylurus laurae</i>	Laura's Clubtail		X						
Odonata	<i>Stylurus notatus</i>	Elusive Clubtail		X						
Odonata	<i>Stylurus scudderi</i>	Zebra Clubtail		X						
Odonata	<i>Sympetrum danae</i>	Black Meadowhawk		X						
Odonata	<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk		X						
Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail		X			X	X		X

Order/Class	Scientific Name	Common Name	Agricultural Lands	Aquatic Systems	Barren Lands	Developed Lands	Forests	Grasslands	Subterranean Systems	Wetlands
Opiliones	<i>Erebomaster flavescens</i>	Golden Cave Harvestman							X	
Orthoptera	<i>Chloealtis conspersa</i>	Sprinkled Locust	X					X		
Orthoptera	<i>Conocephalus saltans</i>	Prairie Meadow Katydid						X		
Orthoptera	<i>Eritettix simplex</i>	Velvet-striped Grasshopper						X		
Orthoptera	<i>Hesperotettix viridis pratensis</i>	Snakeweed Grasshopper						X		
Orthoptera	<i>Melanoplus fasciatus</i>	Huckleberry Spur-throat Grasshopper			X			X		
Orthoptera	<i>Melanoplus gracilis</i>	Graceful Spur-throat Grasshopper						X		X
Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper			X		X	X		
Orthoptera	<i>Melanoplus tepidus</i>	Fearful Barrens Locust					X	X		
Orthoptera	<i>Melanoplus viridipes viridipes</i>	Green-legged Spur-throat Grasshopper					X	X		
Orthoptera	<i>Neoconocephalus exiliscanorus</i>	Slightly Musical Conehead Katydid	U	U	U	U	U	U	U	U
Orthoptera	<i>Neoconocephalus nebrascensis</i>	Nebraska Conehead Katydid						X		
Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper			X	X		X		X
Orthoptera	<i>Pardalophora phoenicoptera</i>	Orange-winged Grasshopper						X		
Orthoptera	<i>Paroxya atlantica</i>	Atlantic Grasshopper						X		X
Orthoptera	<i>Paroxya hoosieri</i>	Hoosier Locust						X		X
Orthoptera	<i>Phoetaliotes nebrascensis</i>	Large-headed Grasshopper	X					X		
Orthoptera	<i>Pseudopomala brachyptera</i>	Bunch Grass Locust						X		
Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust			X		X	X		
Orthoptera	<i>Stethophyma lineatum</i>	Striped Sedge Grasshopper						X		X
Orthoptera	<i>Trimerotropis maritima</i>	Seaside Grasshopper (Dune Locust)	X		X			X		







Order/Class	Scientific Name	Common Name	Large Rivers	Medium Rivers	Streams	Creeks	Springs/Brooks	Riffles	Lakes	Ponds
Malacostraca	<i>Crangonyx packardi</i>	Packard's Groundwater Amphipod				X	X			
Malacostraca	<i>Gammarus bousfieldi</i>	Bousfield's Spring Amphipod	X							
Malacostraca	<i>Orconectes indianensis</i>	Indiana Crayfish <sup>3</sup>		X	X	X				
Neuroptera	<i>Sisyra sp. 1</i>	Indiana Spongilla Fly	U	U	U	U	U	U	U	U
Odonata	<i>Aeshna canadensis</i>	Canada Darner			X				X	X
Odonata	<i>Aeshna clepsydra</i>	Mottled Darner			X				X	X
Odonata	<i>Aeshna tuberculifera</i>	Black-tipped Darner			X				X	X
Odonata	<i>Anax longipes</i>	Comet Darner			X				X	X
Odonata	<i>Archilestes grandis</i>	Great Spreadwing					X			
Odonata	<i>Arigomphus cornutus</i>	Horned Clubtail		X	X		X			
Odonata	<i>Arigomphus furcifer</i>	Lilypad Clubtail		X	X		X			
Odonata	<i>Arigomphus lentulus</i>	Stillwater Clubtail		X	X		X			
Odonata	<i>Calopteryx aequabilis</i>	River Jewelwing		X		X		X		
Odonata	<i>Calopteryx angustipennis</i>	Appalachian Jewelwing		X	X				X	X
Odonata	<i>Celithemis fasciata (monomelaena)</i>	Banded Pennant (Black Spotted Skimmer)	U	U	U	U	U	U	U	U
Odonata	<i>Celithemis verna</i>	Double-ringed Pennant							X	X
Odonata	<i>Chromagrion conditum</i>	Aurora Damsel			X	X	X		X	
Odonata	<i>Cordulegaster bilineata</i>	Brown Spiketail	U	U	U	U	U	U	U	U
Odonata	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail	U	U	U	U	U	U	U	U
Odonata	<i>Cordulegaster erronea</i>	Tiger Spiketail	U	U	U	U	U	U	U	U
Odonata	<i>Cordulegaster maculata</i>	Twin-spotted Spiketail		X	X					
Odonata	<i>Cordulegaster obliqua</i>	Arrowhead Spiketail			X	X				





Order/Class	Scientific Name	Common Name	Large Rivers	Medium Rivers	Streams	Creeks	Springs/Brooks	Riffles	Lakes	Ponds
Trichoptera	<i>Diplectrona metaqui</i>	A diplectronan caddisfly	U	U	U	U	U	U	U	U
Trichoptera	<i>Goera stylata</i>	Little Gray Sedge	U	U	U	U	U	U	U	U
Trichoptera	<i>Homoplectra doringa</i>	A homoplectran caddisfly	U	U	U	U	U	U	U	U
Trichoptera	<i>Nectopsyche pavidata</i>	A long-horned casemaker caddisfly	U	U	U	U	U	U	U	U
Trichoptera	<i>Pycnopsyche rossi</i>	A northern casemaker caddisfly		X	X					
Trichoptera	<i>Setodes oligius</i>	A long-horned caddisfly	U	U	U	U	U	U	U	U

<sup>1</sup>Narrowly restricted to riparian cobblestone habitat, cobblestone islands, rocky shores, or unvegetated patches

<sup>2</sup>Inhabits shallow water in lakes

<sup>3</sup>Presence is correlated with rock cobble or boulder habitat

**Table E-5.** Subhabitat associations for invertebrate (not including Freshwater Mussels) SGCN in barren lands.

X – Occurrence

Order/Class	Scientific Name	Common Name	Sand/Dunes	Bare Rock/Talus	Rock Outcrops
Coleoptera	<i>Cicindela patruela</i>	Northern Barrens Tiger Beetle		X	
Gastropoda	<i>Carychium exile</i>	Ice Thorn		X	
Homoptera	<i>Philaenarcys killa</i>	Great Lakes Dune Spittlebug	X		
Lepidoptera	<i>Amblyscirtes belli</i>	Bell's Roadside-Skipper			
Lepidoptera	<i>Atrytonopsis hianna</i>	Dusted Skipper			X
Lepidoptera	<i>Calephelis borealis</i>	Northern Metalmark			X
Lepidoptera	<i>Callophrys irus</i>	Frosted Elfin			X
Lepidoptera	<i>Calycopis cecrops</i>	Red-banded Hairstreak			
Lepidoptera	<i>Coenochroa bipunctella</i>	Sand Dune Panic Grass Moth	X		
Lepidoptera	<i>Coenochroa illibella</i>	Dune Panic Grass Moth	X		
Lepidoptera	<i>Euchloe olympia</i>	Olympia Marble	X		
Lepidoptera	<i>Faronta rubripennis</i>	Pink Streak	X		
Lepidoptera	<i>Hermeuptychia sosybius</i>	Carolina Satyr			
Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth	X		
Lepidoptera	<i>Plebejus (Lycaeides) melissa samuelis</i>	Karner Blue	X		
Lepidoptera	<i>Schinia sanguinea (gloriosa)</i>	Bleeding (Glorious Blazing Star) Flower Moth	X		
Lepidoptera	<i>Sympistis (Oncoctenemis) riparia</i>	Dune Oncoctenemis Moth	X		
Orthoptera	<i>Melanoplus fasciatus</i>	Huckleberry Spur-throat Grasshopper	X		
Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper		X	
Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper			
Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust	X		

Orthoptera	<i>Trimerotropis maritima</i>	Seaside Grasshopper (Dune Locust)	X		
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**Table E-6.** Subhabitat associations for invertebrate (not including Freshwater Mussels) SGCN in forests.

U – Subhabitat associations unknown or unclear. More specific habitat requirements are given in footnotes where information was available.

Order/Class	Scientific Name	Common Name	Deciduous & Evergreen Forests	Forested Riparian Zones	Forest Openings	Forest Edges
Coleoptera	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle		X		
Coleoptera	<i>Dryobius sexnotatus</i>	Six-banded Longhorn Beetle	X			
Coleoptera	<i>Dynastes tityus</i>	Eastern Hercules (Unicorn) Beetle	X <sup>1</sup>			
Coleoptera	<i>Nicrophorus americanus</i>	American Burying Beetle	X			
Gastropoda	<i>Carychium exile</i>	Ice Thorn		X		
Lepidoptera	<i>Acleris (Croesia) semipurpurana</i>	Oak Leaf-tier Moth	X			
Lepidoptera	<i>Acronicta dactylina</i>	Fingered Dagger Moth	X			
Lepidoptera	<i>Amblyscirtes aesculapius</i>	Lace-winged Roadside-Skipper	X	X <sup>2</sup>		
Lepidoptera	<i>Amblyscirtes hegon</i>	Pepper And Salt Skipper		X		X
Lepidoptera	<i>Amblyscirtes vialis</i>	Common Roadside-skipper		X	X	X
Lepidoptera	<i>Autochton cellus</i>	Gold-banded Skipper		X		
Lepidoptera	<i>Calephelis borealis</i>	Northern Metalmark			X	X
Lepidoptera	<i>Calephelis muticum</i>	Swamp Metalmark		X		
Lepidoptera	<i>Catocala amestris</i>	Three-staff (Leadplant) Underwing			X	
Lepidoptera	<i>Catocala flebilis</i>	Mournful (Black-dashed) Underwing	X			
Lepidoptera	<i>Catocala gracilis</i>	Graceful Underwing	X			
Lepidoptera	<i>Catocala insolabilis</i>	Inconsolable Underwing	X			
Lepidoptera	<i>Catocala marmorata</i>	Marbled Underwing		X		
Lepidoptera	<i>Catocala praeclara</i>	Praeclara Underwing Moth	X			

Order/Class	Scientific Name	Common Name	Deciduous & Evergreen Forests	Forested Riparian Zones	Forest Openings	Forest Edges
Lepidoptera	<i>Catocala relictata</i>	White Underwing Moth	X			
Lepidoptera	<i>Catocala sordida</i>	Sordid (Huckleberry) Underwing Moth	X			
Lepidoptera	<i>Celastrina neglectamajor</i>	Appalachian Azure		X		
Lepidoptera	<i>Celastrina nigra</i>	Dusky (Sooty) Azure	X <sup>3</sup>			
Lepidoptera	<i>Chrysanympa formosa</i>	Formosa (Huckleberry) Looper Moth	X			
Lepidoptera	<i>Cryptocala acadiensis</i>	Catocaline Dart Moth	X			
Lepidoptera	<i>Cyllopsis gemma</i>	Gemmed Satyr		X		
Lepidoptera	<i>Eosphropteryx thyatyroides</i>	Pink-patched Looper Moth			X	
Lepidoptera	<i>Erynnis martialis</i>	Mottled Duskywing			X	
Lepidoptera	<i>Lethe (Enodia) anhedon</i>	Northern Pearly-eye	X	X		
Lepidoptera	<i>Lethe (Enodia) creola</i>	Creole Pearly-eye	X			
Lepidoptera	<i>Lytrosis permagnaria</i>	A geometrid moth	X			
Lepidoptera	<i>Melanchra assimilis</i>	Black (Shadowy) Arches		X		
Lepidoptera	<i>Meropleon ambifuscum</i>	Newman's Brocade			X	
Lepidoptera	<i>Panthea furcilla</i>	Eastern Panthea Moth	X			
Lepidoptera	<i>Papaipema astuta</i>	Yellow Stoneroot Borer	X			
Lepidoptera	<i>Papaipema cerina</i>	Golden Borer Moth	X			
Lepidoptera	<i>Papaipema leucostigma</i>	Columbine Borer Moth	X			
Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth				X
Lepidoptera	<i>Papaipema marginidens</i>	Brick Red Borer Moth	X			X
Lepidoptera	<i>Papaipema polymniae</i>	Polymnia (Cup Plant) Borer Moth	X	X		X
Lepidoptera	<i>Papaipema rutila</i>	Mayapple Borer Moth	X			
Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer	X			
Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth		X		

Order/Class	Scientific Name	Common Name	Deciduous & Evergreen Forests	Forested Riparian Zones	Forest Openings	Forest Edges
Lepidoptera	<i>Parasa indetermina</i>	A Moth	X			
Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak	X			
Lepidoptera	<i>Phalaenostola hanhami</i>	Hanham's Owlet (Rare Sedge) Moth			X	X
Lepidoptera	<i>Pieris (Artogeia) virginiensis</i>	West Virginia White	X			
Lepidoptera	<i>Polygonia progne</i>	Gray Comma		X		
Lepidoptera	<i>Pyreferra ceromatica</i>	Anointed Sallow Moth	X			
Lepidoptera	<i>Rhodoecia aurantiago</i>	Aureolaria Seed Borer	X			
Lepidoptera	<i>Sphinx luscitiosa</i>	Clemens' (Luscious Willow) Sphinx			X	X
Mecoptera	<i>Merope tuber</i>	Earwig Scorpionfly		X		
Odonata	<i>Cordulegaster bilineata</i>	Brown Spiketail		U		
Odonata	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail		U		
Odonata	<i>Cordulegaster erronea</i>	Tiger Spiketail		U		
Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail	X	X		
Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper				X
Orthoptera	<i>Melanoplus tepidus</i>	Fearful Barrens Locust				X
Orthoptera	<i>Melanoplus viridipes viridipes</i>	Green-legged Spur-throat Grasshopper			X	
Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust	X			

<sup>1</sup>Associated with ash and oak

<sup>2</sup>Can be associated with canebreaks

**Table E-7.** Subhabitat associations for invertebrate (other than Freshwater Mussels) SGCN in grasslands.

X – Occurrence, U – Subhabitat associations unknown or unclear. More specific habitat requirements are given in footnotes where information was available.

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
Coleoptera	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle								X
Coleoptera	<i>Cicindela patruela</i>	Northern Barrens Tiger Beetle				X	X			
Homoptera	<i>Cicadetta calliope</i>	Small Prairie Cicada	U	U	U					
Homoptera	<i>Fitchiella robertsonii</i>	Robertson's Flightless Planthopper			X					
Homoptera	<i>Lepyronia gibbosa</i>	Hill-prairie Spittlebug	U	U	U					
Homoptera	<i>Polyamia caperata</i>	Little Bluestem Polyamia	U	U	U					
Homoptera	<i>Polyamia dilata</i>	Short-winged Panic Grass Leafhopper	U	U	U					
Homoptera	<i>Polyamia herbida</i>	Prairie Panic Grass Leafhopper	U	U	U					
Homoptera	<i>Polyamia obtecta</i>	Sand Panic Grass Leafhopper	U	U	U					
Homoptera	<i>Prairiana kansana</i>	Kansas prairie leafhopper	U	U	U					
Homoptera	<i>Texananus areolatus</i>	Spotted (Ivory) Texan Leafhopper			X					
Hymenoptera	<i>Formica glacialis</i>	An Ant	X		X					
Lepidoptera	<i>Achalarus lyciades</i>	Hoary Edge <sup>1</sup>		X		X	X	X		
Lepidoptera	<i>Acleris (Croesia) semipurpurana</i>	Oak Leaf-tier Moth					X	X		
Lepidoptera	<i>Amblyscirtes belli</i>	Bell's Roadside-Skipper					X			X
Lepidoptera	<i>Amblyscirtes hegon</i>	Pepper And Salt Skipper							X	
Lepidoptera	<i>Amblyscirtes vialis</i>	Common Roadside-skipper					X	X	X	
Lepidoptera	<i>Atrytonopsis hianna</i>	Dusted Skipper <sup>2</sup>		X	X	X	X	X	X	
Lepidoptera	<i>Autochton cellus</i>	Gold-banded Skipper				X	X			

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
Lepidoptera	<i>Boloria selene myrina</i>	Myrina (Silver-bordered) Fritillary	X							
Lepidoptera	<i>Boloria selene nebraskensis</i>	Nebraska (Silver-bordered) Fritillary	U	U	U					
Lepidoptera	<i>Calephelis borealis</i>	Northern Metalmark <sup>3</sup>					X		X	
Lepidoptera	<i>Callophrys irus</i>	Frosted Elfin	X			X	X	X	X	
Lepidoptera	<i>Callophrys polios</i>	Hoary Elfin				X	X		X	
Lepidoptera	<i>Calycopis cecrops</i>	Red-banded Hairstreak		X		X	X	X		
Lepidoptera	<i>Caradrina (Platyperigea) meralis</i>	(Rare) Sand Quaker Moth	X	X	X					
Lepidoptera	<i>Catocala abbreviatella</i>	Abbreviated Underwing			X				X	
Lepidoptera	<i>Catocala amestris</i>	Three-staff (Leadplant) Underwing <sup>4</sup>			X				X	
Lepidoptera	<i>Chlosyne harrisii</i>	Harris's Checkerspot	X	X		X				X
Lepidoptera	<i>Chrysanympa formosa</i>	Formosa (Huckleberry) Looper Moth					X			
Lepidoptera	<i>Cochylis ringsi</i>	A Moth	U	U	U					
Lepidoptera	<i>Cycnia inopinatus</i>	Unexpected Milkweed Moth							X	
Lepidoptera	<i>Cyllopsis gemma</i>	Gemmed Satyr					X	X		
Lepidoptera	<i>Eosphoropteryx thyatyroides</i>	Pink-patched Looper Moth	X				X			
Lepidoptera	<i>Erynnis lucilius</i>	Columbine Duskywing					X	X	X	
Lepidoptera	<i>Erynnis martialis</i>	Mottled Duskywing <sup>5</sup>	X			X	X		X	
Lepidoptera	<i>Erynnis persius persius</i>	Persius Duskywing					X	X	X	
Lepidoptera	<i>Euchloe olympia</i>	Olympia Marble	X			X	X	X	X	
Lepidoptera	<i>Eucoptocnemis fimbriaris</i>	A Noctuid Moth			X					
Lepidoptera	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	X	X			X			X
Lepidoptera	<i>Faronta rubripennis</i>	Pink Streak	X	X		X		X		
Lepidoptera	<i>Feltia (Trichosilia) manifesta</i>	A Noctuid Moth				X	X	X		

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
Lepidoptera	<i>Glaucopsyche lygdamus couperi</i>	Couper's (Silvery) Blue	U	U	U					
Lepidoptera	<i>Grammia phyllira</i>	Phyllira Tiger Moth (Sand Barrens Grammia)		X					X	
Lepidoptera	<i>Hadena ectypa</i>	Starry Campion (Purple Sundew) Moth	X				X	X		
Lepidoptera	<i>Hemaris gracilis</i>	Graceful Clearwing (Blueberry Clearwing Sphinx)				X	X	X		
Lepidoptera	<i>Hermeuptychia sosybius</i>	Carolina Satyr	X				X	X		X
Lepidoptera	<i>Herpetogramma thestealis</i>	Zigzag Herpetogramma Moth	X	X						
Lepidoptera	<i>Hesperia leonardus</i>	Leonard's Skipper		X		X	X	X		
Lepidoptera	<i>Hesperia metea</i>	Cobweb Skipper	X			X	X	X	X	
Lepidoptera	<i>Hesperia ottoe</i>	Ottoe Skipper	X		X					
Lepidoptera	<i>Hesperia sassacus</i>	Indian Skipper	X	X		X	X	X		
Lepidoptera	<i>Himella fidelis (intractata)</i>	Intractable Quaker Moth					X			
Lepidoptera	<i>Lethe (Enodia) anthedon</i>	Northern Pearly-eye					X			
Lepidoptera	<i>Lethe (Enodia) creola</i>	Creole Pearly-eye					X			
Lepidoptera	<i>Lycaena helloides</i>	Purplish Copper	X	X						X
Lepidoptera	<i>Lycaena xanthoides</i>	Great Copper	X							X
Lepidoptera	<i>Macrochilo bivittata</i>	Two-striped Cord Grass Moth	U	U	U					
Lepidoptera	<i>Melanchra assimilis</i>	Black (Shadowy) Arches	X							
Lepidoptera	<i>Meropleon ambifuscum</i>	Newman's Brocade			X					
Lepidoptera	<i>Metarranthis apiciaria</i>	Barrens Metarranthis Moth					X	X	X	
Lepidoptera	<i>Neodactria (Crambus) murellus</i>	A prairie sedge moth			X					
Lepidoptera	<i>Oarisma powesheik</i>	Poweshiek Skipperling	X							
Lepidoptera	<i>Pangrapta decoralis</i>	Decorated Owlet (Multicolored)				X	X			

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
		Huckleberry) Moth								
Lepidoptera	<i>Papaipema appassionata</i>	Pitcher Plant Borer Moth					X			
Lepidoptera	<i>Papaipema astuta</i>	Yellow Stoneroot Borer					X			
Lepidoptera	<i>Papaipema beeriana</i>	(Beer's) Blazing Star Stem Borer	X							
Lepidoptera	<i>Papaipema cerina</i>	Golden Borer Moth	X				X			
Lepidoptera	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	X				X	X		
Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth								X
Lepidoptera	<i>Papaipema leucostigma</i>	Columbine Borer Moth					X			
Lepidoptera	<i>Papaipema limpida</i>	Ironweed Borer Moth	X	X						
Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth					X	X	X	
Lepidoptera	<i>Papaipema marginidens</i>	Brick Red Borer Moth		X			X			
Lepidoptera	<i>Papaipema maritima</i>	Maritime (Giant) Sunflower Borer Moth	X		X	X				
Lepidoptera	<i>Papaipema polymniae</i>	Polymnia (Cup Plant) Borer Moth					X			
Lepidoptera	<i>Papaipema rutila</i>	Mayapple Borer Moth					X			
Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer	X	X			X			
Lepidoptera	<i>Papaipema silphii</i>	Silphium Borer Moth	X		X					
Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth					X			
Lepidoptera	<i>Parasa indetermina</i>	A Moth				X				
Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak				X	X			
Lepidoptera	<i>Phalaenostola hanhami</i>	Hanham's Owlet (Rare Sedge) Moth	X							
Lepidoptera	<i>Phaneta olivaceana</i>	A Moth			X					
Lepidoptera	<i>Photedes (Spartiniphaga) includens</i>	Included Cordgrass Borer	X							
Lepidoptera	<i>Photedes (Spartiniphaga) inops</i>	Spartina Borer Moth	X							

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
Lepidoptera	<i>Phyciodes batesii</i>	Tawny Crescent	X	X		X	X	X		
Lepidoptera	<i>Pieris oleracea</i>	Eastern Veined White <sup>6</sup>	X				X			
Lepidoptera	<i>Plebejus (Lycaeides) melissa samuelis</i>	Karner Blue <sup>7</sup>	X	X			X	X	X	
Lepidoptera	<i>Polites mystic</i>	Long Dash	X	X						X
Lepidoptera	<i>Polygonia progne</i>	Gray Comma					X			
Lepidoptera	<i>Problema byssus</i>	Byssus (Bunchgrass) Skipper	X				X	X		
Lepidoptera	<i>Pygarctia spraguei</i>	Sprague's Pygarctia	X					X		
Lepidoptera	<i>Pyreferra ceromatica</i>	Anointed Sallow Moth					X			
Lepidoptera	<i>Rhodoecia aurantiago</i>	Aureolaria Seed Borer					X	X		
Lepidoptera	<i>Satyrium (Fixsenia) favonius</i>	Oak (Northern) Hairstreak <sup>8</sup>				X	X	X	X	
Lepidoptera	<i>Schinia indiana</i>	Phlox Moth <sup>9</sup>	X				X	X		
Lepidoptera	<i>Schinia jaguarina</i>	Jaguar Flower Moth	X							
Lepidoptera	<i>Schinia lucens</i>	Leadplant Flower Moth	X		X				X	
Lepidoptera	<i>Schinia sanguinea (gloriosa)</i>	Bleeding (Glorious Blazing Star) Flower Moth			X				X	
Lepidoptera	<i>Schinia septentrionalis</i>	A Noctuid Moth	X	X				X		
Lepidoptera	<i>Speyeria aphrodite</i>	Aphrodite Fritillary	X	X		X	X	X		
Lepidoptera	<i>Speyeria diana</i>	Diana Fritillary	X				X	X		X
Lepidoptera	<i>Speyeria idalia</i>	Regal Fritillary	X	X				X		X
Lepidoptera	<i>Sphinx luscitiosa</i>	Clemens' (Luscious Willow) Sphinx	X							
Lepidoptera	<i>Thorybes pylades</i>	Northern Cloudywing	X	X		X	X	X		
Lepidoptera	<i>Tricholita notata</i>	Marked Noctuid			X					
Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail					X			

Order/Class	Scientific Name	Common Name	Herbaceous Grasslands	Old Fields	Prairies	Shrublands	Woodlands	Savannas	Barrens & Glades	Grassy Riparian Zones
Orthoptera	<i>Chloealtis conspersa</i>	Sprinkled Locust				X	X			
Orthoptera	<i>Conocephalus saltans</i>	Prairie Meadow Katydid	X	X	X					
Orthoptera	<i>Eritettix simplex</i>	Velvet-striped Grasshopper	X							
Orthoptera	<i>Hesperotettix viridis pratensis</i>	Snakeweed Grasshopper	U	U	U					
Orthoptera	<i>Melanoplus fasciatus</i>	Huckleberry Spur-throat Grasshopper					X			
Orthoptera	<i>Melanoplus gracilis</i>	Graceful Spur-throat Grasshopper	X	X			X			
Orthoptera	<i>Melanoplus keeleri luridus</i>	Keeler's Spur-throat Grasshopper	X						X	
Orthoptera	<i>Melanoplus tepidus</i>	Fearful Barrens Locust					X			
Orthoptera	<i>Melanoplus viridipes viridipes</i>	Green-legged Spur-throat Grasshopper					X			
Orthoptera	<i>Neoconocephalus nebrascensis</i>	Nebraska Conehead Katydid	X	X						
Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper	X				X			X
Orthoptera	<i>Pardalophora phoenicoptera</i>	Orange-winged Grasshopper	X	X			X			
Orthoptera	<i>Paroxya atlantica</i>	Atlantic Grasshopper	X							
Orthoptera	<i>Paroxya hoosieri</i>	Hoosier Locust	X							X
Orthoptera	<i>Phoetaliotes nebrascensis</i>	Large-headed Grasshopper	X							
Orthoptera	<i>Pseudopomala brachyptera</i>	Bunch Grass Locust	X							X
Orthoptera	<i>Psinidia fenestralis</i>	Sand Locust	X				X			
Orthoptera	<i>Stethophyma lineatum</i>	Striped Sedge Grasshopper	X							
Orthoptera	<i>Trimerotropis maritima</i>	Seaside Grasshopper (Dune Locust)	X							

<sup>1</sup>Hostplants are usually species of *Desmodium* (tick-trefoil).

<sup>2</sup>Dependent on well-managed airports and rights of ways on remnant prairie preserves

<sup>3</sup>Larvae feed only on leaves of round-leaved ragwort (*Packera obovata*).

<sup>4</sup>Larvae feed exclusively on leadplant (*Amphora canescens*).

<sup>5</sup>Has similar management needs as the Karner Blue

<sup>6</sup>May require a complex of moist woods, grassland, and shrubby wetland

<sup>7</sup>Dependent on large areas of lupine

<sup>8</sup>Larvae rely on the new growth of oaks.

<sup>9</sup>Relies on flowering *Phlox pilosa*

**Table E-8.** Subhabitat associations for invertebrate (other than Freshwater Mussels) SGCN in subterranean systems.

X – Occurrence

Order/Class	Scientific Name	Common Name	Subaquatic	Subterrestrial
Actinedida	<i>Hamohalacarus subterraneus</i>	Donaldson Cave Water Mite	X	
Araneae	<i>Anahita punctulata</i>	Southeastern Wandering Spider		X
Araneae	<i>Porrhomma cavernicola</i>	Cavernicolous Sheet-web (Appalachian Cave) Spider		X
Coleoptera	<i>Aleochara lucifuga</i>	A rove beetle		X
Coleoptera	<i>Atheta annexa</i>	A rove beetle		X
Coleoptera	<i>Atheta trogliphila</i>	Cave-loving Rove Beetle		X
Coleoptera	<i>Batrisodes krekeri</i>	Krekeler's Cave Ant Beetle		X
Coleoptera	<i>Pseudanophthalmus barri</i>	Barr's Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus chthonius</i>	A cave ground beetle		X
Coleoptera	<i>Pseudanophthalmus emersoni</i>	Emerson's Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus eremita</i>	Wyandotte Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus jeanneli</i>	A cave beetle		X
Coleoptera	<i>Pseudanophthalmus leonae</i>	Leona's Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus shilohensis</i>	Shiloh Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus shilohensis mayfieldensis</i>	Monroe Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus stricticollis</i>	Marengo Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus tenuis</i>	Blue River Cave Ground Beetle		X
Coleoptera	<i>Pseudanophthalmus youngi</i>	Young's Cave Ground Beetle		X
Collembola	<i>Anurida harti</i>	Hart's Springtail		X
Collembola	<i>Arrhopalites ater</i>	Black Medusa Cave Springtail		X
Collembola	<i>Arrhopalites benitus</i>	A springtail		X

Order/Class	Scientific Name	Common Name	Subaquatic	Subterrstitial
Collembola	<i>Arrhopalites bimus</i>	Two Year Cave Springtail		X
Collembola	<i>Arrhopalites lewisi</i>	Lewis's Cave Springtail		X
Collembola	<i>Dicyrtoma flammea</i>	Flaming Springtail		X
Collembola	<i>Folsomia prima</i>	Primitive Springtail		X
Collembola	<i>Folsomides americanus</i>	A springtail		X
Collembola	<i>Hypogastrura gibbosus</i>	A springtail		X
Collembola	<i>Hypogastrura helena</i>	Helen's Springtail		X
Collembola	<i>Hypogastrura horrida</i>	Bristly Springtail		X
Collembola	<i>Hypogastrura lucifuga</i>	Wyandotte Cave Springtail		X
Collembola	<i>Hypogastrura maheuxi</i>	Maheux Springtail		X
Collembola	<i>Hypogastrura succinea</i>	Girded Springtail		X
Collembola	<i>Isotoma anglicana</i>	A springtail		X
Collembola	<i>Isotoma caeruleatra</i>	Blue Springtail		X
Collembola	<i>Isotoma christianseni</i>	Christiansen's Springtail		X
Collembola	<i>Isotoma nigrifrons</i>	Dark Springtail		X
Collembola	<i>Isotoma nixonii</i>	Nixon's Springtail		X
Collembola	<i>Isotoma torilidae</i>	A springtail		X
Collembola	<i>Isotoma truncata</i>	Truncated Springtail		X
Collembola	<i>Isotomiella minor</i>	Petit Springtail		X
Collembola	<i>Onychiurus casus</i>	Fallen Springtail		X
Collembola	<i>Onychiurus reluctus</i>	A springtail		X
Collembola	<i>Onychiurus subtenuis</i>	Slender Springtail		X
Collembola	<i>Pseudosinella aera</i>	A cave obligate springtail		X
Collembola	<i>Pseudosinella argentea</i>	A springtail		X

Order/Class	Scientific Name	Common Name	Subaquatic	Subterrestrial
Collembola	<i>Pseudosinella collina</i>	Hilly Springtail		X
Collembola	<i>Pseudosinella fonsa</i>	Fountain Cave Springtail		X
Collembola	<i>Sensillanura barberi</i>	Barber's Springtail		X
Collembola	<i>Sensillanura caeca</i>	Blind Springtail		X
Collembola	<i>Sinella alata</i>	Indiana Cave Springtail		X
Collembola	<i>Sinella avita</i>	Ancestral Springtail		X
Collembola	<i>Sinella barri</i>	Barr's Cave Springtail		X
Collembola	<i>Sinella cavernarum</i>	A springtail		X
Collembola	<i>Sminthurides hypogramme</i>	A springtail		X
Collembola	<i>Sminthurides weichseli</i>	Weichsel's Springtail		X
Collembola	<i>Tomocerus elongatus</i>	Elongate Springtail		X
Collembola	<i>Tomocerus lamelliferus</i>	Layered Springtail		X
Collembola	<i>Tomocerus missus</i>	Relict Cave Springtail		X
Copepoda	<i>Bryocamptus morrisoni morrisoni</i>	Morrison's Cave Copepod	X	
Copepoda	<i>Cauloxenus stygius</i>	Northern Cavefish (Commensal) Copepod	X	
Copepoda	<i>Diacyclops jeanneli</i>	Jeannel's Groundwater Copepod	X	
Copepoda	<i>Megacyclops donaldsoni</i>	Donaldson's Cave Copepod	X	
Diplopoda	<i>Conotyla bollmani</i>	Bollman's Cave Millipede		X
Diplopoda	<i>Pseudopolydesmus collinus</i>	A millipede		X
Diplopoda	<i>Pseudotremia conservata</i>	TNC Cave Millipede		X
Diplopoda	<i>Pseudotremia indianae</i>	Blue River Cave Millipede		X
Diplopoda	<i>Pseudotremia nefanda</i>	Clark Cave (Indian Cave) Millipede		X
Diplopoda	<i>Pseudotremia salisae</i>	Salisa's Cave Millipede		X
Diplura	<i>Campodea plusiochaeta</i>	A dipluran		X

Order/Class	Scientific Name	Common Name	Subaquatic	Subterrestrial
Gastropoda	<i>Antroselatus spiralis</i>	Shaggy Cavesnail	X	
Gastropoda	<i>Carychium exile</i>	Ice Thorn		X
Gastropoda	<i>Fontigens cryptica</i>	Hidden Springsnail	X	
Malacostraca	<i>Caecidotea jordani</i>	Jordan's Groundwater Isopod	X	
Malacostraca	<i>Caecidotea rotunda</i>	Northeastern (Frost) Cave Isopod	X	
Malacostraca	<i>Caecidotea teresae</i>	Indiana University Southeast Groundwater Isopod	X	
Malacostraca	<i>Crangonyx packardi</i>	Packard's Groundwater Amphipod	X	
Malacostraca	<i>Crangonyx sp. 1</i>	Undescribed cave amphipod	X	
Malacostraca	<i>Gammarus bousfieldi</i>	Bousfield's Spring Amphipod	X	
Malacostraca	<i>Miktoniscus barri</i>	Barr's Terrestrial Isopod		X
Malacostraca	<i>Orconectes inermis inermis</i>	Ghost Crayfish	X	
Malacostraca	<i>Orconectes inermis testii</i>	Unarmed (Troglotic) Crayfish	X	
Malacostraca	<i>Stygobromus mackini</i>	Mackin's (Southwestern Virginia) Cave Amphipod	X	
Malacostraca	<i>Stygobromus sp. 2</i>	Devil's Graveyard Cave Amphipod	X	
Malacostraca	<i>Synurella dentata</i>	Dentate Amphipod	X	
Opiliones	<i>Erebomaster flavescens</i>	Golden Cave Harvestman		X
Ostracoda	<i>Dactylocythere susanae</i>	An ostracod	X	
Ostracoda	<i>Pseudocandona jeanneli</i>	Jeannel's Groundwater Ostracod	X	
Ostracoda	<i>Pseudocandona marengoensis</i>	Marengo Cave Ostracod	X	
Ostracoda	<i>Sagittocythere barri</i>	Barr's Commensal (Ectocommensal) Cave Ostracod	X	
Pseudoscorpions	<i>Apochthonius indianensis</i>	Indiana Cave Pseudoscorpion		X
Pseudoscorpions	<i>Chthonius virginicus</i>	A pseudoscorpion		X
Pseudoscorpions	<i>Hesperocheles mirabilis</i>	Southeastern Cave Pseudoscorpion		X

Order/Class	Scientific Name	Common Name	Subaquatic	Subterrrestrial
s				
Pseudoscorpione s	<i>Kleptochthonius packardi</i>	Packard's Cave Pseudoscorpion		X
Tricladida	<i>Sphalloplana chandleri</i>	Chandler's Cave Flatworm	X	
Tricladida	<i>Sphalloplana weingartneri</i>	Weingartner's Cave Flatworm	X	

**Table E-9.** Subhabitat associations for invertebrate (other than Freshwater Mussels) SGCN in wetlands.

X – Occurrence, U – Subhabitat associations unknown or unclear. More specific habitat requirements are given in footnotes where information was available.

Order/Class	Scientific Name	Common Name	Vernal pools	Bogs/ Fens	Herbaceous Wetlands	Shrub Wetlands	Forested Wetlands
Branchiopoda	<i>Lyneus brachyurus</i>	Holarctic Clam Shrimp	X				
Hymenoptera	<i>Formica glacialis</i>	An Ant		X	X		
Lepidoptera	<i>Atrytonopsis hianna</i>	Dusted Skipper		X			
Lepidoptera	<i>Autochton cellus</i>	Gold-banded Skipper					X
Lepidoptera	<i>Bellura densa</i>	Pickerelweed Borer Moth		X	X		
Lepidoptera	<i>Boloria selene myrina</i>	Myrina (Silver-bordered) Fritillary		X	X		
Lepidoptera	<i>Boloria selene nebraskensis</i>	Nebraska (Silver-bordered) Fritillary	U	U	U	U	U
Lepidoptera	<i>Calephelis muticum</i>	Swamp Metalmark <sup>1</sup>		X	X	X	
Lepidoptera	<i>Callophrys polios</i>	Hoary Elfin		X			
Lepidoptera	<i>Catocala marmorata</i>	Marbled Underwing					X
Lepidoptera	<i>Chlosyne harrisii</i>	Harris's Checkerspot <sup>2</sup>		X	X	X	
Lepidoptera	<i>Coenophila opacifrons</i>	(Plain-faced) Blueberry Dart Moth		X			
Lepidoptera	<i>Crambus bidens</i>	Biden's Grass-veneer Moth		X			
Lepidoptera	<i>Cyllopsis gemma</i>	Gemmed Satyr					X
Lepidoptera	<i>Euphydryas phaeton</i>	Baltimore Checkerspot		X	X	X	
Lepidoptera	<i>Euphyes bimacula</i>	Two-spotted Skipper		X	X	X	

Order/Class	Scientific Name	Common Name	Vernal pools	Bogs/ Fens	Herbaceous Wetlands	Shrub Wetlands	Forested Wetlands
Lepidoptera	<i>Euphyes dion</i>	Dion (Sedge) Skipper		X	X	X	
Lepidoptera	<i>Euphyes dukesi</i>	Dukes' (Scarce Swamp) Skipper		X			X
Lepidoptera	<i>Euphyes dukesi dukesi</i>	Dukes' Skipper		X			X
Lepidoptera	<i>Exyra fax (rolandiana)</i>	Pitcher Plant (Window) Moth	U	U	U	U	U
Lepidoptera	<i>Fagitana littera</i>	Marsh Fern Moth	U	U	U	U	U
Lepidoptera	<i>Hemaris gracilis</i>	Graceful Clearwing (Blueberry Clearwing Sphinx)		X		X	
Lepidoptera	<i>Hemileuca nevadensis</i>	Nevada Buck Moth	U	U	U	U	U
Lepidoptera	<i>Hemileuca nevadensis ssp. 3</i>	Great Lakes (Midwestern Fen) Buckmoth		X		X	
Lepidoptera	<i>Hemipachnobia monochromatea</i>	Sundew Cutworm Moth		X	X	X	X
Lepidoptera	<i>Hermeuptychia sosybius</i>	Carolina Satyr					X
Lepidoptera	<i>Lethe (Enodia) anthedon</i>	Northern Pearly-eye					X
Lepidoptera	<i>Lethe (Enodia) creola</i>	Creole Pearly-eye					X
Lepidoptera	<i>Lethe (Satyrodes) appalachia appalachia</i>	Appalachian Eyed Brown		X		X	X
Lepidoptera	<i>Lethe (Satyrodes) eurydice</i>	Eyed Brown		X	X	X	
Lepidoptera	<i>Lethe (Satyrodes) eurydice fumosus</i>	Smoky-eyed Brown		X	X		
Lepidoptera	<i>Lycaena epixanthe</i>	Bog Copper	U	U	U	U	U
Lepidoptera	<i>Lycaena xanthoides</i>	Great Copper			X		
Lepidoptera	<i>Macrochilo hypocriticalis</i>	Twin-dotted Macrochilo Moth			X		
Lepidoptera	<i>Macrochilo louisiana</i>	Louisiana Owlet Moth		X	X		
Lepidoptera	<i>Melanchra assimilis</i>	Black (Shadowy) Arches		X			

Order/Class	Scientific Name	Common Name	Vernal pools	Bogs/ Fens	Herbaceous Wetlands	Shrub Wetlands	Forested Wetlands
Lepidoptera	<i>Meropleon ambifuscum</i>	Newman's Brocade	X	X	X		
Lepidoptera	<i>Neonympha mitchellii mitchellii</i>	Mitchell's Satyr <sup>3</sup>		X	X		
Lepidoptera	<i>Nola Pustulata</i>	Sharp-blotched Nola		X	X	X	
Lepidoptera	<i>Oarisma powesheik</i>	Poweshiek Skipperling		X	X		
Lepidoptera	<i>Papaipema appassionata</i>	Pitcher Plant Borer Moth		X <sup>4</sup>		X	X
Lepidoptera	<i>Papaipema beeriana</i>	(Beer's) Blazing Star Stem Borer		X	X		
Lepidoptera	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth			X		
Lepidoptera	<i>Papaipema harrisii</i>	Heracleum Stem Borer Moth		X	X	X	
Lepidoptera	<i>Papaipema limpida</i>	Ironweed Borer Moth		X	X	X	
Lepidoptera	<i>Papaipema lysimachiae</i>	Loosestrife (St. John's Wort) Borer Moth		X	X	X	X
Lepidoptera	<i>Papaipema sciata</i>	Culver's Root Borer			X	X	
Lepidoptera	<i>Papaipema speciosissima</i>	Osmunda (Royal Fern) Borer Moth		X		X	X
Lepidoptera	<i>Parrhasius m-album</i>	White-m Hairstreak					X
Lepidoptera	<i>Photedes (Spartiniphaga) includens</i>	Included Cordgrass Borer			X		
Lepidoptera	<i>Photedes (Spartiniphaga) inops</i>	Spartina Borer Moth			X		
Lepidoptera	<i>Pieris (Artogeia) virginienensis</i>	West Virginia White					X
Lepidoptera	<i>Pieris oleracea</i>	Eastern Veined White <sup>5</sup>		X		X	X
Lepidoptera	<i>Poanes massasoit</i>	Mulberry Wing		X	X	X	X
Lepidoptera	<i>Poanes viator viator</i>	Broad-winged Skipper <sup>6</sup>		X	X	X	
Lepidoptera	<i>Polites mystic</i>	Long Dash		X	X		
Lepidoptera	<i>Polygona progne</i>	Gray Comma		X			X

Order/Class	Scientific Name	Common Name	Vernal pools	Bogs/ Fens	Herbaceous Wetlands	Shrub Wetlands	Forested Wetlands
Lepidoptera	<i>Problema byssus</i>	Byssus (Bunchgrass) Skipper			X		
Lepidoptera	<i>Speyeria diana</i>	Diana Fritillary				X	X
Lepidoptera	<i>Speyeria idalia</i>	Regal Fritillary		X	X		
Malacostraca	<i>Crangonyx packardi</i>	Packard's Groundwater Amphipod	X				
Odonata	<i>Archilestes grandis</i>	Great Spreadwing	X				
Odonata	<i>Enallagma divagans</i>	Turquoise Bluet		X			
Odonata	<i>Epitheca canis</i>	Beaverpond Baskettail			X		
Odonata	<i>Epitheca spinigera</i>	Spiny Baskettail			X		
Odonata	<i>Nannothemis bella</i>	Elfin (Dwarf) Skimmer		X			
Odonata	<i>Rhionaeschna (Aeshna) mutata</i>	Spatterdock Darner		X			
Odonata	<i>Somatochlora hineana</i>	Hine's Emerald		X	X		
Odonata	<i>Tachopteryx thoreyi</i>	Gray Petaltail					X
Orthoptera	<i>Melanoplus gracilis</i>	Graceful Spur-throat Grasshopper			X		
Orthoptera	<i>Orphulella pelidna</i>	Spotted-winged (Green Desert) Grasshopper			X		
Orthoptera	<i>Paroxya atlantica</i>	Atlantic Grasshopper			X		
Orthoptera	<i>Paroxya hoosieri</i>	Hoosier Locust		X	X		
Orthoptera	<i>Stethophyma lineatum</i>	Striped Sedge Grasshopper		X	X	X	

<sup>1</sup>Larvae feed on swamp thistle (*Cirsium muticum*).

<sup>2</sup>Relies on foodplant flat-topped aster (*Aster umbellatus*); there is concern about impacts from purple loostrife

<sup>3</sup>Restricted to calcareous sedge wetlands

<sup>4</sup>Can occur in any habitat with pitcher plants

<sup>5</sup>May require a complex of moist woods, grassland, and shrubby wetland

<sup>6</sup>Requires sedge habitats

## Appendix F. Detailed Methods for Individual Landscape-level Models.

### Outline

- A. Introduction
- B. Species With Published Models
  - 1. Northern Bobwhite
  - 2. Henslow's Sparrow
  - 3. Cerulean Warbler
  - 4. American Woodcock
  - 5. Eastern Red Bat
  - 6. Prairie Warbler
  - 7. Ruffed Grouse
  - 8. Timber Rattlesnake
  - 9. Red-headed Woodpecker
- C. Species Without Published Models
  - 1. Northern Leopard Frog
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  - 4. Blanding's Turtle
  - 5. Swamp Rabbit
- D. References

### A. Introduction

Landscape-level models were used to objectively quantify current habitat conditions for wildlife in Indiana using GIS analysis.

The parameters built into the models included many different aspects of landscape composition and configuration—for example, how habitat cover types were interspersed, habitat patch sizes/degree of fragmentation, distance from one habitat feature to another, or density of roads or developed areas. The number and types of parameters used varied with each species (see below).

The models were set up to calculate individual suitability indices (SIs), which are denoted  $SI_1$ ,  $SI_2$ ,  $SI_3$ , etc. Each SI represented one parameter of habitat quality as it pertained to the focal species (e.g., density of developed areas). Each SI produced a calculated value of relative habitat quality for the focal species ranging from 0 (unsuitable) to 1 (perfectly suitable) for each 30×30 meter cell (i.e., map pixel) in a planning region. SIs were then combined in a final equation (habitat suitability index, or HSI), frequently using a geometric mean, to determine overall habitat quality given the values of each individual SI for each cell. To calculate the SIs, a variety of patch-definition and distance algorithms were used, depending on the requirements of the focal species. Frequently, a moving-window analysis was used to assess the proportion of different habitat requisites within a defined area (usually the species' average home range), and those proportions were compared to what was believed to be the ideal interspersion of habitat types and resources. In this way, these models took into account that habitat suitability of a species is a function of multiple cover types, and not simply an association with one cover type, as was a common assumption in the 2005 SWAP.

These models incorporated spatial context into wildlife-habitat relationships.

*Input data* – All of the models were built and run with the NLCD 2011 land cover data (Jin et al. 2013), and in a few cases (noted below), the Indiana GAP land cover data (U.S. Geological Survey 2011). For some species, landscape-level models had already been published (references are noted below), and modified versions of these off-the-shelf models were applied to Indiana landscapes. The input data used in the published models varied, and many times the input layers used to produce the published models were not readily accessible. Therefore, the published models were simplified to accommodate the data that was available and the most useful for describing habitat conditions for the SWAP (land cover data). For species without published models, models were developed from scratch, based on summaries of species' habitat requirements in published literature.

*Model results* – After running a model (i.e., one species in one planning region), each cell contained in the region was assigned a particular value of habitat quality ranging from 0 to 1 (see maps in Regional Chapters). Because the models were landscape-level and did not necessarily take into account all of the possible local details that make a habitat of high or low quality for a species, they are not intended to serve as predictors of a species' presence, although they can give some overview of potential hotspot areas. For the purposes of the SWAP, when all the species in a region were taken together, they gave a good objective measure of current habitat condition. The original intent was to run the models with future conditions—alternative landscape scenarios that would be based on the outcome of different combinations of conservation actions—but as described in Chapter V, this endeavor was, at present, too abstract a question to be useful. Another option considered was running the models with landscapes simulated every decade up to 2050 by Tayyebi et al. (2013), which would have been used to represent a landscape of no action and a baseline against which to compare the alternative action scenarios. These maps simulate urban expansion in the U.S. over the next 50 years but not overall land use change, so their utility on their own for purposes of the SWAP may be limited.

Models were built for 14 representative species, and methods for each are detailed below. A total of 38 models were run, with six to seven species representing each region (note: a species could represent more than one region).

## ***B. Species With Published Models***

### **1. NORTHERN BOBWHITE**

A habitat suitability model published in Rittenhouse et al. (2007) was used for the Northern Bobwhite. The model was implemented exactly as described, because there were no differences in available input data between their model and ours (only NLCD land cover data was used).

Elements of the Northern Bobwhite habitat suitability model included the relative values of grassland, cropland, and woody edge as habitat, and the interspersion of these habitats.

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify grassland habitat, which would be used by bobwhites for nest sites, cover, and food. An evaluation of land cover type in each cell was conducted, and the Reclassify tool was used to set  $SI_1 = 0.50$  if the land cover type was grassland/herbaceous or hay/pasture and  $SI_1 = 0.00$  otherwise.
- $SI_2$  – The second suitability index was used to identify agricultural food sources.

An evaluation of land cover type in each cell was conducted, and the Reclassify tool was used to set  $SI_2 = 0.40$  if land cover type was cultivated crops and  $SI_2 = 0.00$  otherwise.

- $SI_3$  – The third suitability index was used to identify woody edges adjacent to grassland or agricultural habitat, which are often used for escape cover. A 60-meter moving window was used to identify forest or shrubland within 30 meters of grassland or agricultural land. This was accomplished by first identifying grassland and cropland as in the steps above. Then, a Focal Statistics tool was used to sum all grassland or cropland cells within a circle with a 2-cell (60-meter) radius using a moving window. If the center pixel in the moving window contained forest (deciduous, evergreen, and mixed forest) or shrubland, and the remaining cells contained either grassland or agricultural land,  $SI_3 = 0.30$  for the center pixel. Otherwise,  $SI_3 = 0.00$ .
- $SI_4$  – The fourth suitability index was used to evaluate interspersions of grassland, cropland, and woody edge. The proportion of grassland, cropland, and woody edge was evaluated using a moving window with a 360-meter radius (~40.7 ha, the maximum average bobwhite home range in this area). The calculated interspersions of habitat types were evaluated against ideal proportions: grassland = 0.22, cropland = 0.47, woody cover = 0.31.  $SI_4 = 0.50$  if the observed proportion in the moving window equaled the ideal proportion. The SI value declined toward 0 as a function of the difference between the observed proportion in the moving window and the ideal proportion:  $SI_4 = 0.5 * ((1 - |observed\ proportion\ grassland - 0.22|) * (1 - |observed\ proportion\ cropland - 0.47|) * (1 - |observed\ proportion\ woody\ cover - 0.31|))$ .
- $SI_5$  – The fifth suitability index was used to zero out roads and urban areas (i.e., non-habitat) that were assigned a suitability value during calculations of  $SI_4$ .  $SI_5 = 1.00$  for forest, shrubland, grassland, and cropland. Otherwise,  $SI_5 = 0.00$ .

#### Overall HSI

The final habitat suitability value was the sum of (1) the maximum value of  $SI_1$ ,  $SI_2$ , and  $SI_3$ ; and (2) the product of  $SI_4$  and  $SI_5$ :  $HSI = \text{maximum}(\text{maximum}(SI_1, SI_2), SI_3) + (SI_4 \times SI_5)$ .

## **2. HENSLOW'S SPARROW**

A habitat suitability model published in Rittenhouse et al. (2007) was used for Henslow's Sparrow. The model was implemented exactly as described, because there were no differences in available input data between their model and ours (only NLCD land cover data was used).

Elements of the Henslow's Sparrow habitat suitability model included the value of grasslands, grassland patch size requirements (a cell's value increased as patch size increased, with only patches  $\geq 10$  ha having a non-zero value), and the reduced value of grassland edges (grasslands within 30 meters of edge were considered unsuitable).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify grasslands as breeding habitat. The Reclassify tool was used to set  $SI_1 = 1.00$  if the land cover type was grassland/herbaceous or hay/pasture, and  $SI_1 = 0.00$  otherwise.
- $SI_2$  – The second suitability index was used to address the Henslow's Sparrow's grassland area requirements (patch size). Patch sizes of grasslands were calculated by first aggregating grassland cells into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in each of those patches and converting to ha.  $SI_2 = 0.01$  for 10-ha patches,  $SI_2 = 0.50$  for 55-ha patches, and  $SI_2 = 1.00$  for 100-ha

patches. Values for all other patches were fit using a sigmoid function:  $SI_2 = 1.0090 / (1 + e^{-1 * (\text{patch size} - 55.1692) / 9.5151})$ .  $SI_2$  was assigned to all grassland cells (i.e., where  $SI_1$  equaled 1) where patch size was >10 ha. For grassland patches  $\leq 10$  ha,  $SI_2 = 0.00$ .

- $SI_3$  – The third suitability index was used to reduce the value of grassland habitat adjacent to non-grassland habitat. A moving window of 3×3 cells was applied to grassland cells (i.e., where  $SI_1$  equaled 1) using the Focal Statistics tool. The moving window assessed the land cover types within the window and assigned  $SI_3 = 0.00$  to the center pixel if the window contained non-grassland habitat, so that grassland immediately adjacent to edges would have no suitability value. Otherwise, the center pixel retained the value assigned in  $SI_1$  (1.00).

#### Overall HSI

The final habitat suitability value was the geometric mean of  $SI_1$  and  $SI_2$ , multiplied by  $SI_3$  to impose the edge-sensitive penalty:  $HSI = (\sqrt{SI_1 \times SI_2}) \times SI_3$ .

### **3. CERULEAN WARBLER**

A habitat suitability model published in Rittenhouse et al. (2007) was used for Cerulean Warblers. Due to incomplete data on forest stand age, the model was modified so that the Indiana GAP land cover data could substitute for stand age data, with its more precise identification of early successional areas than the NLCD land cover data. Complete data on forest tree species composition was also not available, so the model was simplified to identify just deciduous and mixed forest cover, rather than assigning values to various tree species.

Elements of the Cerulean Warbler habitat suitability model included identification of deciduous and mixed forest habitat, reduced value of early successional habitat relative to higher-quality mature forest habitat, and mature forest patch size (a cell's value increased as patch size increased).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable breeding habitat. The published model identified specific tree species used for nesting; deciduous and mixed forest cover was identified as suitable for breeding. The Reclassify tool was used to set  $SI_1 = 1.00$  if land cover type was deciduous forest or mixed forest, and  $SI_1 = 0.00$  otherwise.
- $SI_2$  – The second suitability index was used to identify mature forest within forest habitat identified in  $SI_1$ . The published model used a data layer of forest stand age and ecological land type, with values increasing as stand age increased. These layers were not available, so the Indiana GAP land cover data was used to identify and zero out early successional areas. First, the Reclassify tool was used to identify the following GAP land cover types: harvested-grass/forb, harvested-shrub, disturbed/successional-grass/forb, disturbed/successional-shrub. This result was then combined with the output from  $SI_1$ , and if a breeding habitat identified in  $SI_1$  was identified as an early successional area in  $SI_2$ ,  $SI_2 = 0.00$ . The remaining cells constituted areas of mature forest and were set  $SI_2 = 1.00$ .
- $SI_3$  – The third suitability index was used to address Cerulean Warbler forest patch size requirements. Patch sizes of mature forest were calculated by first aggregating mature forest cells into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in each of those patches and converting to ha.  $SI_3 = 0.01$  for 100-ha patches,  $SI_3 = 0.10$  for 700-ha patches, and  $SI_3 = 1.00$  for patches  $\geq 3000$  ha. Values for all other patches were fit using a sigmoid function:  $SI_3 = 1.002 / (1 + e^{-1 * (\text{patch size} - 1173.6472)})$

<sup>215.5805</sup>)).  $SI_3$  was assigned to all mature forest cells (i.e., where  $SI_2$  equaled 1) where patch size was  $\geq 100$  ha. For patches  $< 100$  ha,  $SI_3 = 0.00$ .

#### Overall HSI

The final habitat suitability value was the geometric mean of  $SI_2$  and  $SI_3$ :  $HSI = \sqrt{(SI_2 \times SI_3)}$ .

#### **4. AMERICAN WOODCOCK**

A habitat suitability model published in Rittenhouse et al. (2007) was used for American Woodcock. Their model was simplified since complete data on tree species composition and forest stand age was not available.

Elements of the American Woodcock habitat suitability model included the identification of habitat for diurnal cover, nesting, brood-rearing, roosting, and display, as well as the interspersions of these habitats.

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify land cover types suitable for nest sites and diurnal cover. The published model used forest species composition data to identify these areas. Because this data was not available, cover was identified as suitable for nest sites and diurnal cover. The reclassify tool was used on the NLCD data to set  $SI_1 = 1.00$  if land cover type was deciduous forest, mixed forest, or shrubland, and  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to identify early successional areas for nest sites and brood-rearing habitat. The published model used forest stand age and ecological land type to identify these areas, with quality decreasing as stand age increased. Because this data was not available, Indiana GAP land cover data was substituted. The Reclassify tool was used to identify the following land cover types: harvested-shrub and disturbed/successional-shrub.  $SI_2 = 1.00$  if the cell contained these cover types. Otherwise,  $SI_2 = 0.00$ .
- $SI_3$  – The third suitability index was used to identify open areas suitable for display and roosting. The published model used forest stand age and ecological land type data, but Indiana GAP land cover data was substituted. The Reclassify tool to identify the following land cover types: central tallgrass prairie, disturbed/successional-grass/forb, harvested-grass/forb, north-central interior sand/gravel tallgrass prairie, pasture/hay, recently burned shrubland.  $SI_3 = 1.00$  if the cell contained these cover types. Otherwise,  $SI_3 = 0.00$ .
- $SI_4$  – The fourth suitability index was used to evaluate the interspersions of nesting/foraging habitat and display habitat. The proportion of early successional habitat ( $SI_2$ ) and open habitat ( $SI_3$ ) was evaluated using a moving window with a 200-meter radius (corresponds to the median distance between diurnal sites and singing grounds and average total home range size). The ideal proportions cited by Rittenhouse et al. (2007) were approximately 0.8 nesting/foraging habitat (early successional/forest) to 0.2 display habitat (open). The calculated proportions of these habitats were evaluated against the ideal proportions.  $SI_4 = 1.00$  if the observed proportion in the moving window equaled the ideal proportion. The  $SI$  value declined toward 0 as a function of the difference between the observed proportion in the moving window and the ideal proportion:  $SI_4 = 1.00 * ((1 - |\text{observed proportion early successional}-0.8|) * (1 - |\text{observed proportion open habitat}-0.2|))$ .

### Overall HSI

SI<sub>1</sub>, SI<sub>2</sub>, and SI<sub>3</sub> were added together to identify all potential suitable habitat and re-assigned all cells where habitat was present to a value of 1. The final habitat suitability value was the geometric mean of the resulting layer and SI<sub>4</sub>:  $HSI = \sqrt{(SI_{123} \times SI_4)}$ .

## **5. EASTERN RED BAT**

A habitat suitability model published in Larson et al. (2003) was used for the Eastern Red Bat. The published model was simplified where necessary to make up for the lack of forest stand age and ecological land type data. A habitat interspersion was also added as a variable because the simplified model was overly simplistic and unrealistic.

Elements of the red bat habitat suitability model included the identification of roosting habitat and foraging habitat, the distance to surface water from roosting habitat (value decreased as distance to surface water increased), and the interspersion of roosting habitat (forest) and foraging habitat (forest edges).

### Suitability Indices

- SI<sub>1</sub> – The first suitability index was used to identify roosting habitat for red bats (forested habitat). The Reclassify tool was used on the NLCD data layer to set SI<sub>1</sub> = 1.00 if land cover type was deciduous forest, evergreen forest, or mixed forest. Otherwise, SI<sub>1</sub> = 0.00.
- SI<sub>2</sub> – The second suitability index was used to identify foraging habitat for red bats (forest edges). The Focal Statistics tool was used on the resulting SI<sub>1</sub> layer to identify forest edges using a 3×3-cell rectangular moving window. SI<sub>2</sub> = 1.00 if the cell contained forest edge habitat. Otherwise, SI<sub>2</sub> = 0.00.
- SI<sub>3</sub> – The third suitability index was used to evaluate the distance from roosting habitat to surface water, and increase the value of roosting habitat closest to surface water. To accomplish this, the Reclassify tool was used on the NLCD data layer (open water, woody wetlands, and emergent herbaceous wetlands) to identify surface water, including wetlands. The Euclidean Distance tool was then used to determine the distance from every cell to the nearest surface water and converting to km. A subset of the resulting layer was taken to create a new layer that contained only the distance from roosting habitat (i.e., where SI<sub>1</sub> = 1.00) to surface water. Following the citations in Larson et al. (2003), SI<sub>3</sub> = 1.00 where the distance to surface water was <0.75 km and SI<sub>3</sub> = 0.00 where the distance was >1.5 km. To assign value to cells >0.75 km but <1.5 km from surface water, an equation was applied which was derived from Larson et al. (2003, Figure 24):  $SI_3 = (-1.333 \times distance) + 2$ .
- SI<sub>4</sub> – The fourth suitability index was used to evaluate the interspersion of roosting and foraging habitats. The proportion of roosting habitat (SI<sub>1</sub>) and foraging habitat (SI<sub>2</sub>) was evaluated using a moving window with a 16-cell radius (corresponds to average home range size in this region; Walters et al. 2007). The ideal proportions of roosting to foraging habitat were set at 0.7:0.3. The calculated proportions of these habitats were evaluated against the ideal proportions. SI<sub>4</sub> = 1.00 if the observed proportion in the moving window equaled the ideal proportion. The SI value declined toward 0 as a function of the difference between the observed proportion in the moving window and the ideal proportion:  $SI_4 = 1.00 * ((1 - |observed\ proportion\ forest - 0.7|) * (1 - |observed\ proportion\ forest\ edge - 0.3|))$ .

### Overall HSI

The final habitat suitability value was the geometric mean of SI<sub>3</sub> and SI<sub>4</sub>:  $HSI = \sqrt{(SI_3 \times SI_4)}$ .

## 6. PRAIRIE WARBLER

A habitat suitability model published in Larson et al. (2003) was used for the Prairie Warbler. The model was simplified because data layers were not available for forest stand age.

Elements of the Prairie Warbler habitat suitability model included the relative value of forest and early successional habitat, habitat patch size (value increased as patch size increased), and the reduced value of habitat edges for nesting.

### Suitability Indices

- $SI_1$  – The first suitability index was used to define and assign value to suitable habitat patches. The Reclassify tool was used on the NLCD data layer to identify suitable habitat.  $SI_1 = 1.00$  if the cell was classified as shrubland,  $SI_1 = 0.30$  if the cell was deciduous forest, evergreen forest, or mixed forest, otherwise,  $SI_1 = 0.00$ . The Indiana GAP data was used to identify early successional habitat.  $SI_1 = 1.00$  if the cell was classified as harvested-shrub or disturbed/successional-shrub. Results from NLCD and GAP were combined.
- $SI_2$  – The second suitability index was used to address Prairie Warbler habitat patch size requirements. Patch sizes of habitat (forest, shrub, and early successional) were calculated by first aggregating habitat cells into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in the each of those patches and converting to ha.  $SI_2 = 1.00$  for patches  $>3.51$  ha and  $SI_2 = 0.00$  for patches  $<0.36$  ha. For patches  $<3.51$  ha but  $>0.36$  ha, the equation  $SI_2 = (0.32 \times \text{patch size}) - 0.13$  was applied (Larson et al. 2003; Figure 11).  $SI_2$  was assigned to all cells containing suitable habitat (i.e., where  $SI_1 > 0$ ).
- $SI_3$  – The third suitability index was used to reduce the value of forest edges, as habitat quality for Prairie Warblers may be lower near edges, where they avoid nesting. First, habitat edges were identified using the Focal Statistics tool with a 3×3-cell rectangular moving window.  $SI_3 = 1.00$  for habitat interior and  $SI_3 = 0.50$  for habitat edges; otherwise,  $SI_3 = 0.00$ .

### Overall HSI

The final habitat suitability value was the geometric mean of  $SI_1$  and  $SI_2$ , multiplied by  $SI_3$  to apply the edge-sensitive penalty:  $HSI = (\sqrt{SI_1 \times SI_2}) \times SI_3$ .

## 7. RUFFED GROUSE

A habitat suitability model published in Rittenhouse et al. (2007) was used for Ruffed Grouse. The published model was simplified since GIS data was not available for mast production, forest stand age, or ecological land type.

Elements of the Ruffed Grouse habitat suitability model included the value of early successional and deciduous forest habitat, patch size of early successional habitat, minimum habitat area requirements, and interspersions of early successional and deciduous forest habitat.

### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable habitat for Ruffed Grouse. Grouse are associated with early successional habitat and forage for in deciduous forests. The Reclassify tool was used on the Indiana GAP land cover data to identify early successional habitat.  $SI_1 = 1.00$  if the cell contained harvested-shrub or disturbed/successional-shrub. The Reclassify tool was also used on the NLCD land cover data to identify deciduous forest.  $SI_1 =$

1.00 if the cell contained deciduous forest. The combination of the resulting layers from GAP and NLCD constituted  $SI_1$ . Otherwise,  $SI_1 = 0.00$ .

- $SI_2$  – The second suitability index was used to address patch size requirements for early successional habitat. Patch size of early successional habitat was calculated by first aggregating early successional cells (identified in  $SI_1$ ) into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in each of those patches and converting to ha.  $SI_2 = 1.00$  for patches >4 ha. For patches <4 ha, equation  $SI_2 = patch\ size / 4$  was applied.
- $SI_3$  – The third suitability index was used to address the minimum forest area requirement for Ruffed Grouse. This included the combination of early successional habitat and surrounding deciduous forest (i.e., where  $SI_1 = 1.00$ ). Patch size of forest habitat was calculated by first aggregating habitat cells into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in each of those patches and converting to ha.  $SI_3 = 0.00$  for patches  $\leq 100$  ha. For patches >100 ha, a sigmoid function:  $SI_3 = 1.000 / (1 + e^{(-1 * (patch\ size - 277.118) / 24.6569)})$  was applied so that  $SI_3$  for patches >400 ha were assigned an approximate value of 1.
- $SI_4$  – The fourth suitability index was used to evaluate the interspersion of early successional and forest habitat. The proportion of early successional habitat and deciduous forest habitat (identified in  $SI_1$ ) was evaluated using a moving window with a 6-cell radius (corresponding to average home range size of Ruffed Grouse). Ideal proportions of early successional and forest habitat were set to 0.4:0.6. The calculated proportions of these habitats were evaluated against the ideal proportions.  $SI_4 = 1.00$  if the observed proportion in the moving window equaled the ideal proportion. The SI value declined toward 0 as a function of the difference between the observed proportion in the moving window and the ideal proportion:  $SI_4 = 1.00 * ((1 - |observed\ proportion\ early\ successional - 0.4|) * (1 - |observed\ proportion\ forest - 0.6|))$ .

#### Overall HSI

The final habitat suitability value was the geometric mean of  $SI_2$  and  $SI_4$ , multiplied by  $SI_3$ :  $HSI = (\sqrt{SI_2 \times SI_4}) \times SI_3$ .

### **8. TIMBER RATTLESNAKE**

A habitat suitability model published in Rittenhouse et al. (2007) was used for the Timber Rattlesnake. The model was simplified for use with only land cover data, as data layers for forest stand age, ecological land type, and den locations was not available.

Elements of the Timber Rattlesnake habitat suitability model included the identification of early successional and deciduous forest habitat, the interspersion of these habitat types, and the distance to roads (with habitat quality increasing as the distance from the nearest road increased).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable habitat for the Timber Rattlesnake. First, the Reclassify tool was used on the Indiana GAP land cover data layer to identify early successional habitat used for foraging and basking.  $SI_1 = 1.00$  if the cell contained harvested-shrub or disturbed/successional-shrub. The Reclassify tool was also used on the NLCD land cover data layer to identify deciduous forests, which contain large coarse woody debris used by rattlesnakes.  $SI_1 = 1.00$  if the cell contained deciduous forest. The combined results of these two layers constituted  $SI_1$ . Otherwise,  $SI_1 = 0.00$ .

- $SI_2$  – The second suitability index was used to evaluate interspersion of early successional habitat and deciduous forest habitat. The Focal Statistics tool was used to evaluate the proportion of early successional habitat and deciduous forest habitat (identified in  $SI_1$ ) using a moving window with a 28-cell (850-meter) radius (corresponding to the maximum average home range size of Timber Rattlesnakes). The ideal proportions of early successional and forest habitat were set to 0.15:0.85. The calculated proportions of these habitats were evaluated against the ideal proportions.  $SI_2 = 1.00$  if the observed proportion in the moving window equaled the ideal proportion. The SI value declined toward 0 as a function of the difference between the observed proportion in the moving window and the ideal proportion:  $SI_2 = 1.00 * ((1 - |observed\ proportion\ early\ successional - 0.15|) * (1 - |observed\ proportion\ forest - 0.85|))$ .
- $SI_3$  – The third suitability index was used to reduce the value of habitat closest to roads and developed areas. First, the Reclassify tool was used on the NLCD land cover data layer to identify roads and developed lands (developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). Then the Euclidean Distance tool was used to determine the distance from all cells to the nearest developed lands and converting to kilometers. A subset of the resulting layer was taken and used to create a new layer that contained only the distance from habitat (i.e., where  $SI_1 = 1.00$ ) to developed lands. Following the citations in Rittenhouse et al. (2007),  $SI_3 = 1.00$  for habitat cells >100 meters from developed lands. For habitat cells <100 meters from developed lands, the equation  $SI_3 = distance\ to\ road / 100$  was applied.

#### Overall HSI

The final habitat suitability value was the product of  $SI_2$  and  $SI_3$ , with  $SI_3$  applying the road-sensitive penalty to the suitable habitat types identified in  $SI_1$  and  $SI_2$ :  $HSI = SI_2 * SI_3$ .

### **9. RED-HEADED WOODPECKER**

A habitat suitability model published in Tirpak et al. (2009) was used for Red-headed Woodpecker. The model was simplified to account for the fact that data layers for standing snag density and timber tree density was not available.

Elements of the Red-headed Woodpecker habitat suitability model included the relative value of land cover types that constituted suitable habitat, and the increased value of habitat that included transitions between habitat and open areas.

#### Suitability Indices

- $SI_1$  – The first suitability index was used to assign relative habitat quality values to land cover types that constitute suitable habitat for Red-headed Woodpeckers. The Reclassify tool was used on the NLCD land cover data layer and set  $SI_1 = 1.00$  for evergreen forest, mixed forest, and woody wetlands,  $SI_1 = 0.75$  for deciduous forest, and  $SI_1 = 0.25$  for shrubland. Otherwise,  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to increase the value of habitat edges (where habitat transitioned to open areas), since Red-headed Woodpeckers breed in relatively open habitats with widely spaced trees near openings. The Focal Statistics tool was used with a 7×7-cell rectangular moving window to identify edges of habitat identified in  $SI_1$  (i.e., wherever  $SI_1 > 0$ ).  $SI_2 = 1.00$  wherever edge occurred within the moving window. Otherwise,  $SI_2 = 0.10$  (for non-habitat,  $SI_2 = 0.00$ ).

### Overall HSI

The final habitat suitability value was the product of  $SI_1$  (relative value of cover types) and  $SI_2$  (increased value of habitat near open areas):  $HSI = SI_1 \times SI_2$ .

## **C. Species Without Published Models**

### **1. NORTHERN LEOPARD FROG**

A habitat suitability model for the Northern Leopard Frog was constructed based on the following publications: Stevens et al. 2010, EPA Northern Leopard Frog Species Profile (and citations therein), UNH Extension Northern Leopard Frog Species Profile (and citations therein).

Elements of the Northern Leopard Frog habitat suitability model included the identification of wetland and water-edge habitat, the identification of grassland habitat, the relative value of grassland habitat based on the distance to wetland habitat, and the decreased value of habitat in areas with high road density.

### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable wetland habitat for the Northern Leopard Frog. First, the Reclassify tool was used on the NLCD land cover data layer to identify wetland habitat (woody wetlands and emergent herbaceous wetlands). Northern Leopard Frogs may also use the edges of open water. The Reclassify tool was used again to identify open water. The Focal Statistics tool was used with a 4×4-cell moving window on the resulting layer to identify open water edges. The combination of these two results constituted  $SI_1$ . If a cell contained wetlands or open water edges,  $SI_1 = 1.00$ . Otherwise,  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to increase the value of water habitat in close proximity to grasslands, since Northern Leopard Frogs will only travel up to 2 km from water to grassland/shrubland habitat. The Euclidean Distance tool was used to determine the distance from each cell to the nearest wetland habitat (identified in  $SI_1$ ) and converted to km. Grassland habitat was then identified using the Reclassify tool on the NLCD land cover data layer (grassland/herbaceous, hay/pasture, and shrubland). A subset of the resulting layer was taken to create a new layer that contained only the distance from grassland habitat to wetlands.  $SI_2 = 0.00$  for any grassland cells >2 kilometers from wetlands. For grassland cells <2 kilometers from wetlands, the equation  $SI_2 = (-0.5 \times distance) + 1$  was applied so that the value of the cell would increase as distance to wetland decreased.
- $SI_3$  – The third suitability index was used to decrease the value of habitat near areas with a high density of roads and developed lands, since Northern Leopard Frogs are sensitive to road mortality. The Reclassify tool was used on the NLCD land cover data layer to identify roads and developed lands (developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). The density of developed lands within a 50-cell radius circular moving window (based on maximum average distance traveled by leopard frogs) was determined using the Focal Statistics tool. The following equation was applied (based on the maximum possible density of developed lands within the moving window) to habitat cells (i.e., wetlands and grasslands <2 kilometers from wetlands identified in  $SI_1$  and  $SI_2$ ):  $SI_3 = (-0.000127 \times density) + 1$ , so that the value of habitat cells with increasing densities of developed lands surrounding them were decreased.

## Overall HSI

The final habitat suitability value was the geometric mean of (1) the combination of  $SI_1$  (wetland habitat) and  $SI_2$  (grassland habitat based on distance to wetlands) and (2)  $SI_3$  (road-sensitive penalty):  $HSI = \sqrt{((SI_1 + SI_2) \times SI_3)}$ .

## **2. COPPER-BELLIED WATERSNAKE**

A habitat suitability model for the Copper-bellied Watersnake was constructed based on the following publications: Roe et al. (2004), Roe et al. (2006), Attum et al. (2007), Attum et al. (2009), Center for Reptile and Amphibian Conservation and Management report– Copperbelly Water Snake: Identification, Status, Ecology, and Conservation in the Midwest (and citations therein).

Elements of the Copper-bellied Watersnake habitat suitability model included the identification of wetland and upland habitat, the density of roads and developed areas (habitat quality decreased as road density increased), the density of vegetative buffers around wetlands (wetland habitat quality increased as upland habitat density increased), and the complexity of wetland mosaic habitat (the quality of habitat increased as the number of wetlands within the Copper-bellied Watersnake's home range increased).

### Suitability Indices

- $SI_1$  – The first suitability index was used to identify both wetland and upland habitat for the Copper-bellied Watersnake. For wetland habitat, woody wetlands and emergent herbaceous wetlands were identified in the NLCD land cover data. Copper-bellies may also use open water edges, so open water in the NLCD land cover data was identified and then the Focal Statistics tool was used with a 3×3-cell rectangular moving window to identify edges of open water habitat. These two results were combined to define wetland habitat. For upland habitat, shrubland was identified in the NLCD data. Copper-bellies may also use forest edges or forest-field margins, so forests (deciduous forest, evergreen forest, and mixed forest) were identified in the NLCD data and then the Focal Statistics tool was used with a 3×3-cell moving window to identify edges of forest habitat. These two results were combined to define upland habitat.  $SI_1 = 1.00$  for any cell containing wetland or upland habitat. Otherwise,  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to decrease the value of habitat in areas with high densities of roads and developed lands, since Copper-bellies are sensitive to road mortality, especially when roads bisect their travel routes between wetlands. First, roads and developed lands were identified using the Reclassify tool on the NLCD land cover data layer (developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). The density of developed lands within a 20-cell radius circular moving window (based on maximum average distance travelled by Copper-bellies) was determined using the Focal Statistics tool. The following equation (based on the maximum possible density of developed lands within the moving window) was applied to habitat cells (i.e., wetlands and uplands identified in  $SI_1$ ):  $SI_2 = (-0.000796 \times \textit{developed density}) + 1$ , so that the value of habitat cells with increasing densities of developed lands surrounding them were decreased.
- $SI_3$  – The third suitability index was used to increase the value of wetland habitat in areas with high density of upland habitat, since the most important habitat feature for Copper-bellies is the presence of wetland complexes/mosaics in the landscape, and adequate vegetative buffers are needed around wetlands, with higher densities of vegetative buffers yielding higher-quality wetland habitat. The density of upland habitat (identified in  $SI_1$ ) within a 20-cell radius circular moving window was determined using the Focal Statistics tool. The

following equation (based on the maximum possible density of upland habitat within the moving window) was applied to habitat cells (i.e., wetlands and uplands identified in  $SI_1$ ):  $SI_2 = (0.000796 \times \text{upland density})$ , so that the value of habitat cells with increasing densities of upland habitat surrounding them were increased.

- $SI_4$  – The fourth suitability index was used to increase the value of more complex wetland areas, since Copper-bellies regularly move between three to five wetlands over the course of their active season. First, wetland habitat was aggregated into patches using the Region Group tool. Then, the number of wetland patches within a 20-cell radius circular moving window was counted using the Focal Statistics tool (output: Variety, rather than the usual Sum). The suitability value of  $SI_4$  was set for each cell identified as habitat in  $SI_1$  based on the number of wetlands within the moving window: for 1 patch,  $SI_4 = 0.00$ , 2 patches = 0.25, 3 patches = 0.50, 4 patches = 0.75, and >4 patches = 1.00.

#### Overall HSI

The final habitat suitability value was the geometric mean of (1) the maximum of  $SI_2$  (density of roads) and  $SI_3$  (density of upland habitat) and (2)  $SI_4$  (complexity of wetland mosaic):  $HSI = \sqrt{((\max(SI_2, SI_3)) \times SI_4)}$ .

### **3. EASTERN BOX TURTLE**

A habitat suitability model for the Eastern Box Turtle was constructed based on the following publications: Williams and Parker 1987, Donaldson & Echternacht 2005, Luensmann 2006 (and citations therein).

Elements of the Eastern Box Turtle habitat suitability model included the identification of suitable habitat, the distance from habitat to water (value increased as distance to water decreased), and density of roads (value decreased as density of roads increased).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable habitat for the Eastern Box Turtle based on land cover type. Box turtles use a wide variety of habitat types: forested habitat (both deciduous and evergreen), wetland and open water edges, forest-field ecotones, shrublands, and grasslands. The Reclassify tool was used on the NLCD land cover data to identify forests (deciduous forest, evergreen forest, and mixed forest), shrubland, and grasslands (grassland/herbaceous and hay/pasture).  $SI_1 = 0.75$  if land cover type in a cell was forest or shrubland, 0.50 for herbaceous grassland, and 0.25 for hay/pasture (as mowing reduces quality of grassland habitat). The Focal Statistics tool was used with a 3×3-cell rectangular moving window to identify forest edges. For any forest habitat identified in the previous step that was forest edge,  $SI_1 = 1.00$ . For non-habitat,  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to increase the value of habitat closest to water. First, open water was identified using the Reclassify tool on the NLCD data. The Euclidean Distance tool was then used to determine the distance from each cell to water. A subset of the resulting layer was taken to create a new layer that contained only the distance from habitat cells (identified in  $SI_1$ ) to water.  $SI_2 = 0.00$  for any habitat cells >200 meters from water. For habitat cells <200 meters from water, the equation  $SI_2 = (-0.005 \times \text{distance}) + 1$  was applied, so that the value of the cell would increase as distance to water decreased.
- $SI_3$  – The third suitability index was used to decrease the value of habitat in areas with high densities of roads and developed lands, since box turtles are sensitive to road mortality as they travel. First, roads and developed lands were identified using the Reclassify tool on the

NLCD land cover data layer (developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). The density of developed lands within a 3-cell radius circular moving window (based on average home range diameter) was determined using the Focal Statistics tool. The following equation (based on the maximum possible density of developed lands within the moving window) was applied to habitat cells (i.e., habitat cells identified in  $SI_1$ ):  $SI_3 = (-0.0354 \times \text{developed density}) + 1$ , so that the value of habitat cells with increasing densities of developed lands surrounding them were decreased.

#### Overall HSI

The final habitat suitability value was the geometric mean of (1) the maximum of  $SI_2$  and  $SI_3$  and (2)  $SI_1$ :  $HSI = \sqrt{((\max(SI_2, SI_3)) \times SI_1)}$ .

#### **4. BLANDING'S TURTLE**

A habitat suitability model for the Blanding's Turtle was constructed based on the following publications: Hamernick 2001, Wisconsin DNR Blanding's Turtle Species Guidance (and citations therein).

Elements of the Blanding's Turtle habitat suitability model included the identification of suitable habitat, distance to nesting habitat (with habitat quality increasing with decreasing distance to nesting habitat), wetland complexity (with habitat quality increasing with increasing number of wetlands within a home range), and density of roads (with habitat quality decreasing in areas with increasing density of roads).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable habitat for Blanding's Turtle. The Reclassify tool was used on the NLCD land cover data layer to identify grasslands (grassland/herbaceous and hay/pasture) and emergent herbaceous wetlands.  $SI_1 = 1.00$  if a cell contained these cover types. Otherwise,  $SI_1 = 0.00$ .
- $SI_2$  – The second suitability index was used to increase the value of habitat in close proximity to nesting habitat. First, the Reclassify tool was used on the Indiana GAP land cover data to identify nesting habitat (Central Tallgrass Prairie, North-Central Interior Oak Savanna, North-Central Interior Sand and Gravel Tallgrass Prairie, Great Lakes Dune, and Great Lakes Wet-Mesic Lakeplain Prairie). The Euclidean Distance tool to determine the distance from habitat identified in  $SI_1$  to suitable nesting habitat.  $SI_2 = 0.00$  for habitat cells >275 meters from nesting habitat (based on maximum average distance travelled). For cells <275 meters from nesting habitat, an equation to increase the value of habitat cells closest to nesting habitat was applied:  $SI_2 = (-0.0036 \times \text{distance}) + 1$ .
- $SI_3$  – The third suitability index was used to increase the value of habitat with increasing complexity of wetland mosaics, since Blanding's Turtles regularly move between 3-6 wetlands over the course of their active season. First, wetland habitat was aggregated into patches using the Region Group tool. Then, the number of wetland patches within a 33-cell radius circular moving window was counted using the Focal Statistics tool (output: Variety, rather than the usual Sum). Then the suitability value of  $SI_3$  was set for each habitat cell based on the number of wetlands within the moving window: for 1 patch,  $SI_3 = 0.00$ , 2 patches = 0.25, 3 patches = 0.50, 4-5 patches = 0.75, and >5 patches = 1.00.
- $SI_4$  – The fourth suitability index was used to decrease the value of habitat in areas with high densities of roads and developed lands, since Blanding's Turtles are sensitive to road mortality as they travel. First roads and developed lands were identified using the Reclassify

tool on the NLCD land cover data layer (developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). The density of developed lands within a 33-cell radius circular moving window (based on average home range diameter) was determined using the Focal Statistics tool. The following equation (based on the maximum possible density of developed lands within the moving window) was applied to habitat cells:  $SI_4 = (-0.000292 \times \textit{developed density}) + 1$ , so that the value of habitat cells with increasing densities of developed lands surrounding them were decreased.

#### Overall HSI

The final habitat suitability value was the maximum of  $SI_2$  and  $SI_3$ , scaled by  $SI_4$ , and multiplied by  $SI_1$  to zero out non-habitat:  $HSI = SI_1 \times (SI_4 \times (\max(SI_2, SI_3)))$ .

### **5. SWAMP RABBIT**

A habitat suitability model for the Swamp Rabbit was constructed based on the following publications: Terrel (1972), Allen (1985), Zollner et al. (2000), Whitaker and Mumford (2009), Vale and Kissell (2010).

Elements of the Swamp Rabbit habitat suitability model included the relative value of wetland and upland habitat, proximity of wetland habitat to upland habitat (with value increasing with decreasing distance to upland), the density of agriculture and developed lands (with value decreasing in areas with increasing density of agriculture and developed lands), and wetland complex patch size (with value increasing as patch size increased).

#### Suitability Indices

- $SI_1$  – The first suitability index was used to identify suitable habitat for the Swamp Rabbit. The Reclassify tool was used with the NLCD land cover data layer to identify woody wetlands and emergent herbaceous wetlands. Floodplain forests were also identified by using the Focal Statistics tool with an 8×8-cell moving window to identify edges of open water. Floodplain forests were identified as any cell containing forest (deciduous forest, evergreen forest, or mixed forest) that fell within the open water edge habitat. Upland habitat used by Swamp Rabbits was also identified: deciduous forest, evergreen forest, mixed forest, shrubland, and herbaceous grassland.  $SI_1 = 1.00$  if a cell contained wetland or floodplain forest habitat and 0.25 if a cell contained upland habitat.
- $SI_2$  – The second suitability index was used to increase the value of wetlands in close proximity to upland habitat. The Euclidean Distance tool was used to determine the distance from wetland habitat identified in  $SI_1$  to upland habitat identified in  $SI_1$  and converted to km.  $SI_2 = 0.00$  for any wetland >2 kilometers from upland. For cells <2 kilometers from upland habitat, the equation  $(-0.0005 \times \textit{distance}) + 1$  was applied so that a cell's value increased with decreasing proximity to upland, and cells directly adjacent to upland were set to  $SI_2 = 1.00$ .
- $SI_3$  – The third suitability index was used to decrease the value of habitat in areas with high densities of agriculture and developed lands. Agriculture and developed lands were identified using the Reclassify tool on the NLCD land cover data layer (cultivated crops, developed-open space, developed-low intensity, developed-medium intensity, developed-high intensity). The density of these cover types within a four-cell radius circular moving window (based on average home range) was determined using the Focal Statistics tool. The following equation (based on the maximum possible density of agriculture and developed lands within the moving window) was applied to habitat cells:  $SI_4 = (-0.02 \times \textit{ag/developed density}) + 1$ , so that

the value of habitat cells with increasing densities of developed lands surrounding them were decreased.

- $SI_4$  – The fourth suitability index was used to address Swamp Rabbit wetland patch size requirements. Patch sizes of wetland habitat (wetlands and floodplains) were calculated by first aggregating habitat cells into patches using the Region Group tool, then using Zonal Statistics to sum the number of cells contained in the each of those patches and converting to ha.  $SI_4 = 1.00$  for patches  $>100$  ha. For patches  $<100$  ha, the equation  $SI_4 = (0.01 \times \text{patch size})$  was applied so that a cell's value decreased with decreasing patch size.

#### Overall HSI

The final habitat suitability value was the geometric mean of (1) the combination of  $SI_2$  and  $SI_4$ , multiplied by  $SI_1$  to scale habitat values and zero out non-habitat and (2)  $SI_3$ :  $HSI = \sqrt[3]{((SI_2 + SI_4) \times SI_1) \times SI_3}$ .

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## Appendix G. Relative Abundance and Trends in Abundance of Indiana SGCN.

### Key

Change in abundance since 2005 <sup>1</sup>		Predicted change in abundance by 2025 <sup>1</sup> (if current conditions and practices continue)		Relative Abundance <sup>2</sup>	
–	Remained constant	–	Will remain constant	C	Common
↑	Slight increase (5-25%)	↑	Will increase slightly (5-25%)	O	Occasional
⤴	Great increase (25-50%)	⤴	Will increase greatly (25-50%)	R	Rare
⬆	Dramatic increase (>50%)	⬆	Will increase dramatically (>50%)	E	Extirpated
↓	Slight decline (5-25%)	↓	Will decline slightly (5-25%)	U	Unknown
⤵	Serious decline (25-50%)	⤵	Will decline seriously (25-50%)		
⬇	Dramatic decline (>50%)	⬇	Will decline dramatically (>50%)		
U	Unknown	U	Unknown		

<sup>1</sup>Averaged over all Species Survey respondents

<sup>2</sup>As noted in Whitaker and Amlaner (2012) or the 2005 Comprehensive Wildlife Strategy

M = Migratory; generally Indiana only considered stopover habitat

**Table G-1.** Relative abundance and trends in abundance for all Indiana’s SGCN.

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
<b>Birds</b>					
	<i>Cranes</i>				
		Whooping Crane (M)	R	⤴	–
		Sandhill Crane	O	↑	↑
	<i>Herons, Egrets, &amp; Bitterns</i>				
		Great Egret	O	↑	↑
		American Bittern	O	↑	–
		Least Bittern	O	–	–
		Yellow-crowned Night-heron	R	↓	–
		Black-crowned Night-heron	O	↑	–
	<i>Nightjars</i>				

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
		Eastern Whip-poor-will	O	↓	↓
		Common Nighthawk	C	↓	↓
	<i>Rails</i>				
		Common Moorhen	R	U	U
		Black Rail (M)	R	↑	–
		King Rail	R	↑	↑
		Virginia Rail	R	–	–
	<i>Raptors</i>				
		Sharp-shinned Hawk	O	↓	↓
		Short-eared Owl	R	↓	↓
		Red-shouldered Hawk	C	↓	↓
		Broad-winged Hawk	O	U	U
		Northern Harrier	O	U	U
		Peregrine Falcon	R	↑	↑
		Bald Eagle	O	↑	↑
		Mississippi Kite	R	U	U
		Osprey	R	↑	↑
		Barn Owl	R	–	–
	<i>Shorebirds</i>				
		Ruddy Turnstone (M)	O	U	U
		Upland Sandpiper	R	↑	↑
		Buff-breasted Sandpiper (M)	R	↑	–
		Piping Plover	R	↑	↑

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
		Short-billed Dowitcher (M)	O	U	U
		Wilson's Phalarope (M)	R	-	↑
		American Golden-plover (M)	O	-	-
		Greater Yellowlegs (M)	O	-	-
		Solitary Sandpiper (M)	C	-	-
	<i>Songbirds</i>				
		Henslow's Sparrow	O	↓	↓
		Marsh Wren	O	-	↓
		Sedge Wren	O	U	U
		Worm-eating Warbler	O	-	↑
		Loggerhead Shrike	R	↓	↓
		Black-and-white Warbler	O	-	↑
		Cerulean Warbler	O	↓	↓
		Kirtland's Warbler	R	U	U
		Hooded Warbler	R	-	↑
		Western Meadowlark	R	U	U
		Golden-winged Warbler	R	-	-
		Yellow-headed Blackbird	R	U	U
	<i>Terns</i>				
		Black Tern	O	-	-
		Least Tern	R	↑	↑

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
	<i>Waterfowl</i>				
		Trumpeter Swan (M)	R	↑	↑
<b>Fish</b>					
	<i>Carp &amp; Minnows</i>				
		Redside Dace	R	↑	-
		Pallid Shiner	R	U	U
		Pugnose Shiner	R	U	U
		Bigmouth Shiner	R	U	U
		Longnose Dace	O	-	-
	<i>Catfish</i>				
		Northern Madtom	R	↓	-
	<i>Cavefish</i>				
		Northern Cavefish	R	-	-
	<i>Lampreys</i>				
		Northern Brook Lamprey	R	-	-
	<i>Perches</i>				
		Western Sand Darter	O	-	-
		Spotted Darter	R	-	-
		Cypress Darter	R	-	-
		Tippecanoe Darter	R	-	↓
		Variegated Darter	R	-	↓
		Channel Darter	R	-	-
		Gilt Darter	O	-	-

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
	<i>Pikes</i>				
		Ohio River Muskellunge	R	U	U
	<i>Pygmy Sunfish</i>				
		Banded Pygmy Sunfish	R	↑	–
	<i>Sculpins</i>				
		Slimy Sculpin	R	↓	–
	<i>Sturgeons</i>				
		Lake Sturgeon	R	–	–
	<i>Suckers</i>				
		Longnose Sucker	R	U	U
		Greater Redhorse	R	–	–
	<i>Sunfish</i>				
		Bantam Sunfish	R	–	–
	<i>Trout-perches</i>				
		Trout-perch	R	–	–
	<i>Trouts &amp; Salmons</i>				
		Cisco	R	↓	↓
		Lake Whitefish	C	↑	↑
<b>Herps</b>					
	<i>Aquatic Salamanders</i>				
		Hellbender	R	↓	↓
		Common Mudpuppy	O	–	–
	<i>Frogs</i>				
		Northern Cricket Frog	U	–	↓
		Crawfish Frog	O	↓	↓
		Plains Leopard Frog	R	↓	–

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
		Northern Leopard Frog	C	–	–
	<i>Salamanders</i>				
		Streamside Salamander	U	↓	↓
		Blue-spotted Salamander	O	–	↓
		Mole Salamander	U	–	–
		Green Salamander	R	–	–
		Four-toed Salamander	R	–	–
		Red Salamander	R	–	–
	<i>Snakes</i>				
		Cottonmouth	R	↓	↓
		Scarletsnake	R	↓	↓
		Kirtland's Snake	O	–	↑
		Timber Rattlesnake	R	–	–
		Red-bellied Mudsake	R	–	–
		Copper-bellied Watersnake	O	–	↓
		Rough Greensnake	O	–	–
		Smooth Greensnake	R	↓	↓
		Massasauga	R	↓	↓
		Southeastern Crowned Snake	R	–	↓
		Butler's Gartersnake	R	U	U
		Western Ribbonsnake	O	–	↓

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
	<i>Turtles</i>				
		Spotted Turtle	O	↓	↓
		Blanding's Turtle	O	↓	↓
		Eastern Mud Turtle	R	U	U
		Alligator Snapping Turtle	R	U	U
		River Cooter	R	–	–
		Eastern Box Turtle	U	↓	↓
		Ornate Box Turtle	O	↓	↓
<b>Mammals</b>					
	<i>Bats</i>				
		Rafinesque's Big-eared Bat	R	–	–
		Silver-haired Bat	O	–	–
		Eastern Red Bat	C	–	↓
		Hoary Bat	O	–	–
		Southeastern Myotis	E	–	–
		Gray Myotis	R	↑	↓
		Eastern Small-footed Myotis	U	–	↓
		Little Brown Myotis	C	↓	↓
		Northern Long-eared Myotis	C	↓	↓
		Indiana Myotis	O	↓	↓
		Evening Bat	O	–	–
		Tri-colored Bat (Eastern Pipistrelle)	C	↓	↓

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
	<i>Mustelids</i>				
		Least Weasel	R	↓	↓
		American Badger	R	–	–
	<i>Rabbits</i>				
		Swamp Rabbit	R	↓	↓
	<i>Rodents</i>				
		Plains Pocket Gopher	C	↓	↓
		Allegheny Woodrat	R	↑	↓
		Franklin's Ground Squirrel	R	↓	↓
	<i>Shrews &amp; Moles</i>				
		Star-nosed Mole	R	↓	↓
		Smoky Shrew	O	–	–
		American Pygmy Shrew	O	–	–
<b>Mollusks</b>					
	<i>River Mussels</i>				
		Fanshell	R	↓	↓
		White Catspaw	R	↓	↓
		Northern Riffleshell	R	U	U
		Tubercled Blossom	E	U	U
		Snuffbox	R	–	↑
		Longsolid	R	U	U
		Pink Mucket	R	U	U
		Wavyrayed Lampmussel	C	–	–
		Round Hickorynut	R	↓	↓

Taxon	Subgroup	Species	Relative Abundance	Since 2005	Predicted
		White Wartyback	R	U	U
		Orangefoot Pimpleback	R	U	U
		Sheepnose	R	↓	↓
		Clubshell	R	↓	↓
		Ohio Pigtoe	O	U	U
		Rough Pigtoe	R	U	U
		Pyramid Pigtoe	R	U	U
		Fat Pocketbook	O	–	–
		Kidneyshell	O	–	–
		Rabbitsfoot	R	↓	↓
		Salamander Mussel	R	–	–
		Purple Lilliput	R	U	U
		Ellipse	C	–	–
		Rayed Bean	R	U	U
		Little Spectaclecase	O	↓	↓
	<i>Snails</i>				
		Pointed Campeloma	U	U	U
		Swamp Lymnaea	U	U	U

**Table G-2.** Relative abundance and seasonal occurrence for SGCN birds.

<b>Subgroup</b>	<b>Common Name</b>	<b>Nesting</b>	<b>Migration</b>	<b>Winter</b>
<b><i>Cranes</i></b>				
	Whooping Crane		R	R
	Sandhill Crane	R	C	
<b><i>Hérons, Egrets, and Bitterns</i></b>				
	Great Egret	R	O	
	American Bittern	R	R	
	Least Bittern	R	R	
	Yellow-crowned Night-heron	R	R	
	Black-crowned Night-heron	O	O	
<b><i>Nightjars</i></b>				
	Eastern Whip-poor-will	O	R	
	Common Nighthawk	O	O	
<b><i>Rails</i></b>				
	Common Gallinule	R	R	
	Black Rail	R	R	
	King Rail	R	R	

Subgroup	Common Name	Nesting	Migration	Winter
	Virginia Rail	R	O	
<b>Raptors</b>				
	Sharp-shinned Hawk	R	C	C
	Short-eared Owl	EX	O	O
	Red-shouldered Hawk	O	C	O
	Broad-winged Hawk	R	O	
	Northern Harrier	R	O	
	Peregrine Falcon	R	R	R
	Bald Eagle	O	O	O
	Mississippi Kite	R	R	
	Osprey	R	O	
	Barn Owl	R	R	R
<b>Shorebirds</b>				
	Ruddy Turnstone		R	
	Upland Sandpiper	R	R	
	Buff-breasted Sandpiper		R	
	Piping Plover	EX	R	

<b>Subgroup</b>	<b>Common Name</b>	<b>Nesting</b>	<b>Migration</b>	<b>Winter</b>
	Short-billed Dowitcher		O	
	Wilson's Phalarope	R	R	
	American Golden-plover		O	
	Greater Yellowlegs		O	
	Solitary Sandpiper		C	
<b>Songbirds</b>				
	Henslow's Sparrow	R	R	
	Marsh Wren	O	O	
	Sedge Wren	R	O	
	Worm-eating Warbler	R	R	
	Loggerhead Shrike	R	R	R
	Black-and-white Warbler	R	C	
	Cerulean Warbler	R	R	
	Hooded Warbler	R	R	
	Kirtland's Warbler		R	
	Western Meadowlark	R	R	R

<b>Subgroup</b>	<b>Common Name</b>	<b>Nesting</b>	<b>Migration</b>	<b>Winter</b>
	Golden-winged Warbler	EX	R	
	Yellow-headed Blackbird	R	R	
<b><i>Terns</i></b>				
	Black Tern	EX	O	
	Interior Least Tern	R	R	
<b><i>Waterfowl</i></b>				
	Trumpeter Swan	EX	R	R

**Appendix H.** Distribution of SGCN Across Indiana SWAP Planning Regions.

**Table H-1.** Distribution of SGCN Across Indiana SWAP Planning Regions.

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Birds	<i>Grus americana</i>	Whooping Crane <sup>1</sup>	X	X	X	X	X	X
Birds	<i>Grus canadensis</i>	Sandhill Crane <sup>2</sup>	X	X	X	X	X	X
Birds	<i>Ardea alba</i>	Great Egret <sup>3</sup>	X	X	X	X	X	X
Birds	<i>Botaurus lentiginosus</i>	American Bittern	X	X	X	X	X	X
Birds	<i>Ixobrychus exilis</i>	Least Bittern	X	X	X	X	X	X
Birds	<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron			X	X	X	X
Birds	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	X	X	X	X	X	X
Birds	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X	X	X	X	X	X
Birds	<i>Chordeiles minor</i>	Common Nighthawk	X	X	X	X	X	X
Birds	<i>Gallinula galeata</i>	Common Gallinule	X	X	X	X	X	X
Birds	<i>Laterallus jamaicensis</i>	Black Rail	X	X	X	X		
Birds	<i>Rallus elegans</i>	King Rail	X	X	X	X	X	X
Birds	<i>Rallus limicola</i>	Virginia Rail	X	X	X	X		
Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X
Birds	<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	X	X
Birds	<i>Buteo lineatus</i>	Red-shouldered Hawk	X	X	X	X	X	X
Birds	<i>Buteo platypterus</i>	Broad-winged Hawk	X	X	X	X	X	X
Birds	<i>Circus cyaneus</i>	Northern Harrier	X	X	X	X	X	X
Birds	<i>Falco peregrinus</i>	Peregrine Falcon	X	X	X	X	X	X

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X
Birds	<i>Ictinia mississippiensis</i>	Mississippi Kite	X		X	X	X	X
Birds	<i>Pandion haliaetus</i>	Osprey	X	X	X	X	X	X
Birds	<i>Tyto alba</i>	Barn Owl	X	X	X	X	X	X
Birds	<i>Arenaria interpres</i>	Ruddy Turnstone	X	X	X	X	X	X
Birds	<i>Bartramia longicauda</i>	Upland Sandpiper	X	X	X	X	X	X
Birds	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	X	X	X	X	X	X
Birds	<i>Charadrius melodus</i>	Piping Plover	X	X	X	X	X	X
Birds	<i>Limnodromus griseus</i>	Short-billed Dowitcher	X	X	X	X	X	X
Birds	<i>Phalaropus tricolor</i>	Wilson's Phalarope	X	X	X	X	X	X
Birds	<i>Pluvialis dominica</i>	American Golden-plover	X	X	X	X	X	X
Birds	<i>Tringa melanoleuca</i>	Greater Yellowlegs	X	X	X	X	X	X
Birds	<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X	X	X	X
Birds	<i>Ammodramus henslowii</i>	Henslow's Sparrow	X	X	X	X	X	X
Birds	<i>Cistothorus palustris</i>	Marsh Wren	X	X	X	X	X	X
Birds	<i>Cistothorus platensis</i>	Sedge Wren	X	X	X	X	X	X
Birds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X	X	X	X	X	X
Birds	<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	X	X
Birds	<i>Mniotilta varia</i>	Black-and-white Warbler	X	X	X	X	X	X
Birds	<i>Setophaga cerulea</i>	Cerulean Warbler	X	X	X	X	X	X
Birds	<i>Setophaga citrina</i>	Hooded Warbler	X	X	X	X	X	X
Birds	<i>Setophaga kirtlandii</i>	Kirtland's Warbler	X		X			
Birds	<i>Sturnella neglecta</i>	Western Meadowlark	X	X	X	X	X	
Birds	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X	X	X	X	X

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Birds	<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird <sup>4</sup>	X	X	X	X	X	X
Birds	<i>Chlidonias niger</i>	Black Tern	X	X	X	X	X	X
Birds	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X	X	X	X	X
Birds	<i>Cygnus buccinator</i>	Trumpeter Swan	X	X	X	X	X	X
Mammals	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat					X	X
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
Mammals	<i>Lasiurus borealis</i>	Eastern Red Bat	X	X	X	X	X	X
Mammals	<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X
Mammals	<i>Myotis austroriparius</i>	Southeastern Myotis					X	
Mammals	<i>Myotis grisescens</i>	Gray Myotis				X	X	X
Mammals	<i>Myotis leibii</i>	Eastern Small-footed Myotis					X	
Mammals	<i>Myotis lucifugus</i>	Little Brown Myotis	X	X	X	X	X	X
Mammals	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X
Mammals	<i>Myotis sodalis</i>	Indiana Myotis	X	X	X	X	X	X
Mammals	<i>Nycticeius humeralis</i>	Evening Bat	X	X	X	X	X	X
Mammals	<i>Perimyotis subflavus</i>	Tri-colored Bat			X	X	X	X
Mammals	<i>Mustela nivalis</i>	Least Weasel	X	X	X	X	X	X
Mammals	<i>Taxidea taxus</i>	American Badger	X	X	X	X	X	X
Mammals	<i>Sylvilagus aquaticus</i>	Swamp Rabbit				X		
Mammals	<i>Geomys bursarius</i>	Plains Pocket Gopher		X	X			
Mammals	<i>Neotoma magister</i>	Allegheny Woodrat					X	
Mammals	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X	X	X			

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Mammals	<i>Condylura cristata</i>	Star-nosed Mole	X	X	X			
Mammals	<i>Sorex fumeus</i>	Smoky Shrew					X	
Mammals	<i>Sorex hoyi</i>	American Pygmy Shrew					X	X
Amphibians	<i>Cryptobranchus alleganiensis</i>	Hellbender					X	
Amphibians	<i>Necturus maculosus</i>	Common Mudpuppy	X	X	X	X	X	X
Amphibians	<i>Acris crepitans</i>	Northern Cricket Frog	X	X	X	X	X	X
Amphibians	<i>Lithobates areolatus</i>	Crawfish Frog				X		X
Amphibians	<i>Lithobates blairi</i>	Plains Leopard Frog		X	X	X		
Amphibians	<i>Lithobates pipiens</i>	Northern Leopard Frog	X	X	X			X
Amphibians	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot				X	X	X
Amphibians	<i>Ambystoma barbouri</i>	Streamside Salamander					X	X
Amphibians	<i>Ambystoma laterale</i>	Blue-spotted Salamander	X	X	X			
Amphibians	<i>Ambystoma talpoideum</i>	Mole Salamander <sup>5</sup>				X		
Amphibians	<i>Aneides aeneus</i>	Green Salamander					X	
Amphibians	<i>Hemidactylum scutatum</i>	Four-toed Salamander	X	X	X		X	X
Amphibians	<i>Pseudotriton ruber</i>	Red Salamander					X	
Reptiles	<i>Agkistrodon piscivorus</i>	Cottonmouth				X	X	
Reptiles	<i>Cemophora coccinea</i>	Scarletsnake					X	X
Reptiles	<i>Clonophis kirtlandii</i>	Kirtland's Snake <sup>6</sup>	X	X	X	X	X	X
Reptiles	<i>Crotalus horridus</i>	Timber Rattlesnake					X	X
Reptiles	<i>Farancia abacura</i>	Red-bellied Mudsucker				X		
Reptiles	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	X			X	X	X
Reptiles	<i>Opheodrys aestivus</i>	Rough Greensnake				X	X	X

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Reptiles	<i>Opheodrys vernalis</i>	Smooth Greensnake	X	X				
Reptiles	<i>Sistrurus catenatus</i>	Massasauga	X	X	X			
Reptiles	<i>Tantilla coronata</i>	Southeastern Crowned Snake					X	X
Reptiles	<i>Thamnophis butleri</i>	Butler's Gartersnake	X		X			
Reptiles	<i>Thamnophis proximus</i>	Western Ribbonsnake	X	X		X	X	
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	X	X	X			
Reptiles	<i>Emydoidea blandingii</i>	Blanding's Turtle	X	X	X			
Reptiles	<i>Kinosternon subrubrum</i>	Eastern Mud Turtle		X		X		
Reptiles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle				X	X	
Reptiles	<i>Pseudemys concinna</i>	River Cooter				X	X	
Reptiles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X
Reptiles	<i>Terrapene ornata</i>	Ornate Box Turtle		X	X			
Fish	<i>Clinostomus elongatus</i>	Redside Dace			X			
Fish	<i>Hybopsis amnis</i>	Pallid Shiner					X	
Fish	<i>Notropis anogenus</i>	Pugnose Shiner	X					
Fish	<i>Notropis dorsalis</i>	Bigmouth Shiner		X				
Fish	<i>Rhinichthys cataractae</i>	Longnose Dace	X					
Fish	<i>Noturus stigmosus</i>	Northern Madtom				X	X	X
Fish	<i>Amblyopsis hoosieri</i>	Hoosier Cavefish					X	
Fish	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	X	X	X			
Fish	<i>Ammocrypta clara</i>	Western Sand Darter				X	X	
Fish	<i>Etheostoma maculatum</i>	Spotted Darter			X	X	X	
Fish	<i>Etheostoma proeliare</i>	Cypress Darter				X		

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Fish	<i>Etheostoma tippecanoe</i>	Tippecanoe Darter			X	X	X	
Fish	<i>Etheostoma variatum</i>	Variagate Darter						X
Fish	<i>Percina copelandi</i>	Channel Darter				X	X	X
Fish	<i>Percina evides</i>	Gilt Darter			X			
Fish	<i>Esox masquinongy ohioensis</i>	Ohio River Muskellunge				X		
Fish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish				X		
Fish	<i>Cottus cognatus</i>	Slimy Sculpin	X					
Fish	<i>Acipenser fulvescens</i>	Lake Sturgeon	X			X	X	
Fish	<i>Catostomus catostomus</i>	Longnose Sucker	X					
Fish	<i>Moxostoma valenciennesi</i>	Greater Redhorse	X	X	X			
Fish	<i>Lepomis symmetricus</i>	Bantam Sunfish				X		
Fish	<i>Percopsis omiscomaycus</i>	Trout-perch	X					X
Fish	<i>Coregonus artedi</i>	Cisco	X		X			
Fish	<i>Coregonus clupeaformis</i>	Lake Whitefish	X					
Mollusks	<i>Cyprogenia stegaria</i>	Fanshell			X	X	X	
Mollusks	<i>Epioblasma obliquata perobliqua</i>	White Catspaw						
Mollusks	<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell			X			
Mollusks	<i>Epioblasma torulosa torulosa</i>	Tuberclad Blossom						
Mollusks	<i>Epioblasma triquetra</i>	Snuffbox			X			
Mollusks	<i>Fusconaia subrotunda</i>	Longsolid						
Mollusks	<i>Lampsilis abrupta</i>	Pink Mucket						

Taxa	Scientific Name	Common Name	Great Lakes	Kankakee	Corn Belt	Valleys & Hills	Interior Plateau	Drift Plains
Mollusks	<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel	X		X		X	
Mollusks	<i>Obovaria subrotunda</i>	Round Hickorynut			X	X	X	
Mollusks	<i>Plethobasus cicatricosus</i>	White Wartback						
Mollusks	<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback						
Mollusks	<i>Plethobasus cyphus</i>	Sheepnose			X	X	X	X
Mollusks	<i>Pleurobema clava</i>	Clubshell	X		X			
Mollusks	<i>Pleurobema cordatum</i>	Ohio Pigtoe				X	X	X
Mollusks	<i>Pleurobema plenum</i>	Rough Pigtoe					X	
Mollusks	<i>Pleurobema rubrum</i>	Pyramid Pigtoe						
Mollusks	<i>Potamilus capax</i>	Fat Pocketbook				X		
Mollusks	<i>Ptychobranthus fasciolaris</i>	Kidneyshell	X		X	X	X	X
Mollusks	<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot			X	X		
Mollusks	<i>Simpsonaias ambigua</i>	Salamander Mussel	X		X		X	X
Mollusks	<i>Toxolasma lividum</i>	Purple Lilliput			X			X
Mollusks	<i>Venustaconcha ellipsiformis</i>	Ellipse	X	X				
Mollusks	<i>Villosa fabalis</i>	Rayed Bean	X		X			
Mollusks	<i>Villosa lienosa</i>	Little Spectaclecase			X	X	X	X
Mollusks	<i>Campeloma decisum</i>	Pointed Campeloma	X	X	X			
Mollusks	<i>Lymnaea stagnalis</i>	Swamp Lymnaea	X	X	X			

<sup>1</sup>No longer nests in Indiana; reintroduced to migration routes through Indiana.

<sup>2</sup>Nesting only occurs in northern and central Indiana.

<sup>3</sup>May nest in southwest corner of Indiana; there is also a nesting colony of >200 individuals in East Chicago, IN.

<sup>4</sup>Nesting population is extremely small. In 2014, there were 1-2 pairs at a single site in northern Indiana. Migrants are also very rare.

<sup>5</sup>Restricted to vicinity of southwest corner of the state.

<sup>6</sup>Absent from SW lowlands.

## Appendix I. Great Lakes Region SGCN Habitat and Subhabitat Tables.

**Table I-1.** SGCN Occurring in Agricultural Systems in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
<i>Lanius ludovicianus</i>		Loggerhead Shrike	
<i>Sturnella neglecta</i>		Western Meadowlark	
Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan	
<b>Mammals</b>	Mustelids	<i>Mustela nivalis</i>	Least Weasel
		<i>Taxidea taxus</i>	American Badger
	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel
<b>Amphibians</b>	Frogs	<i>Lithobates pipiens</i>	Northern Leopard Frog
<b>Reptiles</b>	Snakes	<i>Sistrurus catenatus</i>	Massasauga
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle



Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>melodus</i>														
		<i>Limnodromus griseus</i>	Short-billed Dowitcher										X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope										X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs										X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X	X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren										X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X							X	X		Can use impoundments.
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X								X	X		Can use borrow pits.
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan										X			Can use impoundments.
<b>Mammals</b>	Shrews and Moles	<i>Condylura cristata</i>	Star-nosed Mole										X			
<b>Amphibians</b>	Aquatic Salamanders	<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X			
		<i>Lithobates pipiens</i>	Northern Leopard Frog		X	X	X		X		X	X	X			
	Salamanders	<i>Ambystoma</i>	Blue-spotted										X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>laterale</i>	Salamander													
<b>Reptiles</b>	Snakes	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake		X	X						X	X			
		<i>Thamnophis proximus</i>	Western Ribbonsnake			X	X		X			X	X			
	Turtles	<i>Clemmys guttata</i>	Spotted Turtle			X			X			X	X			
		<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X			X			X	X			
<b>Fish</b>	Carp and Minnows	<i>Notropis anogenus</i>	Pugnose Shiner		X	X			X			X	X	X		
		<i>Rhinichthys cataractae</i>	Longnose Dace		X		X	X		X		X	X	X	X	
	Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey		X	X	X		X	X		X				
	Sculpins	<i>Cottus cognatus</i>	Slimy Sculpin		X			X		X	X	X	X	X	X	
	Sturgeons	<i>Acipenser fulvescens</i>	Lake Sturgeon	X		X	X						X	X	X	
	Suckers	<i>Catostomus catostomus</i>	Longnose Sucker	X	X		X		X	X		X	X	X	X	
		<i>Moxostoma valenciennesi</i>	Greater Redhorse	X	X		X	X	X				X	X		
	Trout-perches	<i>Percopsis omiscomaycus</i>	Trout-perch	X	X		X		X			X	X	X	X	
	Trouts and Salmons	<i>Coregonus artedi</i>	Cisco	X									X	X	X	
		<i>Coregonus clupeaformis</i>	Lake Whitefish	X	X								X	X	X	

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
<b>Mollusks</b>	Mussels	<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel	X	X					X		X				
		<i>Pleurobema clava</i>	Clubshell	X	X					X		X				
		<i>Ptychobranthus fasciolaris</i>	Kidneyshell	X	X		X	X		X		X	X	X		
		<i>Simpsonaias ambigua</i>	Salamander Mussel	X	X		X					X	X			
		<i>Venustaconcha ellipsiformis</i>	Ellipse		X					X		X				
		<i>Villosa fabalis</i>	Rayed Bean		X					X		X	X			
	Snails	<i>Campeloma decisum</i>	Pointed Campeloma	U	U	U	U	U	U	U	U	U	U	U	U	Can be found in areas with decent current in rivers or lakes over sand.
		<i>Lymnaea stagnalis</i>	Swamp Lymnaea	U	U	U	U	U	U	U	U	U	U	U	U	Can be found in slower moving areas/backwaters of rivers or lakes.

**Table I-3.** SGCN Occurring in Barren Lands in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/ Rock Outcrops	Bare Rock/ Talus	Comments
<b>Birds</b>	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-plover	X			
	Songbirds	<i>Setophaga kirtlandii</i>	Kirtland's Warbler	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
<b>Mammals</b>	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X			
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
		<i>Lithobates pipiens</i>	Northern Leopard Frog			X	Can use quarries.

**Table I-4.** SGCN Occurring in Developed Lands in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas
<b>Birds</b>	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	
		<i>Falco peregrinus</i>	Peregrine Falcon		X
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	
		<i>Lasiurus borealis</i>	Eastern Red Bat	X	
		<i>Lasiurus cinereus</i>	Hoary Bat	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X	
		<i>Nycticeius humeralis</i>	Evening Bat	X	
		<i>Mustela nivalis</i>	Least Weasel	X	
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	

**Table I-5.** SGCN Occurring in Forests in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands	
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X	
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X	
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X	
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X	X	X	X	
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X			
		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X	
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X	
		<i>Setophaga citrina</i>	Hooded Warbler	X			X			
		<i>Setophaga kirtlandii</i>	Kirtland's Warbler		X					
	<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
			<i>Lasiurus borealis</i>	Eastern Red Bat	X		X	X		X
		<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		X	X		X	
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X		X	X		X	
		<i>Nycticeius humeralis</i>	Evening Bat	X		X	X		X	
		Mustelids	<i>Mustela nivalis</i>	Least Weasel	X		X	X	X	X
<b>Amphibians</b>	Frogs	<i>Lithobates pipiens</i>	Northern Leopard Frog	X						
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander	X		X				

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Reptiles</b>	Snakes	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake				X	X	X
		<i>Opheodrys vernalis</i>	Smooth Greensnake				X	X	X
		<i>Sistrurus catenatus</i>	Massasauga				X	X	X
		<i>Thamnophis proximus</i>	Western Ribbonsnake				X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X

**Table I-6.** SGCN Occurring in Grasslands in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Herons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
	<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X			

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	
		<i>Setophaga kirtlandii</i>	Kirtland's Warbler		X			
		<i>Sturnella neglecta</i>	Western Meadowlark			X	X	
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use vegetated dunes.
	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X		X		Can use prairies and rights-of-way.
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X		X		
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	
		<i>Nerodia erythrogaster</i>	Copper-bellied			X		

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>neglecta</i>	Watersnake					
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	X	X	X	
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	
		<i>Thamnophis butleri</i>	Butler's Gartersnake	X		X		
		<i>Thamnophis proximus</i>	Western Ribbonsnake	X		X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		

**Table I-7.** SGCN Occurring in Wetlands in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					
		<i>Laterallus jamaicensis</i>	Black Rail		X					
		<i>Rallus elegans</i>	King Rail		X		X			
		<i>Rallus limicola</i>	Virginia Rail	X	X					X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Ictinia mississippiensis</i>	Mississippi Kite			X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris</i>	Buff-breasted					X	X	X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones
		<i>subruficollis</i>	Sandpiper							
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel							X
	Shrews and Moles	<i>Condylura cristata</i>	Star-nosed Mole	X	X	X	X			X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X	X		X	X		X
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander			X	X	X		X
		<i>Hemidactylium scutatum</i>	Four-toed Salamander	X		X	X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones	
Reptiles	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X	
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	X	X	X		X		X	
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	X		X			X	
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	X		X	
		<i>Thamnophis butleri</i>	Butler's Gartersnake		X			X		X	
		<i>Thamnophis proximus</i>	Western Ribbonsnake		X	X	X	X		X	
		Turtles	<i>Clemmys guttata</i>	Spotted Turtle	X	X	X	X	X		X
			<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X	X	X		X

**Appendix J.** Kankakee Region SGCN Habitat and Subhabitat Tables.

**Table J-1.** SGCN Occurring in Agricultural Systems in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name
Birds	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
		<i>Lanius ludovicianus</i>	Loggerhead Shrike
		<i>Sturnella neglecta</i>	Western Meadowlark
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan
Mammals	Mustelids	<i>Mustela nivalis</i>	Least Weasel
		<i>Taxidea taxus</i>	American Badger
	Rodents	<i>Geomys bursarius</i>	Plains Pocket Gopher
		<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel
Amphibians	Frogs	<i>Lithobates blairi</i>	Plains Leopard Frog

Taxa	Group	Scientific Name	Common Name
		<i>Lithobates pipiens</i>	Northern Leopard Frog
<b>Reptiles</b>	Snakes	<i>Sistrurus catenatus</i>	Massasauga
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle
		<i>Terrapene ornata</i>	Ornate Box Turtle

**Table J-2.** SGCN Occurring in Aquatic Systems in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane										X			
		<i>Grus canadensis</i>	Sandhill Crane			X	X						X			
	Hérons	<i>Ardea alba</i>	Great Egret	X	X	X	X		X	X	X	X	X		X	
		<i>Botaurus lentiginosus</i>	American Bittern										X			Can use impoundments.
		<i>Ixobrychus exilis</i>	Least Bittern										X			
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron			X	X		X				X		X	
	Rails	<i>Gallinula galeata</i>	Common Gallinule										X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Rallus limicola</i>	Virginia Rail								X		X			
	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon												X	Can use impoundments.
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X		X	X					X	X	X	Can use impoundments and borrow pits.
		<i>Pandion haliaetus</i>	Osprey	X	X		X	X					X	X	X	Can use impoundments and borrow pits.
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone										X		X	
		<i>Charadrius melodus</i>	Piping Plover												X	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher										X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope										X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs										X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X	X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren										X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X							X	X		Can use impoundments.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X								X	X		Can use borrow pits.
<b>Birds</b>	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan										X			Can use impoundments.
<b>Mammals</b>	Shrews and Moles	<i>Condylura cristata</i>	Star-nosed Mole										X			
<b>Amphibians</b>	Aquatic Salamanders	<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X			
		<i>Lithobates blairi</i>	Plains Leopard Frog		X	X	X		X		X	X	X			
		<i>Lithobates pipiens</i>	Northern Leopard Frog		X	X	X		X		X	X	X			
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander										X			
<b>Reptiles</b>	Snakes	<i>Thamnophis proximus</i>	Western Ribbonsnake			X	X		X			X	X			
	Turtles	<i>Clemmys guttata</i>	Spotted Turtle			X			X			X	X			
		<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X			X			X	X			
		<i>Kinosternon subrubrum</i>	Eastern Mud Turtle			X			X			X	X			
<b>Fish</b>	Carps and Minnows	<i>Notropis dorsalis</i>	Bigmouth Shiner		X	X	X		X			X				

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
	Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey		X	X	X		X	X		X				
	Suckers	<i>Moxostoma valenciennesi</i>	Greater Redhorse	X	X		X	X	X				X	X		
<b>Mollusks</b>	Mussels	<i>Venustaconcha ellipsiformis</i>	Ellipse		X					X		X				
	Snails	<i>Campeloma decisum</i>	Pointed Campeloma	U	U	U	U	U	U	U	U	U	U	U	U	Can be found in areas with decent current in rivers or lakes over sand.
		<i>Lymnaea stagnalis</i>	Swamp Lymnaea	U	U	U	U	U	U	U	U	U	U	U	U	Can be found in slower moving areas/backwaters of rivers or lakes.

**Table J-3.** SGCN Occurring in Barren Lands in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/Rock Outcrops	Bare Rock/ Talus	Comments
<b>Birds</b>	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-plover	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
<b>Mammals</b>	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X			
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
		<i>Lithobates pipiens</i>	Northern Leopard Frog			X	Can use quarries.

**Table J-4.** SGCN Occurring in Developed Lands in the Kankakee Region.

<b>Taxa</b>	<b>Group</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Suburban Areas</b>	<b>Urban Areas</b>
<b>Birds</b>	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	
		<i>Falco peregrinus</i>	Peregrine Falcon		X
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	
		<i>Lasiurus borealis</i>	Eastern Red Bat	X	
		<i>Lasiurus cinereus</i>	Hoary Bat	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X	
		<i>Nycticeius humeralis</i>	Evening Bat	X	
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X	
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	

**Table J-5.** SGCN Occurring in Forests in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X		
		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X
		<i>Setophaga citrina</i>	Hooded Warbler	X			X		
	<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X
<i>Lasiurus borealis</i>			Eastern Red Bat	X		X	X		X
<i>Lasiurus cinereus</i>			Hoary Bat	X	X	X	X	X	X
<i>Myotis lucifugus</i>			Little Brown Myotis	X		X	X		X
<i>Myotis septentrionalis</i>			Northern Long-eared Myotis	X	X	X	X	X	X
<i>Myotis sodalis</i>			Indiana Myotis	X		X	X		X
<i>Nycticeius humeralis</i>			Evening Bat	X		X	X		X
Mustelids			<i>Mustela nivalis</i>	Least Weasel	X		X	X	X
<b>Amphibians</b>	Frogs	<i>Lithobates pipiens</i>	Northern Leopard Frog	X					
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander	X		X			
<b>Reptiles</b>	Snakes	<i>Opheodrys vernalis</i>	Smooth Greensnake				X	X	X
		<i>Sistrurus catenatus</i>	Massasauga				X	X	X

		<i>Thamnophis proximus</i>	Western Ribbonsnake				X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X
		<i>Terrapene ornata</i>	Ornate Box Turtle				X		

**Table J-6.** SGCN Occurring in Grasslands in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Hérons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	
		<i>Sturnella neglecta</i>	Western Meadowlark			X	X	
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				Can use recovering mine lands.
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				Can use recovering mine lands.
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands and recovering mine lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use recovering mine lands and dunes.
	Rodents	<i>Geomys bursarius</i>	Plains Pocket Gopher	X		X		
		<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X		X		Can use prairies and rights-of-way.
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Lithobates blairi</i>	Plains Leopard Frog	X		X		
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X		X		
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	X	X	X	
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	
		<i>Thamnophis proximus</i>	Western Ribbonsnake	X		X		Can use recovering mine lands.
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		
		<i>Terrapene ornata</i>	Ornate Box Turtle	X	X	X		Can use vegetated dunes and swales.

**Table J-7.** SGCN Occurring in Wetlands in the Kankakee Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					
		<i>Laterallus jamaicensis</i>	Black Rail		X					
		<i>Rallus elegans</i>	King Rail		X		X			
		<i>Rallus limicola</i>	Virginia Rail	X	X					X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper					X	X	X
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel							X
	Moles	<i>Condylura cristata</i>	Star-nosed Mole	X	X	X	X			X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X
		<i>Lithobates blairi</i>	Plains Leopard Frog		X		X	X		X
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X	X		X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander			X	X	X		X
		<i>Hemidactylium scutatum</i>	Four-toed Salamander	X		X	X	X		X
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X
		<i>Opheodrys vernalis</i>	Smooth Greensnake	X	X		X			X
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	X		X
		<i>Thamnophis proximus</i>	Western Ribbonsnake		X	X	X	X		X
	Turtles	<i>Clemmys guttata</i>	Spotted Turtle	X	X	X	X	X		X
		<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X	X	X		X
		<i>Kinosternon subrubrum</i>	Eastern Mud Turtle		X	X		X		X
		<i>Terrapene ornata</i>	Ornate Box Turtle							X

**Appendix K.** Corn Belt Region SGCN Habitat and Subhabitat Tables.

**Table K-1.** SGCN Occurring in Agricultural Systems in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
		<i>Lanius ludovicianus</i>	Loggerhead Shrike
		<i>Sturnella neglecta</i>	Western Meadowlark
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan
	<b>Mammals</b>	Mustelids	<i>Mustela nivalis</i>
<i>Taxidea taxus</i>			American Badger
Rodents		<i>Geomys bursarius</i>	Plains Pocket Gopher
		<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel

Taxa	Group	Scientific Name	Common Name
Amphibians	Frogs	<i>Lithobates blairi</i>	Plains Leopard Frog
		<i>Lithobates pipiens</i>	Northern Leopard Frog
Reptiles	Snakes	<i>Sistrurus catenatus</i>	Massasauga
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle
		<i>Terrapene ornata</i>	Ornate Box Turtle

**Table K-2.** SGCN Occurring in Aquatic Systems in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
Birds	Cranes	<i>Grus americana</i>	Whooping Crane									X			
		<i>Grus canadensis</i>	Sandhill Crane			X	X					X			
	Hérons	<i>Ardea alba</i>	Great Egret	X	X	X	X		X	X	X	X		X	
		<i>Botaurus lentiginosus</i>	American Bittern									X			Can use impoundments.
		<i>Ixobrychus exilis</i>	Least Bittern									X			
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron									X			
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron			X	X		X			X		X	
	Rails	<i>Gallinula galeata</i>	Common Gallinule									X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Rallus limicola</i>	Virginia Rail								X	X			
	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon											X	Can use impoundments.
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X		X	X				X	X	X	Can use impoundments and borrow pits.
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X		X	X				X	X		
		<i>Pandion haliaetus</i>	Osprey	X	X		X	X				X	X	X	Can use impoundments and borrow pits.
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone									X		X	
		<i>Charadrius melodus</i>	Piping Plover											X	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher									X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope									X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs									X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren									X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X						X	X		Can use impoundments.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X							X	X		Can use borrow pits.
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan									X			Can use impoundments.
<b>Mammals</b>	Shrews and Moles	<i>Condylura cristata</i>	Star-nosed Mole									X			
<b>Amphibians</b>	Aquatic Salamanders	<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X		
		<i>Lithobates blairi</i>	Plains Leopard Frog		X	X	X		X		X	X	X		
		<i>Lithobates pipiens</i>	Northern Leopard Frog		X	X	X		X		X	X	X		
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander									X			
<b>Reptiles</b>	Turtles	<i>Clemmys guttata</i>	Spotted Turtle			X			X			X	X		
		<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X			X			X	X		
<b>Fish</b>	Carp and Minnows	<i>Clinostomus elongatus</i>	Redside Dace		X		X		X	X	X	X			
	Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey		X	X	X		X	X		X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
	Perches	<i>Etheostoma maculatum</i>	Spotted Darter		X		X	X	X	X		X			
		<i>Etheostoma tippecanoe</i>	Tippecanoe Darter		X		X			X					
		<i>Percina evides</i>	Gilt Darter		X		X	X	X	X		X			
	Suckers	<i>Moxostoma valenciennesi</i>	Greater Redhorse	X	X		X	X	X			X	X		
	Trouts and Salmons	<i>Coregonus artedii</i>	Cisco	X								X	X	X	
<b>Mollusks</b>	Mussels	<i>Cyprogenia stegaria</i>	Fanshell	X	X										
		<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell		X			X		X		X			
		<i>Epioblasma triquetra</i>	Snuffbox	X	X					X					
		<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel	X	X					X		X			
		<i>Obovaria subrotunda</i>	Round Hickorynut	X	X	X	X			X		X			
		<i>Plethobasus cyphus</i>	Sheepnose	X	X	X	X			X					
		<i>Pleurobema clava</i>	Clubshell	X	X					X		X			
		<i>Ptychobranthus fasciolaris</i>	Kidneyshell	X	X		X	X		X		X	X		

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	X	X		X			X		X			
		<i>Simpsonaias ambigua</i>	Salamander Mussel	X	X		X					X	X		
		<i>Toxolasma lividum</i>	Purple Lilliput		X	X		X		X		X			
		<i>Villosa fabalis</i>	Rayed Bean		X					X		X			
		<i>Villosa lienosa</i>	Little Spectaclecase	X	X	X	X		X	X		X			
	Snails	<i>Campeloma decisum</i>	Pointed Campeloma	U	U	U	U	U	U	U	U	U	U	U	Can be found in areas with decent current in rivers or lakes over sand.
		<i>Lymnaea stagnalis</i>	Swamp Lymnaea	U	U	U	U	U	U	U	U	U	U	U	Can be found in slower moving areas/ backwaters of rivers or lakes.

**Table K-3.** SGCN Occurring in Barren Lands in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/ Rock Outcrops	Bare Rock/ Talus	Comments
<b>Birds</b>	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-Plover	X			
	Songbirds	<i>Setophaga kirtlandii</i>	Kirtland's Warbler	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
<b>Mammals</b>	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X			
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
		<i>Lithobates pipiens</i>	Northern Leopard Frog			X	Can use quarries.

**Table K-4.** SGCN Occurring in Developed Lands in the Corn Belt Region.

Taxa	Group	Scientific Names	Common Name	Suburban Areas	Urban Areas
Birds	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	
		<i>Falco peregrinus</i>	Peregrine Falcon		X
Mammals	Bats	<i>Lasiurus noctivagans</i>	Silver-haired Bat	X	
		<i>Lasiurus borealis</i>	Eastern Red Bat	X	
		<i>Lasiurus cinereus</i>	Hoary Bat	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X	
		<i>Nycticeius humeralis</i>	Evening Bat	X	
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X	
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X	
Reptiles	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X

**Table K-5.** SGCN Occurring in Forests in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X	X	X	X
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X		
		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X
		<i>Setophaga citrina</i>	Hooded Warbler	X			X		
		<i>Setophaga kirtlandii</i>	Kirtland's Warbler		X				
<b>Mammals</b>	Bats	<i>Lasiurus noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
		<i>Lasiurus borealis</i>	Eastern Red Bat	X		X	X		X
		<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		X	X		X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X
		<i>Myotis sodalis</i>	Indiana Myotis	X		X	X		X
		<i>Nycticeius humeralis</i>	Evening Bat	X		X	X		X
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X		X	X		X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X		X	X	X	X

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Amphibians</b>	Frogs	<i>Lithobates pipiens</i>	Northern Leopard Frog	X					
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander	X		X			
<b>Reptiles</b>	Snakes	<i>Sistrurus catenatus</i>	Massasauga				X	X	X
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X
		<i>Terrapene ornata</i>	Ornate Box Turtle				X		

**Table K-6.** SGCN Occurring in Grasslands in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Herons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X		
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Setophaga kirtlandii</i>	Kirtland's Warbler		X			
		<i>Sturnella neglecta</i>	Western Meadowlark			X	X	
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				Can use recovering mine lands.
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				Can use recovering mine lands.
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands and recovering mine lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use recovering mine lands and dunes.
	Rodents	<i>Geomys bursarius</i>	Plains Pocket Gopher	X		X		
		<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	X		X		Can use prairies and rights-of-way.
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Lithobates blairi</i>	Plains Leopard Frog	X		X		
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X		X		
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	
		<i>Thamnophis butleri</i>	Butler's Gartersnake	X		X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		
		<i>Terrapene ornata</i>	Ornate Box Turtle	X	X	X		Can use vegetated dunes and swales.

**Table K-7.** SGCN Occurring in Wetlands in the Corn Belt Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/ Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron		X	X				X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					
		<i>Laterallus jamaicensis</i>	Black Rail			X				
		<i>Rallus elegans</i>	King Rail		X		X			
		<i>Rallus limicola</i>	Virginia Rail	X	X					X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Ictinia mississippiensis</i>	Mississippi Kite			X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper					X	X	X
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Lasiurus noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
		<i>Perimyotis subflavus</i>	Tri-colored Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Rodents	<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel							X
	Moles	<i>Condylura cristata</i>	Star-nosed Mole	X	X	X	X			X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X
		<i>Lithobates blairi</i>	Plains Leopard Frog		X		X	X		X
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X	X		X	X		X
	Salamanders	<i>Ambystoma laterale</i>	Blue-spotted Salamander			X	X	X		X
		<i>Hemidactylium scutatum</i>	Four-toed Salamander	X		X	X	X		X
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X
		<i>Sistrurus catenatus</i>	Massasauga	X	X	X	X	X		X
		<i>Thamnophis butleri</i>	Butler's Gartersnake		X			X		X
	Turtles	<i>Clemmys guttata</i>	Spotted Turtle	X	X	X	X	X		X
		<i>Emydoidea blandingii</i>	Blanding's Turtle		X	X	X	X		X
		<i>Terrapene ornata</i>	Ornate Box Turtle							X

## Appendix L. Valleys and Hills Region SGCN Habitat and Subhabitat Tables.

**Table L-1.** SGCN Occurring in Agricultural Systems in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name
Birds	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
		<i>Lanius ludovicianus</i>	Loggerhead Shrike
		<i>Sturnella neglecta</i>	Western Meadowlark
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan
	Mammals	Mustelids	<i>Mustela nivalis</i>
<i>Taxidea taxus</i>			American Badger
Amphibians	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog
		<i>Lithobates blairi</i>	Plains Leopard Frog
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
Reptiles	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle

**Table L-2.** SGCN Occurring in Aquatic Systems in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane										X			
		<i>Grus canadensis</i>	Sandhill Crane			X	X						X			
	Herons	<i>Ardea alba</i>	Great Egret	X	X	X	X		X	X	X	X	X		X	
		<i>Botaurus lentiginosus</i>	American Bittern										X			Can use impoundments.
		<i>Ixobrychus exilis</i>	Least Bittern										X			
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron										X			
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron			X	X		X				X		X	
	Rails	<i>Gallinula galeata</i>	Common Gallinule										X			
		<i>Rallus limicola</i>	Virginia Rail								X		X			
	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon												X	Can use impoundments.
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X		X	X					X	X	X	Can use impoundments and borrow pits.
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X		X	X					X	X		
		<i>Pandion haliaetus</i>	Osprey	X	X		X	X					X	X	X	Can use impoundments and borrow pits.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone										X		X	
		<i>Charadrius melodus</i>	Piping Plover												X	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher										X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope										X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs										X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X	X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren										X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X							X	X		Can use impoundments.
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X								X	X		Can use borrow pits.
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan										X			Can use impoundments.
<b>Amphibians</b>	Aquatic Salamanders	<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Lithobates areolatus</i>	Crawfish Frog										X			
		<i>Lithobates blairi</i>	Plains Leopard Frog		X	X	X		X		X	X	X			
<b>Reptiles</b>	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth		X	X	X		X			X	X			
		<i>Farancia abacura</i>	Red-bellied Mudsnake			X			X		X	X	X			
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake		X	X						X	X			
		<i>Thamnophis proximus</i>	Western Ribbonsnake			X	X		X			X	X			
	Turtles	<i>Kinosternon subrubrum</i>	Eastern Mud Turtle			X			X			X	X			
		<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	X	X	X			X			X	X	X		
		<i>Pseudemys concinna</i>	River Cooter		X	X	X					X	X	X		
<b>Fish</b>	Catfish	<i>Noturus stigmosus</i>	Northern Madtom		X	X	X			X		X				
	Perches	<i>Ammocrypta clara</i>	Western Sand Darter	X	X	X	X		X	X						
		<i>Etheostoma maculatum</i>	Spotted Darter		X		X	X	X	X		X				

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Etheostoma proeliare</i>	Cypress Darter		X	X			X			X	X			Can be found in oxbows/ backwaters/ sloughs/ embayments.
		<i>Etheostoma tippecanoe</i>	Tippecanoe Darter		X		X			X						
		<i>Percina copelandi</i>	Channel Darter		X	X	X		X	X		X	X			
	Pikes	<i>Esox masquinongy ohioensis</i>	Ohio River Muskellunge	X	X	X			X			X	X			
	Pygmy Sunfish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish		X	X						X				Can be found in oxbows/ backwaters/ sloughs/ embayments.
	Sturgeons	<i>Acipenser fulvescens</i>	Lake Sturgeon	X		X	X						X	X	X	
	Sunfish	<i>Lepomis symmetricus</i>	Bantam Sunfish		X	X			X			X	X			Can be found in oxbows/ backwaters/ sloughs/ embayments.
<b>Mollusks</b>	Mussels	<i>Cyprogenia stegaria</i>	Fanshell	X	X											
		<i>Obovaria subrotunda</i>	Round Hickorynut	X	X	X	X			X			X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Plethobasus cyphus</i>	Sheepnose	X	X	X	X			X						
		<i>Pleurobema cordatum</i>	Ohio Pigtoe	X	X	X	X			X			X			
		<i>Potamilus capax</i>	Fat Pocketbook	X	X	X			X	X			X			
		<i>Ptychobranhus fasciolaris</i>	Kidneyshell	X	X		X	X		X		X	X	X		
		<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	X	X		X			X		X				
		<i>Villosa lienosa</i>	Little Spectaclecase	X	X	X	X		X	X		X				

**Table L-3.** SGCN Occurring in Barren Lands in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/ Rock Outcrops	Bare Rock/ Talus	Comments
Birds	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-plover	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
Amphibians	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
Reptiles	Turtles	<i>Pseudemys concinna</i>	River Cooter	X			

**Table L-4.** SGCN Occurring in Developed Lands in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas
Birds	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	
		<i>Falco peregrinus</i>	Peregrine Falcon		X
Mammals	Bats	<i>Lasiurus noctivagans</i>	Silver-haired Bat	X	
		<i>Lasiurus borealis</i>	Eastern Red Bat	X	
		<i>Lasiurus cinereus</i>	Hoary Bat	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X	

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas
		<i>Nycticeius humeralis</i>	Evening Bat	X	
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X	
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X	
Amphibians	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog	X	
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	
Reptiles	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X
		<i>Opheodrys aestivus</i>	Rough Greensnake	X	

**Table L-5.** SGCN Occurring in Forests in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X	X	X	X
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X		

Taxa	Group	Scientific Name	Common Name	Hardwood forests	Conifer forests	Mixed forests	Hardwood woodlands	Conifer woodlands	Mixed woodlands
		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X
		<i>Setophaga citrina</i>	Hooded Warbler	X			X		
<b>Mammals</b>	Bats	<i>Lasiorycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
		<i>Lasiurus borealis</i>	Eastern Red Bat	X		X	X		X
		<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		X	X		X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X
		<i>Myotis sodalis</i>	Indiana Myotis	X		X	X		X
		<i>Nycticeius humeralis</i>	Evening Bat	X		X	X		X
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X		X	X		X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X		X	X	X	X
	Rabbits	<i>Sylvilagus aquaticus</i>	Swamp Rabbit	X		X	X		X
<b>Amphibians</b>	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog					X	
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X	X	X	X
	Salamanders	<i>Ambystoma talpoideum</i>	Mole Salamander	X	X	X	X	X	X
<b>Reptiles</b>	Snakes	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake				X	X	X
		<i>Opheodrys aestivus</i>	Rough Greensnake	X			X		
		<i>Thamnophis proximus</i>	Western Ribbonsnake				X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X

**Table L-6.** SGCN Occurring in Grasslands in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Hérons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X		
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	
		<i>Sturnella neglecta</i>	Western Meadowlark			X	X	

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				Can use recovering mine lands.
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				Can use recovering mine lands.
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands and recovering mine lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use recovering mine lands and dunes.
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Lithobates areolatus</i>	Crawfish Frog	X		X		
		<i>Lithobates blairi</i>	Plains Leopard Frog	X		X		
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X		
<b>Reptiles</b>	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth	X				
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake			X		Can use recovering mine lands.
		<i>Opheodrys aestivus</i>	Rough Greensnake		X	X	X	Can use recovering mine lands.
		<i>Thamnophis proximus</i>	Western Ribbonsnake	X		X		Can use recovering mine lands.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		

**Table L-7.** SGCN Occurring in Wetlands in the Valleys and Hills Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron		X	X				X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Laterallus jamaicensis</i>	Black Rail		X					
		<i>Rallus elegans</i>	King Rail		X		X			
		<i>Rallus limicola</i>	Virginia Rail	X	X					X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Ictinia mississippiensis</i>	Mississippi Kite			X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper					X	X	X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X
		<i>Myotis grisescens</i>	Gray Myotis							X
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
		<i>Perimyotis subflavus</i>	Tri-colored Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Rabbits	<i>Sylvilagus aquaticus</i>	Swamp Rabbit			X	X			X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Lithobates areolatus</i>	Crawfish Frog		X			X		X
		<i>Lithobates blairi</i>	Plains Leopard Frog		X		X	X		X
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot					X		X
	Salamanders	<i>Ambystoma talpoideum</i>	Mole Salamander			X	X	X		X
<b>Reptiles</b>	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth		X	X	X			X
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X
		<i>Farancia abacura</i>	Red-bellied Mudsnake	X	X	X	X			X
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	X	X	X		X		X
		<i>Opheodrys aestivus</i>	Rough Greensnake			X	X			X
		<i>Thamnophis proximus</i>	Western Ribbonsnake		X	X	X	X		X
	Turtles	<i>Kinosternon subrubrum</i>	Eastern Mud Turtle		X	X		X		X
		<i>Macrochelys temminckii</i>	Alligator Snapping Turtle			X				X
		<i>Pseudemys concinna</i>	River Cooter			X				X
<b>Fish</b>	Perches	<i>Etheostoma proeliare</i>	Cypress Darter			X				

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
	Pikes	<i>Esox masquinongy ohioensis</i>	Ohio River Muskellunge		X	X	X			
	Pygmy Sunfish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish			X				
	Sunfish	<i>Lepomis symmetricus</i>	Bantam Sunfish			X				

**Appendix M.** Interior Plateau Region SGCN Habitat and Subhabitat Tables.

**Table M-1.** SGCN Occurring in Agricultural Systems in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
		<i>Lanius ludovicianus</i>	Loggerhead Shrike
		<i>Sturnella neglecta</i>	Western Meadowlark
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan
<b>Mammals</b>	Mustelids	<i>Mustela nivalis</i>	Least Weasel
		<i>Taxidea taxus</i>	American Badger
<b>Amphibians</b>	Frogs	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
<b>Reptiles</b>	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle

**Table M-2.** SGCN Occurring in Aquatic Systems in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane										X			
		<i>Grus canadensis</i>	Sandhill Crane			X	X						X			
	Herons	<i>Ardea alba</i>	Great Egret	X	X	X	X		X	X	X	X	X		X	
		<i>Botaurus lentiginosus</i>	American Bittern										X			Can use impoundments.
		<i>Ixobrychus exilis</i>	Least Bittern										X			
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron										X			
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron			X	X		X				X		X	
	Rails	<i>Gallinula galeata</i>	Common Gallinule										X			
	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon												X	Can use impoundments.
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X		X	X					X	X	X	Can use impoundments and borrow pits.
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X		X	X					X	X		
		<i>Pandion haliaetus</i>	Osprey	X	X		X	X					X	X	X	Can use impoundments and borrow pits.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone										X		X	
		<i>Charadrius melodus</i>	Piping Plover												X	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher										X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope										X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs										X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X	X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren										X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X							X	X		Can use impoundments.
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X								X	X		Can use borrow pits.
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan										X			Can use impoundments.
<b>Amphibians</b>	Aquatic Salamanders	<i>Cryptobranchus alleganiensis</i>	Hellbender		X	X	X		X	X		X				Requires clear, rocky streams.
		<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X			
	Salamanders	<i>Ambystoma barbouri</i>	Streamside Salamander						X			X				



Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel	X	X					X		X				
		<i>Obovaria subrotunda</i>	Round Hickorynut	X	X	X	X			X			X			
		<i>Plethobasus cyphus</i>	Sheepnose	X	X	X	X			X						
		<i>Pleurobema cordatum</i>	Ohio Pigtoe	X	X	X	X			X			X			
		<i>Pleurobema plenum</i>	Rough Pigtoe	X	X					X						
		<i>Ptychobranthus fasciolaris</i>	Kidneyshell	X	X		X	X		X		X	X	X		
		<i>Simpsonaias ambigua</i>	Salamander Mussel	X	X		X					X	X			
		<i>Villosa lienosa</i>	Little Spectaclecase	X	X	X	X		X	X		X				

**Table M-3.** SGCN Occurring in Barren Lands in Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/ Rock Outcrops	Bare Rock/ Talus	Comments
<b>Birds</b>	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-plover	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
<b>Mammals</b>	Bats	<i>Myotis leibii</i>	Eastern Small-footed Myotis			X	
	Rodents	<i>Neotoma magister</i>	Allegheny Woodrat		X	X	
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
	Salamanders	<i>Aneides aeneus</i>	Green Salamander		X	X	Requires deep, moist crevices in rock outcrops.
<b>Reptiles</b>	Snakes	<i>Crotalus horridus</i>	Timber Rattlesnake		X	X	Requires rocky areas for hibernation.
	Turtles	<i>Pseudemys concinna</i>	River Cooter	X			

**Table M-4.** SGCN Occurring in Developed Lands in the Great Lakes Region.

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas	
<b>Birds</b>	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X		
		<i>Falco peregrinus</i>	Peregrine Falcon		X	
<b>Mammals</b>	Bats	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X		
		<i>Lasiurus borealis</i>	Eastern Red Bat	X		
		<i>Lasiurus cinereus</i>	Hoary Bat	X		
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		
		<i>Myotis sodalis</i>	Indiana Myotis	X		
		<i>Nycticeius humeralis</i>	Evening Bat	X		
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X		
		Mustelids	<i>Mustela nivalis</i>	Least Weasel	X	
		<b>Amphibians</b>	Frogs	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X	
		<i>Opheodrys aestivus</i>	Rough Greensnake	X		

**Table M-5.** SGCN Occurring in Forests in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands	
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X	
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X	
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X	
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X	X	X	X	
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X			
		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X	
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X	
		<i>Setophaga citrina</i>	Hooded Warbler	X			X			
	<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	X		X	X		X
			<i>Lasiorycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
			<i>Lasiurus borealis</i>	Eastern Red Bat	X		X	X		X
		<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X	
		<i>Myotis austroriparius</i>	Southeastern Myotis	X	X	X	X	X	X	
		<i>Myotis leibii</i>	Eastern Small-footed Myotis	X	X	X	X	X	X	
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		X	X		X	
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X	
	<i>Myotis sodalis</i>	Indiana Myotis	X		X	X		X		

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
		<i>Nycticeius humeralis</i>	Evening Bat	X		X	X		X
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X		X	X		X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X		X	X	X	X
	Rodents	<i>Neotoma magister</i>	Allegheny Woodrat	X		X	X		X
	Shrews	<i>Sorex fumeus</i>	Smoky Shrew	X	X	X	X	X	X
		<i>Sorex hoyi</i>	American Pygmy Shrew	X	X	X			
<b>Amphibians</b>	Frogs	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X	X	X	X
	Salamanders	<i>Ambystoma barbouri</i>	Streamside Salamander	X					
		<i>Aneides aeneus</i>	Green Salamander	X			X		
<b>Reptiles</b>	Snakes	<i>Cemophora coccinea</i>	Scarletsnake	X	X	X	X	X	X
		<i>Crotalus horridus</i>	Timber Rattlesnake	X	X	X	X	X	X
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake				X	X	X
		<i>Opheodrys aestivus</i>	Rough Greensnake	X			X		
		<i>Tantilla coronata</i>	Southeastern Crowned Snake				X	X	X
		<i>Thamnophis proximus</i>	Western Ribbonsnake				X		
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X

**Table M-6.** SGCN Occurring in Grasslands in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Herons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X		
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	
	<i>Sturnella neglecta</i>	Western Meadowlark			X	X		

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				Can use recovering mine lands.
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				Can use recovering mine lands.
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands and recovering mine lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use recovering mine lands and dunes.
	Shrews	<i>Sorex fumeus</i>	Smoky Shrew				X	
		<i>Sorex hoyi</i>	American Pygmy Shrew		X	X		
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X		
<b>Reptiles</b>	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth	X				
		<i>Cemophora coccinea</i>	Scarletsnake			X		
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	
		<i>Crotalus horridus</i>	Timber Rattlesnake		X			
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake			X		Can use recovering mine lands.
		<i>Opheodrys aestivus</i>	Rough Greensnake		X	X	X	Can use recovering mine lands.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Thamnophis proximus</i>	Western Ribbonsnake	X		X		Can use recovering mine lands.
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		

**Table M-7.** SGCN Occurring in Subterranean Systems in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Subaquatic	Subterrestrial	Comments
<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat		X	
		<i>Lasionycteris noctivagans</i>	Silver-haired Bat		X	
		<i>Myotis austroriparius</i>	Southeastern Myotis		X	
		<i>Myotis grisescens</i>	Gray Myotis		X	Requires wet caves.
		<i>Myotis leibii</i>	Eastern Small-footed Myotis		X	
		<i>Myotis lucifugus</i>	Little Brown Myotis		X	
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis		X	
		<i>Myotis sodalis</i>	Indiana Myotis		X	
		<i>Perimyotis subflavus</i>	Tri-colored Bat		X	
	Rodents	<i>Neotoma magister</i>	Allegheny Woodrat		X	

<b>Amphibians</b>	Salamanders	<i>Aneides aeneus</i>	Green Salamander		X	
<b>Reptiles</b>	Snakes	<i>Crotalus horridus</i>	Timber Rattlesnake		X	
<b>Fish</b>	Cavefish	<i>Amblyopsis hoosieri</i>	Hoosier Cavefish	X		

**Table M-8.** SGCN Occurring in Wetlands in the Interior Plateau Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron		X	X				X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					
		<i>Rallus elegans</i>	King Rail		X		X			
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Ictinia mississippiensis</i>	Mississippi Kite			X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper					X	X	X
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat			X				X
		<i>Lasionycteris noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X
		<i>Myotis austroriparius</i>	Southeastern Myotis			X				X
		<i>Myotis grisescens</i>	Gray Myotis							X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Myotis leibii</i>	Eastern Small-footed Myotis							X
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
		<i>Perimyotis subflavus</i>	Tri-colored Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Shrews	<i>Sorex fumeus</i>	Smoky Shrew			X				X
		<i>Sorex hoyi</i>	American Pygmy Shrew	X	X	X				X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot					X		X
	Salamanders	<i>Hemidactylium scutatum</i>	Four-toed Salamander	X		X	X	X		X
		<i>Pseudotriton ruber</i>	Red Salamander			X				X
<b>Reptiles</b>	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth		X	X	X			X
		<i>Cemophora coccinea</i>	Scarletsnake							X
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Crotalus horridus</i>	Timber Rattlesnake			X	X			X
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	X	X	X		X		X
		<i>Opheodrys aestivus</i>	Rough Greensnake			X	X			X
		<i>Thamnophis proximus</i>	Western Ribbonsnake		X	X	X	X		X
	Turtles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle			X				X
		<i>Pseudemys concinna</i>	River Cooter			X				X

**Appendix N.** Drift Plains Region SGCN Habitat and Subhabitat Tables.

**Table N-1.** SGCN Occurring in Agricultural Systems in the Drift Plains Region.

<b>Taxa</b>	<b>Group</b>	<b>Scientific Name</b>	<b>Common Name</b>
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane
		<i>Grus canadensis</i>	Sandhill Crane
	Raptors	<i>Asio flammeus</i>	Short-eared Owl
		<i>Circus cyaneus</i>	Northern Harrier
		<i>Tyto alba</i>	Barn Owl
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper
		<i>Pluvialis dominica</i>	American Golden-plover
		<i>Tringa solitaria</i>	Solitary Sandpiper
	Songbirds	<i>Cistothorus platensis</i>	Sedge Wren
<i>Lanius ludovicianus</i>		Loggerhead Shrike	
Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan	
<b>Mammals</b>	Mustelids	<i>Mustela nivalis</i>	Least Weasel
		<i>Taxidea taxus</i>	American Badger
<b>Amphibians</b>	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog
		<i>Lithobates pipiens</i>	Northern Leopard Frog
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
<b>Reptiles</b>	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle

**Table N-2.** SGCN Occurring in Aquatic Systems in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane										X			
		<i>Grus canadensis</i>	Sandhill Crane			X	X						X			
	Herons	<i>Ardea alba</i>	Great Egret	X	X	X	X		X	X	X	X	X		X	
		<i>Botaurus lentiginosus</i>	American Bittern										X			Can use impoundments.
		<i>Ixobrychus exilis</i>	Least Bittern										X			
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron										X			
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron			X	X		X				X		X	
	Rails	<i>Gallinula galeata</i>	Common Gallinule										X			
	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon												X	Can use impoundments.
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X		X	X					X	X	X	Can use impoundments and borrow pits.
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X		X	X					X	X		
		<i>Pandion haliaetus</i>	Osprey	X	X		X	X					X	X	X	Can use impoundments and borrow pits.

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone										X		X	
		<i>Charadrius melodus</i>	Piping Plover												X	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher										X		X	
		<i>Phalaropus tricolor</i>	Wilson's Phalarope										X			
		<i>Tringa melanoleuca</i>	Greater Yellowlegs										X			
		<i>Tringa solitaria</i>	Solitary Sandpiper		X	X						X	X			
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren										X			
	Terns	<i>Chlidonias niger</i>	Black Tern	X	X	X							X	X		Can use impoundments.
		<i>Sternula antillarum athalassos</i>	Interior Least Tern	X	X								X	X		Can use borrow pits.
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan										X			Can use impoundments.
<b>Amphibians</b>	Aquatic Salamanders	<i>Necturus maculosus</i>	Common Mudpuppy	X	X							X	X	X		Requires silt-free areas for nesting.
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X			X			X	X			
		<i>Lithobates areolatus</i>	Crawfish Frog										X			

Taxa	Group	Scientific Name	Common Name	Big Rivers	Medium Rivers	Low Gradient	Moderate Gradient	High Gradient	Pools	Riffles	Springs/ Spring Brooks	Creeks	Shallow Water Lakes	Deep Water Lakes	Lake Michigan	Comments
		<i>Lithobates pipiens</i>	Northern Leopard Frog		X	X	X		X		X	X	X			
	Salamanders	<i>Ambystoma barbouri</i>	Streamside Salamander						X			X				
<b>Reptiles</b>	Snakes	<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake		X	X						X	X			
<b>Fish</b>	Catfish	<i>Noturus stigmosus</i>	Northern Madtom		X	X	X			X		X				
	Perches	<i>Etheostoma variatum</i>	Variagate Darter		X			X	X	X		X				
		<i>Percina copelandi</i>	Channel Darter		X	X	X		X	X		X	X			
	Trout-perches	<i>Percopsis omiscomaycus</i>	Trout-perch	X	X		X		X			X	X	X	X	
<b>Mollusks</b>	Mussels	<i>Plethobasus cyphus</i>	Sheepnose	X	X	X	X			X						
		<i>Pleurobema cordatum</i>	Ohio Pigtoe	X	X	X	X			X			X			
		<i>Ptychobranchnus fasciolaris</i>	Kidneyshell	X	X		X	X		X		X	X	X		
		<i>Simpsonaias ambigua</i>	Salamander Mussel	X	X		X					X	X			
		<i>Toxolasma lividum</i>	Purple Lilliput		X	X		X		X		X				
		<i>Villosa lienosa</i>	Little Spectaclecase	X	X	X	X		X	X		X				

**Table N-3.** SGCN Occurring in Barren Lands in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Sand/ Dunes	Cliffs/ Rock Outcrops	Bare Rock/ Talus	Comments
<b>Birds</b>	Raptors	<i>Falco peregrinus</i>	Peregrine Falcon		X		
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X		
	Shorebirds	<i>Charadrius melodus</i>	Piping Plover	X			
		<i>Pluvialis dominica</i>	American Golden-plover	X			
	Terns	<i>Sternula antillarum athalassos</i>	Interior Least Tern	X			
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog			X	Can use quarries.
		<i>Lithobates pipiens</i>	Northern Leopard Frog			X	Can use quarries.
<b>Reptiles</b>	Snakes	<i>Crotalus horridus</i>	Timber Rattlesnake		X	X	Requires rocky areas for hibernation.

**Table N-4.** SGCN Occurring in Developed Lands in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas
<b>Birds</b>	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk	X	X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	
		<i>Falco peregrinus</i>	Peregrine Falcon		X
<b>Mammals</b>	Bats	<i>Lasiurus noctivagans</i>	Silver-haired Bat	X	
		<i>Lasiurus borealis</i>	Eastern Red Bat	X	
		<i>Lasiurus cinereus</i>	Hoary Bat	X	

Taxa	Group	Scientific Name	Common Name	Suburban Areas	Urban Areas
		<i>Myotis lucifugus</i>	Little Brown Myotis	X	
		<i>Myotis sodalis</i>	Indiana Myotis	X	
		<i>Nycticeius humeralis</i>	Evening Bat	X	
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X	
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X	
<b>Amphibians</b>	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog	X	
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	
<b>Reptiles</b>	Snakes	<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X
		<i>Opheodrys aestivus</i>	Rough Greensnake	X	

**Table N-5.** SGCN Occurring in Forests in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Hardwood Forests	Conifer Forests	Mixed Forests	Hardwood Woodlands	Conifer Woodlands	Mixed Woodlands
<b>Birds</b>	Nightjars	<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	X		X	X		X
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	X	X	X	X	X	X
		<i>Buteo lineatus</i>	Red-shouldered Hawk	X		X	X		X
		<i>Buteo platypterus</i>	Broad-winged Hawk	X		X	X		X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X	X	X	X	X	X
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X	X	X	X
	Songbirds	<i>Helmitheros vermivorum</i>	Worm-eating Warbler	X			X		

		<i>Mniotilta varia</i>	Black-and-white Warbler	X		X	X		X
		<i>Setophaga cerulea</i>	Cerulean Warbler	X		X	X		X
		<i>Setophaga citrina</i>	Hooded Warbler	X			X		
<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	X		X	X		X
		<i>Lasionycteris noctivagans</i>	Silver-haired Bat	X	X	X	X	X	X
		<i>Lasiurus borealis</i>	Eastern Red Bat	X		X	X		X
		<i>Lasiurus cinereus</i>	Hoary Bat	X	X	X	X	X	X
		<i>Myotis lucifugus</i>	Little Brown Myotis	X		X	X		X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X	X	X	X	X	X
		<i>Myotis sodalis</i>	Indiana Myotis	X		X	X		X
		<i>Nycticeius humeralis</i>	Evening Bat	X		X	X		X
		<i>Perimyotis subflavus</i>	Tri-colored Bat	X		X	X		X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	X		X	X	X	X
	Shrews	<i>Sorex hoyi</i>	American Pygmy Shrew	X	X	X			
<b>Amphibians</b>	Frogs	<i>Lithobates areolatus</i>	Crawfish Frog					X	
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X					
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X	X	X	X
	Salamanders	<i>Ambystoma barbouri</i>	Streamside Salamander	X					
<b>Reptiles</b>	Snakes	<i>Cemophora coccinea</i>	Scarletsnake	X	X	X	X	X	X
		<i>Crotalus horridus</i>	Timber Rattlesnake	X	X	X	X	X	X
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake				X	X	X
		<i>Opheodrys aestivus</i>	Rough Greensnake	X			X		
		<i>Tantilla coronata</i>	Southeastern Crowned Snake				X	X	X
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle	X	X	X	X	X	X

**Table N-6.** SGCN Occurring in Grasslands in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane			X		
		<i>Grus canadensis</i>	Sandhill Crane			X		
	Hérons	<i>Ardea alba</i>	Great Egret			X		
		<i>Botaurus lentiginosus</i>	American Bittern			X		
	Nightjars	<i>Chordeiles minor</i>	Common Nighthawk			X	X	
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk				X	
		<i>Asio flammeus</i>	Short-eared Owl	X	X	X	X	
		<i>Circus cyaneus</i>	Northern Harrier			X	X	
		<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X	X		
		<i>Tyto alba</i>	Barn Owl	X		X	X	
	Shorebirds	<i>Bartramia longicauda</i>	Upland Sandpiper			X	X	
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper			X		
		<i>Pluvialis dominica</i>	American Golden-plover			X		
	Songbirds	<i>Ammodramus henslowii</i>	Henslow's Sparrow			X	X	Can use Farm Bill Program lands.
		<i>Cistothorus platensis</i>	Sedge Wren			X	X	
		<i>Lanius ludovicianus</i>	Loggerhead Shrike	X	X	X	X	

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X	X		X	
<b>Mammals</b>	Bats	<i>Myotis lucifugus</i>	Little Brown Myotis	X				Can use recovering mine lands.
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	X				
		<i>Myotis sodalis</i>	Indiana Myotis	X				Can use recovering mine lands.
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X	X	X	Can use hay lands and recovering mine lands.
		<i>Taxidea taxus</i>	American Badger	X	X	X		Can use recovering mine lands and dunes.
	Shrews	<i>Sorex hoyi</i>	American Pygmy Shrew		X	X		
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X		X		
		<i>Lithobates areolatus</i>	Crawfish Frog	X		X		
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X		X		
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	X	X	X		
<b>Reptiles</b>	Snakes	<i>Cemophora coccinea</i>	Scarletsnake			X		
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X		X	X	
		<i>Crotalus horridus</i>	Timber Rattlesnake		X			
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake			X		Can use recovering mine lands.

Taxa	Group	Scientific Name	Common Name	Savannas	Shrublands	Herbaceous Grasslands	Old Fields (Early Successional)	Comments
		<i>Ophiodrys aestivus</i>	Rough Greensnake		X	X	X	Can use recovering mine lands.
	Turtles	<i>Terrapene carolina</i>	Eastern Box Turtle			X		

**Table N-7.** SGCN Occurring in Subterranean Systems in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Subaquatic	Subterrestrial	Comments
<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat		X	
		<i>Lasionycteris noctivagans</i>	Silver-haired Bat		X	
		<i>Myotis grisescens</i>	Gray Myotis		X	Requires wet caves.
		<i>Myotis lucifugus</i>	Little Brown Myotis		X	
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis		X	
		<i>Myotis sodalis</i>	Indiana Myotis		X	
		<i>Perimyotis subflavus</i>	Tri-colored Bat		X	
<b>Reptiles</b>	Snakes	<i>Crotalus horridus</i>	Timber Rattlesnake		X	

**Table N-8.** SGCN Occurring in Wetlands in the Drift Plains Region.

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
<b>Birds</b>	Cranes	<i>Grus americana</i>	Whooping Crane	X	X			X		
		<i>Grus canadensis</i>	Sandhill Crane	X	X					X
	Herons	<i>Ardea alba</i>	Great Egret		X	X	X	X		X
		<i>Botaurus lentiginosus</i>	American Bittern		X		X	X		X
		<i>Ixobrychus exilis</i>	Least Bittern	X	X		X			X
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron		X	X				X
		<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		X	X	X	X		X
	Rails	<i>Gallinula galeata</i>	Common Gallinule		X					
		<i>Rallus elegans</i>	King Rail		X		X			
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk							X
		<i>Asio flammeus</i>	Short-eared Owl	X	X					
		<i>Buteo lineatus</i>	Red-shouldered Hawk			X				X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Buteo platypterus</i>	Broad-winged Hawk			X				X
		<i>Circus cyaneus</i>	Northern Harrier	X	X					
		<i>Falco peregrinus</i>	Peregrine Falcon		X					X
		<i>Haliaeetus leucocephalus</i>	Bald Eagle		X	X				X
		<i>Ictinia mississippiensis</i>	Mississippi Kite			X				X
		<i>Pandion haliaetus</i>	Osprey		X	X				X
		<i>Tyto alba</i>	Barn Owl		X					X
	Shorebirds	<i>Arenaria interpres</i>	Ruddy Turnstone		X				X	X
		<i>Calidris subruficollis</i>	Buff-breasted Sandpiper					X	X	X
		<i>Charadrius melodus</i>	Piping Plover		X				X	X
		<i>Limnodromus griseus</i>	Short-billed Dowitcher		X			X	X	X
		<i>Phalaropus tricolor</i>	Wilson's Phalarope		X			X	X	X
		<i>Pluvialis dominica</i>	American Golden-plover		X			X	X	X
		<i>Tringa melanoleuca</i>	Greater Yellowlegs		X			X	X	X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Tringa solitaria</i>	Solitary Sandpiper	X	X	X		X	X	X
	Songbirds	<i>Cistothorus palustris</i>	Marsh Wren		X					
		<i>Cistothorus platensis</i>	Sedge Wren	X	X					X
		<i>Mniotilta varia</i>	Black-and-white Warbler			X				X
		<i>Setophaga cerulea</i>	Cerulean Warbler			X				X
		<i>Vermivora chrysoptera</i>	Golden-winged Warbler	X		X				X
		<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird		X					
	Terns	<i>Chlidonias niger</i>	Black Tern		X					X
		<i>Sternula antillarum athalassos</i>	Interior Least Tern		X					X
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan		X			X		X
<b>Mammals</b>	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat			X				X
		<i>Lasiorycteris noctivagans</i>	Silver-haired Bat							X
		<i>Lasiurus borealis</i>	Eastern Red Bat							X
		<i>Lasiurus cinereus</i>	Hoary Bat							X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Myotis grisescens</i>	Gray Myotis							X
		<i>Myotis lucifugus</i>	Little Brown Myotis			X				X
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis			X				X
		<i>Myotis sodalis</i>	Indiana Myotis			X				X
		<i>Nycticeius humeralis</i>	Evening Bat							X
		<i>Perimyotis subflavus</i>	Tri-colored Bat							X
	Mustelids	<i>Mustela nivalis</i>	Least Weasel		X					X
	Shrews	<i>Sorex hoyi</i>	American Pygmy Shrew	X	X	X				X
<b>Amphibians</b>	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	X	X		X	X		X
		<i>Lithobates areolatus</i>	Crawfish Frog		X			X		X
		<i>Lithobates pipiens</i>	Northern Leopard Frog	X	X		X	X		X
		<i>Scaphiopus holbrookii</i>	Eastern Spadefoot					X		X
	Salamanders	<i>Hemidactylium scutatum</i>	Four-toed Salamander	X		X	X	X		X
<b>Reptiles</b>	Snakes	<i>Cemophora coccinea</i>	Scarletsnake							X

Taxa	Group	Scientific Name	Common Name	Bogs/Fens	Herbaceous Wetlands	Forested Wetlands	Shrub Wetlands	Ephemeral/Temporary Wetlands	Mudflats	Riparian Zones
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	X	X		X	X		X
		<i>Crotalus horridus</i>	Timber Rattlesnake			X	X			X
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	X	X	X		X		X
		<i>Opheodrys aestivus</i>	Rough Greensnake			X	X			X

# DNR **Indiana Department of Natural Resources**

**Appendix O.** Most relevant conservation actions for SGCN according to responses to the Species Survey free-response questions from the statewide Species Survey. Note: All actions were derived from survey respondents only with no suggested actions from the survey team.

**Table O-1.** Most relevant conservation actions for SGCN according to responses to the Species Survey free-response questions from the statewide Species Survey. Note: All actions were derived from survey respondents only with no suggested actions from the survey team.

Species	Relevant Actions	Effective Actions	Major Barriers
<b>Whooping Crane</b>	<ul style="list-style-type: none"> <li>Continued management of wetlands (e.g., control of invasive plants)</li> <li>Restoring wetlands that provide important stopover and roosting habitat</li> <li>Provide secure wintering habitat</li> <li>Education of general public to reduce illegal shooting</li> </ul>	<ul style="list-style-type: none"> <li>Protection and restoration of large wetland complexes</li> <li>Reintroduction of migratory populations</li> <li>Restoration of Goose Pond Fish and Wildlife Area and Patoka National Wildlife Refuge (NWR)</li> </ul>	<ul style="list-style-type: none"> <li>Funding</li> <li>Cost of delivery and location of projects</li> <li>Lack of personnel</li> <li>Illegal shootings</li> </ul>
<b>Sandhill Crane</b>	<ul style="list-style-type: none"> <li>Wetland protection and restoration</li> <li>Public education</li> <li>Conservation easements on farm land surrounding protected areas</li> <li>Resist establishment of hunting season</li> <li>Buffers around suitable habitat</li> </ul>	<ul style="list-style-type: none"> <li>Wetlands Reserve Program</li> <li>Partners for Wildlife program</li> <li>Creation of Goose Pond</li> <li>Restoration at Muscatatuck NWR</li> <li>Wetland restoration</li> <li>Wildlife preservation areas, particularly Jasper-Pulaski</li> <li>Healthy Rivers Initiative</li> </ul>	<ul style="list-style-type: none"> <li>Competition with agriculture for land area</li> <li>Political will</li> <li>Funding</li> <li>Cost of implementation and location of projects</li> <li>Property values; landowners unwilling to sell land</li> </ul>
<b>Great Egret</b>	<ul style="list-style-type: none"> <li>Maintain availability of shallow water feeding habitats</li> <li>Cleaning of polluted areas such as the Calumet River</li> <li>Wetland protection</li> </ul>	<ul style="list-style-type: none"> <li>Construction of wetlands (e.g., Goose Pond)</li> <li>Development of Eagle Marsh at Ft. Wayne</li> </ul>	<ul style="list-style-type: none"> <li>Competition with recreational uses for Indiana reservoirs/lakes</li> <li>Cooperation of industry and land owners</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>American Bittern</i></b>	<ul style="list-style-type: none"> <li>· Acquire and restore large wetland complexes</li> <li>· Control invasive wetland plants</li> <li>· Habitat preservation</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond FWA</li> <li>· Development of Eagle Marsh at Ft. Wayne</li> </ul>	<ul style="list-style-type: none"> <li>· Budget</li> <li>· Limited wetland availability</li> </ul>
<b><i>Least Bittern</i></b>	<ul style="list-style-type: none"> <li>· Acquire and restore large wetland complexes</li> <li>· Control invasive wetland plants</li> <li>· Habitat preservation</li> <li>· Restoration of hemi-marsh</li> <li>· Protection from road kills where marshes are bisected by roads</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond</li> <li>· Restoration of wetlands at Patoka River</li> </ul>	<ul style="list-style-type: none"> <li>· Budget</li> <li>· Lack of land for restoring marshes</li> </ul>
<b><i>Yellow-crowned Night-heron</i></b>	<ul style="list-style-type: none"> <li>· Reduce recreational overuse of habitats</li> <li>· Statewide survey to assess status</li> </ul>	<ul style="list-style-type: none"> <li>· Restoration and acquisition of large wetland complexes like Goose Pond FWA</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of adequate budget to manage for invasive plant control and water levels at Goose Pond and similar large wetland complexes</li> </ul>
<b><i>Black-crowned Night-Heron</i></b>	<ul style="list-style-type: none"> <li>· Reduce disturbance at breeding sites</li> <li>· Cleanup of polluted areas</li> </ul>	<ul style="list-style-type: none"> <li>· Production of suitable foraging habitat (e.g., Goose Pond)</li> <li>· Restoring the Grand Calumet River</li> </ul>	<ul style="list-style-type: none"> <li>· Political support</li> <li>· Cooperation with private industrial landowners where current colonies exist</li> </ul>
<b><i>Eastern Whip-poor-will</i></b>	<ul style="list-style-type: none"> <li>· Educate public about value of vegetative disturbance</li> <li>· Removal of understory invasive plants</li> <li>· Targeted surveys</li> <li>· Management of large tracts of mature forest</li> </ul>	<ul style="list-style-type: none"> <li>· Surveys of nocturnal birds</li> <li>· Management of young forest habitat</li> </ul>	<ul style="list-style-type: none"> <li>· Uneducated public</li> <li>· Expense of invasive plant removal</li> <li>· Lack of species knowledge</li> </ul>
<b><i>Common Nighthawk</i></b>	<ul style="list-style-type: none"> <li>· Increase gravel-surfaced sites for breeding</li> <li>· Provision of suitable rooftop habitat for nesting</li> </ul>	<ul style="list-style-type: none"> <li>· Initiatives in Indianapolis have increased awareness</li> </ul>	<ul style="list-style-type: none"> <li>· Changing architectural preferences for roofing</li> <li>· Cooperation by private building owners and roofing companies</li> <li>· Limited resources</li> </ul>
<b><i>Common Gallinule</i></b>	<ul style="list-style-type: none"> <li>· Preserve and restore large wetland complexes</li> <li>· Control invasive wetland plants</li> <li>· Long-term management of water levels in large wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond</li> <li>· Eagle Marsh restoration at Ft. Wayne</li> </ul>	<ul style="list-style-type: none"> <li>· Inadequate budget for wetland management</li> <li>· Cooperation of private landowners</li> <li>· Lack of resources</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Black Rail</i></b>	<ul style="list-style-type: none"> <li>· Large wetland restoration projects</li> <li>· Management for high-diversity marshes</li> <li>· Control of invasive wetland plants</li> <li>· Water control structures</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond</li> <li>· Restoration of Patoka River National Wildlife Refuge</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Inadequate budget</li> <li>· Lack of land available for wetland restoration</li> </ul>
<b><i>King Rail</i></b>	<ul style="list-style-type: none"> <li>· Large wetland restoration projects</li> <li>· Control invasive plants</li> <li>· Manage water levels</li> <li>· Restoration of hemi-marsh</li> <li>· Management of ditch habitat adjacent to refuges</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond</li> <li>· Restoration at Limberlost Swamp Wetland Preserve</li> <li>· Establishment of additional habitat at Patoka River NWR</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Inadequate budget</li> <li>· Lack of land suitable for restoration</li> <li>· Legal problems with water control structures</li> </ul>
<b><i>Virginia Rail</i></b>	<ul style="list-style-type: none"> <li>· Preserve marsh habitats</li> <li>· Control invasive wetland plants</li> <li>· Maintain natural water flow</li> <li>· Restore wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland Reserve Program</li> <li>· Creation of Goose Pond</li> <li>· Management of Pine Creek in Benton County</li> <li>· Wetland restoration at Eagle Marsh in Ft. Wayne</li> <li>· Restoration at Limberlost Swamp Wetland Preserve</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Inadequate budget</li> <li>· Lack of land available for wetland restoration</li> </ul>
<b><i>Sharp-shinned Hawk</i></b>	<ul style="list-style-type: none"> <li>· Maintain large patches of contiguous forest</li> <li>· Resist housing development on forest lands</li> <li>· Maintain forest habitat along Lake Michigan shoreline</li> <li>· Restore forests</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of nature preserves, such as Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Loss and fragmentation of mature forests</li> <li>· Inadequate funding</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Short-eared Owl</i></b>	<ul style="list-style-type: none"> <li>· Maintain restored grasslands and hayfields</li> <li>· Reduce mowing of grasslands</li> <li>· Reduce conversion of grasslands to coal mines</li> <li>· Maintain CRP lands</li> <li>· Restore grasslands</li> </ul>	<ul style="list-style-type: none"> <li>· CRP enrollments</li> <li>· Restoration of grasslands at Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Cooperation of coal mine companies</li> <li>· Unwillingness to use fire as management tool</li> <li>· Inadequate funding</li> </ul>
<b><i>Red-shouldered Hawk</i></b>	<ul style="list-style-type: none"> <li>· Preserve large contiguous mature forests, especially riparian areas</li> <li>· Resist housing development on forest lands</li> <li>· Restore forested wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Reforestation of bottomland forests in southern Indiana</li> <li>· Creation of wildlife management areas, such as Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Cooperation of private landowners</li> <li>· Cooperation of timber companies</li> <li>· Inadequate funding</li> <li>· Pressures from development</li> </ul>
<b><i>Broad-winged Hawk</i></b>	<ul style="list-style-type: none"> <li>· Protect large forest patches</li> <li>· Forest habitat restoration</li> </ul>	<ul style="list-style-type: none"> <li>· Proposed purchase of new protected forests near Muscatatuck and along the Wabash River</li> <li>· Creation of wildlife management areas, such as Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Zoning regulations</li> <li>· Pressures from development</li> <li>· Inadequate funding</li> </ul>
<b><i>Northern Harrier</i></b>	<ul style="list-style-type: none"> <li>· Restore grasslands</li> <li>· Restore wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Kankakee Sands Restoration</li> <li>· Creation of wildlife management areas, such as Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Inadequate funding</li> <li>· Large scale of habitat required for breeding</li> </ul>
<b><i>Peregrine Falcon</i></b>	<ul style="list-style-type: none"> <li>· Minimize disturbance during nesting season</li> <li>· Continue active management</li> <li>· Public education in urban areas</li> </ul>	<ul style="list-style-type: none"> <li>· Reintroduction/hacking programs</li> <li>· Artificial nest boxes</li> <li>· Continued active management</li> <li>· Nest monitoring</li> <li>· Rescue of injured birds</li> </ul>	<ul style="list-style-type: none"> <li>· Industrial activity (possible contamination)</li> <li>· Collisions with buildings or vehicles</li> <li>· Budget for monitoring</li> <li>· Cooperation of private landowners</li> </ul>
<b><i>Bald Eagle</i></b>	<ul style="list-style-type: none"> <li>· Maintain bottomland floodplain habitat</li> <li>· Protection of individual nest sites</li> </ul>	<ul style="list-style-type: none"> <li>· Strong state agency action</li> <li>· Public education campaigns</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation among state and federal agencies</li> <li>· None currently; species</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
	<ul style="list-style-type: none"> <li>· Manage water levels in rivers and lakes</li> <li>· Improve water quality</li> </ul>	<ul style="list-style-type: none"> <li>· Protection of nesting areas</li> <li>· Restoration of wetland habitat, such as Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· is recovered and doing well</li> </ul>
<b><i>Mississippi Kite</i></b>	<ul style="list-style-type: none"> <li>· Preserve large continuous riparian woodlands</li> <li>· Forest habitat restoration</li> </ul>	<ul style="list-style-type: none"> <li>· Protection of forest habitat at state and city parks</li> <li>· Restoration of Patoka River National Wildlife Refuge</li> </ul>	<ul style="list-style-type: none"> <li>· Conversion of forest habitat to housing and agriculture</li> </ul>
<b><i>Osprey</i></b>	<ul style="list-style-type: none"> <li>· Maintain habitat</li> <li>· Improve water quality</li> <li>· Preserve nest sites</li> </ul>	<ul style="list-style-type: none"> <li>· Reintroduction program</li> <li>· Provision of nesting platforms</li> <li>· Population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Inadequate funding</li> <li>· Cooperation of owners of large manmade towers used for nesting</li> </ul>
<b><i>Barn Owl</i></b>	<ul style="list-style-type: none"> <li>· Protect and restore grasslands</li> <li>· Preserve suitable nest sites</li> <li>· Increase CRP grasslands</li> </ul>	<ul style="list-style-type: none"> <li>· CRP enrollment</li> <li>· Provision of nest boxes</li> <li>· Population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Agricultural economics</li> <li>· Other priorities</li> <li>· Urban sprawl</li> </ul>
<b><i>Ruddy Turnstone</i></b>	<ul style="list-style-type: none"> <li>· Protect and restore migratory stopover sites, especially along Lake Michigan shoreline</li> </ul>	<ul style="list-style-type: none"> <li>· Restoration of Goose Pond FWA and Patoka River NWR</li> </ul>	<ul style="list-style-type: none"> <li>· Development/contamination issues along Lake Michigan</li> <li>· Lack of available land for habitat restoration projects along Lake Michigan</li> </ul>
<b><i>Upland Sandpiper</i></b>	<ul style="list-style-type: none"> <li>· Preserve grasslands</li> <li>· Reduce mowing of grasslands</li> </ul>	<ul style="list-style-type: none"> <li>· Kankakee Sands restoration efforts</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of farmers</li> </ul>
<b><i>Buff-breasted Sandpiper</i></b>	<ul style="list-style-type: none"> <li>· Maintain open areas with short grass, such as sod farms</li> <li>· Maintain shallow-water areas</li> <li>· Create new shorebird management areas</li> <li>· Control invasive plants in non-agricultural wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond and other large wetland complexes</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Political will</li> <li>· Budget constraints</li> </ul>
<b><i>Piping Plover</i></b>	<ul style="list-style-type: none"> <li>· Maintain shallow-water areas</li> <li>· Protect suitable nesting sites</li> <li>· Protect areas along Lake Michigan with</li> </ul>	<ul style="list-style-type: none"> <li>· Cane Ridge management area</li> <li>· Creation of Goose Pond</li> </ul>	<ul style="list-style-type: none"> <li>· Development/contamination issues along Lake Michigan</li> <li>· Human disturbance</li> <li>· Political will</li> <li>· Inadequate budget</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
	<ul style="list-style-type: none"> <li>· sandbars, pools for foraging</li> <li>· Reintroduction</li> </ul>		<ul style="list-style-type: none"> <li>· High cost associated with location of projects</li> </ul>
<b><i>Short-billed Dowitcher</i></b>	<ul style="list-style-type: none"> <li>· Maintain shallow-water areas</li> <li>· Preserve large wetland complexes</li> <li>· Control invasive wetland plants</li> </ul>	<ul style="list-style-type: none"> <li>· Development and management of Goose Pond</li> <li>· Purchase of large wetland projects</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Inadequate budget for active habitat management</li> </ul>
<b><i>Wilson's Phalarope</i></b>	<ul style="list-style-type: none"> <li>· Maintain shallow-water areas</li> <li>· Reintroduce light grazing into wetland/grassland systems</li> <li>· Control invasive plants</li> </ul>	<ul style="list-style-type: none"> <li>· Kankakee Sands restoration</li> <li>· Creation and management of Goose Pond and Patoka River NWR</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Management attitudes</li> <li>· Drainage on agricultural fields</li> <li>· Insufficient budgets</li> </ul>
<b><i>American Golden-plover</i></b>	<ul style="list-style-type: none"> <li>· Maintain wet-soil areas</li> <li>· Preserve large wetland complexes</li> <li>· Reduce conversion of farm land to development</li> <li>· Encourage no-till soybean production</li> <li>· Education of ag community</li> <li>· Assess impacts of wind farm development</li> <li>· Provide incentives to farmers to increase landowner participation</li> </ul>	<ul style="list-style-type: none"> <li>· Conservation initiatives such as the Important Bird Area program and the Audubon Society</li> <li>· Pine Creek habitat area</li> <li>· Designation of Union Township in Benton County as an IBA</li> <li>· Willingness of wind-energy companies to work with IBA constraints</li> </ul>	<ul style="list-style-type: none"> <li>· Drainage on agricultural fields</li> <li>· Political will</li> <li>· Management attitudes</li> <li>· Insufficient budgets for active management</li> <li>· Cooperation of farmers</li> </ul>
<b><i>Greater Yellowlegs</i></b>	<ul style="list-style-type: none"> <li>· Maintain shallow-water areas</li> <li>· Restore large wetland complexes</li> <li>· Create new shorebird management areas</li> <li>· Incentivize farmers to restore seasonal wetlands on their lands</li> <li>· Control invasive plants</li> </ul>	<ul style="list-style-type: none"> <li>· Creation and management of Goose Pond</li> <li>· Planned acquisitions of large-scale state properties that include wetland management and restoration</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Budget constraints</li> <li>· Cooperation of private landowners</li> <li>· Cooperation of DOT</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
<b><i>Solitary Sandpiper</i></b>	<ul style="list-style-type: none"> <li>· Maintain shallow-water areas</li> <li>· Restore large wetland complexes</li> <li>· Control invasive plants</li> <li>· Create new shorebird management areas</li> <li>· Restore ephemeral wetlands in forests and agricultural lands</li> </ul>	<ul style="list-style-type: none"> <li>· Creation and management of Goose Pond</li> <li>· Planned acquisitions of large-scale state properties that include wetland management and restoration</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Budget constraints</li> <li>· Cooperation of private landowners</li> <li>· Cultural change in the agricultural community</li> </ul>
<b><i>Henslow's Sparrow</i></b>	<ul style="list-style-type: none"> <li>· Increase CRP grasslands</li> <li>· Implement fire regimes</li> <li>· Control woody encroachment</li> <li>· Restore grasslands on reclaimed coal mines</li> <li>· Conservation easements</li> <li>· Maintain large grassland tracts</li> <li>· Minimize disturbance during nesting season</li> <li>· Improve grazing practices</li> <li>· Prevent conversion of grassland to row crops</li> <li>· Incentivize landowners to maintain grasslands in early successional stage</li> </ul>	<ul style="list-style-type: none"> <li>· LRWP's Arrowhead Prairie restoration</li> <li>· CRP enrollment</li> <li>· CRP SAFE program</li> <li>· Grassland management at Prophetstown, Big Oaks, Pine Creek</li> <li>· Enforcement of no disturbance during the primary nesting season</li> <li>· Kankakee Sands restoration</li> <li>· Reclaiming strip mines</li> <li>· Land acquisition programs such as HRI, NAWCA partnerships, Patoka NWR</li> </ul>	<ul style="list-style-type: none"> <li>· High commodity prices</li> <li>· Urban sprawl</li> <li>· Cooperation of private landowners</li> <li>· Budget constraints for active management</li> <li>· Increasing ownership fragmentation</li> <li>· Lack of manpower</li> <li>· Difficulty of acquiring new land for management</li> <li>· CRP enrollment caps</li> <li>· Inadequate financial incentives</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Marsh Wren</i></b>	<ul style="list-style-type: none"> <li>· Encourage wetland enrollment in protection programs for private lands</li> <li>· Habitat preservation and restoration</li> <li>· Improve water quality</li> <li>· Control invasive plants in wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Creation of Goose Pond</li> <li>· LRWP's Eagle Marsh restoration</li> <li>· Removal of invasive species</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Funds for restoration of wetlands</li> </ul>
<b><i>Sedge Wren</i></b>	<ul style="list-style-type: none"> <li>· Prevent conversion of habitat to row crops</li> <li>· Reclaim coal mine grasslands</li> <li>· Maintain grassland habitat on marginal lands, CRP lands, and reclaimed coal mines</li> <li>· Implement fire regimes</li> <li>· Control woody encroachment</li> <li>· Maintain wet meadows</li> </ul>	<ul style="list-style-type: none"> <li>· Creation and maintenance of large-scale grasslands at Prophetstown, Goose Pond, Big Oaks NWR and state gamebird habitat areas</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Budget constraints</li> <li>· Resources for habitat acquisition</li> </ul>
<b><i>Worm-eating Warbler</i></b>	<ul style="list-style-type: none"> <li>· Implement best management practices in forestry</li> <li>· Protect large blocks of contiguous forest</li> <li>· Limit forest conversion to non-forest uses</li> </ul>	<ul style="list-style-type: none"> <li>· The Nature Conservancy (TNC) efforts to consolidate forest protection in the greater Brown County region</li> </ul>	<ul style="list-style-type: none"> <li>· Urban sprawl</li> <li>· Domestic cats</li> <li>· Political will</li> <li>· Cooperation of private landowners and timber industry</li> <li>· Zoning restrictions</li> <li>· Land values</li> </ul>
<b><i>Loggerhead Shrike</i></b>	<ul style="list-style-type: none"> <li>· Reduce conversion of habitat to farmland</li> <li>· Protect reclaimed grasslands</li> <li>· Engage with private landowners to maintain suitable habitat, especially fencerows</li> </ul>	<ul style="list-style-type: none"> <li>· Population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Cooperation of coal companies</li> <li>· Agricultural economics</li> </ul>
<b><i>Black-and-white Warbler</i></b>	<ul style="list-style-type: none"> <li>· Limit conversion of forest to non-forest land uses</li> </ul>	<ul style="list-style-type: none"> <li>· TNC efforts to consolidate forest protection in the greater Brown County region</li> </ul>	<ul style="list-style-type: none"> <li>· Urban/suburban development</li> <li>· Domestic cats</li> <li>· Willingness of private landowners to maintain large blocks of forest</li> <li>· Land values</li> </ul>
<b><i>Cerulean Warbler</i></b>	<ul style="list-style-type: none"> <li>· Create small openings in forests</li> <li>· Retain large trees</li> <li>· Moderate levels of timber harvest within actively managed</li> </ul>	<ul style="list-style-type: none"> <li>· Research into timber harvest effects on habitat quality</li> </ul>	<ul style="list-style-type: none"> <li>· Cowbird nest predation</li> <li>· Forest fragmentation</li> <li>· Cooperation of public and private forest land managers</li> <li>· Difficulty in restoring</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
	forests that retain some large diameter oaks and hickories along the edges of retained forest <ul style="list-style-type: none"> <li>· Woodland restoration</li> <li>· Remove brown-headed cowbirds</li> <li>· Limit conversion of forest to non-forest land uses</li> </ul>		forests <ul style="list-style-type: none"> <li>· Land values</li> </ul>
<b><i>Kirtland's Warbler</i></b>	<ul style="list-style-type: none"> <li>· Maintain stopover habitat in natural vegetation along Lake Michigan shoreline</li> <li>· Reduce conversion of forests to housing development</li> </ul>	<ul style="list-style-type: none"> <li>· Identify stopover habitat, especially along Lake Michigan shoreline</li> </ul>	<ul style="list-style-type: none"> <li>· Zoning regulations</li> <li>· Political will</li> </ul>
<b><i>Hooded Warbler</i></b>	<ul style="list-style-type: none"> <li>· Reduce development in forest lands</li> <li>· Maintain and increase the amount of large forested properties</li> <li>· Restore bottomland forests</li> <li>· Reduce forest fragmentation</li> <li>· Limit conversion of forests to non-forest land uses</li> </ul>	<ul style="list-style-type: none"> <li>· TNC efforts to consolidate forest protection in the greater Brown County region</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Cooperation of timber companies</li> <li>· Willingness of public land managers to adopt forestry best management practices</li> <li>· Budget constraints</li> <li>· Availability of land for woodland restoration</li> </ul>
<b><i>Western Meadowlark</i></b>	<ul style="list-style-type: none"> <li>· Increase CRP grasslands</li> <li>· Reduce loss of reclaimed coal mine grasslands</li> </ul>	<ul style="list-style-type: none"> <li>· Maintain grasslands in western counties</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners</li> <li>· Cooperation of coal companies with reclaimed grasslands</li> </ul>
<b><i>Golden-winged Warbler</i></b>	<ul style="list-style-type: none"> <li>· Maintain forested wetlands</li> <li>· Protect stopover habitat</li> <li>· Conserve small private woodlots</li> </ul>	<ul style="list-style-type: none"> <li>· Identify stopover habitat</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of private landowners to maintain forest cover on their lands</li> <li>· Willingness of public land managers to manage for diversity of habitats on their properties</li> </ul>
<b><i>Yellow-headed Blackbird</i></b>	<ul style="list-style-type: none"> <li>· Restore and maintain large wetland complexes, especially in northern part of the state</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland restorations at Goose Pond FWA, Eagle Marsh in Ft. Wayne, Limberlost Swamp Wetland Preserve, Patoka River NWR</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of land available near Lake Michigan for large wetland restoration</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
<b><i>Black Tern</i></b>	<ul style="list-style-type: none"> <li>· Maintain large wetland complexes</li> <li>· Active water management</li> <li>· Control invasive plants</li> <li>· Restore hemi-marsh</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland restoration at Goose Pond</li> <li>· Management at Pine Creek Gamebird Habitat Area</li> <li>· Potential acquisition of lands that might include large wetland complexes</li> </ul>	<ul style="list-style-type: none"> <li>· Inadequate budget for active management</li> <li>· Selecting suitable sites to manage</li> </ul>
<b><i>Least Tern</i></b>	<ul style="list-style-type: none"> <li>· Restrict recreational overuse on rivers</li> <li>· Reduce disturbance at power plants</li> <li>· Control predator access</li> <li>· Control invasive plants</li> <li>· Establish permanent nesting habitat</li> <li>· Improve water quality</li> </ul>	<ul style="list-style-type: none"> <li>· Habitat creation programs such as Cane Ridge, Gibson Lake, and Goose Pond</li> <li>· Active management</li> <li>· Working with power companies</li> </ul>	<ul style="list-style-type: none"> <li>· Political will</li> <li>· Budget constraints to continue management activities</li> <li>· Unwillingness to change water quality standards</li> </ul>
<b><i>Trumpeter Swan</i></b>	<ul style="list-style-type: none"> <li>· Do not reopen active coal mines</li> <li>· Collaborate with coal companies on land use</li> <li>· Re-establish traditional breeding habitat</li> <li>· Remove non-native mute swans</li> <li>· Protection and restoration of wetlands, especially in the northern part of the state</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland restoration of Goose Pond FWA</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation with private landowners</li> <li>· Cooperation with coal companies</li> <li>· Finding good locations for projects</li> <li>· Property values</li> </ul>
<b><i>Rafinesque's Big-eared Bat</i></b>	<ul style="list-style-type: none"> <li>· Continue monitoring efforts</li> <li>· Protect caves</li> <li>· Limit recreational caving</li> <li>· Protect mature forests</li> <li>· Protect riparian areas</li> <li>· Retain large hollow trees</li> </ul>	<ul style="list-style-type: none"> <li>· Protection and monitoring of caves</li> <li>· Promoting mature forests</li> </ul>	<ul style="list-style-type: none"> <li>· Time constraints</li> <li>· Funding</li> <li>· Resistance from public caving community</li> <li>· Limited public ownership of caves</li> <li>· Poor understanding of hibernation locations</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Silver-haired Bat</i></b>	<ul style="list-style-type: none"> <li>· Education and awareness</li> <li>· Reduce fatalities at wind energy facilities</li> <li>· Protect caves</li> <li>· Limit recreational caving</li> <li>· Continue monitoring efforts</li> <li>· Manage forests to provide roost trees</li> </ul>	<ul style="list-style-type: none"> <li>· Raising cut-in speeds of wind turbines</li> <li>· Cave gating</li> <li>· Promoting forest cover</li> </ul>	<ul style="list-style-type: none"> <li>· Costs associated with needed actions</li> <li>· Limited understanding of which caves are being used for hibernation</li> <li>· Cooperation from recreational caving organizations</li> <li>· Limited number of caves currently in public ownership</li> <li>· Lack of information about species' status</li> <li>· Removal of forest cover</li> </ul>
<b><i>Eastern Red Bat</i></b>	<ul style="list-style-type: none"> <li>· Reduce fatalities at wind energy facilities</li> <li>· Preserve intact forest habitat</li> <li>· Reduce urban sprawl and commercial property expansion</li> <li>· Reduce forest conversion to other land uses</li> </ul>	<ul style="list-style-type: none"> <li>· Raising cut-in speeds at wind-energy facilities</li> <li>· Monitoring at wind energy sites</li> <li>· Research and mitigation efforts at wind farms</li> </ul>	<ul style="list-style-type: none"> <li>· Disinterest in environmental issues</li> <li>· Land values</li> <li>· Wind farms</li> <li>· Increasing cost of energy</li> </ul>
<b><i>Hoary Bat</i></b>	<ul style="list-style-type: none"> <li>· Reduce fatalities at wind energy facilities</li> <li>· Protect forests</li> <li>· Learn more about the species' ecology</li> </ul>	<ul style="list-style-type: none"> <li>· Feathering wind turbine blades below cut-in speeds</li> <li>· Monitoring at wind energy sites</li> <li>· Research and mitigation efforts at wind farms</li> </ul>	<ul style="list-style-type: none"> <li>· Costs associated with lost production and turbine warranties that prevent blade feathering</li> <li>· Land values</li> <li>· No legal nexus to control wind energy facilities</li> </ul>
<b><i>Southeastern Myotis</i></b>	<ul style="list-style-type: none"> <li>· Protect caves</li> <li>· Monitoring to determine species' distribution (may be extirpated)</li> <li>· Re-establish older-growth bottomland hardwood forests</li> </ul>	<ul style="list-style-type: none"> <li>· Cave gating</li> <li>· Monitoring efforts</li> <li>· Protection of roosts</li> </ul>	<ul style="list-style-type: none"> <li>· Poor understanding of where species hibernates</li> <li>· Cooperation from recreational caving organizations</li> <li>· White-nose syndrome</li> </ul>
<b><i>Gray Myotis</i></b>	<ul style="list-style-type: none"> <li>· Protect caves</li> <li>· Restrict recreational caving</li> <li>· Population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Cave gating</li> <li>· Monitoring efforts</li> <li>· Roost protection</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation from recreational caving organizations</li> <li>· Limited number of caves in public ownership</li> <li>· Limited understanding of caves where species hibernates/roosts</li> <li>· White-nose syndrome</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Eastern Small-footed Myotis</i></b>	<ul style="list-style-type: none"> <li>· Protect rocky habitat</li> <li>· Protect caves</li> <li>· Education and awareness</li> <li>· Inventory and monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Cave gating</li> <li>· Locating populations</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Need better understanding of where species hibernates</li> <li>· cooperation from recreational caving organizations</li> <li>· Different ecology than other bats</li> </ul>
<b><i>Little Brown Myotis</i></b>	<ul style="list-style-type: none"> <li>· Protect roost trees</li> <li>· Decrease human visitation to caves used by bats</li> <li>· WNS research</li> <li>· Disease management</li> <li>· Protect intact forests</li> <li>· Reduce collisions with wind turbines</li> <li>· Preserve wetlands and riparian corridors</li> <li>· Public education and awareness</li> <li>· Population monitoring</li> <li>· Protect caves</li> </ul>	<ul style="list-style-type: none"> <li>· Protection of caves</li> <li>· Contributions to national WNS implementation plan</li> <li>· Cave gating</li> <li>· Land acquisition projects</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· No definitive methods for managing WNS</li> <li>· Disinterest in environmental issues</li> <li>· Pesticide use</li> <li>· Spread of WNS</li> <li>· Time constraints</li> <li>· Cooperation from wind energy</li> </ul>
<b><i>Northern Long-eared Myotis</i></b>	<ul style="list-style-type: none"> <li>· Prevent spread of WNS</li> <li>· Preserve intact forest</li> <li>· Protect wetlands and riparian corridors</li> <li>· Reduce mortalities from wind turbines</li> <li>· Public awareness and education</li> <li>· Protect caves</li> <li>· Restrict recreational cave use</li> </ul>	<ul style="list-style-type: none"> <li>· Contributions to national WNS implementation plan</li> <li>· Cave gating</li> <li>· Research on species' ecology</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· No clear solution to WNS</li> <li>· Disinterest in environmental issues</li> <li>· Time constraints</li> </ul>
<b><i>Indiana Myotis</i></b>	<ul style="list-style-type: none"> <li>· Control impacts of WNS</li> <li>· Protect roost trees</li> <li>· Decrease human visitation to caves</li> <li>· Protect hibernacula</li> <li>· Public education and awareness</li> <li>· Protect caves</li> <li>· Protect forests</li> <li>· Reduce pesticide use</li> </ul>	<ul style="list-style-type: none"> <li>· Cave gating</li> <li>· WNS guidelines</li> <li>· Forest management</li> <li>· Contributions to national WNS implementation plan</li> <li>· identification/ protection of maternity colonies</li> </ul>	<ul style="list-style-type: none"> <li>· Limited knowledge of WNS</li> <li>· Lack of funding</li> <li>· Disinterest in environmental issues</li> <li>· Pesticide use</li> </ul>
<b><i>Evening Bat</i></b>	<ul style="list-style-type: none"> <li>· Limiting forest conversion to non-forest uses</li> <li>· Locate populations and study ecology</li> </ul>	<ul style="list-style-type: none"> <li>· Funding supporting other bat work</li> </ul>	<ul style="list-style-type: none"> <li>· Land values</li> <li>· Public sentiment</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Tri-colored Bat</i></b>	<ul style="list-style-type: none"> <li>· Protect roost trees</li> <li>· Decrease human visitation to caves</li> <li>· Mitigate WNS</li> <li>· Protect forests</li> <li>· Protect wetlands and riparian corridors</li> <li>· Reduce mortality from wind turbines</li> <li>· Public education and awareness</li> </ul>	<ul style="list-style-type: none"> <li>· Contributions to national WNS implementation plan</li> <li>· Cave gating</li> <li>· Funding for WNS research</li> </ul>	<ul style="list-style-type: none"> <li>· No clear solution to WNS</li> <li>· Disinterest in environmental issues</li> <li>· Funding</li> <li>· Time constraints</li> </ul>
<b><i>Least Weasel</i></b>	<ul style="list-style-type: none"> <li>· Establish and monitoring and research program</li> <li>· Cut more timber to provide downed woody debris</li> <li>· Reduce loss of habitat connectivity</li> <li>· Expand grasslands and shrub lands</li> </ul>	<ul style="list-style-type: none"> <li>· Forest management</li> <li>· Kankakee Sands restoration</li> <li>· Seasonal burns promote prey diversity</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Lack of awareness</li> <li>· Difficulty of trapping</li> <li>· Lack of knowledge</li> </ul>
<b><i>American Badger</i></b>	<ul style="list-style-type: none"> <li>· Protect and restore grasslands</li> <li>· Enhance connectivity of habitat</li> </ul>	<ul style="list-style-type: none"> <li>· CRP enrollment</li> <li>· Prairie restoration efforts at Kankakee</li> </ul>	<ul style="list-style-type: none"> <li>· Farmer and landowner cooperation</li> <li>· Agricultural practices</li> </ul>
<b><i>Swamp Rabbit</i></b>	<ul style="list-style-type: none"> <li>· Restore bottomland hardwood forests</li> <li>· Create corridors between habitat patches</li> <li>· Reintroduction program</li> <li>· Enroll lands in WRP</li> </ul>	<ul style="list-style-type: none"> <li>· Acquiring large blocks of habitat</li> <li>· Long-term research program</li> </ul>	<ul style="list-style-type: none"> <li>· Land values</li> <li>· Cooperation of coal industry</li> <li>· Lack of funding</li> <li>· Lack of interest in the species</li> </ul>
<b><i>Plains Pocket Gopher</i></b>	<ul style="list-style-type: none"> <li>· Restore prairies</li> <li>· Establish populations through translocation</li> </ul>	<ul style="list-style-type: none"> <li>· Kankakee Sands restoration</li> <li>· Restoration of non-game habitats by groups such as NICHES, TNC and Division of Nature Preserves</li> <li>· Recent inventory of current distribution</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding and staff</li> <li>· Cooperation of farmers</li> <li>· Public disinterest</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Allegheny Woodrat</i></b>	<ul style="list-style-type: none"> <li>· Land acquisition</li> <li>· Reintroduction program</li> <li>· Establish corridors between habitat</li> <li>· Reduce exposure to raccoon roundworm</li> <li>· Supplement genetic diversity</li> <li>· Forest management</li> <li>· Continue population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Identification and protection of habitats</li> <li>· Monitoring program</li> <li>· Raccoon roundworm baiting program</li> <li>· translocation program</li> <li>· captive breeding program</li> <li>· genetic analysis</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of landowners</li> <li>· Quarry industry</li> <li>· Raccoon population levels</li> <li>· Lack of public interest</li> <li>· Small population size</li> </ul>
<b><i>Franklin's Ground Squirrel</i></b>	<ul style="list-style-type: none"> <li>· Restore grassland habitat</li> <li>· Improve connectivity of grasslands</li> <li>· Translocation program</li> </ul>	<ul style="list-style-type: none"> <li>· Land acquisition and management efforts</li> <li>· Grassland habitat restoration</li> </ul>	<ul style="list-style-type: none"> <li>· Limited population size</li> <li>· Lack of knowledge about habitat suitability</li> <li>· Lack of funding</li> <li>· Public disinterest</li> </ul>
<b><i>Star-nosed Mole</i></b>	<ul style="list-style-type: none"> <li>· Basic population surveys</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Little known about abundance and distribution</li> <li>· Limited funding</li> </ul>
<b><i>Smoky Shrew</i></b>	<ul style="list-style-type: none"> <li>· Basic population surveys</li> <li>· Maintain upland hardwood forests</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of interest</li> </ul>
<b><i>American Pygmy Shrew</i></b>	<ul style="list-style-type: none"> <li>· Basic population surveys</li> <li>· Research habitat suitability</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Cost and staffing</li> <li>· Lack of interest</li> </ul>
<b><i>Hellbender</i></b>	<ul style="list-style-type: none"> <li>· Restore riparian buffers</li> <li>· Improve water quality</li> <li>· Limit by-catch</li> <li>· Captive breeding and reintroduction</li> <li>· Public education and awareness</li> <li>· Continue population monitoring</li> </ul>	<ul style="list-style-type: none"> <li>· Wastewater treatment</li> <li>· Land acquisition</li> <li>· Captive breeding and head starting</li> <li>· Translocations from West Virginia</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Coordination with landowners and farmers</li> <li>· Small population size</li> </ul>
<b><i>Common Mudpuppy</i></b>	<ul style="list-style-type: none"> <li>· Gather baseline population data</li> <li>· Improve water quality</li> <li>· Protect aquatic systems</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of improving sewage treatment facilities</li> <li>· Other priorities</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Northern Cricket Frog</i></b>	<ul style="list-style-type: none"> <li>· Conduct range wide survey</li> <li>· Research causes of decline, especially in northern Indiana</li> <li>· Protect wetlands</li> <li>· Establish new populations</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Time constraints</li> <li>· Funding</li> <li>· Droughts</li> <li>· Lack of interest</li> <li>· Lack of knowledge</li> <li>· Conflicting land use needs</li> </ul>
<b><i>Crawfish Frog</i></b>	<ul style="list-style-type: none"> <li>· Repatriation</li> <li>· Establish no-plow zones</li> <li>· Captive breeding</li> <li>· Restore grasslands</li> <li>· Restore wetlands</li> <li>· Manage grasslands (burning and mowing)</li> <li>· Reclaim mine lands</li> </ul>	<ul style="list-style-type: none"> <li>· No-plow zones around breeding wetlands</li> <li>· Wetland construction</li> <li>· Predator removal</li> <li>· Cattail removal</li> <li>· Captive rearing</li> <li>· Grassland and wetland restoration at Hillenbrand FWA</li> <li>· Translocations at Big Oaks</li> <li>· Reclaiming strip mines</li> <li>· Buffers around burrows</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Conflicting land use needs</li> <li>· Education of landowners and managers</li> <li>· High cost of captive breeding</li> <li>· Disease</li> </ul>
<b><i>Plains Leopard Frog</i></b>	<ul style="list-style-type: none"> <li>· Protect wetlands</li> <li>· Protect grasslands</li> <li>· Assess abundance and range in Indiana</li> </ul>	<ul style="list-style-type: none"> <li>· Habitat restoration at Kankakee Sands</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with landowners</li> <li>· Lack of interest</li> <li>· Lack of knowledge</li> </ul>
<b><i>Northern Leopard Frog</i></b>	<ul style="list-style-type: none"> <li>· Increase wetland breeding areas</li> <li>· Protect buffers around wetlands</li> <li>· Improve water quality</li> </ul>	<ul style="list-style-type: none"> <li>· Wetlands protected in land reserve programs</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of land acquisition</li> <li>· Ag and urban expansion</li> <li>· Cost of building wetlands</li> </ul>
<b><i>Streamside Salamander</i></b>	<ul style="list-style-type: none"> <li>· Protect streams</li> <li>· Protect forested riparian zones</li> <li>· Improve water quality</li> <li>· Survey to determine abundance and range</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Personnel</li> <li>· Mismanagement of streams</li> </ul>
<b><i>Blue-spotted Salamander</i></b>	<ul style="list-style-type: none"> <li>· Protect/create vernal pools</li> <li>· Protect large wooded areas</li> <li>· Protect buffers around wetlands</li> <li>· Determine abundance and distribution (hybridization issues)</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Cost of land acquisition</li> <li>· Cooperation of private landowners</li> <li>· Political will</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Mole Salamander</i></b>	<ul style="list-style-type: none"> <li>· Manage Twin Swamps Nature Preserve for habitat</li> <li>· Acquire habitat adjacent to Twin Swamps</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Very limited range</li> <li>· Cost of land acquisition</li> </ul>
<b><i>Green Salamander</i></b>	<ul style="list-style-type: none"> <li>· Protect rocky cliff habitat</li> <li>· Protect forests adjacent to habitat</li> <li>· Population inventory</li> </ul>	<ul style="list-style-type: none"> <li>· Increased survey efforts</li> </ul>	<ul style="list-style-type: none"> <li>· Cooperation of agencies</li> <li>· Cooperation of private landowners</li> <li>· Very limited range</li> </ul>
<b><i>Four-toed Salamander</i></b>	<ul style="list-style-type: none"> <li>· Protect wetlands and upland habitat</li> <li>· Acquire land where species occurs</li> <li>· Incentivize landowners to protect woodlands and wetlands</li> </ul>	<ul style="list-style-type: none"> <li>· Surveys</li> <li>· Protection of wetland and riparian habitat</li> <li>· Land acquisition at Muscatatuck Bottoms</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of land acquisition</li> <li>· Cooperation of landowners</li> <li>· Conflicting land use needs</li> </ul>
<b><i>Red Salamander</i></b>	<ul style="list-style-type: none"> <li>· Survey to determine whether species exists in Indiana</li> <li>· Protect stream quality</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Personnel</li> <li>· Forestry practices</li> </ul>
<b><i>Cottonmouth</i></b>	<ul style="list-style-type: none"> <li>· Protect and restore river corridors</li> <li>· Restore floodplains</li> <li>· Reduce road barriers</li> <li>· Protect from poachers</li> </ul>	<ul style="list-style-type: none"> <li>· Acquiring habitat</li> <li>· Expansion and improvement of Patoka River NWR</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of land acquisition</li> <li>· Poachers</li> <li>· Roads</li> <li>· Unwillingness to sell land</li> </ul>
<b><i>Scarlet snake</i></b>	<ul style="list-style-type: none"> <li>· Glade restoration and preservation via prescribed burning and selective cutting</li> <li>· Acquire glades where species occurs</li> <li>· Glade vegetation management</li> </ul>	<ul style="list-style-type: none"> <li>· Acquisition of land in the Knob region</li> </ul>	<ul style="list-style-type: none"> <li>· Urban sprawl</li> <li>· Limited population size</li> <li>· Cost of land acquisition</li> </ul>
<b><i>Kirtland's Snake</i></b>	<ul style="list-style-type: none"> <li>· Preserve low, wet woods and fields where burrowing crayfish are abundant</li> <li>· Proper habitat management (burns, mowing)</li> <li>· Remove trash and debris from habitat</li> <li>· Keep out of pet trade</li> <li>· Rangewide survey</li> </ul>	<ul style="list-style-type: none"> <li>· Purchases at Muskatatuck Bottoms</li> <li>· Protection from development</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Personnel</li> <li>· Pet trade</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Timber Rattlesnake</i></b>	<ul style="list-style-type: none"> <li>· Preserve large forest tracts</li> <li>· Mitigate road barriers</li> <li>· Limit development in forested areas</li> <li>· Protect den locations</li> <li>· Communication with public</li> </ul>	<ul style="list-style-type: none"> <li>· HEE research to understand response to timber harvest</li> <li>· Land acquisition in southern Indiana</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of knowledge</li> <li>· Resistance from land developers</li> <li>· Unwillingness to protect venomous species</li> <li>· Roads</li> </ul>
<b><i>Red-bellied Mudsake</i></b>	<ul style="list-style-type: none"> <li>· Determine whether extirpated status is correct</li> <li>· Protect suitable habitat</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Willingness to preserve remaining habitat</li> </ul>
<b><i>Copper-bellied Watersnake</i></b>	<ul style="list-style-type: none"> <li>· Restore and protect habitat</li> <li>· Expand floodplain and upland habitat with multiple wetlands</li> <li>· Mitigate roads as barriers</li> <li>· Restrict clearing of forested bottomlands</li> </ul>	<ul style="list-style-type: none"> <li>· Restoration of potential habitat in northeast Indiana</li> <li>· WRP and Healthy Forests programs</li> <li>· Outreach programs</li> <li>· Conservation agreements in coal industry</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of incentives to maintain woodlands and wetlands</li> <li>· Concerns about flooding</li> <li>· Roads</li> <li>· Lack of interest</li> </ul>
<b><i>Rough Greensnake</i></b>	<ul style="list-style-type: none"> <li>· Protect wetland and riparian habitat</li> <li>· Better population survey</li> <li>· Manage for healthy forest edge habitats</li> <li>· Limit mowing along roads</li> <li>· Restrict pesticide use</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Public awareness</li> </ul>
<b><i>Smooth Greensnake</i></b>	<ul style="list-style-type: none"> <li>· Survey to determine remaining populations</li> <li>· Reduce burning during active season</li> <li>· Restrict herbicide use</li> <li>· Protect grasslands and edge habitat</li> </ul>	<ul style="list-style-type: none"> <li>· Protection of lands through TNC, land trusts, and DNR Nature Preserves</li> </ul>	<ul style="list-style-type: none"> <li>· Economic interests of land developers</li> </ul>
<b><i>Massasauga</i></b>	<ul style="list-style-type: none"> <li>· Acquire and manage habitat</li> <li>· Reduce shrub encroachment</li> <li>· Restore habitats adjacent to occupied areas</li> <li>· Maintain open habitats</li> <li>· Repatriation/translocation</li> </ul>	<ul style="list-style-type: none"> <li>· Land acquisition and management</li> <li>· Fen conservation</li> <li>· Educational programs</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of land acquisition</li> <li>· Fear of snakes</li> <li>· Lack of interest</li> <li>· Funding</li> <li>· Unwillingness to sell land</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Southeastern Crowned Snake</i></b>	<ul style="list-style-type: none"> <li>· Acquire and manage habitat (forested knobs)</li> <li>· Maintain glade habitats (fire regimes)</li> </ul>	<ul style="list-style-type: none"> <li>· Land acquisition and management</li> </ul>	<ul style="list-style-type: none"> <li>· Manpower</li> <li>· Access to sites in private ownership</li> <li>· Unwillingness to sell land</li> <li>· Funding</li> </ul>
<b><i>Butler's Gartersnake</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Western Ribbonsnake</i></b>	<ul style="list-style-type: none"> <li>· Conserve wetlands</li> <li>· Rangewide survey to determine status and management needs</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Lack of incentives to protect habitat</li> </ul>
<b><i>Spotted Turtle</i></b>	<ul style="list-style-type: none"> <li>· Conserve wetlands and small lakes</li> <li>· Improve water quality</li> <li>· Mitigate road barriers</li> <li>· Police pet trade</li> <li>· Incentivize landowners to retain wetland habitats</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland conservation and management</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Unwillingness to sell land</li> <li>· Lack of resources</li> <li>· Roads</li> <li>· Cost of land acquisition</li> </ul>
<b><i>Blanding's Turtle</i></b>	<ul style="list-style-type: none"> <li>· Manage mesopredators</li> <li>· Protect large wetlands</li> <li>· Minimize nest disturbance</li> <li>· Mitigate road hazards</li> <li>· Surveys to determine status</li> </ul>	<ul style="list-style-type: none"> <li>· Wetland restoration and management</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Roads</li> <li>· Lack of resources</li> <li>· Unwillingness to sell land</li> <li>· Time constraints</li> </ul>
<b><i>Eastern Mud Turtle</i></b>	<ul style="list-style-type: none"> <li>· Accurately assess status of species</li> <li>· Preserve and restore bottomland hardwoods and floodplain swamps</li> </ul>	<ul style="list-style-type: none"> <li>· Initiatives to preserve land along the Wabash River</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Lack of knowledge</li> <li>· Cost of land acquisition</li> </ul>
<b><i>Alligator Snapping Turtle</i></b>	<ul style="list-style-type: none"> <li>· Survey to determine whether species is extirpated</li> <li>· Educate fishers</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· None</li> </ul>
<b><i>River Cooter</i></b>	<ul style="list-style-type: none"> <li>· Survey to determine population extent</li> <li>· Improve water quality</li> <li>· Eliminate construction of levees where practicable</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Scale of water quality issues</li> <li>· Resistance from ag community</li> </ul>
<b><i>Eastern Box Turtle</i></b>	<ul style="list-style-type: none"> <li>· Educate landowners and citizens</li> <li>· Enhance forest connectivity</li> <li>· Protect large forest</li> </ul>	<ul style="list-style-type: none"> <li>· Educational efforts</li> <li>· Land acquisition</li> <li>· Legislation protecting them</li> </ul>	<ul style="list-style-type: none"> <li>· Cost of road crossing construction</li> <li>· Pet trade</li> <li>· Development in forests</li> <li>· Funding</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
	<ul style="list-style-type: none"> <li>· tracts</li> <li>· Control invasive woody plants</li> <li>· Remove mesopredators</li> <li>· Mitigate road hazards</li> <li>· Restrict collection for pet trade</li> </ul>	<ul style="list-style-type: none"> <li>· from collection</li> <li>· HEE research on response to forest practices</li> </ul>	<ul style="list-style-type: none"> <li>· Citizen attitudes</li> </ul>
<b><i>Ornate Box Turtle</i></b>	<ul style="list-style-type: none"> <li>· Reduce mesopredators</li> <li>· Maintain grassland habitat</li> <li>· Mitigate road hazards</li> <li>· Implement fire regimes</li> <li>· Conserve ephemeral wetlands</li> <li>· Supplement populations (headstarting)</li> </ul>	<ul style="list-style-type: none"> <li>· Land acquisition</li> <li>· Population surveys</li> <li>· Kankakee Sands restoration</li> <li>· Habitat management</li> </ul>	<ul style="list-style-type: none"> <li>· Unwillingness to sell land</li> <li>· Funding</li> <li>· Other priorities</li> <li>· Cost of habitat acquisition</li> <li>· Cooperation with landowners</li> </ul>
<b><i>Redside Dace</i></b>	<ul style="list-style-type: none"> <li>· Protect riparian corridors along small order streams</li> <li>· Control water withdrawal</li> <li>· Control take of bait</li> <li>· Understand effects of climate change</li> <li>· Write watershed management plans</li> <li>· Inform stakeholders</li> <li>· Keep streams cool</li> <li>· Maintain stream substrates</li> </ul>	<ul style="list-style-type: none"> <li>· Introduction to second watershed</li> <li>· Investigation into population genetic structure</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with landowners</li> <li>· Climate change</li> <li>· Lack of interest in BMPs</li> <li>· Drainage and irrigation practices</li> <li>· Funding</li> </ul>
<b><i>Pallid Shiner</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Pugnose Shiner</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Bigmouth Shiner</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Longnose Dace</i></b>	<ul style="list-style-type: none"> <li>· Reduce flashiness in watersheds</li> <li>· Wetland restoration</li> <li>· Conservation tillage</li> <li>· Reduce pollution</li> <li>· Implement BMPs</li> <li>· Remove dams</li> </ul>	<ul style="list-style-type: none"> <li>· The Elkhart County surveyors office has implemented instream restoration projects in Baugo Creek which have helped stabilize some areas of the stream and create habitat</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with landowners</li> <li>· Increases in agriculture production</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
		<ul style="list-style-type: none"> <li>Survey to determine distribution</li> </ul>	
<b><i>Northern Madtom</i></b>	<ul style="list-style-type: none"> <li>Implement BMPs</li> <li>Survey deep water habitats of the Ohio River</li> <li>Restrict urban development</li> </ul>	<ul style="list-style-type: none"> <li>None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>Funding</li> <li>Social importance</li> </ul>
<b><i>Hoosier Cavefish</i></b>	<ul style="list-style-type: none"> <li>Protect karst systems</li> <li>Implement BMPs</li> <li>Education of landowners</li> <li>Concentrated nutrient management</li> <li>Develop tools to limit septic system failures</li> <li>Implement monitoring program</li> </ul>	<ul style="list-style-type: none"> <li>Purchasing caves</li> </ul>	<ul style="list-style-type: none"> <li>Funding</li> <li>Lack of interest in karst systems</li> <li>Resistance to ordinance and policy changes</li> <li>Coordination with landowners</li> </ul>
<b><i>Northern Brook Lamprey</i></b>	<ul style="list-style-type: none"> <li>Protect habitat from dredging</li> <li>Reduce non-point source pollution</li> </ul>	<ul style="list-style-type: none"> <li>Survey to determine current distribution</li> </ul>	<ul style="list-style-type: none"> <li>Unwillingness to implement BMPs</li> </ul>
<b><i>Western Sand Darter</i></b>	<ul style="list-style-type: none"> <li>Reduce point and non-point source pollution</li> <li>Restore riparian buffers along large rivers</li> <li>Reduce bank erosion</li> </ul>	<ul style="list-style-type: none"> <li>No responses</li> </ul>	<ul style="list-style-type: none"> <li>No responses</li> </ul>
<b><i>Spotted Darter</i></b>	<ul style="list-style-type: none"> <li>Reduce point and non-point source pollution</li> <li>Stabilize banks</li> <li>Storm water policies and education</li> <li>Incentives to slow water from urban and residential areas</li> <li>Remove dams</li> <li>Implement Best Management Practices</li> </ul>	<ul style="list-style-type: none"> <li>Work by TNC on Blue River to educate public in conservation</li> </ul>	<ul style="list-style-type: none"> <li>Coordination with landowners</li> <li>Resistance to change agricultural practices</li> <li>Mining industry</li> </ul>
<b><i>Cypress Darter</i></b>	<ul style="list-style-type: none"> <li>Reconnect floodplains to river</li> <li>Protect oxbow lakes and sloughs</li> </ul>	<ul style="list-style-type: none"> <li>Acquisition of floodplain lands in Wabash River and Ohio River</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural land prices</li> <li>Levee systems</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Tippecanoe Darter</i></b>	<ul style="list-style-type: none"> <li>· Reduce point and non-point source pollution in large rivers</li> <li>· Restore and maintain riparian buffers</li> <li>· Education of stakeholders on best practices</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with landowners</li> <li>· Dam operations</li> </ul>
<b><i>Variegate Darter</i></b>	<ul style="list-style-type: none"> <li>· Reduce point and non-point source pollution</li> <li>· Restore and maintain riparian buffers</li> <li>· Protect current habitat</li> <li>· Dam management</li> <li>· Education for proper recreational use of rivers</li> </ul>	<ul style="list-style-type: none"> <li>· None taken directly</li> </ul>	<ul style="list-style-type: none"> <li>· Dam operations</li> <li>· Coordination with landowners</li> </ul>
<b><i>Channel Darter</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Gilt Darter</i></b>	<ul style="list-style-type: none"> <li>· protect riffle habitats in the Tippecanoe River from sedimentation</li> <li>· implement best management practices in the Tippecanoe River watershed</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with landowners</li> <li>· Willingness to implement BMPs</li> </ul>
<b><i>Ohio River Muskellunge</i></b>	<ul style="list-style-type: none"> <li>· Create stocking plan if the subspecies still exists</li> </ul>	<ul style="list-style-type: none"> <li>· Establishing populations in suitable lakes has helped to popularize public interest in muskellunge</li> </ul>	<ul style="list-style-type: none"> <li>· Doubtful availability of the Ohio River subspecies for propagation</li> <li>· Funding</li> </ul>
<b><i>Banded Pygmy Sunfish</i></b>	<ul style="list-style-type: none"> <li>· Protect floodplain lands in Ohio and Wabash River drainages</li> <li>· Reconnect floodplains and rivers</li> <li>· Restrict draining of floodplain lakes</li> <li>· Conserve aquatic vegetation</li> <li>· Maintain natural water regime</li> <li>· Protect habitat from dredging</li> </ul>	<ul style="list-style-type: none"> <li>· Acquisition of floodplain land in Wabash and Ohio River drainages</li> </ul>	<ul style="list-style-type: none"> <li>· Coordination with agencies and landowners</li> <li>· Agricultural land prices</li> </ul>
<b><i>Slimy Sculpin</i></b>	<ul style="list-style-type: none"> <li>· Control invasive species in Lake Michigan</li> <li>· Control round goby</li> <li>· Public education</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Political will</li> <li>· Manpower</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Lake Sturgeon</i></b>	<ul style="list-style-type: none"> <li>· Dam removal</li> <li>· Protect water quality</li> <li>· Improve agricultural techniques</li> <li>· Install fish ladder</li> <li>· Reduce sediment and nutrient loads</li> <li>· Reduce mortality due to anglers</li> <li>· maintain important spawning habitat below Williams Dam</li> <li>· restore riparian buffer zones</li> </ul>	<ul style="list-style-type: none"> <li>· Denoting the species as endangered</li> <li>· making possession illegal</li> <li>· annual monitoring</li> <li>· limited propagation</li> </ul>	<ul style="list-style-type: none"> <li>· Public awareness</li> <li>· Political support</li> <li>· Funding</li> <li>· High agricultural prices</li> <li>· Compliance with fishing regulations</li> <li>· Social support</li> </ul>
<b><i>Longnose Sucker</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Greater Redhorse</i></b>	<ul style="list-style-type: none"> <li>· Protect water quality</li> <li>· Dam removal</li> <li>· Reduce point and non-point source pollution</li> <li>· Implement BMPs</li> <li>· Restore riparian corridors</li> <li>· Reduce siltation and nutrient inputs</li> <li>· Maintain/increase flows and flow volumes</li> </ul>	<ul style="list-style-type: none"> <li>· Agricultural BMPs</li> <li>· Dam removal on the Eel River</li> </ul>	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Social support</li> <li>· Farming industry</li> <li>· Willingness to implement BMPs</li> </ul>
<b><i>Bantam Sunfish</i></b>	<ul style="list-style-type: none"> <li>· Acquire land in floodplains of Ohio and Wabash Rivers</li> <li>· Connect floodplains to rivers</li> </ul>	<ul style="list-style-type: none"> <li>· Land acquisition in Wabash and Ohio River floodplains</li> </ul>	<ul style="list-style-type: none"> <li>· Agricultural land prices</li> <li>· Levees</li> </ul>
<b><i>Trout-perch</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>

Species	Relevant Actions	Effective Actions	Major Barriers
<b>Cisco</b>	<ul style="list-style-type: none"> <li>· Protect watershed from nutrient impacts</li> <li>· Control vegetation in lakes</li> <li>· Increase agricultural BMPs</li> <li>· Limit high-speed boating</li> <li>· Create cost-share program for lake residents</li> <li>· Public education</li> <li>· Reintroductions</li> <li>· Manage adjacent lands</li> <li>· Protect natural shoreline habitats</li> <li>· Limit seawall construction</li> </ul>	<ul style="list-style-type: none"> <li>· Bio-engineered seawall installed on South Twin Lake (LaGrange Co.) in 2012</li> <li>· DNR worked with the University of Notre Dame and Purdue University to test environmental DNA (eDNA) techniques to determine the presence of cisco in several cold-water lakes in 2013</li> <li>· DNR re-assessed the status (presence, catch rates, sex ratios, size- and age-structures) of cisco among lakes historically containing cisco (2012--14)</li> <li>· North Region Fisheries Section (DNR) is currently vetting new vegetation control guidelines (2012-14) for cold-water lakes to limit nutrient recycling and sustain water quality</li> </ul>	<ul style="list-style-type: none"> <li>· Communication issues</li> <li>· Political will</li> <li>· Funding</li> <li>· Lack of resources</li> <li>· Public disinterest</li> <li>· Manpower</li> <li>· High agricultural commodity prices</li> </ul>
<b>Lake Whitefish</b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b>Fanshell</b>	<ul style="list-style-type: none"> <li>· Protect current habitats</li> <li>· Reduce point and non-point source pollution</li> <li>· Restore and maintain riparian buffer zones</li> <li>· Prohibit take of mussels</li> <li>· Investigate life history</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>White Catspaw</i></b>	<ul style="list-style-type: none"> <li>· Address hydrologic alteration of headwater streams</li> <li>· Captive breeding if possible</li> </ul>	<ul style="list-style-type: none"> <li>· Restoration efforts at Fish Creek NRDA</li> </ul>	<ul style="list-style-type: none"> <li>· Likely extinct</li> </ul>
<b><i>Northern Riffleshell</i></b>	<ul style="list-style-type: none"> <li>· Address altered hydrology in headwaters to decrease flashiness downstream</li> <li>· Non-point source strategies to limit nutrients and sediments from moving downstream</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Scale of agricultural industry</li> </ul>
<b><i>Tubercled Blossom</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Snuffbox</i></b>	<ul style="list-style-type: none"> <li>· Protect current habitats</li> <li>· reduce point and nonpoint source pollution</li> <li>· restore and maintain riparian buffer zones</li> <li>· augment populations</li> <li>· improve water quality</li> <li>· reduce siltation from ag practices</li> <li>· reduce flood peaks from storm water runoff and ditches</li> <li>· maintain instream habitat stability</li> <li>· Farm Bill programs and policy changes to maintain native cover</li> </ul>	<ul style="list-style-type: none"> <li>· propagation of snuffbox from the Salamonie River to augment Tippecanoe River population</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> <li>· Lack of public understanding</li> </ul>
<b><i>Longsolid</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Pink Mucket</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Wavyrayed Lampmussel</i></b>	<ul style="list-style-type: none"> <li>· Identify habitat requirements and current populations</li> <li>· Augment populations</li> <li>· Improve water quality</li> <li>· Reduce point and non-point source pollution</li> <li>· Restore and maintain buffer zones</li> </ul>	<ul style="list-style-type: none"> <li>· Laws prohibiting take of mussels</li> </ul>	<ul style="list-style-type: none"> <li>· Resistance to change</li> <li>· Cost</li> <li>· Lack of public knowledge</li> <li>· Lack of landowner buy-in</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Round Hickorynut</i></b>	<ul style="list-style-type: none"> <li>· Determine life history attributes</li> <li>· Improve water quality</li> <li>· Reduce point and non-point source pollution</li> <li>· Refine propagation techniques</li> </ul>	·	<ul style="list-style-type: none"> <li>· Funding</li> <li>· Limited source populations for propagation</li> </ul>
<b><i>White Wartyback</i></b>	· No responses	· No responses	· No responses
<b><i>Orangefoot Pimpleback</i></b>	· No responses	· No responses	· No responses
<b><i>Sheepnose</i></b>	<ul style="list-style-type: none"> <li>· Protect current habitats</li> <li>· Reduce point and non-point source pollution</li> <li>· Restore and maintain riparian buffer zones</li> </ul>	· No responses	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> </ul>
<b><i>Clubshell</i></b>	<ul style="list-style-type: none"> <li>· Improve water quality</li> <li>· Refine propagation techniques</li> <li>· Determine life history attributes</li> <li>· Determine watersheds for reintroduction</li> <li>· Improve ditch maintenance practices</li> <li>· Landowner education</li> <li>· Augment populations</li> </ul>	· Restoration efforts at Fish Creek NRDA	<ul style="list-style-type: none"> <li>· Cost constraints</li> <li>· Resistance to change</li> <li>· Lack of knowledge</li> <li>· Lack of landowner buy-in</li> </ul>
<b><i>Ohio Pigtoe</i></b>	· No responses	· No responses	· No responses
<b><i>Rough Pigtoe</i></b>	· No responses	· No responses	· No responses
<b><i>Pyramid Pigtoe</i></b>	· No responses	· No responses	· No responses
<b><i>Fat Pocketbook</i></b>	<ul style="list-style-type: none"> <li>· Improve water quality</li> <li>· Protect current habitats</li> </ul>	· No responses	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Scale of water quality issues</li> </ul>
<b><i>Kidneyshell</i></b>	<ul style="list-style-type: none"> <li>· Protect current habitats</li> <li>· Improve water quality</li> <li>· Determine reasons for decline</li> <li>· Find habitats for reintroduction</li> <li>· Improve ditch maintenance</li> <li>· Dam removal</li> </ul>	· No responses	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of public support</li> <li>· Lack of landowner buy-in</li> <li>· Poor understanding of issues</li> </ul>

<b>Species</b>	<b>Relevant Actions</b>	<b>Effective Actions</b>	<b>Major Barriers</b>
<b><i>Rabbitsfoot</i></b>	<ul style="list-style-type: none"> <li>· Protect current habitats</li> <li>· Improve water quality</li> <li>· Public education</li> <li>· Find habitats for reintroduction</li> <li>· Species monitoring</li> <li>· Genetic modelling</li> </ul>	<ul style="list-style-type: none"> <li>· Listing as federally threatened</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of public buy-in</li> <li>· Lack of knowledge</li> </ul>
<b><i>Salamander Mussel</i></b>	<ul style="list-style-type: none"> <li>· Improve water quality</li> <li>· Protect current habitats</li> <li>· Restore riparian buffers</li> <li>· Investigate life history attributes</li> <li>· Determine streams for reintroductions</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> </ul>
<b><i>Purple Lilliput</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Ellipse</i></b>	<ul style="list-style-type: none"> <li>· Improve water quality</li> <li>· Restore riparian buffer zones</li> <li>· Determine watersheds for species restoration</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> <li>· Lack of public support</li> </ul>
<b><i>Rayed Bean</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Little Spectaclecase</i></b>	<ul style="list-style-type: none"> <li>· Reduce point and non-point source pollution</li> <li>· Refine propagation techniques</li> <li>· Determine watershed for species reintroduction</li> <li>· Public education</li> </ul>	<ul style="list-style-type: none"> <li>· Listing as federally endangered</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of funding</li> <li>· Lack of landowner buy-in</li> <li>· Lack of public understanding</li> </ul>
<b><i>Pointed Campeloma</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>
<b><i>Swamp Lymnaea</i></b>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>	<ul style="list-style-type: none"> <li>· No responses</li> </ul>

## Appendix P. Full Species Survey Results.

### Section I.

Questions 1-3 excluded from this report

### Section II. Information on SGCN and their habitats in Indiana

4. In which of the following taxonomic groups do you consider yourself knowledgeable to provide relevant species and habitat information for SGCN? (Check all that apply)

Taxa	Number (N)
Mammals	44
Birds	53
Fish	46
Amphibians	23
Reptiles	20
Mollusks	18

5. Select the species from the following SGCN list for which you consider yourself knowledgeable to provide relevant species population and habitat information. For each individual species you select, you will be asked to respond to 23 related questions. (Check all that apply)

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number
Mammals	Bats	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	NA	SC	5
		<i>Lasionycteris noctivagans</i>	Silver-haired Bat	NA	SC	5
		<i>Lasiurus borealis</i>	Red Bat	NA	SC	11
		<i>Lasiurus cinereus</i>	Hoary Bat	NA	SC	7
		<i>Myotis austroriparius</i>	Southeastern Myotis	NA	SC	4
		<i>Myotis grisescens</i>	Gray Myotis	FE	SE	5
		<i>Myotis leibii</i>	Eastern Small-footed Myotis	NA	SC	5
		<i>Myotis lucifugus</i>	Little Brown Myotis	NA	SC	16
		<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	NA	SC	14
		<i>Myotis sodalis</i>	Indiana Myotis	FE	SE	23

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number
		<i>Nycticeius humeralis</i>	Evening Bat	NA	SE	5
		<i>Perimyotis subflavus</i>	Tri-colored Bat	NA	SC	11
	Mustelids	<i>Mustela nivalis</i>	Least Weasel	NA	SC	7
		<i>Taxidea taxus</i>	Badger	NA	SC	6
	Rabbits	<i>Sylvilagus aquaticus</i>	Swamp Rabbit	NA	SE	9
	Rodents	<i>Geomys bursarius</i>	Plains Pocket Gopher	NA	SC	9
		<i>Neotoma magister</i>	Allegheny Woodrat	NA	SE	11
		<i>Spermophilus franklinii</i>	Franklin's Ground Squirrel	NA	SE	10
	Shrews & Moles	<i>Condylura cristata</i>	Star-nosed Mole	NA	SC	4
		<i>Sorex fumeus</i>	Smoky Shrew	NA	SC	4
		<i>Sorex hoyi</i>	Pygmy Shrew	NA	SC	5
Birds	Cranes	<i>Grus americana</i>	Whooping Crane	FE	SE	10
		<i>Grus canadensis</i>	Sandhill Crane	NA	SC	17
	Hérons, Egrets, & Bitterns	<i>Ardea alba</i>	Great Egret	NA	SC	9
		<i>Botaurus lentiginosus</i>	American Bittern	NA	SE	5
		<i>Ixobrychus exilis</i>	Least Bittern	NA	SE	7
		<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	NA	SE	5
		<i>Nycticorax</i>	Black-crowned Night-heron	NA	SE	6
	Nightjars	<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	NA	SC	7
		<i>Chordeiles minor</i>	Common Nighthawk	NA	SC	8
	Rails	<i>Gallinula chloropus</i>	Common Moorhen	NA	SE	3
		<i>Laterallus jamaicensis</i>	Black Rail	NA	SE	3
		<i>Rallus elegans</i>	King Rail	NA	SE	6
		<i>Rallus limicola</i>	Virginia Rail	NA	SE	5
	Raptors	<i>Accipiter striatus</i>	Sharp-shinned Hawk	NA	SC	5
		<i>Asio flammeus</i>	Short-eared Owl	NA	SE	5
		<i>Buteo lineatus</i>	Red-shouldered Hawk	NA	SC	11
		<i>Buteo platypterus</i>	Broad-winged Hawk	NA	SC	7
		<i>Circus cyaneus</i>	Northern Harrier	NA	SE	5
		<i>Falco peregrinus</i>	Peregrine Falcon	NA	SC	7
		<i>Haliaeetus leucocephalus</i>	Bald Eagle	NA	SC	10
<i>Ictinia mississippiensis</i>		Mississippi Kite	NA	SC	3	
<i>Pandion haliaetus</i>		Osprey	NA	SE	5	

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number	
	Shorebirds	<i>Tyto alba</i>	Barn Owl	NA	SE	4	
		<i>Arenaria interpres</i>	Ruddy Turnstone	NA	SC	1	
		<i>Bartramia longicauda</i>	Upland Sandpiper	NA	SE	4	
		<i>Charadrius melodus</i>	Piping Plover	FE	SE	4	
		<i>Limnodromus griseus</i>	Short-billed Dowitcher	NA	SC	4	
			<i>Phalaropus tricolor</i>	Wilson's Phalarope	NA	SC	3
			<i>Pluvialis dominica</i>	American Golden-plover	NA	SC	8
			<i>Tringa melanoleuca</i>	Greater Yellowlegs	NA	SC	5
			<i>Tringa solitaria</i>	Solitary Sandpiper	NA	SC	6
			<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper	NA	SC	3
			<i>Ammodramus henslowii</i>	Henslow's Sparrow	NA	SE	16
			<i>Cistothorus palustris</i>	Marsh Wren	NA	SE	6
			<i>Cistothorus platensis</i>	Sedge Wren	NA	SE	7
			<i>Dendroica cerulea</i>	Cerulean Warbler	NA	SE	10
			<i>Dendroica kirtlandii</i>	Kirtland's Warbler	FE	SE	3
			<i>Helmitheros vermivorum</i>	Worm-eating Warbler	NA	SC	4
			<i>Lanius ludovicianus</i>	Loggerhead Shrike	NA	SE	6
			<i>Mniotilta varia</i>	Black-and-white Warbler	NA	SC	4
			<i>Sturnella neglecta</i>	Western Meadowlark	NA	SC	1
			<i>Vermivora chrysoptera</i>	Golden-winged Warbler	NA	SE	3
			<i>Wilsonia citrina</i>	Hooded Warbler	NA	SC	8
			<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	NA	SE	2
		Terns	<i>Chlidonias niger</i>	Black Tern	NA	SE	4
	<i>Sternula antillarum</i>		Least Tern	FE	SE	9	
	Waterfowl	<i>Cygnus buccinator</i>	Trumpeter Swan	NA	SE	5	
Fish	Catfish	<i>Noturus stigmosus</i>	Northern Madtom	NA	SC	4	
	Cavefish	<i>Amblyopsis spelaea</i>	Northern Cavefish	NA	SE	4	
	Cyprinids	<i>Clinostomus elongatus</i>	Redside Dace	NA	SE	9	
		<i>Hybopsis amnis</i>	Pallid Shiner	NA	SE	1	
		<i>Notropis anogenus</i>	Pugnose Shiner	NA	SC	1	
		<i>Notropis dorsalis</i>	Bigmouth Shiner	NA	SC	1	
		<i>Rhinichthys cataractae</i>	Longnose Dace	NA	SC	4	
	Darters	<i>Ammocrypta clara</i>	Western Sand Darter	NA	SC	3	
<i>Etheostoma maculatum</i>		Spotted Darter	NA	SC	5		

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number
		<i>Etheostoma proeliare</i>	Cypress Darter	NA	SC	3
		<i>Etheostoma tippecanoe</i>	Tippecanoe Darter	NA	SC	4
		<i>Etheostoma variatum</i>	Variagate Darter	NA	SE	4
		<i>Percina copelandi</i>	Channel Darter	NA	SE	4
		<i>Percina evides</i>	Gilt Darter	NA	SE	3
	Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	NA	SE	4
	Pikes	<i>Esox masquinongy ohioensis</i>	Ohio River Muskellunge	NA	SC	4
	Salmonids	<i>Coregonus artedi</i>	Cisco	NA	SC	13
		<i>Coregonus clupeaformis</i>	Lake Whitefish	NA	SC	3
	Sculpins	<i>Cottus cognatus</i>	Slimy Sculpin	NA	SC	6
	Sturgeons	<i>Acipenser fulvescens</i>	Lake Sturgeon	NA	SE	11
	Suckers	<i>Catostomus catostomus</i>	Longnose Sucker	NA	SC	2
		<i>Moxostoma valenciennesi</i>	Greater Redhorse	NA	SE	8
	Pygmy Sunfish	<i>Elassoma zonatum</i>	Banded Pygmy Sunfish	NA	SC	3
	Sunfish	<i>Lepomis symmetricus</i>	Bantam Sunfish	NA	SE	3
	Trout-perches	<i>Percopsis omiscomaycus</i>	Trout-perch	NA	SC	4
Amphibians	Aquatic Salamanders	<i>Cryptobranchus alleganiensis</i>	Hellbender	NA	SE	5
		<i>Necturus maculosus</i>	Common Mudpuppy	NA	SC	3
	Frogs	<i>Acris crepitans</i>	Northern Cricket Frog	NA	SC	7
		<i>Lithobates areolatus</i>	Crawfish Frog	NA	SE	8
		<i>Lithobates blairi</i>	Plains Leopard Frog	NA	SE	7
		<i>Lithobates pipiens</i>	Northern Leopard Frog	NA	SC	7
	Salamanders	<i>Ambystoma barbouri</i>	Streamside Salamander	NA	SC	3
		<i>Ambystoma laterale</i>	Blue-spotted Salamander	NA	SC	8
		<i>Ambystoma talpoideum</i>	Mole Salamander	NA	SE	3
		<i>Aneides aeneus</i>	Green Salamander	NA	SE	4
<i>Hemidactylium scutatum</i>		Four-toed Salamander	NA	SC	6	
<i>Pseudotriton ruber</i>		Red Salamander	NA	SE	2	
Reptiles	Snakes	<i>Agkistrodon piscivorus</i>	Cottonmouth	NA	SE	5
		<i>Cemophora coccinea</i>	Scarletsnake	NA	SE	2

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number
		<i>Clonophis kirtlandii</i>	Kirtland's Snake	NA	SE	5
		<i>Crotalus horridus</i>	Timber Rattlesnake	NA	SE	4
		<i>Farancia abacura</i>	Red-bellied Mudsake	NA	SC	2
		<i>Nerodia erythrogaster neglecta</i>	Copper-bellied Watersnake	FT	SE	5
		<i>Opheodrys aestivus</i>	Rough Greensnake	NA	SC	3
		<i>Opheodrys vernalis</i>	Smooth Greensnake	NA	SE	3
		<i>Sistrurus catenatus</i>	Massasauga	FC	SE	5
		<i>Tantilla coronata</i>	Southeastern Crowned Snake	NA	SE	3
		<i>Thamnophis butleri</i>	Butler's Gartersnake	NA	SE	0
		<i>Thamnophis proximus</i>	Western Ribbonsnake	NA	SC	2
	Turtles	<i>Clemmys guttata</i>	Spotted Turtle	NA	SE	5
		<i>Emydoidea blandingii</i>	Blanding's Turtle	NA	SE	7
		<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	NA	SE	2
		<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	NA	SE	2
		<i>Pseudemys concinna</i>	River Cooter	NA	SE	1
		<i>Terrapene carolina</i>	Eastern Box Turtle	NA	SC	9
		<i>Terrapene ornata</i>	Ornate Box Turtle	NA	SE	7
Mollusks	Snails	<i>Campeloma decisum</i>	Pointed Campeloma	NA	SC	1
		<i>Lymnaea stagnalis</i>	Swamp Lymnaea	NA	SC	1
	Mussels	<i>Cyprogenia stegaria</i>	Fanshell	FE	SE	3
		<i>Epioblasma obliquata perobliqua</i>	White Catspaw	FE	SE	2
		<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell	FE	SE	3
		<i>Epioblasma torulosa torulosa</i>	Tuberclad Blossom	FE	SE	1
		<i>Epioblasma triquetra</i>	Snuffbox	FE	SE	5
		<i>Fusconaia subrotunda</i>	Longsolid	NA	SE	1
		<i>Lampsilis abrupta</i>	Pink Mucket	FE	SE	1
		<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel	NA	SC	6
		<i>Obovaria subrotunda</i>	Round Hickorynut	NA	SE	2
		<i>Plethobasus cicatricosus</i>	White Wartyback	FE	SE	0
		<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	FE	SE	0
		<i>Plethobasus cyphus</i>	Sheepnose	FE	SE	3

Taxa	Group	Scientific Name	Common Name	Federal Status	State Status	Number
		<i>Pleurobema clava</i>	Clubshell	FE	SE	5
		<i>Pleurobema cordatum</i>	Ohio Pigtoe	NA	SC	0
		<i>Pleurobema plenum</i>	Rough Pigtoe	FE	SE	0
		<i>Pleurobema rubrum</i>	Pyramid Pigtoe	NA	SE	0
		<i>Potamilus capax</i>	Fat Pocketbook	FE	SE	4
		<i>Ptychobranhus fasciolaris</i>	Kidneyshell	NA	SC	2
		<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	FT	SE	5
		<i>Simpsonaias ambigua</i>	Salamander Mussel	NA	SC	2
		<i>Toxolasma lividus</i>	Purple Lilliput	NA	SC	1
		<i>Venustaconcha ellipsiformis</i>	Ellipse	NA	SC	3
		<i>Villosa fabalis</i>	Rayed Bean	FE	SE	1
		<i>Villosa lienosa</i>	Little Spectaclecase	NA	SC	0

6. Identify species that you would suggest be removed from or added to the State Endangered or Special Concern categories in Indiana and briefly explain your reasoning. (Check all that apply) (Note: State Endangered fish and wildlife species are listed through a formal process that includes statutory requirements and administrative rule procedures. Species must meet criteria under IC 14-22-34. Information on population, distribution, habitat needs, limiting factors, and other biological and ecological data for species for possible listing as Endangered or Special Concern are reviewed by Technical Advisory Committees (TACs) periodically. The TACs make recommendations for listings, which then go through the administrative rule process. Suggested additions/removals with sufficient reasoning will be forwarded onto the TACs.)

I would suggest removing the following species and my reasoning and the data I use to support my suggestion are: (N=12)	
<b>Badgers</b>	The species is marginal in Indiana but stable throughout its core range. As such there is no real value in protecting and managing the species.
<b>Badger</b>	The species is primarily a prairie/Plains species which reaches its range limits in Indiana. The sporadic occurrences encountered in Indiana appear to be the result of dispersal of individuals from the core range. The species is not restricted to a very rare habitat, which would warrant state-level protections
<b>Bald Eagle</b>	There are over 200 nesting pairs according to data provided by DNR. It has been removed from Federal Endangered list and is considered a nuisance in some states.
<b>Bald Eagle, Osprey</b>	Nesting is becoming a regular occurrence in east central Indiana.
<b>Cypress Darter, Western Sand Darter, Variegated Darter, Northern Cavefish,</b>	Species on the list should not include those species on the periphery of their range, but rather focus on species that are declining. Stable populations that are limited in number should be considered as threatened. The list should also be reviewed with respect to recent information. Limited funding and lack of Non-game grants has virtually ended research in the state and the investigation of these types of questions.

<b>Bigmouth Shiner, Tippecanoe Darter</b>	
<b>Evening Bats</b>	Evening bats are extremely common throughout the south east. They are not listed in any other state. Indiana is the periphery of its range and Indiana simply doesn't have high populations because Indiana doesn't have the ideal habitat. Throughout the S it is one of the most common species encountered. We should not expect populations to be high along the periphery of the range, as such there is no reason to list the species when populations are exactly where we expect them to be. If the species was i decline or had threats in other portions of their range then the Indiana populations would have greater ecological importance and may warrant listing, but that is not the case and there are no substantial threats for the species now or on the horizon. Evening bats may actually be the one eastern bat species that is not facing specific and direct ecological challenges. They are not affected by WNS and are not likely to based on ecology and range. They are also not impacted by wind energy. I sincerely think that listing this otherwise very common species in Indiana makes Indiana look silly. At best they should be a species of Special Concern - They are certainly more common range wide than Raf bats or SE bats which are listed as Special Concern.
<b>Lithobates Pipiens, Northern Leopard Frog</b>	I've only been in Indiana for a couple of years but this species is one of the most common species that I have encountered. Most of my research is conducted around West Lafayette and focused on larvae. In the ponds that I have investigated and that are uitable for leopard frog reproduction, I have seen healthy populations.
<b>Myotis austroriparius</b>	At what point does a species that has not been recorded in the state begin to be considered accidental? I believe the last record of austro was in 1977.
<b>Northern Harrier</b>	Although they do not commonly nest in Indiana, they are quite common in other seasons, and are common nesters in other states
<b>Peregrine Falcon</b>	This species has exceeded recovery goals in the Midwest by a considerable number of pairs. The current population may be almost double what the historical population was in the Midwest. As a top predator this species is supposed to be rare and as long a its population is secure, there is nothing wrong with being rare. Recovery folks need to accept the current population and quit placing new nest boxes up in every power plant and grain elevator along the Great lakes and major rivers as is being done in Wisconsin and other Midwest states. The prey items of Peregrines breeding just northeast of Indiana is sobering to bird conservationists and included many woodcock, cuckoos, and other species of conservation concern. Enough is enough. The species is secure and should be delisted.
<b>Sandhill Cranes</b>	We have a consistently stable or increasing population. Cranes are highly adaptable. The majority of the population does not breed or over-winter in IN. Their congregation during migration is not limited to J-P FWA but also includes Muscatatuck NWR and many privately owned agricultural areas adjacent to riparian areas. I support evaluating the possibility of a hunting season for this species.
<b>Scarletsnake</b>	Their presence in the state hasn't been documented in Indiana since 1957 according to the Natural Heritage Database to my knowledge. Tantilla coronata could be removed from occurring in Indiana too since it hasn't been sighted since 1988. However, given he secretive nature of the species, I suppose it is possible they may still occur in Indiana given the discovery of mole salamanders in 2004. I understand including them on the list may be deemed harmless by some and provides some level of protection. However, I think it confuses people and gives them a false sense of snake diversity in the state. By definition, these both are better classified as extirpated.

**I would suggest adding the following species and my reasoning and the data I use to support my suggestion are: (N=13)**

<b>Cave bats</b>	Based on the seemingly unstoppable progression of WNS and based on the hibernacula results reported by Scott Johnson, I believe that all the cave bats should be added to the endangered list. There is a CLEAR trend that the populations of these species are declining at an amazing rate and that is the very definition of endangered. I think that <i>Myotis septentrionalis</i> , <i>M. lucifugus</i> , <i>M. leibii</i> , and <i>Perimyotis subflavus</i> all be added to endangered list. I really don't think this needs further argument, the data shows a clear and disturbing trend.
<b>Cisco</b>	Due to water quality and possibly global warming, the number of lakes capable of supporting cisco has declined over the decades.
<b>Lepidopterans</b>	Current Indiana law does not protect these animals, but there are ever increasing risks to native butterflies that are not being addressed
<b>Little Brown Bat, Eastern Pipistrelle, and Northern Long-eared Bat</b>	All are currently listed as species of concern. However, since the last TAC meeting additional evidence has become available which indicates these species are rapidly declining as a result of White-Nose Syndrome (WNS).
<b>Little Brown, Northern Long-eared, and Eastern Pipistrelle Abts</b>	These species are all listed as species of concern at present. All have suffered dramatic declines in surrounding states due to White-Nose Syndrome (WNS) and we now have evidence of similar, catastrophic declines in hibernacula of Indiana and adjacent states.
<b>Myotis leibii, Myotis lucifugus, Myotis septentrionalis</b>	If these species' populations continue to decline as a result of WNS, then they may merit listing as state endangered. We have some capture and observation data to suggest that summer populations of MYSE are still stable in Indiana. However, we have little or no data on MYLU and MYLE summer populations. For MYLU, it may be easier to make a decision based on changes in wintering populations.
<b>Northern Bobwhite; American Woodcock; Ruffed Grouse</b>	Each of these species, though currently hunted, deserve "special concern" status. Their populations are declining and their early-successional habitats are shrinking. The Northern Bobwhite, based on the Annual Whistle Count Index, has an annual decline of 5.03% over the last 10 years and 3.78% over the last 20 years. The American Woodcock, based on the Annual Singing Ground Survey, has an annual decline of 3.99% over the last 10 years, and 4.13% over the long-term study (1968-2014). The annual long-term decline in Indiana is the most severe of all the Central region states in the survey. No ruffed grouse were heard in 2013 on the annual survey and populations are projected to lose viability in the next couple years, and if trend continues, extirpation is likely. I believe listing these species is important in raising their monitoring priority and making their habitat needs a priority as well.
<b>Paddlefish</b>	Increase of Silver & Bighead Carp in Ohio River main stem and tribs will adversely affect the already fragile populations.
<b>River Chub</b>	Although, I cannot speak for other basins outside of the St. Joe River (Lake Michigan) drainage, river chub ( <i>Nocomis micropogon</i> ) are not common in the St. Joseph River basin in Indiana. Our program collects them in one tributary to the St. Joseph River (Christiana Creek), but none others.
<b>Ruffed Grouse</b>	Decline and local extirpation have been well documented in Indiana...e.g., Backs, S.E. and J.S. Castrale. 2010. The distribution and conservation status of ruffed grouse in Indiana: 25 years of decline. Proceedings of the Indiana Academy of Science, 119():101-104.
<b>Ruffed Grouse</b>	The long term population trend for ruffed grouse in Indiana has reached a point where dramatic actions are needed to maintain viable populations of the species within the state. Ruffed grouse surveys conducted in 2014 by Steven Backs from the Indiana Division of Fish and Wildlife found no drumming male ruffed grouse along 14 roadside survey routes (15 stops/route) for the second consecutive year. The 5-year (2010-2014) mean drumming index for the control routes is 0.002 drummers per stop (~1 drummer hear every 500 stops) compared to 1.16 drummers per stop during the peak years of

	<p>1979-8, or nearly a 600 fold decrease. Currently, ruffed grouse are thought to exist in about 15 of the 43 county distribution reported in 1983. Prospects for population recovery are dismal given the continual advancement of forest succession on both public and private lands. Ruffed grouse population levels have likely dropped below “minimal viable population levels” within most of the current range in Indiana and the species appears destined for extirpation unless some intervention (e.g., immediate and extensive timber harvests of sufficient intensity) or sizable natural disturbances occur across the forested landscape to create early successional forest habitats.</p> <p>Data from the Indiana Breeding Bird Atlas (2005–2010) indicate ruffed grouse occurred in less than 1% of the priority blocks surveyed compared to 10% for the same blocks during the 1985–1990 assessment. Ruffed grouse appear to be extirpated from 15 counties where they previously occurred.</p> <p>This information is especially concerning considering that ruffed grouse are considered a Representative Species for Early Forest Stage Habitat Type in Indiana's State Wildlife Action Plan. Early successional habitat is required by ruffed grouse and 19 other species that are listed in the Indiana State Wildlife Action Plan. Immediate restoration of this habitat across swaths of the forested landscape in Indiana is vital</p>
<p><b>Ruffed Grouse (specifically Appalachian subspecies)</b></p>	<p>35 years of population monitoring, species facing extirpation from state, is already considered extirpated from more than half of its 1983 distribution in Indiana</p>
<p><b>Valvatidae: Valvata bicarinata (Lea 1841), Valvata lewisi (Currier 1868), Valvata tricarinata (Say 1817), Valvata sincera (Say 1824); Viviparidae: Viviparus georgianus (Lea 1824), Viviparus subpurpureus (Say 1829); Hydrobiidae: Birgella subglobosus (Say 125), Cincinnatia integra (Say 1821), Pyrgulopsis lustrica (Pilsbry 1890), Amnicola limosus (Say 1817); Pomatiopsidae: Pomatiopsis cincinnatiensis (Lea 1850); Pleuroceridae: Pleurocera canaliculata (Say 1821), Leptoxis praerosa (Say</b></p>	<p>These listed species were described in a recent paper by Pyron et al. (Pyron, M., J. Beugly, E. Martin, and M. Spielmann. 2008. Conservation of the freshwater gastropods of Indiana: Historic and current distributions. American Malacological Bulletin 26: 17-151. Available at <a href="http://mpyron.iweb.bsu.edu/Publications/GastropodsIndiana.pdf">http://mpyron.iweb.bsu.edu/Publications/GastropodsIndiana.pdf</a>) as either vulnerable, imperiled, critically imperiled or possibly extinct in Indiana based on historical records and their surveys conducted at 123 sites in Indiana. However, Pyron et al. also described the global distribution of the 39 snail species known from Indiana as globally secure (G4 and G5 rankings).</p>

<p>1821), Lithasia obovta (Say 1829), Lymnaea stagnalis (Linnaeus 1758), Stagnicola catascopium (Say 1867), Stagnicola caperata (Say 1829), Stagnicola exilis (I. Lea 1838); Physidae: Aplexa elongata; Planorbidae: Gyralus circumstriatus (Tyron 1866), Gyralus deflectus (Say 1824) Helisoma anceps (Menke 1830), Planorbella campanulata (Say 1821), Planorbula armigera (Say 1821), Promenetus exacuous (Say 1821); Ancyliidae: Ferrissia fragilis (Tyron 1863), Ferrissia paralellus (Haldeman 1841), Laevapex fuscus (C.B. Adams 1841)</p>	
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**Directions:**

You will be asked to respond to 23 questions for each SGCN you selected and considered yourself knowledgeable to provide relevant species population and habitat information.

Please answer the following questions for **SPECIES**.

**Habitat**

7. Based on your current knowledge and professional opinion, are there populations of SPECIES currently persisting in habitat in Indiana that are **not suitable** to sustain its populations over the next 10 years? (Check only one)

	Yes		No		Information is unknown		Total Responses
	%	N	%	N	%	N	
<b>Amphibians</b>	35.9	19	35.9	19	28.3	15	53
<b>Birds</b>	18.6	26	52.9	74	28.6	40	140

<b>Fish</b>	26.2	16	45.9	28	27.9	17	61
<b>Mammals</b>	28.6	36	42.9	54	28.6	36	126
<b>Mollusks</b>	28.6	8	39.3	11	32.1	9	28
<b>Reptiles</b>	52.4	33	17.5	11	30.2	19	63
<b>Total</b>	29.3	138	41.8	197	28.9	136	471

8. Based on your current knowledge and professional opinion, is there habitat in Indiana that is **suitable to sustain populations** of SPECIES but is **not currently occupied** by SPECIES? (Check only one)

	Yes		No		Information is unknown		Total Responses
	%	N	%	N	%	N	
<b>Amphibians</b>	58.5	31	15.1	8	26.4	14	53
<b>Birds</b>	55.3	78	16.3	23	28.4	40	141
<b>Fish</b>	48.3	29	21.7	13	30.0	18	60
<b>Mammals</b>	39.7	50	28.6	36	31.7	40	126
<b>Mollusks</b>	82.8	24	3.4	1	13.8	4	29
<b>Reptiles</b>	49.2	31	14.3	9	36.5	23	63
<b>Total</b>	51.5	243	19.1	90	29.4	139	472

9. How would you describe the **total amount of habitat** in Indiana available to SPECIES? (Check only one)

	Very limited (1)		Limited (2)		About right (3)		Abundant (4)		Very Abundant (5)		Mean	Total Responses
	%	N	%	N	%	N	%	N	%	N		
<b>Amphibians</b>	29.4	15	39.2	20	13.7	7	15.7	8	2.0	1	2.22	51
<b>Birds</b>	25.2	36	50.3	72	11.9	17	12.6	18	0.0	0	2.12	143
<b>Fish</b>	23.3	14	51.7	31	25.0	15	0.0	0	0.0	0	2.02	60
<b>Mammals</b>	16.3	20	34.1	42	29.3	36	17.1	21	3.3	4	2.57	123
<b>Mollusks</b>	15.4	4	26.9	7	46.2	12	11.5	3	0.0	0	2.54	26
<b>Reptiles</b>	41.9	26	48.4	30	3.2	2	6.5	4	0.0	0	1.74	62
<b>Total</b>	24.7	115	43.4	202	19.1	89	11.6	54	1.1	5	2.21	465

10. How would you describe the **overall quality of habitat** in Indiana where SPECIES currently occurs? (Check only one)

	Very poor (1)		Poor (2)		Satisfactory (3)		Good (4)		Very Good (5)		Mean	Total Responses
	%	N	%	N	%	N	%	N	%	N		
<b>Amphibians</b>	1.9	1	28.8	15	48.1	25	19.2	10	1.9	1	2.90	52
<b>Birds</b>	4.9	7	24.6	35	50.0	71	19.7	28	0.7	1	2.87	142
<b>Fish</b>	10.0	6	28.3	17	50.0	30	8.3	5	3.3	2	2.67	60
<b>Mammals</b>	0.0	0	23.6	29	56.1	69	16.3	20	4.1	5	3.01	123
<b>Mollusks</b>	7.7	2	19.2	5	57.7	15	15.4	4	0.0	0	2.81	26

<b>Reptiles</b>	14.5	9	37.1	23	41.9	26	6.5	4	0.0	0	2.40	62
<b>Total</b>	5.4	25	26.7	124	50.8	236	15.3	71	1.9	9	2.82	465

11. Based on your current knowledge and professional opinion, how would you describe the **total amount and overall quality of habitat** for SPECIES in Indiana since 2005? (Check one for each line item)

#### Total amount of habitat

	Increase		About the same		Decrease		I don't know		Total Responses
	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	2.0	1	66.7	34	17.6	9	13.7	7	51
<b>Birds</b>	18.3	26	38.7	55	21.8	31	21.1	30	142
<b>Fish</b>	0.0	0	65.0	39	21.7	13	13.3	8	60
<b>Mammals</b>	5.7	7	56.9	70	22.8	28	14.6	18	123
<b>Mollusks</b>	0.0	0	82.1	23	3.6	1	14.3	4	28
<b>Reptiles</b>	3.2	2	49.2	31	44.4	28	3.2	2	63
<b>Total</b>	7.7	36	54.0	252	23.6	110	14.8	69	467

#### Overall quality of habitat

	Increase		About the same		Decrease		I don't know		Total Responses
	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	0.0	0	65.3	32	22.4	11	12.2	6	49
<b>Birds</b>	17.1	24	37.1	52	20.7	29	25.0	35	140
<b>Fish</b>	1.7	1	52.5	31	33.9	20	11.9	7	59
<b>Mammals</b>	6.5	8	52.8	65	26.0	32	14.6	18	123
<b>Mollusks</b>	0.0	0	75.0	21	10.7	3	14.3	4	28
<b>Reptiles</b>	1.6	1	52.5	32	39.3	24	6.6	4	61
<b>Total</b>	7.4	34	50.7	233	25.9	119	16.1	74	460

12. Based on your current knowledge and professional opinion, how would you predict about the **total amount and overall quality of habitat** for SPECIES in Indiana over the next 10 years? (Check one for each line item)

#### Total amount of habitat

	Increase		About the same		Decrease		I don't know		Total Responses
	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	5.8	3	61.5	32	25.0	13	7.7	4	52
<b>Birds</b>	12.8	18	43.3	61	27.0	38	17.0	24	141
<b>Fish</b>	1.7	1	58.3	35	33.3	20	6.7	4	60
<b>Mammals</b>	4.9	6	56.1	69	30.9	38	8.1	10	123
<b>Mollusks</b>	0.0	0	78.6	22	7.1	2	14.3	4	28
<b>Reptiles</b>	4.8	3	38.1	24	50.8	32	6.3	4	63
<b>Total</b>	6.6	31	52.0	243	30.6	143	10.7	50	467

**Overall quality of habitat**

	Increase		About the same		Decrease		I don't know		Total Responses
	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	7.8	4	56.9	29	27.5	14	7.8	4	51
<b>Birds</b>	10.6	15	41.1	58	25.5	36	22.7	32	141
<b>Fish</b>	1.7	1	46.7	28	45.0	27	6.7	4	60
<b>Mammals</b>	4.9	6	52.8	65	33.3	41	8.9	11	123
<b>Mollusks</b>	0.0	0	75.0	21	10.7	3	14.3	4	28
<b>Reptiles</b>	4.9	3	42.6	26	41.0	25	11.5	7	61
<b>Total</b>	6.3	29	48.9	227	31.5	146	13.4	62	464

13. Are you aware of any current **habitat inventory and assessment** (i.e., monitoring of habitat quality or suitability) effort with respect to SPECIES in Indiana? (Check only one)

	Yes		No		Total Responses
	%	N	%	N	
<b>Amphibians</b>	37.7	20	62.3	33	53
<b>Birds</b>	14.2	20	85.8	121	141
<b>Fish</b>	35.0	21	65.0	39	60
<b>Mammals</b>	30.9	38	69.1	85	123
<b>Mollusks</b>	7.1	2	92.9	26	28
<b>Reptiles</b>	3.2	2	96.8	60	62
<b>Total</b>	22.1	103	77.9	364	467

14. Are you aware of any current **species monitoring** (i.e., sequential assessment of species population size or status) effort with respect to SPECIES in Indiana? (Check only one)

	Yes		No		Total Responses
	%	N	%	N	
<b>Amphibians</b>	38.5	20	61.5	32	52
<b>Birds</b>	46.1	65	53.9	76	141
<b>Fish</b>	51.7	31	48.3	29	60
<b>Mammals</b>	62.3	76	37.7	46	122
<b>Mollusks</b>	63.0	17	37.0	10	27
<b>Reptiles</b>	12.9	8	87.1	54	62
<b>Total</b>	46.8	217	53.2	247	464

***Habitat inventory and assessment***

15. Have **habitat inventory and assessment** efforts with respect to SPECIES in Indiana changed since 2005?

	Yes		No		I don't know		Total Responses
	%	N	%	N	%	N	
<b>Amphibians</b>	65.0	13	25.0	5	10.0	2	20
<b>Birds</b>	30.0	6	30.0	6	40.0	8	20
<b>Fish</b>	52.4	11	14.3	3	33.3	7	21
<b>Mammals</b>	71.1	27	7.9	3	21.1	8	38
<b>Mollusks</b>	0.0	0	0.0	0	100.0	2	2
<b>Reptiles</b>	50.0	1	0.0	0	50.0	1	2
<b>Total</b>	56.3	58	16.5	17	27.2	28	103

16. Indicate the **techniques** and the **frequency** of the techniques that are being used to conduct **habitat inventory and assessment** with respect to SPECIES in Indiana. (Check all that apply)

Total	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
<b>GIS mapping</b>	53.7	44	11.0	9	32.9	27	2.4	2	82	8.3	5	3.3	2	5.0	3	26.7	16	45.0	27	11.7	7	60
<b>Remote sensing</b>	32.0	24	16.0	12	45.3	34	6.7	5	75	7.7	4	1.9	1	13.5	7	0.0	0	48.1	25	28.8	15	52
<b>Modeling (e.g., habitat suitability index model)</b>	44.4	36	13.6	11	37.0	30	4.9	4	81	3.5	2	0.0	0	1.8	1	26.3	15	52.6	30	15.8	9	57
<b>Vegetative sampling</b>	42.5	34	18.8	15	31.3	25	7.5	6	80	5.3	3	8.8	5	3.5	2	14.0	8	43.9	25	24.6	14	57
<b>Water quality sampling</b>	42.0	34	18.5	15	25.9	21	13.6	11	81	6.6	4	4.9	3	6.6	4	11.5	7	44.3	27	26.2	16	61
<b>Systematic sampling</b>	65.8	52	6.3	5	24.1	19	3.8	3	79	13.1	8	27.9	17	9.8	6	13.1	8	29.5	18	6.6	4	61
<b>Inventory of unique habitat features (e.g., cavities for cavity nesters)</b>	54.3	44	17.3	14	23.5	19	4.9	4	81	10.0	6	20.0	12	5.0	3	10.0	6	40.0	24	15.0	9	60
<b>Voluntary landowner reporting</b>	26.6	21	27.8	22	34.2	27	11.4	9	79	32.1	17	1.9	1	0.0	0	1.9	1	32.1	17	32.1	17	53

Property tax estimates	1.3	1	43.6	34	21.8	17	33.3	26	78	0.0	0	0.0	0	0.0	0	0.0	0	19.2	10	80.8	42	52
State revenue data	0.0	0	43.4	33	22.4	17	34.2	26	76	0.0	0	0.0	0	0.0	0	0.0	0	17.6	9	82.4	42	51
Regulatory information	20.8	16	26.0	20	27.3	21	26.0	20	77	13.5	7	17.3	9	0.0	0	0.0	0	17.3	9	51.9	27	52
Participation in land use and conservation programs	32.9	26	17.7	14	35.4	28	13.9	11	79	30.2	16	1.9	1	0.0	0	7.5	4	34.0	18	26.4	14	53

Amphibians	Is this technique being used?								Total Responses	Frequency of technique												
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
GIS mapping	57.1	8	28.6	4	14.3	2	0.0	0	14	40.0	4	10.0	1	0.0	0	0.0	0	20.0	2	30.0	3	10
Remote sensing	27.3	3	36.4	4	36.4	4	0.0	0	11	16.7	1	0.0	0	0.0	0	0.0	0	16.7	1	66.7	4	6
Modeling (e.g., habitat suitability index model)	50.0	7	14.3	2	35.7	5	0.0	0	14	12.5	1	0.0	0	12.5	1	12.5	1	37.5	3	25.0	2	8
Vegetative sampling	35.7	5	21.4	3	35.7	5	7.1	1	14	33.3	3	22.2	2	0.0	0	0.0	0	22.2	2	22.2	2	9
Water quality sampling	35.7	5	35.7	5	21.4	3	7.1	1	14	22.2	2	11.1	1	11.1	1	0.0	0	22.2	2	33.3	3	9
Systematic sampling	78.6	11	14.3	2	7.1	1	0.0	0	14	44.4	4	33.3	3	0.0	0	0.0	0	11.1	1	11.1	1	9
Inventory of unique habitat features (e.g., cavities for cavity nesters)	64.3	9	21.4	3	14.3	2	0.0	0	14	44.4	4	22.2	2	0.0	0	0.0	0	11.1	1	22.2	2	9
Voluntary landowner reporting	28.6	4	42.9	6	28.6	4	0.0	0	14	25.0	2	0.0	0	0.0	0	12.5	1	25.0	2	37.5	3	8
Property tax estimates	0.0	0	50.0	7	35.7	5	14.3	2	14	0.0	0	0.0	0	0.0	0	0.0	0	16.7	1	83.3	5	6
State revenue data	0.0	0	50.0	7	35.7	5	14.3	2	14	0.0	0	0.0	0	0.0	0	0.0	0	16.7	1	83.3	5	6
Regulatory information	0.0	0	50.0	7	35.7	5	14.3	2	14	0.0	0	0.0	0	0.0	0	0.0	0	16.7	1	83.3	5	6
Participation in land use	28.6	4	35.7	5	35.7	5	0.0	0	14	12.5	1	0.0	0	0.0	0	12.5	1	25.0	2	50.0	4	8



Fish	Is this technique being used?								Total Responses	Frequency of technique												
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
<b>GIS mapping</b>	23.5	4	11.8	2	52.9	9	11.8	2	17	0.0	0	0.0	0	20.0	2	10.0	1	50.0	5	20.0	2	10
<b>Remote sensing</b>	5.6	1	27.8	5	50.0	9	16.7	3	18	9.1	1	0.0	0	0.0	0	0.0	0	36.4	4	54.5	6	11
<b>Modeling (e.g., habitat suitability index model)</b>	23.5	4	11.8	2	47.1	8	17.6	3	17	0.0	0	0.0	0	0.0	0	25.0	3	50.0	6	25.0	3	12
<b>Vegetative sampling</b>	25.0	4	31.3	5	31.3	5	12.5	2	16	0.0	0	0.0	0	18.2	2	18.2	2	9.1	1	54.5	6	11
<b>Water quality sampling</b>	88.2	15	5.9	1	5.9	1	0.0	0	17	5.9	1	11.8	2	17.6	3	41.2	7	17.6	3	5.9	1	17
<b>Systematic sampling</b>	81.3	13	0.0	0	18.8	3	0.0	0	16	0.0	0	0.0	0	25.0	4	25.0	4	50.0	8	0.0	0	16
<b>Inventory of unique habitat features (e.g., cavities for cavity nesters)</b>	52.9	9	5.9	1	23.5	4	17.6	3	17	7.1	1	7.1	1	7.1	1	21.4	3	42.9	6	14.3	2	14
<b>Voluntary landowner reporting</b>	0.0	0	47.1	8	11.8	2	41.2	7	17	0.0	0	0.0	0	0.0	0	0.0	0	18.2	2	81.8	9	11
<b>Property tax estimates</b>	0.0	0	43.8	7	0.0	0	56.3	9	16	0.0	0	0.0	0	0.0	0	0.0	0	9.1	1	90.9	10	11
<b>State revenue data</b>	0.0	0	43.8	7	0.0	0	56.3	9	16	0.0	0	0.0	0	0.0	0	0.0	0	9.1	1	90.9	10	11
<b>Regulatory information</b>	5.9	1	35.3	6	23.5	4	35.3	6	17	0.0	0	9.1	1	0.0	0	0.0	0	18.2	2	72.7	8	11
<b>Participation in land use and conservation programs</b>	11.8	2	23.5	4	23.5	4	41.2	7	17	10.0	1	0.0	0	0.0	0	20.0	2	30.0	3	40.0	4	10

Mammals	Is this technique being used?								Total Responses	Frequency of technique												
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
<b>GIS mapping</b>	76.5	26	5.9	2	17.6	6	0.0	0	34	0.0	0	0.0	0	3.3	1	40.0	12	50.0	15	6.7	2	30
<b>Remote sensing</b>	58.1	18	6.5	2	29.0	9	6.5	2	31	7.7	2	3.8	1	23.1	6	0.0	0	50.0	13	15.4	4	26
<b>Modeling (e.g., habitat suitability index model)</b>	61.8	21	14.7	5	20.6	7	2.9	1	34	0.0	0	0.0	0	0.0	0	37.0	10	48.1	13	14.8	4	27
<b>Vegetative sampling</b>	55.9	19	17.6	6	20.6	7	5.9	2	34	0.0	0	7.1	2	0.0	0	17.9	5	53.6	15	21.4	6	28
<b>Water quality sampling</b>	35.3	12	17.6	6	23.5	8	23.5	8	34	0.0	0	0.0	0	0.0	0	0.0	0	65.4	17	34.6	9	26
<b>Systematic sampling</b>	63.6	21	6.1	2	21.2	7	9.1	3	33	10.7	3	42.9	12	7.1	2	14.3	4	14.3	4	10.7	3	28
<b>Inventory of unique habitat features (e.g., cavities for cavity nesters)</b>	58.8	20	23.5	8	14.7	5	2.9	1	34	0.0	0	33.3	9	7.4	2	7.4	2	37.0	10	14.8	4	27
<b>Voluntary landowner reporting</b>	45.5	15	12.1	4	36.4	12	6.1	2	33	53.8	14	3.8	1	0.0	0	0.0	0	30.8	8	11.5	3	26
<b>Property tax estimates</b>	3.0	1	54.5	18	18.2	6	24.2	8	33	0.0	0	0.0	0	0.0	0	0.0	0	22.2	6	77.8	21	27
<b>State revenue data</b>	0.0	0	56.3	18	18.8	6	25.0	8	32	0.0	0	0.0	0	0.0	0	0.0	0	19.2	5	80.8	21	26
<b>Regulatory information</b>	45.2	14	16.1	5	22.6	7	16.1	5	31	25.9	7	29.6	8	0.0	0	0.0	0	14.8	4	29.6	8	27
<b>Participation in land use and conservation programs</b>	54.5	18	9.1	3	27.3	9	9.1	3	33	48.1	13	3.7	1	0.0	0	3.7	1	29.6	8	14.8	4	27

Mollusks	Is this technique being used?								Total Responses	Frequency of technique													
	Yes		No		I don't know		Not applicable			Total Responses	Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N			%	N	%	N	%	N	%	N	%	N	%	N	
GIS mapping	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Remote sensing	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Modeling (e.g., habitat suitability index model)	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Vegetative sampling	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Water quality sampling	50.0	1	0.0	0	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Systematic sampling	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Inventory of unique habitat features (e.g., cavities for cavity nesters)	50.0	1	0.0	0	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	1	0.0	0	1	
Voluntary landowner reporting	0.0	0	50.0	1	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1	1	
Property tax estimates	0.0	0	50.0	1	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1	1	
State revenue data	0.0	0	0.0	0	100.0	1	0.0	0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1	1	
Regulatory information	0.0	0	50.0	1	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1	1	
Participation in land use and conservation programs	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1	1	

Reptiles	Is this technique being used?								Total Responses	Frequency of technique												
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
GIS mapping	50.0	1	0.0	0	50.0	1	0.0	0	2	50.0	1	0.0	0	0.0	0	0.0	0	50.0	1	0.0	0	2
Remote sensing	0.0	0	0.0	0	100.0	2	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	50.0	1	2
Modeling (e.g., habitat suitability index model)	10.0	2	0.0	0	0.0	0	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	0.0	0	2
Vegetative sampling	50.0	1	0.0	0	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	0.0	0	2
Water quality sampling	0.0	0	0.0	0	0.0	0	100.0	2	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	2	2
Systematic sampling	10.0	2	0.0	0	0.0	0	0.0	0	2	50.0	1	0.0	0	0.0	0	0.0	0	50.0	1	0.0	0	2
Inventory of unique habitat features (e.g., cavities for cavity nesters)	50.0	1	50.0	1	0.0	0	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	50.0	1	2
Voluntary landowner reporting	50.0	1	50.0	1	0.0	0	0.0	0	2	50.0	1	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	2
Property tax estimates	0.0	0	0.0	0	0.0	0	100.0	2	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	2	2
State revenue data	0.0	0	0.0	0	0.0	0	100.0	2	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	2	2
Regulatory information	0.0	0	0.0	0	0.0	0	100.0	2	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	2	2
Participation in land use and conservation programs	0.0	0	50.0	1	50.0	1	0.0	0	2	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	50.0	1	2

Other methodology listed by respondents for Q16:

Taxa	Species	Other Text	Is this technique used?	Frequency
<b>Amphibians</b>	Crawfish Frog	Use of piezometers	Yes	Year-round
<b>Amphibians</b>	Hellbender	Purdue Research	Yes	
<b>Amphibians</b>	Northern Cricket Frog	Personal surveys of historic and new sites in northern Indiana.	Yes	
<b>Bird</b>	Eastern Whip-poor-will	US Nightjar Survey	Yes	Once a year
<b>Fish</b>	Cisco	E-DNA sampling	Yes	< once a year and not regularly scheduled
<b>Mammal</b>	Allegheny Woodrat	See PhD work of Tim Smyser at Purdue	Yes	Year-round
<b>Mammal</b>	Little Brown Myotis	WNS Monitoring	Yes	Once a year
<b>Mammal</b>	Rafinesque's Big-eared Bat	Cave surveys (including acoustics)	Yes	Once a year

17. Which of the following agencies/organizations conduct **habitat inventory and assessment** with respect to SPECIES in Indiana? (Check all that apply)

	Federal agencies (e.g., USDA Forest Service)		State agencies (e.g., Indiana Department of Natural Resources)		Local agencies (e.g., County Parks & Recreation Department)		Non-profit organizations		For-profit entities		Research entities (e.g., universities)		I don't know		Total Responses
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	20.0	3	80.0	12	6.7	1	20.0	3	0.0	0	73.3	11	0.0	0	1
<b>Birds</b>	57.1	8	64.3	9	0.0	0	35.7	5	0.0	0	14.3	2	7.1	1	1
<b>Fish</b>	5.6	1	94.4	17	0.0	0	5.6	1	0.0	0	55.6	10	0.0	0	1
<b>Mammals</b>	54.3	19	91.4	32	20.0	7	48.6	17	31.4	11	80.0	28	0.0	0	3
<b>Mollusks</b>	0.0	0	50.0	1	0.0	0	0.0	0	0.0	0	100.0	2	0.0	0	2
<b>Reptiles</b>	0.0	0	100.0	2	50.0	1	0.0	0	0.0	0	100.0	2	0.0	0	2
<b>Total</b>	36.0	31	84.9	73	10.5	9	30.2	26	12.8	11	64.0	55	1.2	1	8

Other agencies/organizations listed by respondents:

<b>Taxa</b>	<b>Species</b>	<b>Other Text</b>
<b>Amphibians</b>	Northern Cricket Frog	My personal surveys
<b>Bird</b>	Four-toed Salamander	Private investigators

18. To what extent are **habitat inventory and assessment data** with respects to SPECIES in Indiana accessible to your agency/organization? (Check only one)

	<b>Extremely accessible</b>		<b>Moderately accessible</b>		<b>Somewhat accessible</b>		<b>Not accessible</b>		<b>I don't know</b>		<b>Total Responses</b>
	%	N	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	33.3	5	26.7	4	40.0	6	0.0	0	0.0	0	15
<b>Birds</b>	14.3	2	35.7	5	35.7	5	7.1	1	7.1	1	14
<b>Fish</b>	33.3	6	44.4	8	16.7	3	5.6	1	0.0	0	18
<b>Mammals</b>	24.2	8	45.5	15	18.2	6	3.0	1	9.1	3	33
<b>Mollusks</b>	0.0	0	0.0	0	50.0	1	0.0	0	50.0	1	2
<b>Reptiles</b>	50.0	1	0.0	0	50.0	1	0.0	0	0.0	0	2
<b>Total</b>	26.2	22	38.1	32	26.2	22	3.6	3	6.0	5	84

***Species population monitoring***

19. Have **species monitoring** efforts with respect to SPECIES in Indiana changed since 2005?

	<b>Yes</b>		<b>No</b>		<b>I don't know</b>		<b>Total Responses</b>
	%	N	%	N	%	N	
<b>Amphibians</b>	75.0	15	15.0	3	10.0	2	20
<b>Birds</b>	28.1	18	48.4	31	23.4	15	64
<b>Fish</b>	48.4	15	29.0	9	22.6	7	31
<b>Mammals</b>	80.0	60	12.0	9	8.0	6	75
<b>Mollusks</b>	70.6	12	5.9	1	23.5	4	17
<b>Reptiles</b>	37.5	3	12.5	1	50.0	4	8
<b>Total</b>	57.2	123	25.1	54	17.7	38	215

20. Indicate the **techniques** and the **frequency** of the techniques that are being used to **monitor SPECIES** in Indiana. (Check all that apply)

Total	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	29.3	44	30.5	45	31.3	47	9.3	14	150	9.9	8	12.3	10	1.2	1	6.2	5	35.8	29	34.6	28	81
Radio telemetry/tracking	32.2	49	32.9	50	28.3	43	6.6	10	152	13.1	11	7.1	6	2.4	2	14.3	12	32.1	27	31.0	26	84
Modelling/spatial information	31.5	47	22.8	34	42.3	63	3.4	5	149	6.3	5	1.3	1	3.8	3	24.1	19	48.1	38	16.5	13	79
Molecular/genetic investigations	27.3	41	25.3	38	44.7	67	2.7	4	150	6.0	5	2.4	2	0.0	0	12.0	10	56.6	47	22.9	19	83
Indices (e.g., scat counts, vocalization surveys, etc)	53.0	79	20.8	31	41.1	61	2.1	18	149	3.6	3	43.4	36	2.4	2	10.8	9	16.9	14	22.9	19	83
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	30.2	45	30.9	46	21.5	32	17.4	26	149	18.1	15	12.0	10	0.0	0	4.8	4	31.3	26	33.7	28	83
Coverboard routes	0.7	1	8.5	15	9.6	14	1.2	6	148	1.4	1	0.0	0	0.0	0	0.0	0	19.4	14	79.2	57	72
Spot mapping	20.9	31	27.7	41	34.5	51	16.9	25	148	8.1	6	4.1	3	1.4	1	5.4	4	45.9	34	35.1	26	74
Driving a survey route	44.6	66	22.3	33	19.6	29	13.5	20	148	1.2	1	50.0	43	2.3	2	1.2	1	16.3	14	19.1	25	86
Professional surveys	75.3	116	6.5	10	16.9	26	1.3	2	154	9.3	10	33.3	36	9.3	10	13.9	15	25.9	28	8.3	9	108
Volunteer surveys	33.3	50	28.7	43	31.3	47	6.7	10	150	6.4	5	3.1	8	2.6	2	5.1	4	33.3	26	29.5	23	78
Trapping by any technique	51.7	76	21.8	32	22.4	33	4.1	6	147	9.0	8	5.8	3	9.0	8	12.4	11	31.5	28	12.4	11	89
Representative sites	39.9	59	18.9	28	37.2	55	4.1	6	148	3.7	3	25.9	21	8.6	7	4.9	4	40.7	33	16.0	13	81
Probabilistic sites	26.4	39	20.9	31	48.6	72	4.1	6	148	3.8	3	11.5	9	7.7	6	10.3	8	47.4	6	25.0	15	78

Amphibians	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	62.5	10	31.5	5	0.0	0	6.3	1	16	30.0	3	30.0	3	0.0	0	0.0	0	10.0	1	30.0	3	10
Radio telemetry/tracking	43.8	7	37.5	6	12.5	2	6.3	1	16	30.0	3	0.0	0	0.0	0	0.0	0	30.0	3	40.0	4	10
Modelling/geospatial information	60.0	9	13.3	2	26.7	4	0.0	0	15	12.5	1	12.5	1	25.0	2	0.0	0	25.0	2	25.0	2	8
Molecular/genetic investigations	62.5	10	25.0	4	12.5	2	0.0	0	16	18.2	2	0.0	0	0.0	0	9.1	1	45.5	5	27.3	3	11
Indices (e.g., scat counts, vocalization surveys, etc)	40.0	6	13.3	2	26.7	4	20.0	3	15	0.0	0	44.4	4	0.0	0	0.0	0	11.1	1	44.4	4	9
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	37.5	6	37.5	6	12.5	2	22.5	2	16	20.0	2	10.0	1	0.0	0	0.0	0	20.0	2	50.0	5	10
Coverboard routes	0.0	0	33.3	5	6.7	1	60.0	9	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	7	7
Spot mapping	43.8	7	25.0	4	25.0	4	6.3	1	16	0.0	0	12.5	1	0.0	0	25.0	2	25.0	2	37.5	3	8
Driving a survey route	50.0	8	12.5	2	22.5	2	25.0	4	16	0.0	0	44.4	4	11.1	1	0.0	0	0.0	0	44.4	4	9
Professional surveys	88.2	15	11.8	2	0.0	0	0.0	0	17	18.2	2	45.5	5	0.0	0	0.0	0	9.1	1	27.3	3	11
Volunteer surveys	62.5	10	25.0	4	12.5	2	0.0	0	16	0.0	0	40.0	4	10.0	1	0.0	0	20.0	2	30.0	3	10
Trapping by any technique	68.8	11	8.8	3	6.3	1	6.3	1	16	9.1	1	45.5	6	0.0	0	0.0	0	8.2	2	8.2	2	11
Representative sites	73.3	11	6.7	1	20.0	3	0.0	0	15	12.5	1	50.0	4	12.5	1	0.0	0	12.5	1	25.5	1	8

<b>Probabilistic sites</b>	6 2. 5	1 0	6. 3	1	3 1. 3	5	0. 0	0	16	1 1 : 1	1	3 3. 3	3	1 1. 1	1	0. 0	0	3 3. 3	0	0. 0	1	9
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Birds	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	20.0	6	23.7	7	46.7	14	10.0	3	30	0.0	0	0.0	0	0.0	0	20.0	2	50.0	5	30.0	3	10
Radio telemetry/tracking	16.1	5	25.8	8	48.4	15	9.7	3	31	20.0	2	0.0	0	0.0	0	10.0	1	50.0	5	20.0	2	10
Modelling/geospatial information	6.5	2	25.8	8	58.1	18	9.7	3	31	10.0	1	0.0	0	0.0	0	10.0	1	60.0	6	20.0	2	10
Molecular/genetic investigations	6.5	2	22.6	7	61.3	19	9.7	3	31	10.0	1	0.0	0	0.0	0	10.0	1	60.0	6	20.0	2	10
Indices (e.g., scat counts, vocalization surveys, etc)	48.4	15	22.6	7	22.6	7	6.5	2	31	27.3	3	45.5	5	0.0	0	0.0	0	27.3	3	0.0	0	11
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	20.0	6	26.7	8	40.0	12	13.3	4	30	25.0	2	0.0	0	0.0	0	0.0	0	62.5	5	12.5	1	8
Coverboard routes	0.0	0	29.0	9	38.7	12	32.3	10	31	0.0	0	0.0	0	0.0	0	0.0	0	62.5	5	37.5	3	8
Spot mapping	16.1	5	25.8	8	48.4	15	9.7	3	31	10.0	1	0.0	0	0.0	0	0.0	0	70.0	7	20.0	2	10
Driving a survey route	29.0	9	22.6	7	41.9	13	6.5	2	31	71.1	1	22.9	6	0.0	0	0.0	0	35.7	5	14.3	2	14
Professional survey/censuses	65.6	21	22.5	4	21.9	7	0.0	0	32	23.1	3	66.2	6	0.0	0	0.0	0	30.8	4	0.0	0	13
Volunteer survey/censuses	50.0	16	9.4	3	34.4	11	6.3	2	32	27.3	3	82.2	2	0.0	0	9.1	1	45.5	5	0.0	0	11
Trapping by any technique	12.9	4	25.8	8	51.6	16	9.7	3	31	0.0	0	0.0	0	0.0	0	20.0	2	60.0	6	20.0	2	10
Representative sites	14.4	6	6.1	5	48.8	17	9.7	3	31	0.0	0	20.0	2	0.0	0	0.0	0	60.0	6	20.0	2	10
Probabilistic sites	6.5	2	25.8	8	58.8	18	9.7	3	31	0.0	0	0.0	0	0.0	0	0.0	0	75.0	7	0.0	2	8





Mammals	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	26.2	16	23.0	14	44.3	27	6.6	4	61	24.0	1	14.6	6	2.4	1	7.3	3	41.5	17	31.7	13	41
Radio telemetry/tracking	47.5	29	44.6	27	7.9	5	0.0	0	61	0.0	0	4.0	6	4.7	2	5.6	1	32.6	14	33.3	10	43
Modelling/geospatial information	41.7	27	33.3	21	5.0	4	0.0	0	60	24.0	1	0.0	0	0.0	0	3.4	1	46.3	19	17.1	7	41
Molecular/genetic investigations	26.7	16	18.3	11	5.0	3	0.0	0	60	24.0	1	2.4	1	0.0	0	1.2	2	58.5	24	24.4	10	41
Indices (e.g., scat counts, vocalization surveys, etc)	81.7	49	8.3	5	3.3	2	6.7	4	60	0.0	0	65.9	27	2.4	1	9.8	4	9.8	4	12.2	5	41
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	40.0	24	21.7	13	18.3	11	2.0	1	60	22.0	9	2.0	9	0.0	0	0.0	0	26.8	11	29.3	12	41
Coverboard routes	0.0	0	40.0	24	8.3	5	5.7	3	60	0.0	0	0.0	0	0.0	0	0.0	0	7.5	3	92.5	37	40
Spot mapping	27.1	16	20.3	12	30.5	18	2.0	1	59	10.3	4	2.6	1	0.0	0	5.1	2	48.7	19	33.3	13	39
Driving a survey route	83.1	49	6.8	4	6.8	4	3.4	2	59	0.0	0	71.7	33	2.2	1	2.2	1	10.9	5	13.0	6	46
Professional surveys	75.4	46	4.9	3	9.7	6	0.0	0	61	43.0	2	50.0	23	1.3	0	0.0	0	23.9	11	8.7	4	46
Volunteer surveys	40.0	24	25.0	15	35.0	21	0.0	0	60	5.0	2	30.0	12	2.5	1	7.5	3	32.5	13	22.5	9	40
Trapping by any technique	86.2	50	1.7	1	2.1	1	0.0	0	58	13.0	6	37.0	17	1.0	0	5.2	2	21.7	10	2.2	1	46
Representative sites	48.3	29	6.7	4	3.3	2	1.7	1	60	0.0	0	7.5	5	7.5	3	7.5	3	50.0	14	2.5	5	40
Probabilistic sites	26.7	16	8.3	5	61.7	37	3.3	2	60	0.0	0	15.0	6	5.0	2	7.5	3	50.0	0	0.0	9	40

Mollusks	Is this technique being used?								Total Responses	Frequency of technique												Total Responses
	Yes		No		I don't know		Not applicable			Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Radio telemetry/tracking	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Modelling/geospatial information	0.0	0	73.3	11	26.7	4	0.0	0	15	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	0.0	0	2
Molecular/genetic investigations	6.7	1	66.7	10	26.7	4	0.0	0	15	0.0	0	0.0	0	0.0	0	0.0	0	66.7	2	33.3	1	3
Indices (e.g., scat counts, vocalization surveys, etc)	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Coverboard routes	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Spot mapping	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Driving a survey route	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Professional surveys	81.3	13	0.0	0	18.8	3	0.0	0	16	0.0	0	0.0	0	0.0	0	85.7	12	14.3	2	0.0	0	14
Volunteer surveys	0.0	0	73.3	11	13.3	2	13.3	2	15	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	10.0	2	2
Trapping by any technique	0.0	0	73.3	11	20.0	3	6.7	1	15	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	50.0	1	2
Representative sites	6.7	1	73.3	11	13.3	2	6.7	1	15	0.0	0	0.0	0	0.0	0	0.0	0	50.0	1	50.0	1	2
Probabilistic sites	0.0	0	71.0	10	28.0	4	0.0	0	14	0.0	0	0.0	0	0.0	0	0.0	0	10.0	0	0.0	0	2

			4	6					0							0.				
																0				

Reptiles	Is this technique being used?								Frequency of technique													
	Yes		No		I don't know		Not applicable		Total Responses	Year-round		Once a year		< once a year, but still regularly scheduled		< once a year and not regularly scheduled		I don't know		Not applicable		Total Responses
	%	N	%	N	%	N	%	N		%	N	%	N	%	N	%	N	%	N	%	N	
Mark-recapture/mark-resight	85.7	6	14.3	1	0.0	0	0.0	0	7	42.9	3	0.0	0	0.0	0	0.0	0	42.9	3	14.3	1	7
Radio telemetry/tracking	71.4	5	14.3	1	4.3	1	0.0	0	7	42.9	3	0.0	0	0.0	0	0.0	0	42.9	3	14.3	1	7
Modelling/geospatial information	71.4	5	0.0	0	28.6	2	0.0	0	7	14.3	1	0.0	0	0.0	0	14.3	1	71.4	5	0.0	0	7
Molecular/genetic investigations	42.9	3	14.3	1	42.9	3	0.0	0	7	0.0	0	0.0	0	0.0	0	0.0	0	83.3	5	16.7	1	6
Indices (e.g., scat counts, vocalization surveys, etc)	0.0	0	0.0	0	57.1	4	42.9	3	7	0.0	0	0.0	0	0.0	0	0.0	0	40.0	2	60.0	3	5
Reporting from harvest, depredation, or unintentional take (e.g., road kill, by-catch)	28.6	2	14.3	1	42.9	3	14.3	1	7	33.3	2	0.0	0	0.0	0	0.0	0	33.3	2	33.3	2	6
Coverboard routes	14.3	1	0.0	0	57.1	4	28.6	2	7	20.0	1	0.0	0	0.0	0	0.0	0	40.0	2	40.0	2	5
Spot mapping	14.3	1	0.0	0	57.1	4	0.0	0	7	20.0	1	0.0	0	0.0	0	0.0	0	60.0	3	20.0	1	5
Driving a survey route	0.0	0	14.3	1	57.1	4	28.6	2	7	0.0	0	0.0	0	0.0	0	0.0	0	40.0	2	60.0	3	5
Professional surveys	57.1	4	0.0	0	42.9	3	0.0	0	7	40.0	2	0.0	0	0.0	0	0.0	0	60.0	3	0.0	0	5
Volunteer surveys	0.0	0	14.3	1	71.4	5	14.3	1	7	0.0	0	0.0	0	0.0	0	0.0	0	60.0	3	40.0	2	5
Trapping by any technique	0.0	0	28.6	2	57.1	4	14.3	1	7	0.0	0	0.0	0	0.0	0	0.0	0	40.0	2	60.0	3	5
Representative sites	28.6	2	14.3	1	57.1	4	0.0	0	7	20.0	1	0.0	0	0.0	0	0.0	0	60.0	3	20.0	1	5

Probabilistic sites	4	3	0	0	5	4	0	0	7	4	2	0	0	0	0	0	0	6	0	2	0	5
	2.		0.		7.		0.			0		0						0.		0		
	9		0		1		0											0		0		

Other methodology listed by respondents for Q20:

Taxa	Species	Other Text	Is this technique used?	Frequency
<b>Amphibians</b>	Four-toed Salamander	8 year statewide survey completed, published in 2011	Yes	Not applicable
<b>Amphibians</b>	Green Salamander	Burlap bands	< once a year and not regularly scheduled	
<b>Birds</b>	Peregrine Falcon	monitoring of nest sites by DNR		
<b>Birds</b>	Sandhill Crane	What ever DNR does to count them	Yes	Once a year
<b>Mammals</b>	Hoary Bat	acoustic monitoring and carcass monitoring at wind-energy facilities	Yes	< once a year, but still regularly scheduled
<b>Mammals</b>	Little Brown Myotis	Acoustic monitoring and carcass surveys at wind projects		
<b>Mammals</b>	Northern Myotis (Northern Long-eared Myotis)	Acoustic surveys and carcass monitoring at wind-energy facilities	< once a year, but still regularly scheduled	
<b>Mammals</b>	Allegheny Woodrat	See work by Smyser et al	Yes	Year-round
<b>Mammals</b>	Swamp Rabbit	See work from Zollner lab	Yes	I don't know
<b>Mammals</b>	Eastern Red Bat	Surveys using acoustic detectors, as well as carcass monitoring at wind projects	Yes	< once a year, but still regularly scheduled
<b>Mollusks</b>	Wavyrayed Lampmussel	snorkle surveys (live and shells)	Yes	

21. Which of the following agencies/organizations **monitor SPECIES** in Indiana? (Check all that apply)

	Federal agencies (e.g., USDA Forest Service)		State agencies (e.g., Indiana Department of Natural Resources)		Local agencies (e.g., County Parks & Recreation Department)		Non-profit organizations		For-profit entities		Research entities (e.g., universities)		I don't know		Total Responses
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	29.4	5	82.4	14	0.0	0	5.9	1	0.0	0	70.6	12	0.0	0	17
<b>Birds</b>	53.1	17	84.4	27	3.1	1	28.1	9	3.1	1	18.8	6	0.0	0	32
<b>Fish</b>	4.5	1	90.9	20	4.5	1	0.0	0	0.0	0	36.4	8	0.0	0	22
<b>Mammals</b>	51.5	34	98.5	65	13.6	9	27.3	18	42.4	28	86.4	57	0.0	0	66
<b>Mollusks</b>	0.0	0	81.3	13	6.3	1	0.0	0	0.0	0	12.5	2	12.5	2	16
<b>Reptiles</b>	14.3	1	100.0	7	14.3	1	0.0	0	0.0	0	71.4	5	0.0	0	7
<b>Total</b>	36.3	58	91.3	146	8.1	13	17.5	28	18.1	29	56.3	90	1.3	2	160

Other agencies/organizations listed by respondents for Q21:

Taxa	Species	Other Text
<b>Amphibians</b>	Northern Cricket Frog	NAAMP, perhaps FROGWATCH
<b>Birds</b>	Black Rail	Goose Pond volunteer monitors
<b>Birds</b>	Sandhill Crane	The surveys indicated above occur weekly, Sept - Jan, each year.

22. To what extent are **SPECIES monitoring data** in Indiana accessible to your agency/organization? (Check only one)

	Extremely accessible		Moderately accessible		Somewhat accessible		Not accessible		I don't know		Total Responses
	%	N	%	N	%	N	%	N	%	N	
<b>Amphibians</b>	41.2	7	23.5	4	35.3	6	0.0	0	0.0	0	17
<b>Birds</b>	39.4	13	21.2	7	30.3	10	3.0	1	6.1	2	33
<b>Fish</b>	40.9	9	31.8	7	22.7	5	4.5	1	0.0	0	22
<b>Mammals</b>	25.8	17	50.0	33	10.6	7	6.1	4	7.6	5	66
<b>Mollusks</b>	75.0	12	6.3	1	6.3	1	0.0	0	12.5	2	16
<b>Reptiles</b>	28.6	2	28.6	2	14.3	1	14.3	1	14.3	1	7
<b>Total</b>	37.3	60	33.5	54	18.6	30	4.3	7	6.2	10	161

**Abundance**

23. Based on your current knowledge and professional opinion, provide an estimate for the **change in abundance** of SPECIES in Indiana since 2005. (Check only one)

	Decline by >75		Decline by 50-75		Decline by 25-50		Decline by 5-25		Remain relatively constant		Increase by 5-25		Increase by 25-50		Increase by 50-75		Increase by >75		I don't know		Total Responses	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N		
Amphibians	0.0	0	3.8	2	18.9	10	37.7	20	0.0	0	0.0	0	0.0	0	1.9	1	19.2	10	18		53	
Birds	1.4	2	0.0	0	.7	1	18.0	25	18.7	26	20.1	28	5.0	7	.7	1	2.9	4	19.7	45	45	139
Fish	1.7	1	0.0	0	5.0	3	21.7	13	43.3	26	3.3	2	3.3	2	0.0	0	3.3	2	8.3	11	11	60
Mammals	5.0	6	5.9	7	11.8	4	15.1	18	24.4	29	4.2	5	0.0	0	0.0	0	2.5	3	16.3	37	37	119
Mollusks	0.0	0	3.6	1	7.1	2	21.4	6	42.9	12	0.0	0	0.0	0	0.0	0	0.0	0	15.4	7	7	28
Reptiles	1.6	1	3.2	2	1.6	1	47.6	30	20.6	13	0.0	0	0.0	0	0.0	0	0.0	0	6.5	16	16	63
Total	2.2	10	2.6	12	5.0	23	22.1	102	27.3	126	7.6	35	1.9	9	.2	1	2.2	10	14.8	64	64	462

24. Based on your current knowledge and professional opinion, provide a prediction of **change in abundance** of SPECIES in Indiana over the next 10 years if current conditions and practices prevail. (Check only one)

	Will decline by >75		Will decline by 50-75		Will decline by 25-50		Will decline by 5-25		Will remain relatively constant		Will increase by 5-25		Will increase by 25-50		Will increase by 50-75		Will increase by >75		I don't know		Total Responses	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N		
Amphibians	1.9	1	0.0	0	9.4	5	20.8	11	45.3	24	1.9	1	0.0	0	0.0	0	0.0	0	20.8	11	11	53
Birds	0.7	1	0.0	0	2.1	3	17.9	25	23.6	33	21.4	30	2.1	3	0.7	1	0.7	1	30.7	43	43	140
Fish	1.7	1	0.0	0	6.7	4	20.0	12	45.0	27	6.7	4	0.0	0	0.0	0	0.0	0	20.0	12	12	60
Mammals	14.3	17	15.1	18	9.2	11	18.5	22	20.2	24	3.4	4	0.0	0	0.0	0	0.0	0	19.3	23	23	119
Mollusks	0.0	0	0.0	0	3.6	1	28.6	8	32.1	9	7.1	2	0.0	0	0.0	0	0.0	0	28.6	8	8	28
Reptiles	1.6	1	3.2	2	3.2	2	52.4	33	12.7	8	1.6	1	0.0	0	0.0	0	0.0	0	25.4	16	16	63
Total	4.5	21	4.3	20	5.6	26	24.0	111	27.0	125	9.1	42	0.6	3	0.2	1	0.2	1	24.4	113	113	463

**Section III: Threats to SGCN and their Habitats**

25. To what extent do you think the following general categories of threats apply to SPECIES and its habitats in Indiana over the next 10 years? (Check one for each line item)

26. Within each general category of threats you selected above, please indicate which of the following are specific threats to SPECIES in Indiana. The list of specific threats presented below was compiled through focus groups with wildlife conservation professionals. You may add additional threats that you think are important using the "Other, please specify" option. (Check one for each line item)

**Total**

	Significant threat (1)		Moderate threat (2)		Minor threat (3)		Not a threat (4)		Mean	Total Responses
	%	N	%	N	%	N	%	N		
Residential and commercial development	15.3	70	33.8	155	39.7	182	11.3	52	2.47	459

<b>Agriculture and aquaculture</b>	28.4	130	31.7	145	23.6	108	16.4	75	2.28	458
<b>Energy production and mining</b>	10.1	46	17.8	81	43.0	196	29.2	133	2.91	456
<b>Transportation and service corridors</b>	7.2	33	14.3	65	53.5	244	25.0	114	2.96	456
<b>Biological resource use</b>	6.6	30	9.8	45	41.7	191	41.9	192	3.19	458
<b>Human intrusion and disturbance</b>	15.4	70	26.2	119	41.0	186	17.4	79	2.60	454
<b>Natural systems modifications</b>	22.0	101	34.6	159	28.7	132	14.8	68	2.36	460
<b>Invasives and other problematic species and genes</b>	17.9	82	20.0	92	35.3	162	26.8	123	2.71	459
<b>Pollution</b>	8.8	40	24.4	111	41.4	188	25.3	115	2.83	454
<b>Climate change and severe weather</b>	9.6	44	28.5	130	36.2	165	25.7	117	2.78	456
<b>Other stressors</b>	9.4	27	12.5	36	24.3	70	53.8	155	3.23	288

	Significant Threat (1)		Moderate Threat (2)		Minor Threat (3)		Not a threat (4)		I don't know		Mean	Total Responses
	%	N	%	N	%	N	%	N	%	N		
<b>Residential and Commercial Development</b>												
<b>Housing and urban areas</b>	25.56	57	60.99	136	11.21	25	0.90	2	1.35	3	1.87	223
<b>Commercial and industrial areas</b>	20.72	46	52.70	117	21.62	48	1.80	4	3.15	7	2.05	222
<b>Tourism and recreation areas</b>	8.56	19	25.23	56	49.10	109	14.41	32	2.70	6	2.71	222
<b>Agriculture and Aquaculture</b>												
<b>Annual and perennial non-timber crops</b>	37.17	100	37.92	102	14.50	39	6.32	17	4.09	11	1.90	269
<b>Wood and pulp plantations</b>	5.30	14	14.39	38	29.55	78	43.18	114	7.58	20	3.20	264
<b>Livestock farming and ranching</b>	15.53	41	29.92	79	26.89	71	24.24	64	3.41	9	2.62	264
<b>Aquaculture</b>	2.28	6	6.46	17	14.07	37	58.94	155	18.25	48	3.59	263
<b>Conversion of habitat to annual crops</b>	42.05	111	37.12	98	10.61	28	7.20	19	3.03	8	1.82	264
<b>Energy Production and Mining</b>												
<b>Oil and gas drilling</b>	12.10	15	24.19	30	37.10	46	16.94	21	9.68	12	2.65	124
<b>Mining and quarrying</b>	21.43	27	33.33	42	26.19	33	15.87	20	3.17	4	2.38	126
<b>Renewable energy</b>	20.1	25	18.5	23	30.6	38	21.7	27	8.87	11	2.5	124

<b>production</b>	6		5		5		7				9	
<b>Fossil fuel energy production</b>	12.80	16	38.40	48	29.60	37	13.60	17	5.60	7	2.47	125
<b>Transportation and Service Corridors</b>												
<b>Roads and railroads</b>	40.21	39	35.05	34	19.59	19	4.12	4	1.03	1	1.88	97
<b>Utility and service lines</b>	8.42	8	27.37	26	34.74	33	25.26	24	4.21	4	2.80	95
<b>Flight paths</b>	2.11	2	1.05	1	11.58	11	82.11	78	3.16	3	3.79	95
<b>Shipping lanes</b>	6.38	6	4.26	4	9.57	9	75.53	71	4.26	4	3.61	94
<b>Biological Resource Use</b>												
<b>Overuse and harvesting species</b>	24.00	24	17.00	17	8.00	8	42.00	42	9.00	9	2.75	100
<b>Forestry practices</b>	2.06	2	22.68	22	34.02	33	37.11	36	4.12	4	3.11	97
<b>Accidental mortality or bycatch</b>	14.85	15	17.82	18	25.74	26	34.65	35	6.93	7	2.86	101
<b>Human Intrusion and Disturbance</b>												
<b>Recreation activities</b>	11.24	20	30.34	54	37.64	67	19.66	35	1.12	2	2.66	178
<b>Natural Systems Modification</b>												
<b>Dams and water management/use</b>	18.90	48	31.10	79	20.47	52	27.56	70	1.97	5	2.58	254
<b>Fire and fire suppression</b>	10.71	27	17.86	45	21.43	54	46.43	117	3.57	9	3.07	252
<b>Log jam removal</b>	1.58	4	10.67	27	28.06	71	54.94	139	4.74	12	3.43	253
<b>Over-mowing of natural areas</b>	11.11	28	19.05	48	30.56	77	36.51	92	2.78	7	2.95	252
<b>Natural habitat conversion</b>	42.58	109	45.70	117	5.86	15	5.08	13	0.78	2	1.73	256
<b>Invasive and other problematic species and genes</b>												
<b>Invasive/alien species</b>	46.11	77	34.13	57	12.57	21	6.59	11	0.60	1	1.80	167
<b>Problematic native species</b>	17.96	30	19.76	33	26.95	45	20.96	35	14.37	24	2.59	167
<b>Diseases from domestic populations and unknown sources</b>	21.43	36	11.31	19	15.48	26	25.60	43	26.19	44	2.61	168
<b>Introduced genetic material</b>	1.19	2	7.74	13	14.88	25	47.02	79	29.17	49	3.52	168
<b>Pollution</b>												
<b>Run-off from roads/service corridors</b>	7.43	11	46.62	69	31.08	46	7.43	11	7.43	11	2.42	148
<b>Chemical spills</b>	12.24	18	42.86	63	35.37	52	4.08	6	5.44	8	2.33	147
<b>Point source pollution</b>	11.64	17	55.48	81	26.71	39	2.05	3	4.11	6	2.20	146
<b>Air pollution</b>	2.03	3	14.86	22	32.43	48	37.84	56	12.84	19	3.22	148

<b>Household sewage</b>	12.7 5	19	38.2 6	57	32.2 1	48	7.38	11	9.40	14	2.3 8	149
<b>Agriculture, residential, and forestry effluents</b>	29.0 5	43	42.5 7	63	14.8 6	22	7.43	11	6.08	9	2.0 1	148
<b>Garbage and solid waste</b>	2.08	3	33.3 3	48	34.7 2	50	18.7 5	27	11.1 1	16	2.7 9	144
<b>Excess energy</b>	2.70	4	15.5 4	23	38.5 1	57	29.0 5	43	14.1 9	21	3.0 9	148
<b>Climate Change and Other Severe Weather</b>												
<b>Changing frequency, duration, and intensity of drought</b>	34.7 1	59	44.7 1	76	9.41	16	5.29	9	5.88	10	1.8 4	170
<b>Changing frequency and duration of floods</b>	18.8 2	32	48.8 2	83	18.2 4	31	9.41	16	4.71	8	2.1 9	170
<b>Shifting and alteration of habitats</b>	39.6 4	67	45.5 6	77	8.28	14	5.33	9	1.18	2	1.7 9	169
<b>Temperature extremes</b>	23.3 9	40	50.2 9	86	15.2 0	26	7.02	12	4.09	7	2.0 6	171
<b>Shifting seasons/phenology</b>	19.6 4	33	38.6 9	65	28.5 7	48	8.93	15	4.17	7	2.2 8	168
<b>Other stressors</b>												
<b>Low genetic diversity</b>	38.9 8	23	22.0 3	13	8.47	5	10.1 7	6	20.3 4	12	1.8 7	59
<b>Diseases</b>	59.0 9	26	22.7 3	10	2.27	1	4.55	2	11.3 6	5	1.4 6	44

Other responses listed underneath appropriate taxa.

### **Amphibians**

	Significant threat (1)		Moderate threat (2)		Minor threat (3)		Not a threat (4)		Mean	Total Responses
	%	N	%	N	%	N	%	N		
<b>Residential and commercial development</b>	13.5	7	51.9	27	26.9	14	7.7	4	2.29	52
<b>Agriculture and aquaculture</b>	30.8	16	42.3	20	15.4	8	11.5	6	2.08	52
<b>Energy production and mining</b>	11.5	6	26.9	14	32.7	17	28.8	15	2.79	52
<b>Transportation and service corridors</b>	5.8	3	21.2	11	63.5	33	9.6	5	2.77	52
<b>Biological resource use</b>	5.8	3	7.7	4	57.7	30	28.8	30	3.10	52
<b>Human intrusion and disturbance</b>	15.4	8	36.5	19	32.7	17	15.4	8	2.48	52
<b>Natural systems modifications</b>	38.5	20	38.5	20	15.4	8	7.7	4	1.92	52
<b>Invasives and other problematic species and genes</b>	9.6	5	25.0	13	51.9	27	13.5	7	2.69	52
<b>Pollution</b>	13.5	7	36.5	19	44.2	23	5.8	3	2.42	52
<b>Climate change and</b>	15.4	8	34.6	18	40.4	21	9.6	5	2.44	52

severe weather											
Other stressors	10.3	4	28.2	11	25.6	10	35.9	14	2.87		39

	Significant Threat (1)		Moderate Threat (2)		Minor Threat (3)		Not a threat (4)		I don't know		Mean	Total Responses
	%	N	%	N	%	N	%	N	%	N		
<b>Residential and Commercial Development</b>												
Housing and urban areas	14.71	5	76.47	26	8.82	3	0.00	0	0.00	0	1.94	34
Commercial and industrial areas	20.59	7	64.71	22	14.71	5	0.00	0	0.00	0	1.94	34
Tourism and recreation areas	8.82	3	26.47	9	47.06	16	17.65	6	0.00	0	2.74	34
<b>Agriculture and Aquaculture</b>												
Annual and perennial nontimber crops	35.14	13	51.35	19	10.81	4	0.00	0	2.70	1	1.75	37
Wood and pulp plantations	13.89	5	19.44	7	36.11	13	25.00	9	5.56	2	2.76	36
Livestock farming and ranching	10.81	4	35.14	13	32.43	12	18.92	7	2.70	1	2.61	37
Aquaculture	13.89	5	25.00	9	11.11	4	19.44	7	30.56	11	2.52	36
Conversion of habitat to annual crops	59.46	22	24.32	9	5.41	2	10.81	4	0.00	0	1.68	37
<b>Energy Production and Mining</b>												
Oil and gas drilling	15.79	3	47.37	9	31.58	6	5.26	1	0.00	0	2.26	19
Mining and quarrying	30.00	6	45.00	9	15.00	3	10.00	2	0.00	0	2.05	20
Renewable energy production	5.26	1	21.05	4	57.89	11	10.53	2	5.26	1	2.78	19
Fossil fuel energy production	15.00	3	35.00	7	45.00	9	5.00	1	0.00	0	2.40	20
<b>Transportation and Service Corridors</b>												
Roads and railroads	28.57	4	42.86	6	28.57	4	0.00	0	0.00	0	2.00	14
Utility and service lines	7.14	1	21.43	3	64.29	9	7.14	1	0.00	0	2.71	14
Flight paths	0.00	0	0.00	0	28.57	4	71.43	10	0.00	0	3.71	14
Shipping lanes	15.38	2	7.69	1	23.08	3	53.85	7	0.00	0	3.15	13
<b>Biological Resource Use</b>												
Overuse and harvesting species	14.29	1	0.00	0	42.86	3	42.86	3	0.00	0	3.14	7
Forestry practices	0.00	0	14.29	1	71.43	5	14.29	1	0.00	0	3.00	7
Accidental mortality	57.1	4	14.2	1	14.29	1	14.2	1	0.00	0	1.8	7

or bycatch	4		9				9				6	
<b>Human Intrusion and Disturbance</b>												
Recreation activities	11.1 1	3	22.2 2	6	59.26	16	7.41	2	0.00	0	2.6 3	27
<b>Natural Systems Modification</b>												
Dams and water management/use	23.0 8	9	30.7 7	12	30.7 7	12	15.3 8	6	0.00	0	2.3 8	39
Fire and fire suppression	7.69	3	35.9 0	14	38.4 6	15	15.3 8	6	2.56	1	2.6 3	39
Log jam removal	5.13	2	12.8 2	5	25.6 4	10	53.8 5	21	2.56	1	3.3 2	39
Over-mowing of natural areas	12.8 2	5	23.0 8	9	35.9 0	14	28.2 1	11	0.00	0	2.7 9	39
Natural habitat conversion	67.5 0	27	27.5 0	11	2.50	1	2.50	1	0.00	0	1.4 0	40
<b>Invasive and other problematic species and genes</b>												
Invasive/alien species	17.6 5	3	58.8 2	10	5.88	1	17.6 5	3	0.00	0	2.2 4	17
Problematic native species	16.6 7	3	27.7 8	5	22.22	4	27.7 8	5	5.56	1	2.6 5	18
Diseases from domestic populations and unknown sources	27.7 8	5	33.3 3	6	27.78	5	5.56	1	5.56	1	2.1 2	18
Introduced genetic material	5.56	1	16.6 7	3	27.78	5	33.3 3	6	16.6 7	3	3.0 7	18
<b>Pollution</b>												
Run-off from roads/service corridors	11.5 4	3	53.8 5	14	30.77	8	3.85	1	0.00	0	2.2 7	26
Chemical spills	26.9 2	7	26.9 2	7	34.62	9	7.69	2	3.85	1	2.2 4	26
Point source pollution	30.7 7	8	30.7 7	8	34.62	9	0.00	0	3.85	1	2.0 4	26
Air pollution	7.69	2	19.2 3	5	53.85	14	15.3 8	4	3.85	1	2.8 0	26
Household sewage	15.3 8	4	30.7 7	8	42.31	11	7.69	2	3.85	1	2.4 4	26
Agriculture, residential, and forestry effluents	38.4 6	10	46.1 5	12	11.54	3	3.85	1	0.00	0	1.8 1	26
Garbage and solid waste	4.00	1	32.0 0	8	52.00	13	8.00	2	4.00	1	2.6 7	25
Excess energy	0.00	0	19.2 3	5	50.00	13	23.0 8	6	7.69	2	3.0 4	26
<b>Climate Change and Other Severe Weather</b>												
Changing frequency, duration, and intensity of drought	53.8 5	14	38.4 6	10	7.69	2	0.00	0	0.00	0	1.5 4	26
Changing frequency and duration of floods	7.69	2	50.0 0	13	34.62	9	7.69	2	0.00	0	2.4 2	26
Shifting and alteration of habitats	46.1 5	12	38.4 6	10	11.54	3	3.85	1	0.00	0	1.7 3	26
Temperature extremes	28.0 0	7	52.0 0	13	20.00	5	0.00	0	0.00	0	1.9 2	25
Shifting	20.0	5	44.0	11	36.00	9	0.00	0	0.00	0	2.1	25

seasons/phenology	0		0								6	
<b>Other stressors</b>												
Low genetic diversity	28.5 7	4	42.8 6	6	14.29	2	0.00	0	14.2 9	2	1.8 3	14
Diseases	55.5 6	5	44.4 4	4	0.00	0	0.00	0	0.00	0	1.4 4	9



## Appendix Q. Full Habitat Survey Results

### Section I: Agency Information and Evaluation of Conservation Actions

Questions 1 – 3 excluded from this report

Directions:

The purpose of this survey is to gather information to update Indiana’s State Wildlife Action Plan (SWAP). You will be asked to (1) provide information on the evaluation of conservation actions, and (2) identify threats to and relevant conservation actions for fish and wildlife habitats in each of the six SWAP planning regions of Indiana. Your responses will remain confidential. No personal information or individual responses will be discussed or disclosed in the final SWAP documentation. Please provide your honest assessment and opinions.

4. Within your agency/organization, at which of the following spatial scale are you responsible for implementing/overseeing conservation actions for fish and wildlife habitats? (Check all that apply)

Scale	Local		Regional		Statewide		Multi-State		National		Total Responses
		N		N		N		N		N	
	57.9	191	38.2	126	30.9	102	6.7	22	12.1	40	330

5. How do you plan conservation actions that you are responsible for implementing/overseeing? (Check only one for each spatial scale)

	I do not have a written plan to guide conservation actions; all conservation actions are taken ad hoc.		I have a written annual plan to guide conservation actions.		I have a written 2- to 5-year plan to guide conservation actions.		I have a written 10-year plan to guide conservation actions.		Other, please specify:		Total Responses
		N		N		N		N		N	
<b>Local</b>	31.5	52	12.1	20	33.9	56	6.1	10	16.4	27	165
<b>Regional</b>	24.3	27	17.1	19	33.3	37	9.9	11	15.3	17	111
<b>Statewide</b>	27.8	25	13.3	12	26.7	24	5.6	5	26.7	24	90
<b>Multi-state</b>	25.0	9	16.7	6	19.4	7	11.1	4	27.8	10	36
<b>National</b>	26.3	5	15.8	3	5.3	1	21.1	4	31.6	6	19

6. How do you evaluate the effectiveness of conservation actions that you are responsible for implementing/overseeing? (Check only one for each spatial scale)

	Evaluation is done on an action-by-action basis.		Evaluation is done for all conservation actions as a whole.		Evaluation is not conducted.		Other, please specify:		Total Responses
		N		N		N		N	
<b>Local</b>	65.9	108	15.9	26	11.0	18	7.3	12	164
<b>Regional</b>	62.7	69	20.9	23	7.3	8	9.1	10	110
<b>Statewide</b>	55.1	49	20.2	18	9.0	8	15.7	14	89
<b>Multi-state</b>	55.6	20	22.2	8	8.3	3	13.9	5	36
<b>National</b>	47.4	9	31.6	6	15.8	3	5.3	1	19

7. How frequently do you evaluate the effectiveness of conservation actions that you are responsible for implementing/overseeing? (Check only one for each spatial scale)

	Evaluation is done on an annual basis.		Evaluation is done about every 2-5 years.		Evaluation is done about every 10 years.		Evaluation is not conducted.		Evaluation frequency varies depending on specific conditions or circumstances. Please specify:		Total Responses
		N		N		N		N		N	
<b>Local</b>	51.8	85	15.9	26	1.2	2	14.0	23	17.1	28	164
<b>Regional</b>	39.3	44	26.8	30	2.7	3	10.7	12	20.5	23	112
<b>Statewide</b>	40.4	36	14.6	13	3.4	3	12.4	11	29.2	26	89
<b>Multi-state</b>	19.4	7	22.2	8	2.8	1	16.7	6	38.9	14	36
<b>National</b>	21.1	4	21.1	4	0.0	0	26.3	5	31.6	6	19

8. Please indicate the extent to which you agree or disagree with the following statements. (Check one for each line item)

	Strongly agree		Moderately agree		Slightly agree		Disagree		I don't know		Total Responses
		N		N		N		N		N	
<b>My agency/organization has a clear policy that the effectiveness of its conservation actions should be measured.</b>	23.9	68	34.0	97	20.7	59	15.8	45	5.6	16	285
<b>My agency/organization has a clear process for measuring the effectiveness of its conservation actions.</b>	10.3	29	35.9	101	27.8	78	20.3	57	5.7	16	281
<b>My agency/organization has a set of metrics that can be used to measure the</b>	12.3	35	27.8	79	24.6	70	26.1	74	9.2	26	284

<b>effectiveness of its conservation actions.</b>											
<b>My agency/organization is willing to take advantage of unexpected and/or emerging opportunities to further our conservation agenda.</b>	40.1	114	35.2	100	14.8	42	3.2	9	6.7	19	284

## Section II: Habitats for Fish and Wildlife in Indiana

### Directions:

When selecting SWAP planning regions, keep in mind that you will be asked to respond to 12 questions for each planning region you select. Specifically, you will be asked to describe the status of various habitat types as they relate to fish and wildlife in Indiana, identify threats to these habitat types, and assess and prioritize a range of conservation actions for these habitat types. Please only select planning regions where you feel you are knowledgeable to provide such information.

9. For which of the following SWAP planning regions do you consider yourself knowledgeable to provide information on the status of, threats to, and relevant conservation actions for fish and wildlife habitats? (Check all that apply)

		<b>N</b>
<b>Great Lakes (Region 1)</b>	30.1	87
<b>Kankakee (Region 2)</b>	21.8	63
<b>Corn Belt (Region 3)</b>	43.9	127
<b>Valleys and Hills (Region 4)</b>	21.1	61
<b>Interior Plateau (Region 5)</b>	27.7	80
<b>Drift Plains (Region 6)</b>	18.7	54
<b>None of these</b>	7.3	21

### Definition of habitat types used in this section:

- **Aquatic systems:** All water habitats, both flowing and stationary, excluding wetlands.
- **Agricultural lands:** Lands devoted to commodity production, including intensively managed nonnative grasses, row crops, fruit and nut-bearing trees.
- **Barren lands:** Lands dominated by exposed rock or minerals with sparse vegetation, including glades.
- **Developed lands:** Highly impacted lands, intensively modified to support human habitation, transportation, commerce, and recreation.
- **Forests:** A plant community extending over a large area and dominated by trees, the crowns of which form an unbroken covering layer or canopy.
- **Grasslands:** Open area dominated by grass species, for example, prairies or reclaimed minelands.
- **Subterranean systems:** Surface openings of subterranean features reaching as far as natural light can penetrate (i.e., twilight zone) and connected underground rooms and passages beyond natural light penetration, including karsts.
- **Wetlands:** Area temporarily or permanently flooded, supporting woody and/or herbaceous vegetation.

10. Within REGION, for which of the following habitat types are you able to provide information on threats to fish and wildlife habitats? (Check all that apply)

	Great Lakes (Region 1)		Kankakee (Region 2)		Corn Belt (Region 3)		Valleys and Hills (Region 4)		Interior Plateau (Region 5)		Drift Plains (Region 6)	
		N		N		N		N		N		N
<b>Aquatic systems</b>	65.1	56	50.0	31	54.4	68	42.4	25	41.3	33	34.6	18
<b>Agricultural lands</b>	27.9	8	54.8	5	48.0	14	40.7	24	36.3	16	42.3	8
<b>Barren lands</b>	9.3	8	8.1	5	11.2	14	13.6	8	20.0	16	15.4	8
<b>Developed Lands</b>	20.9	18	32.3	20	24.8	31	15.3	9	16.3	13	11.5	6
<b>Forests</b>	44.2	38	51.6	32	58.4	73	62.7	37	78.8	63	75.0	39
<b>Grasslands</b>	33.7	29	62.9	39	36.8	46	40.7	24	26.3	21	40.4	21
<b>Subterranean systems</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18.8	15	9.6	5
<b>Wetlands</b>	57.0	49	69.4	43	44.0	55	57.6	34	37.5	30	48.1	25

**Section III: Threats to Fish and Wildlife Habitats**

11. How would you describe the **overall quality** of fish and wildlife habitats within **HABITAT** in the REGION? (Check only one)

<i>All Regions</i>	<b>Very poor</b>		<b>Poor</b>		<b>Satisfactory</b>		<b>Good</b>		<b>Very good</b>		<b>I don't know</b>		<b>Total Responses</b>
		N		N		N		N		N		N	
<b>Total</b>	7.7	61	36.1	288	34.8	277	16.6	132	3.8	30	1.1	9	797

12. How would you describe the total amount and overall quality of fish and wildlife habitats within **HABITAT** in the REGION since 2005? (Check one for each line item)

**Amount of fish and wildlife habitats within HABITAT since 2005**

<i>All Regions</i>	<b>Increase</b>		<b>About the same</b>		<b>Decrease</b>		<b>I don't know</b>		<b>Total Responses</b>
		N		N		N		N	
<b>Total</b>	14.5	116	41.3	331	40.2	322	4.0	32	801

**Quality of fish and wildlife habitats within HABITAT since 2005**

<i>All Regions</i>	<b>Increase</b>		<b>About the same</b>		<b>Decrease</b>		<b>I don't know</b>		<b>Total Responses</b>
		N		N		N		N	
<b>Total</b>	13.3	106	43.7	348	38.5	307	4.5	36	797

13. How would you predict about the total amount and overall quality of fish and wildlife habitats within **HABITAT** in the REGION over the next 10 years? (Check one for each line item)

**Amount of fish and wildlife habitats within HABITAT over the next 10 years**

<i>All Regions</i>	<b>Increase</b>		<b>About the same</b>		<b>Decrease</b>		<b>I don't know</b>		<b>Total Responses</b>
		N		N		N		N	

		N		N		N		N	
Total	14.4	115	35.6	285	47.2	378	2.9	23	801

**Quality of fish and wildlife habitats within HABITAT over the next 10 years**

All Regions	Increase		About the same		Decrease		I don't know		Total Responses
		N		N		N		N	
Total	13.4	107	35.1	281	47.9	383	3.6	29	800

14. **Currently**, to what extent do you think the following general categories of threats apply to fish and wildlife habitats within **HABITAT** in the REGION? (Check one for each line item)

Entire State		Significant Threat		Moderate Threat		Minor Threat		Not a threat		I Don't Know		Mean	Total Responses
		%	N	%	N	%	N	%	N	%	N		
		Residential and commercial development	43.0	334	38.8	301	15.0	114	2.7	21	0.8		
Agriculture and aquaculture	49.5	384	31.7	246	35.7	277	3.4	26	2.3	18	1.69	775	
Energy production and mining	11.9	92	24.3	187	35.9	310	19.2	148	8.7	67	2.68	771	
Transportation and service corridors	16.3	126	32.5	251	40.1	331	7.2	56	3.9	30	2.40	773	
Biological resource use	8.4	65	19.6	151	43	195	22.6	174	6.4	49	2.85	770	
Human intrusion and disturbance	29.6	228	36.1	278	25.3	171	5.1	39	3.9	30	2.06	770	
Natural systems modifications	32.4	250	36.7	283	22.2	110	5.2	40	3.6	28	1.66	772	
Invasives and other problematic species and genes	51.9	403	30.3	235	14.2	205	1.9	15	1.7	13	2.00	776	
Pollution	27.3	210	38.2	294	26.6	202	3.8	29	4.2	32	2.07	770	
Climate change and severe weather	20.8	161	29.1	225	26.1	226	15.4	119	8.7	67	2.39	774	
Other stressors	13.1	94	27.2	195	31.5	226	7.0	50	21.2	152	2.41	717	

15. You indicated a number of general categories as significant or moderate threats to fish and wildlife habitats within **HABITAT** in the REGION. Please indicate which of the following are specific threats to fish and wildlife habitats within HABITAT in the REGION and their trends over the next 10 years. You may add additional threats you think are important using the "Other, please specify" option.

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total	
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase	Remain the Same	Decrease	I Don't know								
	%	N	%	N	%	N	%	N	%	N							%	N	%	N				
<b>Residential and Commercial Development</b>																								

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase	Remain the Same		Decrease		I Don't know					
	%	N	%	N	%	N	%	N	%	N				%	N	%	N	%	N				
Housing and urban areas	46.0	284	43.2	267	9.7	60	0.6	4	0.5	3	1.82	618	74.7	416	22.3	124	0.4	2	2.7	15	557		
Commercial and industrial areas	36.0	217	45.6	275	15.9	96	1.2	7	1.3	8	1.65	603	62.6	340	31.1	169	1.1	6	5.2	28	543		
Tourism and recreation areas (e.g., sites with a substantial footprint – golf courses, campgrounds, etc.)	46.0	284	43.2	267	9.7	60	0.6	4	0.5	3	1.82	618	74.7	416	22.3	124	0.4	2	2.7	15	557		
<b>Agriculture and Aquaculture</b>																							
Annual and perennial nontimber crops	44.9	276	30.4	187	16.4	101	5.5	34	2.8	17	1.82	615	52.6	299	39.1	222	1.6	9	6.7	38	568		
Wood and pulp plantations	3.6	22	13.1	80	34.8	212	32.7	199	15.8	96	3.29	609	10.9	61	62.5	350	2.7	15	23.9	134	560		
Livestock farming and ranching	19.3	119	40.3	248	28.5	175	7	43	4.9	30	1.60	615	34	193	51.3	291	4.4	25	10.2	58	567		
Aquaculture	2.4	14	8.8	52	25.1	148	33.9	200	29.8	176	2.24	590	9.4	50	51.7	275	0.8	4	38.2	203	532		
Conversion of habitat to annual crops	54.7	335	29.7	182	10.9	67	2.3	14	2.3	14	3.15	612	69.1	392	24.5	139	1.8	10	4.6	26	567		
<b>Energy Production and Mining</b>																							

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase		Remain the Same		Decrease		I Don't know				
	%	N	%	N	%	N	%	N	%	N			%	N	%	N	%	N	%	N			
Oil and gas drilling	21.6	59	30.4	83	29.7	81	10.3	28	8.1	22	2.07	273	53.1	135	35.4	90	0	0	11.4	29	2.07	254	
Mining and quarrying	23.9	64	36.6	98	25	67	8.6	23	6	16	2.19	268	46.4	117	41.7	105	2	5	9.9	25	2.19	252	
Renewable energy production	9.7	26	34.9	94	30.9	83	15.6	42	8.9	24	2.31	269	49.8	122	34.7	85	1.2	3	14.3	35	2.31	245	
Fossil fuel energy production	29.4	80	34.9	95	20.2	55	7.7	21	7.7	21	2.58	272	44.3	112	41.5	105	2.8	7	11.5	29	2.58	253	
Shale gas development (e.g., fracking)	30.1	82	24.3	66	19.1	52	9.9	27	16.5	45	2.11	272	53.8	136	25.3	64	0	0	20.9	53	2.11	253	
<b>Transportation and Service Corridors</b>																							
Roads and railroads	35.9	133	46.8	173	14.9	55	1.4	5	1.1	4	3.17	370	65.4	225	31.7	109	0.3	1	2.6	9	3.17	344	
Utility and service lines	8.9	33	50.4	186	32.5	120	6.2	23	1.9	7	1.81	369	44.2	152	51.7	178	0.3	1	3.8	13	1.81	344	
Flight paths	3.8	14	13.2	49	33.8	125	35.7	132	13.5	50	3.29	370	16.4	55	63	211	0.3	1	20.3	68	3.29	335	
Shipping lanes	6.6	24	11.9	43	15.7	57	49.4	179	16.3	59	2.37	362	13.4	44	58.7	193	1.2	4	26.7	88	2.37	329	

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase		Remain the Same		Decrease		I Don't know				
	%	N	%	N	%	N	%	N	%	N			%	N	%	N	%	N	%	N			
<b>Biological Resource Use</b>																							
Forestry practices (e.g., silvicultural methods leading to the lack of early successional habitat)	26.8	56	37.8	79	17.7	37	11	23	6.7	14	2.14	209	45.1	87	43.5	84	0	0	11.4	22	193		
<b>Human Intrusion and Disturbance</b>																							
Recreation activities (e.g., ATVs, trail use, horseback riding, high-speed boating, canoeing)	17.8	88	47.5	234	29.6	146	4.1	20	1	5	2.20	493	59.4	176	37.4	176	0.2	1	3	14	471		
<b>Natural Systems Modification</b>																							
Dams and water management and use	18.9	98	36	187	27.6	143	10.8	56	6.7	35	2.32	519	38.6	184	49.9	238	0.6	3	10.9	52	477		
Fire and fire suppression	13.1	67	25	128	27.3	140	27.3	140	7.4	38	2.74	513	19.1	91	68.3	326	1	5	11.5	55	477		
Log jam removal	10.8	56	23.8	123	28.6	148	24.8	128	12	62	2.76	517	22.9	108	58.6	276	1.5	7	17	80	471		
Over-mowing of natural areas	17.9	91	33.9	172	28.4	144	11.8	60	7.9	40	2.37	507	30	143	54.5	260	1.5	7	17	80	471		
Conversion of natural habitats to other land uses	64.7	334	28.3	146	6	31	0.6	3	0.4	2	1.42	516	75	363	23.1	112	0.6	3	1.2	6	484		
<b>Invasives and Other Problematic Species</b>																							

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase		Remain the Same		Decrease		I Don't know				
	%	N	%	N	%	N	%	N	%	N			%	N	%	N	%	N	%	N			
Invasive and alien species	69.5	422	27.8	169	1.6	10	0	0	1	6	1.31	607	88.7	504	9	51	0.9	5	1.4	8	568		
Problematic native species (e.g. overabundant native deer or algae)	27.8	171	38.8	239	23.7	146	7.6	47	2.1	13	2.11	616	49.7	286	43.4	250	1.2	7	5.7	33	576		
Plant diseases	17.6	109	31.4	194	22.8	141	8.4	52	19.7	122	2.27	618	42.7	247	31.1	180	0.2	1	26.1	151	579		
Introduced genetic material (such as crop, seed stock, biocontrol, stocked/released species, etc.)	16.4	101	26.8	165	26.5	163	8.3	51	22	135	2.34	615	42	242	33.3	192	0.3	2	24.3	140	576		
<b>Pollution</b>																							
Runoff from roads and service corridors	32.5	160	47.2	232	18.1	89	1	5	1.2	6	1.73	492	59.3	275	37.1	172	0.2	1	3.4	16	464		
Chemical spills	20.2	98	40	194	34.6	168	1.4	7	3.7	18	2.15	485	34.2	156	57.9	264	0.4	2	7.5	34	456		
Point source pollution from commercial/industrial sources	30.2	147	46.4	226	21.1	103	0.6	3	1.6	8	2.18	487	41.7	193	50.3	233	4.1	19	3.9	18	463		
Air pollution (e.g., smoke, mercury emissions)	24.2	118	34.8	170	30.9	151	3.7	18	6.4	31	2.38	488	35.9	166	47.2	218	8	37	8.9	41	462		

	To what extent is this issue a current threat to fish and wildlife habitats within HABITAT in the REGION?										Mean	Total	How will the significance of this threat change over the next 10 years?										Total
	Significant Threat		Moderate Threat		Minor Threat		Not a Threat		I Don't know				Increase		Remain the Same		Decrease		I Don't know				
	%	N	%	N	%	N	%	N	%	N			%	N	%	N	%	N	%	N			
Household sewage and urban water waste	28.2	138	40.7	199	25.4	124	2.7	13	3.1	15	2.31	489	46.4	214	40.8	188	6.9	32	5.9	27	461		
Agriculture, residential, and forestry effluents	41.9	205	42.1	206	13.3	65	1.2	6	1.4	7	2.03	489	56.2	260	35.9	166	3.7	17	4.3	20	463		
Garbage and solid waste	17.9	87	35.5	172	36.5	177	5.8	28	4.3	21	1.92	485	43.6	200	47.7	219	2	9	6.8	31	459		
Excess energy (e.g., noise/light pollution, warm water discharge, etc.)	17.5	84	33.1	159	33.3	160	10	48	6	29	1.87	480	42.4	190	46.9	210	1.1	5	9.6	43	448		
<b>Climate Change and Other Severe Weather</b>																							
Changing frequency, duration, and intensity of drought	47.6	180	41.3	156	9	34	0.8	3	1.3	5	1.62	378	82.2	291	11	39	0	0	6.8	24	354		
Changing frequency, duration, and intensity of floods	47.2	178	40.8	154	8.2	31	1.6	6	2.1	8	1.63	377	80.9	284	12.5	44	0	0	6.6	23	351		
Shifting and alteration of habitats due to climate change	38.1	144	47.1	178	12.2	46	1.3	5	1.3	5	1.76	378	78.5	277	14.4	51	0	0	7.1	25	353		
Temperature extremes	34.8	130	46	172	17.1	64	1.3	5	0.8	3	1.82	374	79	278	15.1	53	0	0	6	21	352		
Shifting seasons/phenology	35.1	131	45.3	169	13.9	52	1.9	7	3.8	14	1.85	373	75.5	265	15.7	55	0	0	8.8	31	351		





Acquire currently unprotected aquatic systems (manage and/or educate for easement habitat values)	60.6	94	31.6	49	6.5	10	0.6	1	0.6	1	1.47	155
Acquire currently unprotected barren lands	68.2	15	13.6	3	13.6	3	4.5	1	0	0	1.55	22
Acquire currently unprotected forests	59.8	76	24.4	31	13.4	17	2.4	3	0	0	1.58	127
Acquire currently unprotected grasslands	74.4	61	19.5	16	4.9	4	1.2	1	0	0	1.33	82
Acquire currently unprotected wetlands	85.3	87	11.8	12	1	1	1	1	1	1	1.17	102
Acquire currently unprotected subterranean habitats	81.8	9	9.1	1	9.1	1	0	0	0	0	1.27	11
Preserve currently existing corridors	73.4	458	19.6	122	6.1	38	0.5	3	0.5	3	1.33	624
Acquire conservation easements to protect important wildlife habitats	62.9	394	27.8	174	7.7	48	1.6	10	0	0	1.48	626
Reduce conversion to cropland	66.1	413	20.6	129	9.4	59	2.6	16	1.3	8	1.48	625
Build/strengthen CRP partnerships	51.9	325	30.5	191	9.3	58	4.2	26	4.2	26	1.64	626
<b>Land/Water/Species Management</b>												

Control invasive species in agricultural lands	44.8	47	34.3	36	18.1	19	2.9	3	0	0	1.79	105
Control invasive species in aquatic systems (e.g., Asian carp, zebra mussels, invasive aquatic plants)	63.7	100	23.6	37	10.8	17	1.9	3	0	0	1.51	157
Control invasive species in barren lands	75	15	5	1	20	4	0	0	0	0	1.45	20
Control invasive species in developed lands	60	21	31.4	11	8.6	3	0	0	0	0	1.49	35
Control invasive species in forests	75.4	107	17.6	25	6.3	9	0.7	1	0	0	1.32	142
Control invasive species in grasslands	65.1	56	16.3	14	15.1	13	3.5	3	0	0	1.57	86
Control invasive species in wetlands	69.3	70	20.8	21	3.5	3	0	0	0	0	1.41	101
Control invasive species in subterranean systems	87.5	7	18.1	0	18.1	19	12.5	1	0	0	1.38	8
Control problematic species (e.g., deer, raccoon, geese, domestic cat, feral hog) in agricultural lands	33	35	9.9	39	100	101	2.8	3	0	0	2.00	106
Control problematic native species in aquatic systems	33.1	52	26.8	42	34.4	54	5.1	8	0	1	2.12	157
Control problematic species (e.g., deer, raccoon, skunk, coyote, domestic cat, feral hog) in barren lands	35	7	35	7	30	6	0	0	0	0	1.91	20

Control problematic species (e.g., deer, raccoon, geese, domestic cat, feral hog, exotic/aggressive vegetation) in developed lands	40	14	34.3	12	20	7	5.7	2	0	0	1.95	35
Control problematic species (e.g., deer, raccoon, domestic cat, feral hog) in forests	40.8	58	33.1	47	23.2	33	2.1	3	0.7	1	1.87	142
Control problematic species (e.g., raccoon, skunk, coyote, domestic cat) in grasslands	17.4	15	23.3	20	39.5	34	17.4	15	2.3	2	2.58	86
Control problematic species (e.g., deer, raccoon, domestic cat, feral hog, exotic/aggressive vegetation) in wetlands	24.2	24	35.4	35	29.3	29	8.1	8	3	3	2.22	99
Control problematic native species in subterranean systems	37.5	3	25	2	2.9	3	25	2	12.5	1	2.14	8
Dam removal	16.1	41	28	71	32.7	83	18.1	46	5.1	13	2.56	254
Decrease E. coli counts	30	74	27.5	68	32.4	80	6.5	16	3.6	9	2.16	247
Decrease number of combined sewer overflow events	44.2	114	35.3	91	15.9	41	3.1	8	1.6	4	1.78	258
Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no till)	59.5	390	27.2	178	9.6	63	3.4	22	0.3	2	1.57	655
Ex situ conservation (protection of a species outside of its natural habitat). Please specify:	7.1	43	13.4	81	20.2	122	27.2	164	32.1	194	2.99	604
Improve drainage management	42.3	271	29	186	18.9	121	6.2	40	3.6	23	1.89	641

Improve integrated pest management	32.4	34	38.1	40	25.7	27	1.9	2	1.9	2	1.97	105
Increase acres of riparian buffers	55.6	300	33.1	179	9.6	52	1.1	6	0.6	3	1.56	540
Increase acres enrolled in the Classified Forest and Wildlands Program	35.2	230	36	235	20.1	131	5.8	38	2.9	19	1.96	653
Link existing habitat blocks through corridor enhancement in agricultural lands	65.7	69	28.6	30	3.8	4	1	1	1	1	1.39	105
Link existing habitat blocks through corridor enhancement in aquatic systems	48.7	76	34.6	54	11.5	18	0.6	1	4.5	7	1.62	156
Link existing habitat blocks through corridor enhancement in barren lands	60	12	25	5	10	2	0	0	5	1	1.47	20
Link existing habitat blocks through corridor enhancement in developed lands	62.9	22	25.7	9	11.4	4	0	0	0	0	1.49	35
Link existing habitat blocks through corridor enhancement in forests	55.6	79	30.3	43	13.4	19	0.7	1	0	0	1.59	142
Link existing habitat blocks through corridor enhancement in grasslands	56.8	50	28.4	25	11.4	10	3.4	3	0	0	1.61	88
Link existing habitat blocks through corridor enhancement in wetlands	55	55	32	32	12	12	1	1	0	0	1.59	100
Enhance corridors in subterranean systems	0	0	25	2	0	0	50	4	25	2	3.33	8

Manage biofuel grasslands	12.5	24	26.6	51	36.5	70	11.5	22	13	25	2.54	192
Manage urban woodlots	51.4	18	40	14	2.9	1	5.7	2	0	0	2.64	35
Mine reclamation	21.2	112	17	90	18	95	28.7	152	15.1	80	1.63	529
Promote diversity of forest types and successional stages	59.3	83	24.3	34	12.9	18	3.6	5	0	0	1.61	140
Promote diversity of grassland types and successional stages	59.8	52	29.9	26	8	7	2.3	2	0	0	1.48	87
Promote diversity of wetland types and successional stages	59.4	60	29.7	30	8.9	9	0	0	2	2	1.53	101
Protect and enhance undeveloped shorelines	49.4	124	28.7	72	15.1	38	4.4	11	2.4	6	1.74	251
Protect natural water regimes (e.g., withdraws, warm-water discharge)	47.8	87	36.3	66	13.2	24	2.2	4	0.5	1	1.70	182
Protect adjacent buffer zones	59.1	143	32.2	78	8.3	20	0.4	1	0	0	1.50	242
Reduce losses of fish and wildlife habitats (due to agriculture, urban sprawl, commercial development, etc.)	76.3	498	17.2	112	5.5	36	0.6	4	0.5	3	1.30	653
Reduce nutrient and toxin loads (e.g., heavy metals, pharmaceuticals, fertilizers, insecticides)	53.8	351	27.8	181	15	98	2.5	16	0.9	6	1.66	652

Reduce recreational overuse of aquatic systems	18.7	29	12.5	48	26.6	51	20	31	0.6	1	2.51	155
Reduce recreational overuse of forests	15.2	21	29	40	39.1	54	14.5	20	2.2	3	2.54	138
Reduce recreational overuse of grasslands	19.5	17	24.1	21	31	27	21.8	19	3.4	3	2.57	87
Reduce recreational overuse of wetlands	21	21	26	26	36	36	15	15	2	2	2.46	100
Reduce recreational overuse of subterranean systems	12.5	1	62.5	5	25	2	0	0	0	0	2.13	8
Reduce stream bank erosion	56.4	88	35.3	55	7.1	11	0.6	1	0.6	1	1.52	156
Reduce stream head cutting	36.4	47	36.4	47	14.7	19	2.3	3	10.1	13	1.81	129
Reestablish natural disturbance regimes in barren lands	78.9	15	15.8	3	5.3	1	0	0	0	0	1.26	19
Reestablish natural disturbance regimes in forests	47.5	67	34.8	49	13.5	19	2.1	3	2.1	3	1.70	141
Reestablish natural disturbance regimes in grasslands	68.2	60	26.1	23	3.4	3	1.1	1	1.1	1	1.37	88
Reestablish natural disturbance regimes in wetlands	45.1	41	35.2	32	15.4	14	0	0	4.4	4	1.69	91

Reestablish natural disturbance regimes in subterranean systems	0	0	28.6	2	28.6	2	0	0	42.9	3	2.50	7
Remove log jams	9	14	17.4	27	31	48	29	45	4.5	7	2.93	155
Restore and integrate diversity of habitats into crop-production dominated landscapes	66	70	27.4	29	5.7	6	0	0	0.9	1	1.39	106
Restore and integrate diversity of habitats into developed landscapes	65.7	23	22.9	8	8.6	3	2.9	1	0	0	1.49	35
Restore habitats and natural systems in aquatic systems	59	92	30.8	48	9	14	1.3	2	0	0	1.53	156
Restore habitats and natural systems in barren lands	70	14	25	5	5	1	0	0	0	0	1.35	20
Restore habitats and natural systems in forests	58.5	83	31.7	45	9.2	13	0.7	1	0	0	1.52	142
Restore habitats and natural systems in grasslands	79.5	70	18.2	16	2.3	2	0	0	0	0	1.23	88
Restore habitats and natural systems in wetlands	77	77	20	20	2	2	0	0	1	1	1.24	100
Restore habitats and natural systems in subterranean systems	50	4	25	2	25	2	0	0	0	0	1.75	8
Species reintroduction. Please specify:	24.9	55	14	31	15.4	34	12.7	28	33	73	2.24	221

<b>Education and Awareness</b>												
Educational programs in general	58.3	368	33.9	214	7.4	47	0.2	1	0.2	1	1.49	631
Educational programs specifically for K-12	52.5	332	33.9	214	12.7	80	0.6	4	0.3	2	1.61	632
Improvement of signage and other communication materials in conservation areas	25.4	160	38.1	240	33.5	211	2.5	16	0.5	3	2.13	630
Training programs for stakeholders	42.9	268	41	256	12.8	80	2.1	13	1.3	8	1.74	625
<b>Law and Policy</b>												
Increase regulations on invasive species	50.5	270	31.6	169	15.1	81	2.2	12	0.6	3	1.69	535
Change current laws, policies, and regulations. Please specify:	29.2	140	23.6	113	15	72	3.1	15	29	139	1.89	479
Set private sector standards and codes	25.8	137	34.2	181	23.2	123	3.8	20	13	69	1.62	530
Improve compliance with and enforcement of current policies	48.7	260	37.6	201	10.3	55	0.6	3	2.8	15	1.67	534
Reduce urban sprawl through planning and zoning	51.3	274	30.1	161	14.4	77	2.4	13	1.7	9	2.06	534

Establish legal lake levels	22	27	22	27	33.3	41	9.8	12	13	16	2.36	123
Establish rules and guidelines for piers and other structures	21.1	26	27.6	34	31.7	39	9.8	12	9.8	12	2.33	123
Increase compliance of existing rules and regulations for aquatic systems	52.4	65	25.8	32	17.7	22	0.8	1	3.2	4	1.66	124
Establish submergent vegetation control guidelines	31.5	39	37.9	47	18.5	23	3.2	4	8.9	11	1.93	124
<b>Livelihood, Economic, and Other Incentives</b>												
Link natural resources to livelihoods through nature tourism	15.6	129	26.1	216	19.2	159	2.4	20	1	8	2.13	532
Support substitution of alternatives for environmentally harmful products and processes	19.8	164	25.8	213	14.5	120	0.8	7	3	25	1.94	529
Promote market forces (e.g., creation of a nitrogen trading market, promotion of alternative agricultural markets) as a tool for conservation	13.7	113	22.2	184	17.8	147	3.1	26	7	58	2.18	528
Promote conservation payment programs (e.g., payment for ecosystem services, conservation easements)	27.3	226	26.2	217	7.9	65	1.3	11	1.2	10	1.73	529
Promote nonmonetary values of natural systems within the state	29.3	242	22.5	186	10.2	84	0.8	7	0.7	6	1.72	525
Manage recreational opportunities to be compatible with fish and wildlife habitats	31.6	261	20.4	169	9.9	82	1.5	12	0.4	3	1.70	527

<b>External Capacity Building</b>												
Develop institutions and civil society	21.1	96	30.5	139	24.1	110	4.4	20	20	91	2.15	456
Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)	62.4	287	30.4	140	6.3	29	0	0	0.9	4	1.43	460
Strengthen conservation financing	66.8	306	22.9	105	8.7	40	0.2	1	1.3	6	1.42	458
Increase state's capacity for research and monitoring of conservation actions	50.4	230	38.2	174	11	50	0.2	1	0.2	1	1.61	456
Promote green infrastructure	42.7	197	35.4	163	16.3	75	2.8	13	2.8	13	1.79	461
Promote use of research and science in conservation decision-making processes	65.1	299	27.5	126	6.8	31	0	0	0.7	3	1.43	459

**Directions:**

To inform the process of prioritizing conservation actions in the **REGION** for the next 10 years, the SWAP team is working to construct landscape-level models of habitat suitability for a set of indicator species. Once the models are constructed, they will be applied to alternative future landscape scenarios which represent the potential outcomes of different combinations of conservation actions listed previously. These landscape-level models will be constructed in a GIS environment, thus only conservation actions that directly result in changing habitat type classifications of some portion of the regional landscape can be simulated. Please note that the landscape-level models will not be the sole determinant of the prioritization of conservation actions in a given region, and the actual prioritization of conservation actions for the overall SWAP process will encompass other considerations beyond the landscape-level models.

- As part of the landscape-level model construction process, we need your inputs to help us develop potential future landscape scenarios for **HABITAT** in the **REGION** as fish and wildlife habitats. Please rank the conservation actions listed below using the following framework: If the conservation community in the **REGION** collectively has a total of 100 units of effort (i.e., a combination of funds, expertise, and man-hours/labor) to invest in conservation actions for **HABITAT** over the next 10 years, how would you recommend the conservation community invest those units in conservation actions for **HABITAT** across the **entire REGION**? (Note: Units of effort must sum to 100.)

Action	Region 1		Region 2		Region 3		Region 4		Region 5		Region 6		Total	
	Mean	N	Mean	N										
Aquatic systems-Other landscape-altering conservation action, please specify:	2.52	48	0.22	23	1.34	56	5.12	17	1.73	26	2.27	11	1.98	181
Aquatic systems-Protect (through fee title or easement acquisition) currently unprotected aquatic systems	15.25	48	12.70	23	11.13	55	17.35	17	12.88	26	14.09	11	13.45	180
Aquatic systems-Control invasive species (e.g., Asian carp, zebra mussels, invasive aquatic plants)	21.04	49	9.61	23	14.11	56	10.88	17	13.19	26	10.45	11	14.75	182
Aquatic systems-Improve drainage management (e.g., two-stage ditches)	11.76	49	12.17	23	11.61	56	10.00	17	8.46	26	10.45	11	11.05	182
Aquatic systems-Improve water quality	12.35	49	7.22	23	15.13	56	12.06	17	11.69	26	12.27	11	12.43	182
Aquatic systems-Reduce urban sprawl	8.74	49	6.26	23	6.55	56	5.59	17	7.35	26	7.45	11	7.18	182
Aquatic systems-Restore aquatic systems	12.05	49	11.22	23	10.89	56	9.59	17	9.77	26	7.55	11	10.76	182
Aquatic systems-Restore riparian zones	10.04	48	8.48	23	11.48	56	12.94	17	13.00	26	12.27	11	11.12	181
Aquatic systems-Restrict recreational overuse	4.56	49	4.04	23	3.88	56	2.35	17	2.16	25	2.73	11	3.63	181

Aquatic systems-Protect adjacent buffer zones	9.81	49	8.30	23	10.34	56	8.24	17	8.69	26	11.36	11	9.57	182
Agricultural lands-Other landscape-altering conservation action, please specify:	0.63	16	2.05	22	0.77	47	0.00	14	0.26	19	1.25	12	0.85	130
Agricultural lands-Control invasive plant and animal species (e.g., bush honeysuckle, wild pigs)	15.00	16	6.27	22	9.28	47	6.40	15	12.79	19	5.83	12	9.34	131
Agricultural lands-Convert marginal cropland to other vegetative cover that benefits wildlife through CRP partnerships	16.88	16	12.59	22	13.57	47	13.13	15	16.16	19	12.50	12	14.04	131
Agricultural lands-Modify drainage management (e.g., two-stage ditches)	8.31	16	5.77	22	7.15	47	6.53	15	4.84	19	2.17	12	6.20	131
Agricultural lands-Improve soil health (e.g., cover crops, conservation tillage)	8.00	16	4.00	22	9.70	47	8.20	15	4.53	19	5.25	12	7.21	131
Agricultural lands-Manage nuisance wildlife populations (e.g., deer, raccoons, Canada geese)	3.13	16	2.36	22	5.41	46	3.47	15	6.47	19	3.08	12	4.33	130
Agricultural lands-Preserve/create corridors between wildlife habitat within agricultural matrix	13.13	16	10.55	22	10.57	47	7.67	15	8.32	19	4.42	12	9.66	131
Agricultural lands-Reduce conversion of wildlife habitat to cropland	10.63	16	9.82	22	13.54	46	18.47	15	9.89	19	7.92	12	12.07	130
Agricultural lands-Reduce urban sprawl	6.56	16	4.68	22	6.53	47	4.73	15	9.21	19	5.08	12	6.27	131
Agricultural lands-Restore wildlife habitat within agricultural matrix	9.06	16	8.59	22	8.47	47	9.20	15	6.26	19	4.42	12	7.95	131

Agricultural lands-Enhance pasture and hayland for wildlife	1.38	16	3.91	22	2.89	47	4.80	15	2.68	19	2.50	12	3.03	131
Agricultural lands-Reduce mowing of hay and pasture during nesting season	2.31	16	5.14	22	4.00	47	4.07	15	2.79	19	3.92	12	3.81	131
Barren lands-Other landscape-altering conservation action, please specify:	0.83	6	0.00	2	0.00	6	0.00	4	0.00	12	6.25	4	0.88	34
Barren lands-Protect (through fee title or easement acquisition) currently unprotected barren lands	12.50	6	0.00	2	14.17	6	25.00	4	25.08	12	1.25	4	16.65	34
Barren lands-Control invasive species (e.g., Amur honeysuckle, wild pigs)	16.67	6	0.00	2	16.67	6	5.00	4	20.00	12	1.25	4	13.68	34
Barren lands-Manage nuisance wildlife populations (e.g., deer, raccoons)	3.33	6	0.00	2	5.83	6	2.50	4	8.33	12	1.25	4	5.00	34
Barren lands-Preserve/create corridors between habitat	5.00	6	0.00	2	17.50	6	3.75	4	11.42	12	3.75	4	8.88	34
Barren lands-Reduce urban sprawl	2.50	6	0.00	2	14.17	6	0.00	4	9.17	12	3.75	4	6.62	34
Barren lands-Reestablish fire regimes in barrens and glades	6.67	6	0.00	2	4.17	6	12.50	4	10.42	12	3.75	4	7.50	34
Barren lands-Restore barren lands	19.17	6	0.00	2	10.83	6	1.25	4	7.25	12	3.75	4	8.44	34
Forests-Other landscape-altering conservation action, please specify:	0.40	25	0.00	16	0.14	51	0.00	23	0.33	46	0.96	26	0.30	187

Forests-Protect (through fee title or easement acquisition) currently unprotected forests	12.60	25	15.63	16	9.94	51	12.26	23	12.30	46	8.19	26	11.41	187
Forests-Control forest pests (e.g., gypsy moth, emerald ash borer)	7.10	25	4.38	16	8.86	49	4.43	23	7.63	46	6.19	26	7.00	185
Forests-Control invasive species (e.g., Amur honeysuckle, garlic mustard, wild pigs)	19.10	25	13.75	16	17.55	51	9.17	23	14.02	46	12.35	26	14.81	187
Forests-Diversify forest types (e.g., create forest openings)	5.82	25	4.06	16	4.24	51	10.37	23	12.39	46	10.12	26	8.01	187
Forests-Increase acres enrolled in the Classified Forest Program	6.20	25	5.63	16	7.04	51	6.17	23	5.65	46	6.27	26	6.25	187
Forests-Manage nuisance species (e.g., white-tailed deer, raccoons)	2.80	25	2.81	16	5.45	51	5.83	23	4.15	46	3.85	26	4.37	187
Forests-Preserve/create corridors between forest habitats	6.98	25	7.81	16	8.24	51	8.41	23	7.71	45	8.88	26	8.02	186
Forests-Prevent conversion of forests to cropland	10.18	25	6.75	16	12.02	51	8.48	23	6.11	46	8.92	26	9.00	187
Forests-Reduce urban sprawl	5.74	25	3.13	16	6.61	51	4.70	23	5.61	46	4.23	26	5.38	187
Forests-Reestablish fire regimes	4.90	25	6.44	16	4.02	51	4.35	23	5.38	45	5.88	26	4.98	186
Forests-Restore forests	8.10	25	3.75	16	5.25	51	6.24	23	4.78	46	6.00	26	5.61	187



Wetlands-Protect (through fee title or easement acquisition) currently unprotected wetlands	13.26	31	14.20	25	11.23	30	18.41	22	13.58	19	16.54	13	14.15	140
Wetlands-Control invasive species (e.g., purple loosestrife)	12.91	32	10.48	25	8.50	30	5.00	22	5.26	19	4.65	13	8.51	141
Wetlands-Create new wetlands	4.63	32	6.00	25	4.90	30	7.25	20	7.26	19	7.88	13	5.97	139
Wetlands-Reduce negative impacts of drainage management (e.g., pattern tiling)	6.69	32	3.80	25	5.57	30	3.50	22	2.58	19	2.69	13	4.52	141
Wetlands-Improve the quality of water that drains into a wetland (through improving agricultural practices, forestry practices, etc.)	7.69	32	7.00	25	8.17	30	6.64	22	6.58	19	7.46	13	7.33	141
Wetlands-Manage nuisance wildlife populations (e.g., deer, raccoons, Canada geese)	2.41	32	1.44	25	1.97	30	0.86	22	1.58	19	1.31	13	1.69	141
Wetlands-Reduce conversion to other land uses	5.56	32	7.00	25	8.50	30	7.27	22	4.84	19	6.69	13	6.72	141
Wetlands-Reduce urban sprawl	3.59	32	3.20	25	4.33	30	3.05	22	1.95	19	2.23	13	3.25	141
Wetlands-Restore wetlands	10.50	32	10.28	25	8.17	30	8.86	22	7.63	19	9.31	13	9.21	141
Wetlands-Enhance wetland connectivity by linking riparian/upland habitat	3.75	32	6.60	25	7.13	30	7.55	22	6.05	19	6.62	13	6.14	141
Wetlands-Create adequate vegetative buffers around wetlands	4.84	32	6.20	25	5.67	30	7.18	22	3.63	19	5.15	13	5.49	141

Wetlands-Actively manage wetlands for habitat quality (e.g., water levels, vegetation management)	5.69	32	6.80	25	9.20	30	6.50	22	2.21	19	6.00	13	6.32	141
Subterranean systems-Improve water quality									32.27	11	3.33	3	26.07	14
Subterranean systems-Protect (through fee title or easement acquisition) currently unprotected cave systems									25.91	11	13.33	3	23.21	14
Subterranean systems-Restore degraded cave habitat									13.18	11	13.33	3	13.21	14
Subterranean systems-Restrict recreational overuse									7.73	11	1.67	3	6.43	14
Subterranean systems-Manage nuisance wildlife populations (e.g., deer, raccoons)									2.73	11	1.67	3	2.50	14
Subterranean systems-Other landscape-altering conservation action, please specify:									0.00	11	0.00	3	0.00	14

20. For any of the above options, please provide details wherever possible (i.e., specify priority locations for restoration or implementation of actions, amount of land suggested for restoration or protection, targeted species for control, or specific methods), especially for actions you highly recommend for **HABITAT** in the **REGION**. These details will be used in conjunction with expert input to realistically map the landscape-level outcomes of conservation actions that will be fed into the models

Question 20 responses are excluded from this report.

21. You identified the following conservation actions as very important for fish and wildlife habitats in the **REGION**. If the conservation community in the **REGION** collectively has a total of 100 units of effort (i.e., a combination of funds, expertise, and man-hours/labor) to invest in these conservation actions over the next 10 years, how would you recommend the conservation community to invest the 100 units of effort across the following conservation actions for the **entire REGION**? (Note: Units of effort must sum to 100).

	Region 1		Region 2		Region 3		Region 4		Region 5		Region 6		Statewide	
	Mean	N	Mean	N										
<b>Acquire conservation easements to protect important wildlife habitats</b>	4.00	53	4.81	32	2.80	80	4.15	33	3.39	49	3.78	27	3.63	274
<b>Acquire currently unprotected aquatic systems (manage and/or educate for easement habitat values)</b>	2.25	53	1.56	32	1.00	80	1.39	33	0.67	49	2.04	27	1.40	274
<b>Acquire currently unprotected barren lands</b>	0.08	53	0.00	32	0.15	80	0.00	33	1.33	49	0.00	27	0.30	274
<b>Acquire currently unprotected forests</b>	0.00	53	1.97	32	1.84	80	1.21	33	4.31	49	0.96	27	1.78	274
<b>Acquire currently unprotected grasslands</b>	0.00	53	2.81	32	1.35	80	5.15	33	1.20	49	1.96	27	1.75	274
<b>Acquire currently unprotected subterranean habitats</b>	0.00	53	0.00	32	0.00	80	0.00	33	1.53	49	1.11	27	0.38	274
<b>Acquire currently unprotected wetlands</b>	3.25	53	4.81	32	1.23	80	5.91	33	3.33	49	4.67	27	3.31	274
<b>American chestnut in forest</b>	0.00	53	0.00	32	0.00	80	0.00	33	0.00	49	0.00	27	0.00	274
<b>Assist private landowners financially and with management plans in agricultural lands</b>	0.09	53	0.00	32	0.00	80	0.00	33	0.00	49	0.00	27	0.02	274





<b>Develop a backyard habitat effort and monitor its effectiveness in developed lands</b>	0.00	0.00	53	53	0.00	32	32	0.05	80	0.00	33	0.00	49	0.00	27	0.01	274
<b>Develop alliances and partnerships (e.g., between producers, landowners, and conservation professionals)</b>	1.74	1.74	53	53	1.09	32	32	2.15	80	1.73	33	2.00	49	2.04	27	1.86	274
<b>Develop and promote farming technologies and practices that have conservation benefits (e.g., cover crops, no till)</b>	4.64	4.64	53	53	3.22	32	32	4.96	80	5.62	33	3.04	49	5.67	27	4.50	274
<b>Develop institutions and civil society</b>	0.19	0.19	53	53	0.00	32	32	0.15	80	0.15	33	0.00	49	0.19	27	0.12	274
<b>Develop markets for producing crops compatible with sustainable grassland management (e.g. prairie hay or Bison ranching) in grasslands</b>	0.00	0.00	53	53	0.00	32	32	0.03	80	0.00	33	0.00	49	0.00	27	0.01	274
<b>Educate private landowners in grasslands</b>	0.19	0.19	53	53	0.00	32	32	0.00	80	0.00	33	0.00	49	0.00	27	0.04	274
<b>Educational programs in general</b>	4.28	4.28	53	53	4.16	32	32	4.09	80	3.06	33	1.96	49	3.33	27	3.55	274
<b>Educational programs specifically for K-12</b>	2.60	2.60	53	53	0.31	32	32	2.38	80	2.42	33	1.08	49	1.00	27	1.82	274
<b>Enhance corridors in subterranean systems</b>	0.00	0.00	53	53	0.00	32	32	0.00	80	0.00	33	0.00	49	0.00	27	0.00	274
<b>Ensure that grassland managers are given and allowed the use of all the proper tools to manage grasslands in grasslands</b>	0.00	0.00	53	53	0.00	32	32	0.13	80	0.00	33	0.00	49	0.00	27	0.04	274
<b>Establish legal lake levels</b>	0.19	0.19	53	53	0.16	32	32	0.08	80	0.00	33	0.04	49	0.00	27	0.08	274















<b>Restore habitats and natural systems in subterranean systems</b>	0.00	0.00	53	53	0.00	32	32	0.00	80	0.00	33	0.31	49	0.56	27	0.11	274
<b>Restore habitats and natural systems in wetlands</b>	1.57	0.00	53	53	0.00	32	32	0.19	80	1.42	33	0.18	49	0.44	27	0.97	274
<b>Rewrite "Indiana Drainage Handbook" in aquatic systems</b>	0.00	0.00	53	53	0.00	32	32	0.11	80	0.00	33	0.00	49	0.00	27	0.03	274
<b>Set private sector standards and codes</b>	0.51	0.00	53	53	0.06	32	32	0.53	80	0.24	33	0.24	49	0.41	27	0.37	274
<b>Set up program on inventory, cataloging, and/or modeling rare wetland habitats such as fens, bogs, and calcareous seeps in wetlands</b>	0.00	0.00	53	53	0.00	32	32	0.06	80	0.00	33	0.00	49	0.00	27	0.02	274
<b>Set up umbrella plan with stepped-down strategic plans at each DNR property to manage for a variety of habitats according to science</b>	0.00	0.00	53	53	0.00	32	32	0.06	80	0.00	33	0.00	49	0.00	27	0.02	274
<b>Spanish Language Signage in aquatic systems</b>	0.00	0.00	53	53	0.00	32	32	0.06	80	0.00	33	0.00	49	0.00	27	0.02	274
<b>Species reintroduction</b>	0.13	0.13	53	53	0.22	32	32	0.43	80	0.00	33	0.10	49	0.93	27	0.28	274
<b>Strengthen conservation financing</b>	2.64	2.64	53	53	3.47	32	32	5.00	80	1.85	33	4.53	49	3.85	27	3.79	274
<b>Stronger wetlands and watershed protection/regulation in agricultural lands</b>	0.00	0.00	53	53	0.00	32	32	0.00	80	0.61	33	0.00	49	0.00	27	0.07	274
<b>Support substitution of alternatives for environmentally harmful products and processes</b>	0.42	0.42	53	53	0.09	32	32	0.55	80	0.21	33	0.00	49	0.44	27	0.32	274

<b>Tax jet skis and ski boats on most natural lakes in wetlands</b>	0.00	53	0.00	32	0.03	80	0.00	33	0.00	49	0.00	27	0.01	274
<b>There can never be enough education for the "general population" in developed lands</b>	0.00	53	0.00	32	0.00	80	0.00	33	0.00	49	0.00	27	0.00	274
<b>Training of volunteer firefighters on grassland management in grasslands</b>	0.00	53	0.00	32	0.03	80	0.00	33	0.00	49	0.00	27	0.01	274
<b>Training programs for stakeholders</b>	1.45	53	3.28	32	1.39	80	0.27	33	2.76	49	1.74	27	1.77	274
<b>Watershed-based planning/regulation in aquatic systems</b>	0.00	53	0.00	32	0.11	80	0.00	33	0.00	49	0.00	27	0.03	274

## Section VI: Adaptation to Changing Conditions

22. Now, think generally about your own agency/organization. What **barriers** does your agency/organization face when implementing/planning conservation actions for fish and wildlife habitats in **Indiana** and what **resources** would your agency/organization need to overcome these barriers?

Question 22 is excluded from this report.

23. Considering your responsibility within your agency/organization, to what extent are you able to respond to the following new or changing **ecological** information or conditions? (Check one for each line item)

Total	<i>Extremely able</i>		<i>Moderately able</i>		<i>Somewhat able</i>		<i>Not able</i>		<i>I don't know</i>		Total Responses
		N		N		N		N		N	
<i>Changing species populations</i>	6.5	13	24.1	48	40.7	81	22.1	44	6.5	13	199
<i>Changing habitat conditions</i>	9.1	18	31.5	62	42.1	83	13.7	27	3.6	7	197
<i>Shifting species distribution</i>	5.0	10	17.6	35	35.7	71	34.7	69	7.0	14	199
<i>Introduction of invasive species</i>	8.7	17	24.0	47	39.8	78	23.5	46	4.1	8	196
<i>Human changes to hydrology (e.g., field tiles, ditches, irrigation, wetlands)</i>	3.5	7	15.1	30	32.2	64	42.7	85	6.5	13	199
<i>Emerging diseases</i>	2.0	4	8.5	17	25.6	51	54.3	108	9.5	19	199

<i>Changing water availability and use</i>	1.0	2	7.1	14	27.3	54	58.6	116	6.1	12	198
<i>Increasing frequency, duration, and intensity of drought</i>	1.0	2	3.6	7	19.3	38	68.0	134	8.1	16	197
<i>Increasing frequency, duration, and intensity of floods</i>	1.0	2	4.0	8	23.7	47	63.6	126	7.6	15	198
<i>Increasing frequency of extreme weather</i>	1.5	3	3.0	6	16.7	33	71.7	142	7.1	14	198
<i>Changing temperatures (e.g., water, seasonal, or extreme event temperature)</i>	1.5	3	5.5	11	18.1	36	66.3	132	8.5	17	199
<i>Genetically modified species spreading into natural systems</i>	1.5	3	6.1	12	24.4	48	52.3	103	15.7	31	197

24. To what extent do you think your agency/organization is able to respond to the following new or changing **economic** information or conditions? (Check one for each line item)

<b>Total</b>	<b>Extremely able</b>		<b>Moderately able</b>		<b>Somewhat able</b>		<b>Not able</b>		<b>I don't know</b>		<b>Total Responses</b>
		N		N		N		N		N	
<i>Changes in demand for commodity crops and biofuel crops</i>	0.5	1	6.0	12	15.6	31	68.3	136	9.5	19	199
<i>Changing renewable energy production footprint in the state</i>	4.1	8	12.7	25	29.9	59	46.2	91	7.1	14	197
<i>Changing non-renewable energy production footprint in the state</i>	1.0	2	3.0	6	16.6	33	69.3	138	10.1	20	199
<i>Changing availability of funding for wildlife conservation and management</i>	1.0	2	3.6	7	12.2	24	72.1	142	11.2	22	197

25. To what extent do you think your agency/organization is able to respond to new or changing **social/political** information or conditions? (Check one for each line item)

Total	Extremely able		Moderately able		Somewhat able		Not able		I don't know		Total Responses
		N		N		N		N		N	
Changing public support for natural resource management and conservation activities	3.5	7	21.7	43	60.6	120	9.6	19	4.5	9	198
Changing participation in wildlife-dependent and other recreational activities	4.1	8	21.9	43	50.5	99	18.9	37	4.6	9	196
Urbanization (resulting in changing connection of people to nature/outdoors)	3.0	6	11.1	22	38.7	77	40.2	80	7.0	14	199
Changes in land use	1.5	3	10.3	20	34.9	68	47.2	92	6.2	12	195
Changes to organizational structure of resource management agencies or conservation organizations	2.0	4	15.6	31	35.2	70	41.2	82	6.0	12	199
Changes in the Endangered Species Act (e.g., adding or removing species)	3.6	7	9.1	18	29.9	59	50.3	99	7.1	14	197
Changes in the Clean Water Act (e.g., redefining jurisdictional waterway)	2.0	4	9.1	18	22.2	44	59.1	117	7.6	15	198
Changes in the Clean Air Act (e.g., changing regulations on greenhouse gas emissions)	1.5	3	6.1	12	18.7	37	65.2	129	8.6	17	198

26. Please provide any additional information or comments that you would like to share with the SWAP team using the box below:

Question 26 is excluded from this report.

# DNR

Indiana Department of Natural Resources

## Appendix R. Conservation Organization Survey

### Summary of Results from the November of 2013 survey

The survey was sent to the original list of partners from the 2005 CWS plus any new partners that had been identified at the time. It was posted on the DFW website; news releases and direct email messages were sent out inviting conservation organizations to participate. We had 86 unique partner organizations respond to the survey.

1. Briefly describe the goals of your organization. (e.g. to restore 50 acres of wetlands per year, to preserve and maintain species diversity, to eliminate invasive species in forests throughout the state, etc.)

81 responses were provided. All answers can be viewed at <http://collab.dnr.in.gov>.

2. Is your organization:

Option	Results (Count)
Nonprofit	54% (44)
For Profit	2% (2)
Government	43% (35)

3. Indicate where your organization's conservation efforts occur. Select all that apply.

Option	Results (Count)
Locally	43% (34)
Great Lakes Watershed	29% (23)
Kankakee River Watershed	30% (24)
Eastern Corn Belt Plains	41% (33)
Ohio River Watershed: Interior River Valleys and Hills	31% (25)
Ohio River Watershed: Interior Plateau	31% (25)
Statewide	46% (37)
Regionally (work with neighboring states)	29% (23)
Nationally	19% (15)

4. On which of the following types of habitats does your organization focus its efforts? For each habitat type, provide a percentage of time and resources.

Habitats	Percentage of Time and Resources
Agriculture	40%
Aquatic Systems	30%
Barren Lands	10%
Developed Lands	20%
Forest Lands	30%
Grasslands	20%
Subterranean Systems	10%

Habitats	Percentage of Time and Resources
Wetlands	20%

5. What is/are your primary wildlife taxa and/or category of species of interest? Select all that apply.

Option	Results (Count)
Amphibians	34% (23)
Birds	66% (44)
Fish	39% (26)
Arthropods	24% (16)
Mammals	51% (34)
Mollusks	25% (17)
Reptiles	27% (18)
Aquatic Invasive	33% (22)
Terrestrial Invasive	45% (30)
Federal/State Listed Species	55% (37)
Nongame Species	49% (33)
Game Species	37% (25)

6. On which of the following activities does your organization spend time and resources? Select all that apply.

Option	Results (Count)
Land Acquisition	26% (19)
Education/Outreach	90% (66)
Invasive Species Control	68% (50)
Habitat Maintenance	49% (36)
Restoration of Habitat	59% (43)
Habitat Migration	26% (19)
Research/Survey/Monitor for Habitats	37% (27)
Landowner Assistance	55% (40)
Restoration of Species	33% (24)
Population Management for Species	21% (15)
Technical Assistance for Species Management	34% (25)
Research/Survey/Monitor for Species	45% (33)

7. Please indicate your total annual budget category for natural resources/conservation. If your organization works beyond conservation/natural resources, please estimate the budget spent on natural resources/conservation.

Option	Results (Count)
\$0-\$9,999	26% (19)
\$10,000-\$24,999	13% (9)
\$25,000-\$49,999	10% (7)
\$50,000-\$99,999	10% (7)
\$100,000-\$249,000	7% (5)
> \$250,000	25% (18)
Chose not to respond	10% (7)

8. What is the primary source of this funding?

Foundation Grants	20%
Local	30%
State	30%
Federal	40%
Individual Contributions/Donations	40%
Dues/Memberships	30%

9. How has your organized used the 2005 CWS?

- 55% of the respondents hadn't used the plan in their organization activities
- 45% of the respondents had used the plan

10. Please describe your organization's project (current and proposed) that could contribute to a local, regional, or statewide wildlife action plan?

- 50 responses were submitted for this question with most of the work being done at the local level, specifically with private landowners.

11. What resources or capabilities does your organization have that could contribute to a wildlife action plan?

- 58 organizations offered ideas on how their organizations could contribute. Below is the list of general categories and percentage of organizations that could offer this type of assistance.

Funding	24%
Technical Assistance/Science	40%
Volunteers	30%
Equipment	2%
Promotion/Education	22%

12. What do you perceive is needed to improve existing partnerships, resources, or programs focused on resource for conservation? Below are the general categories that organizations suggested, as needs improvement to be successful.

Increase/Better Communication	54%
Coordination/Collaboration of Habitat/Species Management	21%
Coordination/Collaboration to Prioritize Existing Funding and to Look for New Funding	27%
Public Awareness	20%

13. Please provide additional information you feel is relevant to our efforts in developing Indiana's SWAP.

- The answers to this question were as diverse as the organizations taking the survey. The general topics of the 33 comments related to communication and collaboration with continued engagement of diverse partners through the planning process and into the implementation of the plan.

14. How can we best engage your organization in the conservation efforts in Indiana?

- The 74 organizations that answered this question said that all of the options listed below were ‘somewhat effective’ at engaging partners. These include:
  - Indiana SWAP website – [www.SWAP.DNR.IN.Gov](http://www.SWAP.DNR.IN.Gov)
  - Electronic newsletter
  - Email announcements
  - Articles in select magazines, newsletters, and newspapers
  - Press release to radio, television, and print publications
  - Customized presentations to your organization at your regular meetings
  - Annual meeting of conservation partners
  - Working groups/meetings
  - Through existing committee/organizations
  - Online collaboration tool (wiki in which people add, modify, delete content in collaboration with others)
  - Electronic surveys
  - Other internet sites

15. Does your organization have strategic or operational documents that could help us identify how to incorporate your efforts into the Indiana SWAP? If so, please share the link to access the file in the comment field below or upload the file to [SWAP@dnr.in.gov](mailto:SWAP@dnr.in.gov).

- This question has been answered 40 times.

16. Given the above information, indicate what areas of interest your organization would be interested in being part of working group/advisory committee:

Option	Results (Count)
Environment – Water	42% (26)
Environment – Habitat/Landscape Conservation Crossing Major Political Boundaries	63% (39)
Invasive Species	47% (29)
Climate Change	21% (13)
Conservation Community	58% (36)
Funding	31% (19)
Citizens/Public	19% (12)
All	21% (13)

**Appendix S.** Focus Group One.

**Table S-1.** Threats to SGCN and their habitats in Indiana.

<b>Major categories of direct threats (adapted from Salafsky et al. 2008, based on the focus group results)</b>	<b>Subcategories of direct threats to SGCN and their habitats in Indiana (based on the focus group results)</b>
<p><b>Urban/exurban development (residential/commercial/industrial)*</b></p> <ul style="list-style-type: none"> <li>• Interacting with invasives/problematic species as it is an avenue for their transmission</li> <li>• Interacting with pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Road construction associated with urban/exurban development, leading to increased road mortality, impeded wildlife movement, fragmented habitat, loss of habitat, increased runoff, flashier hydrology, down-cutting streams, and increased sediments</li> <li>• Removal of riparian habitats associated with development</li> <li>• Point source pollution from commercial/industrial sources</li> <li>• Non-point source pollution from pesticide use on residential/commercial lawns</li> <li>• Cats and other domestic pets killing small birds/mammals</li> </ul>
<p><b>Agriculture and aquaculture</b></p>	<ul style="list-style-type: none"> <li>• Water quality problems resulting from pesticide use in farming and on-farm nutrient/waste management</li> <li>• Exotic species from aquaculture</li> <li>• Land conversion for biofuels, contributing to habitat fragmentation</li> <li>• High cost of land</li> <li>• Changes in drainage due to installation of tile drainage</li> <li>• Changes in water quantity affecting the availability of shallow, standing water for species</li> <li>• Introduced genetic material from fish stock</li> <li>• Channelization and dredging of streams contributing to habitat loss</li> </ul>
<p><b>Energy production and mining</b></p> <ul style="list-style-type: none"> <li>• Interacting with transportation/service corridors</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality problems from chemicals used in/spilled from mining and energy production facilities/operations (e.g., fracking, coal mining, etc.)</li> <li>• Disturbing/diminishing habitats due to siting of the facilities/operations and related road construction</li> <li>• Large amount of water used for energy production</li> <li>• Wind farms affecting bird/bat species</li> <li>• Filled in caves</li> </ul>
<p><b>Transportation and service corridors</b></p>	<ul style="list-style-type: none"> <li>• Highway/road/service corridor construction leading to increased road mortality and increased runoff</li> <li>• Habitat loss due to roads and service corridors</li> <li>• Passage way for introducing/spreading invasive species</li> </ul>

<b>Biological resource use</b>	<ul style="list-style-type: none"> <li>• Over use and harvesting of certain wildlife species (e.g., aquatic turtles, reptiles, mussels, roe-bearing fish)</li> <li>• Inappropriate forestry practices (e.g., select harvesting) affecting wildlife habitat</li> <li>• Genetic patenting for commercial use (introduction of genes into natural populations)</li> <li>• Privatization of wildlife/captive wildlife causing disease introduction</li> <li>• Fewer hunters and fishers to support the wildlife conservation programs</li> </ul>
<b>Human intrusions and disturbance</b> <ul style="list-style-type: none"> <li>• Interacting with invasives/problematic species</li> <li>• Interacting with climate change</li> </ul>	<ul style="list-style-type: none"> <li>• Recreation activities affecting wildlife/aquatic habitat (e.g., ATV/off-highway vehicles, trail use, horseback riding, high-speed boating, canoeing)</li> <li>• Human-induced invasive species</li> <li>• Overuse and misuse of public lands (e.g., trashing, arson, pesticide dumping)</li> <li>• Stream crossings by ATV/horse riding disrupting habitat</li> </ul>
<b>Natural systems modification*</b>	<ul style="list-style-type: none"> <li>• Wetland loss due to agriculture</li> <li>• Riparian zone removal for stream channelization</li> <li>• Channelization and dredging of streams, changing water flow patterns, water temperature, and sediments</li> <li>• Manmade structures in aquatic systems (e.g., seawalls, levies, dams) stabilizing water levels and disrupting habitat</li> <li>• Lack of good forest management (i.e., fire suppression, snag removal), leading to diminishing quality habitat, particularly for early successional species</li> <li>• Change in patterns, for example fire suppression or over-mowing of areas</li> </ul>
<b>Invasives and problematic species*</b>	<ul style="list-style-type: none"> <li>• Aquatic invasive species overwhelming native species and changing aquatic habitats</li> <li>• Overabundance of deer in the natural system</li> <li>• Forest insects threatening forest wildlife habitats</li> <li>• Biofuel planting, converting natural habitats to agricultural fields and creating monoculture</li> <li>• GMO spread into nature, changing wildlife habitats</li> <li>• Wildlife diseases (e.g., white-nose syndrome, chronic wasting disease)</li> <li>• Invasive shrubs, for example honeysuckle and multiflora rose</li> </ul>
<b>Pollution</b>	<ul style="list-style-type: none"> <li>• Water quality problems</li> <li>• Thermal pollution</li> <li>• Noise/light pollution</li> <li>• Air pollution, particularly smoke, mercury emissions, and ammonia from fertilizer use</li> <li>• Bioaccumulation of pollutants in wildlife</li> </ul>

<p><b>Climate change*</b></p> <p>Note: This is a long-term challenge and will become a huge burden on conservation.</p>	<ul style="list-style-type: none"> <li>• Changing the frequency, duration, and intensity of drought</li> <li>• Reducing base flow in streams and increasing water temperature, affecting aquatic species, particularly cold-water fish and vernal pool species</li> <li>• Changing the frequency and duration of floods</li> <li>• Changing wildfire frequency and intensity</li> <li>• Shifting the range of suitable habitats</li> <li>• Changing temperature and shifting seasons, particularly warmer winters leading to increased adapted invasive species</li> <li>• Potential inability of native species to adapt to shifting species</li> <li>• Increased ground water withdrawal for irrigation to mitigate shifting weather patterns because of climate change</li> </ul>
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\* Indicates threats that were identified as particularly important in Indiana.

**Table S-2.** Conservation actions necessary in the next 10 years to address threats to SGCN and their habitats in Indiana.

<b>Major categories of conservation actions (adapted from Salafsky et al. 2008, based on the focus group results)</b>	<b>Subcategories of conservation actions necessary to conserve SGCN and their habitats in Indiana (based on the focus group results)</b>
<b>Land/water protection</b>	<ul style="list-style-type: none"> <li>• Acquire unprotected wetlands and enhance wetland protection</li> <li>• Acquire more conservation easements to protect important wildlife habitats</li> <li>• Create more communication and coordination among agricultural producers, developers, planners, and state wildlife personnel</li> <li>• Increase the amount of public lands in the state as wildlife habitats</li> <li>• Enhance the protection of riparian corridors</li> <li>• Take an ecosystem planning approach to prioritize actions to protect land and water</li> <li>• Develop metrics for monitoring effectiveness of conservation actions</li> </ul>

<p><b>Land/water/species management</b></p>	<ul style="list-style-type: none"> <li>• Develop and promote farming technologies and practices that have conservation benefits, particularly technologies and practices that improve on-farm nutrient management</li> <li>• Consolidate adjacent lands to create unfragmented, large patch of wildlife habitats</li> <li>• Enforce better/targeted mitigation measures for vulnerable habitat</li> <li>• Buffer existing protected areas</li> <li>• Improve statewide coordination on invasive species management</li> <li>• Relate water management (for example, dealing with drought) to climate change</li> <li>• Promote holistic, landscape-level planning and management and reduce conflicts among competing interests</li> <li>• Promote city planning and zoning regulations to reduce urban sprawl</li> <li>• Restore natural streams</li> <li>• Use an umbrella/indicator species approach to provide directions for conservation actions</li> <li>• Invest in research that helps better understand the impacts of climate change on wildlife habitats</li> <li>• Invest in proactive rather than reactive management policies, programs, and practices</li> <li>• Promote management policies, programs, and practices that balance game and non-game species</li> <li>• Promote effective invasive species control</li> <li>• Promote effective management of nuisance wildlife populations (e.g., deer, raccoons, Canada geese)</li> <li>• Restore/relocate certain species that are “on the edge” (e.g., mussels)</li> </ul>
<p><b>Education and awareness</b></p>	<ul style="list-style-type: none"> <li>• Create/promote programs that bring kindergarten and elementary students outside</li> <li>• Create/promote education programs that focus on improving the conservation awareness/literacy of urban population</li> <li>• Enhance current education programs that focus on landowners</li> <li>• Put up conservation signage in smaller natural areas/around smaller rivers (instead of only putting signage in state parks/forests)</li> </ul>
<p><b>Law and policy</b></p>	<ul style="list-style-type: none"> <li>• Increase regulations on invasive species</li> <li>• Influence legislators to ensure consistent funding for wildlife conservation, to increase funding for protection of state endangered species, and to provide sufficient resources for the Division of Fish and Wildlife operations</li> <li>• Legalize venison processing in Indiana</li> <li>• Amend/update existing policies/laws</li> <li>• Change policies that aren’t working</li> <li>• Protect existing working policies, i.e. methods to support Indiana’s hardwood industry through certified forest programs</li> </ul>

<b>Livelihood and economic incentives</b>	<ul style="list-style-type: none"> <li>• Create a market for nitrogen trading</li> <li>• Promote payment for ecosystem services programs</li> <li>• Promote nature tourism</li> <li>• Promote conservation easements as a means to providing financial incentives to landowner</li> <li>• Support a balanced hardwood industry</li> <li>• Expand alternative agricultural markets and support local organic farms</li> <li>• Improve current mitigation funds to be more systematic</li> </ul>
<b>External capacity building</b>	<ul style="list-style-type: none"> <li>• Enhance public-private partnerships and coordination and organization for partners to work together on conservation issues</li> <li>• Increase the state's capacity for research and monitoring of conservation actions</li> <li>• Promote the use of science in conservation decision making</li> <li>• Foster productive relationships between scientists, environmentalists, and agricultural producers and landowners</li> </ul>

## Focus Group One Protocol

### ***Greetings/Introduction/Ground rules – 10 minutes***

- Welcome and thank you for taking the time to participate in this focus group meeting
- Project team introductions:
  - PI: Pat Zollner
  - Co-PI: Rob Chapman, Vanessa Quinn, Zhao Ma
  - Research Assistants: Rita Blythe, Colleen Hartel
- Project introductions (with potential verbiage to use)

Our Purdue team contracted with the DFW to update and prepare the 2015 SWAP for Indiana. Through the next few months, we will be working closely with the Core Team and the Advisory Team to engage conservation professionals throughout the state and to collect and update wildlife species and habitat information.

One of our objectives for the next few months is to identify threats to the SGCN in Indiana and to prioritize conservation actions for the state in the next 10 years. Therefore, we want to use today's focus group meeting as a scoping process to discuss what potential threats you see as present in Indiana and what conservation actions need to be taken in the next 10 years. At the end of today, we hope to be able to compile a list of potential threats and conservation actions, and we will then use this list to inform the development of a survey questionnaire, which will be administered sometime in May and June.

### ***Participant introductions (with potential verbiage to use)***

Before we get started, let's go around and have everyone in the room briefly introduce him/herself, just your name and organization will be fine. Thank you. We would also like to ask for your permission to audio record our meeting, so we won't miss any important ideas you offer. The recording will be used only for the purpose of updating Indiana's State Wildlife Action Plan. Only the

project team has access to the recording, and no comments will be attributed to specific individuals in any future reports. Please let us know at this time if you do not feel comfortable with us recording our discussion (Note: The facilitator needs to look around the room for consent and if everyone seems to be ok, make sure to conclude that everyone seems ok and we will get started. The facilitator turns on the recorder).

***Ground rules (with potential verbiage to use). Time duration – We hope to complete our discussion today in 90 minutes.***

We have a total of three topics to go through. Under each topic, we have 3 to 5 specific questions that we would like to ask. I will be the facilitator for our discussion to ensure that we cover all the topics and questions and that everybody has an opportunity to share his/her opinions. Time is somewhat limited, so please help keep the discussion going at a good pace.

- Turn-taking – Please be courteous and take turns in speaking. Speak one at a time and allow others to finish their thoughts before commenting.
- Breaks – If you need to use the restroom at any time during the discussion please feel free to do so. The restrooms are located...
- Refreshments – We have (some cookies and drinks) for everybody. Please feel free to help yourself at any time to the refreshments during the course of our discussion.
- Concluding comments – Remember that there are no right or wrong answers, and we expect to hear a wide variety of opinions today. Please feel free to share your ideas. We are eager to hear from everyone in the room. We want to assure you that all the information we collect today will be used for the purpose of updating Indiana's State Wildlife Action Plan only and no personal identity will be revealed in any way.

***Topic 1 – General: Wildlife management and conservation experience – 10 minutes***

Let's start with a general question about your experience with the 2005 State Wildlife Action Plan in Indiana.

1. Who here has been involved in or has used information contained in the 2005 State Wildlife Action Plan?
2. What kind of information do you find useful in the 2005 State Wildlife Action Plan, and what kind of information do you find not useful in the 2005 State Wildlife Action Plan?

***Topic 2 – Threats to Species of Greatest Conservation Need in Indiana – 30 minutes***

Now, I want to switch gears and talk about threats to SGCN in Indiana. Let's start with two general questions and we will then talk about the classification of threats presented in the 2008 Salafsky et al. paper that the Division sent to you a few days ago.

1. Generally speaking, what do you see as immediate threats to Species of Greatest Conservation Need in Indiana? By immediate, we mean in the next 10 years. (Note: Use flip chart to write down threats identified by participants)
2. Generally speaking, what do you see as long-term threats to Species of Greatest Conservation Need in Indiana? By long-term, we mean in the next 10 to 50 years? (Note: Use flip chart to write down threats identified by participants)

Alright, we've talked about some general threats in Indiana. Now I want to bring our discussion to the 2008 Salafsky et al. paper. The Division recommended this paper to us a while back and it

seems to be really helpful for conceptualizing different types of direct threats to biodiversity. You may have already read through Table 1. It groups all potential threats to biodiversity into 11 categories. These 11 categories are presented on the flip chart (Note: The facilitator shows participants the pre-drawn flip chart. See Appendix A for how the flip chart could look like). I would like to go through these categories with you and discuss their applicability to SGCN in Indiana.

1. In your opinion, do we have all these 11 categories of threats in Indiana? If not, which ones are not present or will not be present in Indiana in the next 10 years?
2. In your opinion, are there any additional types of threats not included in these 11 categories but are present or will be present in Indiana in the next 10 years? If yes, what are they?
3. We pretty much agree that we have all these threats in Indiana (Note: The facilitator will point to the ones that have been identified). Could you give us a few examples of the threats that you and/or your organization are particularly concerned about under each of these categories?
4. (Note: If a category has not been discussed much, the facilitator should draw everybody's attention to that category and ask the following question). It seems we have quite some examples for these categories (Note: The facilitator will point to the categories with many examples), but I noticed that we have not talked much about these categories (Note: The facilitator will point to the categories with few examples). Do you still think these types of threats problematic in Indiana? If so, what examples can you give?

### ***Topic 3 – Conservation actions needed in Indiana – 30 minutes***

Alright, after identifying threats to Species of Greatest Conservation Need in Indiana, I want to ask all of you to think about what conservation actions are needed to address these threats. Just like last round, I will ask you one general question and we will then talk about the classification of conservation actions presented in the 2008 Salafsky et al. paper.

1. Generally speaking, what types of conservation actions need to be taken in the next 10 years to protect Species of Greatest Conservation Need and their habitat in Indiana? (Note: Use flip chart to write down actions identified by participants)

Alright, we've talked about some general conservation actions that are needed in Indiana. Now I want to bring our attention once again to the 2008 Salafsky et al. paper. Table 2 groups all potential conservation actions into 7 categories. These 7 categories are presented on the flip chart (Note: The facilitator shows participants the pre-drawn flip chart. See Appendix A for how the flip chart could look like). I would like to go through these categories with you and discuss their applicability in Indiana.

2. In your opinion, do we need all these 7 categories of conservation actions in Indiana? If not, which ones do we not need to worry about in the next 10 years?
3. In your opinion, are there any additional types of conservation actions not included in these 7 categories but will be needed in Indiana in the next 10 years? If yes, what are they?
4. We pretty much agree that we need to take these types of actions in Indiana (Note: The facilitator will point to the ones that have been identified). Could you give us a few examples of the types of actions that you and/or your organization think are particularly important for protecting Species of Greatest Conservation Need in Indiana?
5. (Note: If a category has not been discussed much, the facilitator should draw everybody's attention to that category and ask the following question). It seems we have quite some examples for these categories (Note: The facilitator will point to the categories with many

examples), but I noticed that we have not talked much about these categories (Note: The facilitator will point to the categories with few examples). Do you still think these types of conservation actions are needed in Indiana? If so, what examples can you give?

**Appendix T.** Focus Group Two.

Focus group 2

Date: June 3, 2014

Note taker: Colleen Hartel

**Presentation about species modelling, summary of response questions:**

- What is base habitat?  
National land cover database
- Is there an error matrix?  
At national level
- How is this different from GAP analysis?  
Not model building, more empirical driven, this is more literature based
- Is the aim the same as gap analysis?  
Our aim is to identify a suite of species that give the range of responses to actions and this is a process we're using to get there
- You're using covertypes but there's a mismatch because invasives are important and not included in that information, is that a constraint?  
Yes, that is a constraint, but we could identify regions where it is controlled, we could potentially build in scores of higher/lower depending on where invasives are controlled
- Is there overlap with surrogate?  
There are a whole suite of ways to identify species like this, similar to surrogate species, in the literature
- To get back to the error, what's this mean for edge species that need small adjacencies like ruffed grouse and woodcock?  
You have to believe the edge data, ruffed grouse is a classic species for these modelling, averaging out over broad enough area that the scores are still very meaningful

- A. Any comments/concerns about indicator species selection process, we want your input and feedback about the feasibility of selecting 3-7 to represent needs of SGCN in a region, taking into the big picture
1. What about four-toed salamanders in caves/what about species that do not seem to match the habitat type they are listed under here (i.e. Wood Peewee, black vultures)?
    - Most of this info came from NatureServe and 2005 species list
    - the list is just a starting point
    - we will go through the list and talk about the species on a region by region basis
  2. What do you want from a cave species? Undisturbed? Good quality?
    - Ultimately we're using this to inform actions, so for example, if a species is sensitive to an action in a cave than we can use that as an indicator on how management actions affect all SGCN in that habitat/region
    - We're not really taking a single species approach, and we have to look at these species as an aggregate
  3. You gave a set of criteria for selecting indicator species, I thought one of them was.... So item 3, remove species on a landscape scale.... Does this mean we are not monitoring or are not capable?
    - Not capable
  4. Is there any advantage of having indicator species sensitive to specific actions i.e. fragmentation rather than just habitat change?
    - yes, this is not just about habitat cover types, it's about types of actions and responses to roads, etc.
  5. I was interpreting this not just by indicator species by habitat types but also by threats
    - yes it ultimately comes back to this action perspective, we don't just want habitat though that's an interface for how actions are taken, so not all the actions are habitat based so not all the selection criteria should be habitat based
  6. So no where do I see presence/absence of a species in the process (citing ornate box turtle as an example), should that species not be chosen because it has no ability to widely disperse?
    - This becomes a consideration based on actions
    - (follow up question) it seems like ability to respond to actions would eliminate a lot of aquatics/herps from the list
    - (Another participant adds) What I would toss into that would be that a species like the racer would be an example of something that can respond on the landscape level rather than other species, so if you find x or y species that would be promising, but not the scale you're looking at. I like using the racer as an example or black ratsnakes, because even though some of the endangered species may not be there, it tells me something about that habitat
  7. Are we looking at a response over a 10 year time frame? If you have species that are really immobile than you may not see it with species with small dispersal capacity
    - (another participant) But then the presences of the species still tells something, so a two stage process, this would not protect the immobile species
  8. Would the two stage process have modelling component for these species with restricted needs? Have these two stage process in order to measure that?
    - We're not saying those species are unimportant, we're just envisioning these broadly based actions/scenarios, we're not trying to devalue those (immobile) species as much as just trying to model large landscape changes
  9. So we're assuming that actions that benefit these "large bodied reptiles" benefit these restricted species
    - yes, we're hoping these species carry-along the benefits

10. So what about these specific anthropogenic needs that may not affect the umbrella species but may affect the restricted species?

- as we contemplate the range of actions, we suspect there are actions that will only affect restricted species

11. But why not just make sure the species covers at least most of the taxa?

- right that's what we're trying to do, what are the 20 species that will "carry along" the other species?
- But there may not be that many
- (Another participant) if you are wanting to protect a particular sensitive species, this modelling effort is really not suited to that and what you're working on has value in terms of looking on landscape level biodiversity impacts. I think we're looking at 2 different things, looking for indicators what tells us what's good, what's bad, but that kind of leaves behind the ornate box turtle, we might want to do that under SWAP but that's not modelling
- So yes, we are still updating the species specific information, we're not ignoring those species, this modelling is just a component
- Amanda: this is just a piece of it, but we do want to use it to measure success of this plan, we're not going to not talk about ornate box turtles, but don't lose sight of this perspective
- (Another participant 2) And I think that helps, I think maybe re-clarifying the objectives of this exercise, we're looking at where are the most effective actions are
- Yes, we're trying to look broadly and have a way to rank the broad landscape actions

B. What is the best way to integrate this information together?

1. [Gives explanation of this question, how to combine/sum up these into a metric that we use to evaluate scenario a, b, c, set different thresholds, sum them, etc., does anyone have any strong feelings?]
2. There's a tradeoff between helping threatened species and maximizing biodiversity and I think one approach is to look at that tradeoff, I think you've got a priority, but you have got to look at that tradeoff
3. There are other region wide conservation efforts (like surrogate species, TNC, NRCS) how are those existing conservation efforts being incorporated, making a plea to incorporate those species
  - Yes we have those lists on our radar, if we are talking about a species please share it

## **Region 1. Great Lakes**

A. Habitats of interest

1. Dunes/swells
2. Eastern part, wetlands and lake complexes (Another participant emphasizes the importance of complexes)
3. Savannahs
4. What about things like river ecosystems?
  - building these for aquatic, you're looking at HUCs and upstream data, it's different than terrestrial models
5. Riverine
6. There's a lot of hay and pasture up there but I've got no idea if it's got conservation value
  - Do we really want to be modelling for hay and pasture?
  - It has more value than cultivated land, but if you think about CRP on a ten year scale, it's important
  - So are we going to have a SWAP promoting hay and pasture?
  - Well that's very different than CRP or managed prairie, this just wipes out nesting habitat

- But there might be things that can be taken on a pasture
- And an action might be prevent pasture to go to row crop
- So the question is basically what effects habitat over the next 10 years?
- Would grassland be a better word? Hayland or CRP is kind of a way of management? (participants all seem to agree)

7. Forested lands, wetlands

8. Woody wetlands

9. Lake Michigan

10. I think once we get to actions we'll want to talk about cultivated crops

#### B. Conservation actions

1. Corridor enhancement (emphasized that we need to do a lot of corridor enhancement)

2. Partnering with CRP, CRP is kind of a broad shot, so CRP by itself won't do it

3. Cover crops (going to be in every region), increasing cover crops

4. And even broader than cover crops is soil health

- yes these are kind of threats, so how do we flip it around?
  - Improvement of soil health and water quality through cover crops, tilling
- Two stage ditches, invasive species control
- The obvious one is that we're in a conservation needy part of the world, so just restoring natural habitats, prairies and savannahs, obviously we need to keep what we've got but there's place where we need to restore them
- Wetland complexes that we need to hammer on
- Just to throw out an idea, the forests in the northern part of the state are being hammered by emerald ash borer, conservation action would be diligence and action
  - The actions would be spray for gypsy moth or survey for new pests, and that can be brought to other areas of the state as well
- Keep forests forests
- So then the mirror image of the corridor one is resist fragmentation
- Restricting overuse of ATVs, high speed boating, horses
- The thing that just popped into my head that maybe is worth mentioning are the actions we are think are important, period, today we're working on stuff that we can model and that's important to keep in mind but that doesn't mean they're not important
- I think actions that perpetuate the diversity of forest types (probably for every region)
- Classified forest system is a concrete thing that can be modeled
- Drainage water management, controlling flow and tile drainage
- Deer management

5. Species

- How are you going to determine response by our indicator species or lack thereof? What are you going to do over 10 years?
  - It's not for us to dictate, but in our report we will recommend
- I think Northern Pike was listed last time, we've got 30 years of data, I think we might be able to detect change within the next ten years so, fit criteria for surrogate species

- What about sandhill crane?
    - Isn't monitored very well, there have been some attempts but...
    - But it is capable of being monitored
    - yeah, maybe our recommendation is to start monitoring
    - The sandhill crane has started being breeding in the last half dozen years
  - Just to throw a different kind of species out there, maybe northern leopard frog, they seem to be fairly mobile, they are responding, they're coming back in areas that have appropriate species, they're not as sexy as some of the other species....
  - Does red headed woodpecker make sense for savannah? And what about Karner blue butterfly? Is it too narrow?
    - I would say it's too narrow, too restricted
    - Is there anything else grabbing the sort of dune-y part of the region?
  - The turtles? Those hit the whole regions
    - I think Blanding's is a wonderful indicator species, will it give us any information over the next 10 years?  
No, I'm not going to pitch that yet
  - What about massasauga?
    - That's even more restricted [than turtles]
    - I know FW it's likely to be listed and FWS is trying to ramp up their monitoring protocols
    - The effort is perhaps rising up but, what I'm trying to do just what I'm trying to do with habitats of interest, I'm trying to be conservative, they're good indicators for certain things, but what are we trying to do in assess a decade response, I guess I'm watching to see what kind of species are going to surface what might give us a clear definition of success, in terms of this monitoring effort I'm wondering if these species do the trick? Cause Blanding's turtle you'll see it in several places, oh there's some promise to this area.
  - What about blue spotted salamander?
  - That's complicated by the fact that you're not sure you're actually looking at blue spotted salamander (hybrids), again those are the things, you find them and oh that's nice but will we be able to see a response by our actions over the next ten years
6. I know the park service is undertaking the restoration with the golden-winged warbler as their indicator
  7. For this ten years, are we looking at a statistically defensible impact? So the only thing you need to work in the ten year is that this species will make the model light up differently
    - Given Vicky's question, you can look at modelling exercise with enhancement of wetlands, forests, you can look at what you're doing to benefit the landscape and in that sense I might say Blanding's turtle and massasauga actually work, because you can say you need this, this, and this, we can actually enhance the habitat, and look at that. Now they're going to take their time crawling over there but you can actually look at that
  8. Franklin's ground squirrel
    - But franklin's is restricted, in the west
    - I do know we found them on the TNC property
    - Some of the natural areas south of there, you can't find them
  9. I see red bats highlighted, it meets some of these other criteria, perhaps hoary bats and silver haired for forest
  10. Red eyed vireo
    - yeah red eyed vireo and wood thrush

11. Maybe water thrush for wetlands?
12. What about great blue herons?
  - They're pretty generalists
13. I'd like to suggest more river species, the greater red horse
14. How do you deal with sport fish? The complexing factor of harvest?
15. I just noticed red shouldered hawk has shown up
16. Ellipse (mussel)
17. What about otter or bobcat or stuff like that?
  - For monitoring or an indicator species?
  - Well yeah, just as our carnivore...
18. Quail
  - For birds, we found in our analysis that the extremes forest and prairies, the scrubby intermediates tended to have weaker indicators, [he will share the list]
19. Bobolink
20. Sedge wren
21. Deer (not kidding) maybe increasing hunting is an action because they have such an impact on the ecosystem

## Region 2.

### A. Habitat

1. Prairies/grasslands
2. Forests
3. Grassy/herbaceous wetland
4. Swamps
5. Savannahs
6. Kankakee River
7. Uplands
  - Natural lakes
8. Conservation actions
  - Prairie restoration
  - Altered disturbance regime
  - Changes in hydrology and drainage
  - And back to [participant's] soil health measure
    - That's going to be ubiquitous across the state
  - Invasive species management
  - Stop or reduce conversion to cropland, not sure if that's feasible because prices are going up
  - Is there restoration on the Kankakee itself at this point? I know there was a NWR effort a few years back
    - Yes, it should be on the list restoration of the Kankakee itself

## 9. Species

- Pocket gophers
- Henslow's sparrow
- Red bat
- Little browns
  - We can just... group myotis
- What about badger?
- What about red headed woodpecker?
  - Yeah it's good for both regions?
- I'm going to put Franklin's up for the shining light for grasslands
- Bobwhite
- Grasshopper sparrow and lark sparrow
- Leopard frog
- What about bullsnake?
  - Maybe, yeah, sure. They actually, they're mobile, they're big.
  - Gopher snake
  - They're the same thing essentially
- I think river red horse for aquatic, northern brook lamprey, they cover a different size stream, and I'm going to say three ridge as a mussel, that would be one, it's around but it's not as common
- For getting at size, continuous size of grassland, harrier and short eared owl
- I'm going to throw sandhill crane out here as well
- For the drier side, so maybe something like sedge wren or marsh wren
- I put in snipe for that, it kind of covered that
- Would you put in a leopard frog, we're trying to figure out if northern or plains
- I'd put bell's vireo
- I'd put the double ended arrow for bobwhite and grasshopper sparrow, they're pretty similar
- Yeah pretty similar, you could argue for either, bobwhite's taken more habitat species but they're more of a niche species
- I guess you can put Blanding's turtle on there too,
- So plain's would wetlands, northern would be wetlands and other types
  - I don't know what a plain's leopard frog looks like
  - I think if you modeled its habitat needs, it would show up
- I'm looking at the realistic ability to respond to actions implemented on the ground, we've done a number of wetland restoration activities and we haven't seen any of that for plain's
- It's real response or modelling response
- Northern leopard frog seems to be coming back
- Yeah I've seen the northern come back

10. Yeah there should probably be some sort of waterfowl, like wood duck

11. I've just got a general question, what if the population response you see is totally unrelated to action on the ground, like in the case of white nose and wind?

- Does that change its value as an indicator? Yes, probably because it's being driven extinct regardless of actions being taken on the ground
12. Did people want massasauga? Maybe eastern massasauga for pines, they'll use grassland habitat
  13. Weed shiner, no one knows what it is so no one's going to pick it
  14. Why don't we have .....(inaudible species) just because they can't be monitored?
    - Yeah I was thinking about star nosed mole
  15. Are there any rails and stuff that are particularly happy in that mucky stuff?
    - I think Virginia rails sometimes
  16. I'd like to throw river otter up there

### Region 3.

#### A. Habitat

1. Forest
2. I should point out TNC has kind of written off flat woods as a climate change/corn disaster, there's just no chance of them making a big enough target (what about Muscatatuck flats? That's a different reason, not a flat woods conservation, that's a wetlands target)
3. Riverine
4. Ephemeral wetlands, there's probably still some there (VM: by mistake)
5. Woody wetlands
6. Prairie habitat
7. Agriculture
8. Are there caves in there?
  - Yes there are two different sets of caves in this region
9. Big oaks is in it, the big green rectangle
10. Big rivers
11. There are also siltstone glades, this is laid out differently from the ecoregions I'm used to
12. Absolutely barrens and glades
13. Well getting back to rivers, I think there's a difference between the white water, blue, and the Ohio, so up on top is the Wabash
  - I don't even think of the Ohio in this
  - Yeah there's not that much you can do with the Ohio in this one
  - Actually 5 only has the Ohio
14. Are the knobs in there?
  - No, the knobs are in 5
15. The Appalachian low elevation glades, they're in 3 and 5 but the knobs are in 5
16. How do you address the urban context? Especially in this area?
  - Do you want to put urban up as a habitat then?
  - But then you get back to the point, urban and row crop are going to be in the models, you're going to be that in the model, does that mean you want to call it a habitat of interest

- Well I think then you just have to go back to that point where it's like, the objectives are going to be different in that are, urban does have... is an opportunity. If you just make a black space for urban you lose any opportunity for urban conservation
- Meaningful conservation or feel good?
- Amanda: there are SGCN in developed lands, and I know it's the kind of work a lot of us think of doing, but when we do not discuss the urban environment, we do lose that chance to engage groups we would otherwise be cutting off
- The reason I push back is because I want to tease out what we mean in habitat of interest, row crop, urban, those are all things that would come in as factors, so what I am not suggesting is that we would not use these as factors, but they're also going to come in on other parts of the SWAP, conservation actions and outreach in urban areas is crucial, but is it crucial in urban areas?
- But you need to have models in urban areas in order to make these decisions?
- Is this particular habitat important to this whole long list? When you think about habitat of interest you think about the majority of those species
- Maybe the question [another participant] is asking is we're looking at the abundance and distribution of wildlife, what roles does wildlife have in this, and how much can we manipulate this
- BK: Yeah, I'm very interested in urban corridor construction, etc., but what I'm looking at is what's going to be useful for the model

#### 17. Conservation actions

- Deer population management SH
- Reforestation
- Connectivity, corridors
- Urban green infrastructure here and cross it off above
- Drainage improvement
  - These all have to deal with water quality, kind of overlapping
- Cat control
- Keeping forests forests
- Fighting fragmentation of natural habitats
- Focused CRP projects
- Prairie biomass, biofuels (switchgrass)
- Forest management
- Land preservation/acquisition
- Are there restrictions on what groups of animals we consider? I was thinking about pollinators in an agricultural landscape as they are of great concern, we can just put it up there and use it later to figure out and build models

#### 18. Species

- Cerulean warbler
- Pollinators
- Wood frog
- Henslow's sparrow

- The one thing we haven't talked about, we've got a couple of species.... This region is important for migration. How do they fit in? Species that are not resident or breeding here?
  - The question is how well will a species that is using Indiana for a stopover carrying other species with them? It may be that in their stop over they might be showing a critical response to actions
- There's a great deal of drainage management for American golden plover
- Smith's longspur
- Red bat
- Kirtland's snake
  - Really not a fun thing to try and monitor
- Eastern gray squirrel and southern flying squirrel
- Peregrine falcons
- Two lined salamander
- With a species like northern leopard frog because there's so much human habitation and pollution, would that be a good indicator species?
  - We're kind of messing with them already
- What about cricket frog?
  - Cricket frog might be problematic, what about gray ratsnake?
- Quail
- I got some aquatics, blue breast darter, eastern sand darter (completely different habitats), small mouth bass, sauger, kidneyshell, clubshell
- Kentucky warbler
- This region is really big, so I'd say franklin's ground squirrel again
- Ruffed grouse
- Copper bellied watersnake in the south part especially
- This is a bigger planning region, so we may have more
- Do we have any glade butterflies? Ask John Shuey about it

#### **Region 4.**

##### **A. Habitat**

1. Forest
2. Riparian zones, riverine
3. Oxbows
4. River bottoms
5. Grasslands, reclaimed from coal mining
6. Wooded wetlands
7. Emergent wetlands
8. Sandy scrub/shrub
9. Flatwoods
10. Cypress swamp

11. Coal mining (affects species but not a habitat of interest, a big part of this region)
12. Abandoned coal mines, an action might be restore these
13. Does the division deal with those final cut/spoiled lakes and ponds? Acid drainage that's a bad thing
14. Cane breaks

B. Conservation Actions

1. Mine reclamation, conservation coverage (too much going to ag)
2. Keep grasslands grassland
3. River corridors connections
4. Restoration of aquatics, oxbows
5. Conservation of woody bottomlands
6. Two stage ditches
7. Wetland restoration, goose pond is in this area
8. Soil health

A. Species

1. Crawfish frogs
2. Cerulean warbler
3. Eastern spadefoot
4. Interior least tern
5. Hooded warbler
6. American woodcock
7. Northern bobwhite
8. Eastern box turtle
9. Red bat
10. Pileated woodpecker
11. Northern harrier (JC: I mean it's a wintering bird, better than short eared owl)
12. Copper bellied watersnake
13. Swamp rabbit
14. Loggerhead shrikes? (agreed)
15. Cricket frog? Spotted salamander
16. Flying squirrel
17. Wood frog
18. Myotis in general
19. Eastern Pipistrelle
20. Yellow Throated Warbler
21. Northern Parula
22. Northern hogsucker
23. What about some of the bigger river fish? Not sure if they will respond in 10 years, but you can project habitat and not actually have a response that you can see in 10 years
24. Blue sucker
25. Red spotted sunfish for oxbows
26. Flier

27. Wood thrush
28. Fat pocketbook (mussel)
29. Dickcissel
30. Six lined racerunner (for sandy scrub)
31. King rail for emergent wetlands
32. Channel catfish

## **Region 5.**

### **A. Habitat**

1. Hardwood forest
2. Caves
3. Glades and barrens
4. Rivers
5. Grasslands
6. Reservoirs?
7. I was going to add onto caves as caves/karst sinkholes for some aquatic species
8. Cliffs
9. Wooded wetlands, I'm really after vernal pools but woody wetlands will capture it
10. Shrub/scrub

### **B. Conservation Actions**

1. Keeping forests and forests
2. Keep Karsts and caves clean for water quality
3. Protect recharge areas, but in terms of getting to know what's coming in/going out can you model that? Know/understand first
4. Preserve/manage forest
5. Limit fragmentation or unfragment
6. Prescribed fire is important in this area, reestablish fire regime
7. Forest opening creation (VM: with great care)
8. Invasive management
9. Deer management
10. Manage for oak hickory
11. Land acquisition
12. Soil health
13. Nutrient management because of the karst especially

### **C. Species**

1. Eastern spadefoot
2. Ruffed grouse
3. Wood frog
4. Wood thrush
5. Cerulean warbler
6. Hoosier cave fish

7. Hellbender
8. Cave fish
9. Red shouldered hawk
10. Bald eagle
11. Eastern box turtle
12. Whip poor will
13. Wood rat
14. Green salamander
15. Timber rattlesnake
16. Red bat/myotis spp. In general
17. Copperhead (covers more area than timber rattlesnake)
18. Prairie warbler
19. Hooded warbler
20. Pileated woodpecker
21. Worm eating warbler
22. Ovenbird
23. Elephant ear mussel
24. Louisiana water thrush
25. Northern bobwhite
26. River otter
27. Paddlefish
28. Sauger
29. Spotted darter
30. Northern slimy salamander
31. Longtail salamander
32. Cave animal/Cave millipede/cave invertebrate
33. Cave salamander
34. Smoky shrew
35. Pygmy shrew
36. Ohio pigtoe mussel
37. Bobcat? It is more of a forest farmland mix
  - I don't think it's a good indicator species, their niche breadth is too wide
  - If you start modeling it away from urban landscapes, it may not be clear
38. Racer might actually be statewide but might sort out differently by region, this species will show up across the state, if you don't want to have at least some species that are state wide, that we envision have some common species.... It provides an example of something where you can be in an area where it used to occur
39. Eastern chipmunk, good indicator of how well oak hickory is doing
40. Turkey? Does it get into the oak?
  - They certainly eat acorns, I don't know if their populations have been shown to respond to oak increase
41. Lake sturgeon

## **Additions/subtractions**

- A. Region 1
- B. Region 2
- C. Region 3
- D. Region 4
  - 1. Add beavers for region 4
- A. Region 5
  - 1. Beavers
  - 2. General comments
  - 3. Add racer to every section
  - 4. Participant about what another was looking at in red bat, he wanted to look at forest bat, but says northern (long eared) would be better
  - 5. Beavers have a lot of back water, lot of amphibians

## Focus Group 2 Flip Chart Species

Species	SGCN	Class	Taxon	Region 1	Region 2	Region 3	Region 4	Region 5	Comments
Alder Flycatcher	No	Terrestrial	Birds	1	0	0	0	0	
Black Tern	Yes	Terrestrial	Birds	1	0	0	0	0	
Blanding's Turtle	Yes	Terrestrial	Reptiles	1	1	0	0	0	May have a slower dispersal rate than ideal indicator species
Blue-spotted Salamander	Yes	Terrestrial	Amphibians	1	0	0	0	0	Question about meeting criteria, actual identification may be hard because of hybrids
Bobcat	No	Terrestrial	Mammals	1	0	0	1	0	Maybe not a good indicator species
Bobolink	No	Terrestrial	Birds	1	0	0	0	0	
Common Gallinule	Yes	Terrestrial	Birds	1	0	0	0	0	
Eastern Massasauga	Yes	Terrestrial	Reptiles	1	1	0	0	0	
Ellipse	Yes	Aquatic	Mussels	1	0	0	0	0	
Field Sparrow	No	Terrestrial	Birds	1	0	0	0	0	
Franklin's Ground Squirrel	Yes	Terrestrial	Mammals	1	1	1	0	0	Restricted in Region 1
Golden-winged Warbler	Yes	Terrestrial	Birds	1	0	0	0	0	Park service monitoring
Greater Redhorse	Yes	Aquatic	Fish	1	0	0	0	0	
Least Flycatcher	No	Terrestrial	Birds	1	0	0	0	0	
Marsh Wren	Yes	Terrestrial	Birds	1	0	0	0	0	
Northern Bobwhite	No	Terrestrial	Birds	1	1	1	1	1	Question about meeting criteria, could also use Grasshopper Sparrow in Region 2
Northern Leopard Frog	Yes	Terrestrial	Amphibians	1	1	1	0	0	Could also use plains leopard frog in Region 2, group seemed to be leaning towards this species in region 2, may be affected by

									pollution
<b>Northern Pike</b>	No	Aquatic	Fish	1	0	0	0	0	
<b>Northern Waterthrush</b>	No	Terrestrial	Birds	1	0	0	0	0	
<b>Racer</b>	No	Terrestrial	Reptiles	1	1	1	1	1	Brought up for it's state-wide ability
<b>Red Bat</b>	Yes	Terrestrial	Mammals	1	1	1	1	1	
<b>Red-eyed Vireo</b>	No	Terrestrial	Birds	1	0	0	0	0	
<b>Red-headed Woodpecker</b>	No	Terrestrial	Birds	1	1	0	0	0	
<b>River Otter</b>	No	Terrestrial	Mammals	1	1	0	0	1	
<b>Sandhill Crane</b>	Yes	Terrestrial	Birds	1	1	0	0	0	
<b>Southern Bog Lemming</b>	No	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Star-nosed Mole</b>	Yes	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Veery</b>	No	Terrestrial	Birds	1	0	0	0	0	
<b>White-tailed Deer</b>	No	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Wood Thrush</b>	No	Terrestrial	Birds	1	0	0	1	1	
<b>Allegheny Woodrat</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>American Beaver</b>	No	Terrestrial	Mammals	0	0	0	1	1	Added after discussion/during final comments
<b>American Golden-plover</b>	Yes	Terrestrial	Birds	0	0	1	0	0	Maybe not good indicator because only uses IN as stopover habitat
<b>American Woodcock</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Badger</b>	Yes	Terrestrial	Mammals	0	1	0	0	0	
<b>Bald Eagle</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Bell's Vireo</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Black Rat Snake</b>	No	Terrestrial	Reptiles	0	0	1	0	0	
<b>Blue Sucker</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Bluebreast Darter</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Bullsnake</b>	No	Terrestrial	Reptiles	0	1	0	0	0	
<b>Butterfly</b>	Unknown	Terrestrial	Invertebrates	0	0	1	0	0	Need a species associated with glades
<b>Cave Millipede</b>	Yes	Terrestrial	Invertebrates	0	0	0	0	1	
<b>Cave Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Cerulean Warbler</b>	Yes	Terrestrial	Birds	0	0	1	1	1	

<b>Channel Catfish</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Clubshell</b>	Yes	Aquatic	Mussels	0	0	1	0	0	
<b>Copperbelly Water Snake</b>	Yes	Terrestrial	Reptiles	0	0	1	1	0	Southern part of Region 3
<b>Crawfish Frog</b>	Yes	Terrestrial	Amphibians	0	0	0	1	0	
<b>Dickcissel</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Eastern Box Turtle</b>	Yes	Terrestrial	Reptiles	0	0	0	1	1	
<b>Eastern Chipmunk</b>	No	Terrestrial	Mammals	0	0	0	0	1	
<b>Eastern Gray Squirrel</b>	No	Terrestrial	Mammals	0	0	1	0	0	
<b>Eastern Sand Darter</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Eastern Spadefoot</b>	No	Terrestrial	Amphibians	0	0	0	1	1	
<b>Eastern Whip-poor-will</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Elephantear</b>	No	Aquatic	Mussels	0	0	0	0	1	
<b>Fat Pocketbook</b>	Yes	Aquatic	Mussels	0	0	0	1	0	
<b>Flier</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Grasshopper Sparrow</b>	No	Terrestrial	Birds	0	1	0	0	0	Alternative to Northern Bobwhite in Region 2
<b>Green Salamander</b>	Yes	Terrestrial	Amphibians	0	0	0	0	1	
<b>Hellbender</b>	Yes	Aquatic	Amphibians	0	0	0	0	1	
<b>Henslow's Sparrow</b>	Yes	Terrestrial	Birds	0	1	1	0	0	
<b>Hooded Warbler</b>	Yes	Terrestrial	Birds	0	0	0	1	1	
<b>Indiana Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Kentucky Warbler</b>	No	Terrestrial	Birds	0	0	1	0	0	
<b>Kidneyshell</b>	Yes	Aquatic	Mussels	0	0	1	0	0	
<b>King Rail</b>	Yes	Terrestrial	Birds	0	0	0	1	0	
<b>Kirtland's Snake</b>	Yes	Terrestrial	Reptiles	0	0	1	0	0	Not easy to monitor
<b>Lake Sturgeon</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Lark Sparrow</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Least Tern</b>	Yes	Terrestrial	Birds	0	0	0	1	0	
<b>Little Brown Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Loggerhead Shrike</b>	Yes	Terrestrial	Birds	0	0	0	1	0	

<b>Longtail Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Louisiana Waterthrush</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Northern Brook Lamprey</b>	Yes	Aquatic	Fish	0	1	0	0	0	Covers different stream size than river red horse
<b>Northern Cavefish</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Northern Copperhead</b>	No	Terrestrial	Reptiles	0	0	0	0	1	Covers more area than timber rattlesnake in region 5
<b>Northern Cricket Frog</b>	Yes	Terrestrial	Amphibians	0	0	1	1	0	Region 3, may not be the best species, proposed gray ratsnake as an alternative herp
<b>Northern Harrier</b>	Yes	Terrestrial	Birds	0	1	0	1	0	
<b>Northern Hogsucker</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Northern Long-eared Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Northern Parula</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Northern Slimy Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Ohio Pigtoe</b>	Yes	Aquatic	Mussels	0	0	0	0	1	
<b>Ovenbird</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Paddlefish</b>	No	Aquatic	Fish	0	0	0	0	1	
<b>Peregrine Falcon</b>	Yes	Terrestrial	Birds	0	0	1	0	0	
<b>Pileated Woodpecker</b>	No	Terrestrial	Birds	0	0	0	1	1	
<b>Plains Leopard Frog</b>	Yes	Terrestrial	Amphibians	0	1	0	0	0	Could also use northern leopard frog in Region 2, group seemed to be leaning towards northern leopard frog in region 2
<b>Plains Pocket Gopher</b>	Yes	Terrestrial	Mammals	0	1	0	0	0	
<b>Pollinators</b>	Unknown	Terrestrial	Invertebrates	0	0	1	0	0	Honeybees?
<b>Prairie Warbler</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Pygmy Shrew</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>Red-shouldered Hawk</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Redspotted Sunfish</b>	No	Aquatic	Fish	0	0	0	1	0	

<b>River Redhorse</b>	No	Aquatic	Fish	0	1	0	0	0	Covers different stream size than northern lamprey
<b>Ruffed Grouse</b>	No	Terrestrial	Birds	0	0	1	0	1	Question about meeting criteria
<b>Sauger</b>	No	Aquatic	Fish	0	0	1	0	1	
<b>Sedge Wren</b>	Yes	Terrestrial	Birds	0	1	0	0	0	Could also use Wilson's snipe in Region 2
<b>Short-eared Owl</b>	Yes	Terrestrial	Birds	0	1	0	0	0	
<b>Shovelnose Sturgeon</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Six-lined Racerunner</b>	No	Terrestrial	Reptiles	0	0	0	1	0	
<b>Smallmouth Bass</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Smith's Longspur</b>	No	Terrestrial	Birds	0	0	1	0	0	Maybe not good indicator because only uses IN as stopover habitat
<b>Smoky Shrew</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>Southern Flying Squirrel</b>	No	Terrestrial	Mammals	0	0	1	1	0	
<b>Spotted Darter</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Spotted Salamander</b>	No	Terrestrial	Amphibians	0	0	0	1	0	
<b>Swamp Rabbit</b>	Yes	Terrestrial	Mammals	0	0	0	1	0	
<b>Threeridge</b>	No	Aquatic	Mussels	0	1	0	0	0	
<b>Timber Rattlesnake</b>	Yes	Terrestrial	Reptiles	0	0	0	0	1	
<b>Tri-colored Bat</b>	Yes	Terrestrial	Mammals	0	0	0	1	1	
<b>Two-lined Salamander</b>	No	Terrestrial	Amphibians	0	0	1	0	0	
<b>Virginia Rail</b>	Yes	Terrestrial	Birds	0	1	0	0	0	
<b>Weed Shiner</b>	No	Aquatic	Fish	0	1	0	0	0	
<b>Wild Turkey</b>	No	Terrestrial	Birds	0	0	0	0	1	Question about meeting criteria
<b>Wilson's Snipe</b>	No	Terrestrial	Birds	0	1	0	0	0	Could also use sedge wren in Region 2
<b>Wood Duck</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Wood Frog</b>	No	Terrestrial	Amphibians	0	0	1	1	1	
<b>Worm-eating Warbler</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Yellow-throated Warbler</b>	No	Terrestrial	Birds	0	0	0	1	0	

Species	SGCN	Class	Taxon	Region 1	Region 2	Region 3	Region 4	Region 5	Comments
Alder Flycatcher	No	Terrestrial	Birds	1	0	0	0	0	
Black Tern	Yes	Terrestrial	Birds	1	0	0	0	0	
Blanding's Turtle	Yes	Terrestrial	Reptiles	1	1	0	0	0	May have a slower dispersal rate than ideal indicator species
Blue-spotted Salamander	Yes	Terrestrial	Amphibians	1	0	0	0	0	Question about meeting criteria, actual identification may be hard because of hybrids
Bobcat	No	Terrestrial	Mammals	1	0	0	1	0	Maybe not a good indicator species
Bobolink	No	Terrestrial	Birds	1	0	0	0	0	
Common Gallinule	Yes	Terrestrial	Birds	1	0	0	0	0	
Eastern Massasauga	Yes	Terrestrial	Reptiles	1	1	0	0	0	
Ellipse	Yes	Aquatic	Mussels	1	0	0	0	0	
Field Sparrow	No	Terrestrial	Birds	1	0	0	0	0	
Franklin's Ground Squirrel	Yes	Terrestrial	Mammals	1	1	1	0	0	Restricted in Region 1
Golden-winged Warbler	Yes	Terrestrial	Birds	1	0	0	0	0	Park service monitoring
Greater Redhorse	Yes	Aquatic	Fish	1	0	0	0	0	
Least Flycatcher	No	Terrestrial	Birds	1	0	0	0	0	
Marsh Wren	Yes	Terrestrial	Birds	1	0	0	0	0	
Northern Bobwhite	No	Terrestrial	Birds	1	1	1	1	1	Question about meeting criteria, could also use Grasshopper Sparrow in Region 2
Northern Leopard Frog	Yes	Terrestrial	Amphibians	1	1	1	0	0	Could also use plains leopard frog in Region 2, group seemed to be leaning towards this species in region 2, may be affected by pollution
Northern Pike	No	Aquatic	Fish	1	0	0	0	0	
Northern Waterthrush	No	Terrestrial	Birds	1	0	0	0	0	
Racer	No	Terrestrial	Reptiles	1	1	1	1	1	Brought up for it's state-wide ability
Red Bat	Yes	Terrestrial	Mammals	1	1	1	1	1	
Red-eyed Vireo	No	Terrestrial	Birds	1	0	0	0	0	
Red-headed Woodpecker	No	Terrestrial	Birds	1	1	0	0	0	
River Otter	No	Terrestrial	Mammals	1	1	0	0	1	

<b>Sandhill Crane</b>	Yes	Terrestrial	Birds	1	1	0	0	0	
<b>Southern Bog Lemming</b>	No	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Star-nosed Mole</b>	Yes	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Veery</b>	No	Terrestrial	Birds	1	0	0	0	0	
<b>White-tailed Deer</b>	No	Terrestrial	Mammals	1	0	0	0	0	Question about meeting criteria
<b>Wood Thrush</b>	No	Terrestrial	Birds	1	0	0	1	1	
<b>Allegheny Woodrat</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>American Beaver</b>	No	Terrestrial	Mammals	0	0	0	1	1	Added after discussion/during final comments
<b>American Golden-plover</b>	Yes	Terrestrial	Birds	0	0	1	0	0	Maybe not good indicator because only uses IN as stopover habitat
<b>American Woodcock</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Badger</b>	Yes	Terrestrial	Mammals	0	1	0	0	0	
<b>Bald Eagle</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Bell's Vireo</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Black Rat Snake</b>	No	Terrestrial	Reptiles	0	0	1	0	0	
<b>Blue Sucker</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Bluebreast Darter</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Bullsnake</b>	No	Terrestrial	Reptiles	0	1	0	0	0	
<b>Butterfly</b>	Unknown	Terrestrial	Invertebrates	0	0	1	0	0	Need a species associated with glades
<b>Cave Millipede</b>	Yes	Terrestrial	Invertebrates	0	0	0	0	1	
<b>Cave Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Cerulean Warbler</b>	Yes	Terrestrial	Birds	0	0	1	1	1	
<b>Channel Catfish</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Clubshell</b>	Yes	Aquatic	Mussels	0	0	1	0	0	
<b>Copperbelly Watersnake</b>	Yes	Terrestrial	Reptiles	0	0	1	1	0	Southern part of Region 3
<b>Crawfish Frog</b>	Yes	Terrestrial	Amphibians	0	0	0	1	0	
<b>Dickcissel</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Eastern Box Turtle</b>	Yes	Terrestrial	Reptiles	0	0	0	1	1	
<b>Eastern Chipmunk</b>	No	Terrestrial	Mammals	0	0	0	0	1	
<b>Eastern Gray Squirrel</b>	No	Terrestrial	Mammals	0	0	1	0	0	
<b>Eastern Sand Darter</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Eastern Spadefoot</b>	No	Terrestrial	Amphibians	0	0	0	1	1	
<b>Eastern Whip-poor-will</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Elephantear</b>	No	Aquatic	Mussels	0	0	0	0	1	

<b>Fat Pocketbook</b>	Yes	Aquatic	Mussels	0	0	0	1	0	
<b>Flier</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Grasshopper Sparrow</b>	No	Terrestrial	Birds	0	1	0	0	0	Alternative to Northern Bobwhite in Region 2
<b>Green Salamander</b>	Yes	Terrestrial	Amphibians	0	0	0	0	1	
<b>Hellbender</b>	Yes	Aquatic	Amphibians	0	0	0	0	1	
<b>Henslow's Sparrow</b>	Yes	Terrestrial	Birds	0	1	1	0	0	
<b>Hooded Warbler</b>	Yes	Terrestrial	Birds	0	0	0	1	1	
<b>Indiana Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Kentucky Warbler</b>	No	Terrestrial	Birds	0	0	1	0	0	
<b>Kidneyshell</b>	Yes	Aquatic	Mussels	0	0	1	0	0	
<b>King Rail</b>	Yes	Terrestrial	Birds	0	0	0	1	0	
<b>Kirtland's Snake</b>	Yes	Terrestrial	Reptiles	0	0	1	0	0	Not easy to monitor
<b>Lake Sturgeon</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Lark Sparrow</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Least Tern</b>	Yes	Terrestrial	Birds	0	0	0	1	0	
<b>Little Brown Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Loggerhead Shrike</b>	Yes	Terrestrial	Birds	0	0	0	1	0	
<b>Longtail Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Louisiana Waterthrush</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Northern Brook Lamprey</b>	Yes	Aquatic	Fish	0	1	0	0	0	Covers different stream size than river red horse
<b>Northern Cavefish</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Northern Copperhead</b>	No	Terrestrial	Reptiles	0	0	0	0	1	Covers more area than timber rattlesnake in region 5
<b>Northern Cricket Frog</b>	Yes	Terrestrial	Amphibians	0	0	1	1	0	Region 3, may not be the best species, proposed gray ratsnake as an alternative herp
<b>Northern Harrier</b>	Yes	Terrestrial	Birds	0	1	0	1	0	
<b>Northern Hogsucker</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Northern Long-eared Myotis</b>	Yes	Terrestrial	Mammals	0	1	1	1	1	Myotis spp. May not be good indicator species because of white-nose effects
<b>Northern Parula</b>	No	Terrestrial	Birds	0	0	0	1	0	
<b>Northern Slimy Salamander</b>	No	Terrestrial	Amphibians	0	0	0	0	1	
<b>Ohio Pigtoe</b>	Yes	Aquatic	Mussels	0	0	0	0	1	

<b>Ovenbird</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Paddlefish</b>	No	Aquatic	Fish	0	0	0	0	1	
<b>Peregrine Falcon</b>	Yes	Terrestrial	Birds	0	0	1	0	0	
<b>Pileated Woodpecker</b>	No	Terrestrial	Birds	0	0	0	1	1	
<b>Plains Leopard Frog</b>	Yes	Terrestrial	Amphibians	0	1	0	0	0	Could also use northern leopard frog in Region 2, group seemed to be leaning towards northern leopard frog in region 2
<b>Plains Pocket Gopher</b>	Yes	Terrestrial	Mammals	0	1	0	0	0	
<b>Pollinators</b>	Unknown	Terrestrial	Invertebrates	0	0	1	0	0	Honeybees?
<b>Prairie Warbler</b>	No	Terrestrial	Birds	0	0	0	0	1	
<b>Pygmy Shrew</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>Red-shouldered Hawk</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Redspotted Sunfish</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>River Redhorse</b>	No	Aquatic	Fish	0	1	0	0	0	Covers different stream size than northern lamprey
<b>Ruffed Grouse</b>	No	Terrestrial	Birds	0	0	1	0	1	Question about meeting criteria
<b>Sauger</b>	No	Aquatic	Fish	0	0	1	0	1	
<b>Sedge Wren</b>	Yes	Terrestrial	Birds	0	1	0	0	0	Could also use Wilson's snipe in Region 2
<b>Short-eared Owl</b>	Yes	Terrestrial	Birds	0	1	0	0	0	
<b>Shovelnose Sturgeon</b>	No	Aquatic	Fish	0	0	0	1	0	
<b>Six-lined Racerunner</b>	No	Terrestrial	Reptiles	0	0	0	1	0	
<b>Smallmouth Bass</b>	No	Aquatic	Fish	0	0	1	0	0	
<b>Smith's Longspur</b>	No	Terrestrial	Birds	0	0	1	0	0	Maybe not good indicator because only uses IN as stopover habitat
<b>Smoky Shrew</b>	Yes	Terrestrial	Mammals	0	0	0	0	1	
<b>Southern Flying Squirrel</b>	No	Terrestrial	Mammals	0	0	1	1	0	
<b>Spotted Darter</b>	Yes	Aquatic	Fish	0	0	0	0	1	
<b>Spotted Salamander</b>	No	Terrestrial	Amphibians	0	0	0	1	0	
<b>Swamp Rabbit</b>	Yes	Terrestrial	Mammals	0	0	0	1	0	
<b>Threeridge</b>	No	Aquatic	Mussels	0	1	0	0	0	
<b>Timber Rattlesnake</b>	Yes	Terrestrial	Reptiles	0	0	0	0	1	
<b>Tri-colored Bat</b>	Yes	Terrestrial	Mammals	0	0	0	1	1	
<b>Two-lined Salamander</b>	No	Terrestrial	Amphibians	0	0	1	0	0	
<b>Virginia Rail</b>	Yes	Terrestrial	Birds	0	1	0	0	0	
<b>Weed Shiner</b>	No	Aquatic	Fish	0	1	0	0	0	

<b>Wild Turkey</b>	No	Terrestrial	Birds	0	0	0	0	1	Question about meeting criteria
<b>Wilson's Snipe</b>	No	Terrestrial	Birds	0	1	0	0	0	Could also use sedge wren in Region 2
<b>Wood Duck</b>	No	Terrestrial	Birds	0	1	0	0	0	
<b>Wood Frog</b>	No	Terrestrial	Amphibians	0	0	1	1	1	
<b>Worm-eating Warbler</b>	Yes	Terrestrial	Birds	0	0	0	0	1	
<b>Yellow-throated Warbler</b>	No	Terrestrial	Birds	0	0	0	1	0	

	Region 1	Region 2	Region 3	Region 4	Region 5
<b>Habitat types of interest</b>	Dunes/Swales	Forests	Appalachian, low-elevation mixed forests	Abandoned mines	Barrens
	Eastern wetland/Lake complexes	Kankakee River	Barrens	Canebreaks	Caves/Karst-sinkholes
	Forests (in western area)	Natural Lakes	Caves	Cypress swamps	Cliffs/rock outcrops
	Grasslands	Pgrassy/Herbaceous wetlands	Cropland	Flatwoods	Glades
	Lake Michigan	Prairies/Grasslands	Forests	Forests	Grasslands
	Riverine	Savannahs	Prairies	Grasslands (reclaimed)	Hardwood forests
	Savannahs	Swamps	Riverine (Wabash and interior)	Lakes/ponds experiencing acid drainage	Reservoirs
	Wetlands - woody		Siltstone glades	Oxbows/Sloughs/River bottoms	Rivers
			Wetlands - ephemeral	Riparian zones	Shrub/Scrub
			Wetlands - woody	Riverine	Wetlands - Woody
				Shrub/Scrub	
				Wetlands - emergent	
			Wetlands - woody		
<b>Conservation Actions</b>	Control forest pests	Altered disturbance regimes	Cat control	Alter disturbance regime (grasslands)	Create forest openings
	Control invasives	Change hydrology/drainage	Corridor enhancement	Corridor enhancement (including river connectivity)	Deer management
	Restore prairie/savannah	Improve soil health through covercrops/tilling practices	CRP projects	Ditch maintenance	Improve soil health through covercrops/tilling practices
	Corridor enhancement	Manage invasive species	Deer management	Improve soil health through covercrops/tilling practices	Improve water quality (especially for caves/drainage)
	CRP partnerships	Preserve forests	Drainage management	Improve water quality	Land acquisition
	Deer management	Reduce conversion to cropland	Forest management	Mine reclamation	Manage forests
	Ditch maintenance	Restore Kankakee river	Green infrastructure	Preserve forests	Manage invasive species
	Drainage management	Restore prairie/savannah	Improve soil health through covercrops/tilling practices	Preserve woody bottomlands	Nutrient management
Expand		Improve water quality	Restore oxbows	Preserve forests	

classified forest proram				
Improve water quality		Land acquisition	Restore wetlands	Protect recharge areas
Improve soil health through covercrops/tilling practices		Mangage prairie biofuels (switchgrass)		Reduce fragementation
Promote a diversity of forest types		Preserve forests		Resetablish fire regimes
Reduce fragmentation		Reduce fragementation		
Restrict recreational overuse (i.e. high speed boating)		Reforestation		

## Focus Group 2 Protocol

### Indiana SWAP Focus Group 2 Protocol

For project titled *Integrating Ecological, Landscape and Social Information for Wildlife Conservation and Management in Indiana*

#### **GREETINGS/INTRODUCTION/GROUND RULES – 10 minutes**

- Welcome and thank you for taking the time to participate in this focus group meeting
- Project team introductions (Note: The same handout used in Focus Group 1 with our contact information added will be distributed before the meeting starts.)

PI: Pat Zollner

Co-PI: Rob Chapman, Vanessa Quinn, Zhao Ma

Research Assistants: Rita Blythe, Colleen Hartel

- Project/focus group introductions (with potential verbiage to use)

*As many of you may know, a few of us from Purdue contracted with the Division of Fish and Wildlife to prepare the 2015 State Wildlife Action Plan for Indiana. Through the next few months, we will be working closely with the Division to engage conservation professionals throughout the state and to collect and update wildlife species and habitat information.*

*Today, our goal is to solicit your professional inputs and to **create a pool of 15 to 20 candidate indicator species for each of the five planning regions in Indiana in order to build some landscape-level habitat models.** This focus group meeting will last till about 2 pm, with a 40-minute lunch break around noon. We will begin with a brief presentation of background information on landscape-level habitat models and the purpose of indicator species by Dr. Pat Zollner. We will then go through five segments, each focusing on a common set of three questions.*

*At the end of today, we hope to be able to create a pool of candidate indicator species for each planning region, and we will then solicit feedback on these candidate indicator species from the broader community of technical experts in each planning region in an upcoming internet survey later this month. Eventually, we hope to identify three to seven indicator species that best represent the needs of SGCN for each planning region.*

- Participant introductions (with potential verbiage to use)

*Before we get started, let's go around and have everyone in the room briefly introduce him/herself. Just your name and organization will be fine.*

*Thank you. We would also like to ask for your permission to audio record our meeting, so we won't miss any important ideas you offer. The recording will be used only for the purpose of updating Indiana's State Wildlife Action Plan. Only the project team has access to the recording, and no comments will be attributed to specific individuals in any future reports. Please let us know at this time if you do not feel comfortable with us recording our discussion (Note: The facilitator needs to look around the room for consent and if everyone seems to be ok, make sure to conclude that everyone seems ok and we will get started. The facilitator turns on the recorder).*

- Ground rules (with potential verbiage to use)

o Time duration – *We hope to go through Regions 1 to 3 this morning and Regions 4 to 5 this afternoon, so time is somewhat limited. Please help keep the discussion going at a good pace.*

- *Breaks – If you need to use the restroom at any time during the discussion please feel free to do so. The restrooms are located...*
- *Refreshments/lunch – We have (some cookies and drinks) for everybody. Please feel free to help yourself at any time to the refreshments during the course of our discussion. We will take a 40-minute lunch break, and lunch will be provided here in this room.*
- *Concluding comments – Remember that there are no right or wrong answers, and we expect to hear a wide variety of opinions today. Please feel free to share your ideas. We are eager to hear from everyone in the room.*

### **TOPIC 1 – Introduction to indicator species and landscape-level habitat modeling process – 60 minutes**

*Now, I am going to turn to Dr. Pat Zollner for an introduction of the concept of indicator species and the landscape-level habitat modeling process. We will then discuss two questions about the indicator species selection process itself and the subsequent process of synthesizing landscape-level habitat modeling results across indicator species.*

#### **Presentation given by Dr. Pat Zollner (15 minutes)**

1. Based on Dr. Zollner's presentation and what you read in the handouts that we distributed prior to today's meeting, what are your comments and/or concerns with respect to the indicator species selection process that was described to you? (30 minutes)

*Let's move beyond selecting and modeling individual indicator species. After selecting a set of indicator species for each planning region and modeling the response of each indicator species to potential conservation action scenarios, we will then need to integrate the responses of all indicator species in a region into a synthesized perspective to help evaluate the relative effectiveness of potential conservation actions on habitat/land use conditions across the region. We are still considering a variety of formulations for synthesizing model results across indicator species.*

2. What ideas, comments, and/or suggestions do you have that can help us determine the best way to synthesizing model results across indicator species? (15 minutes)

### **TOPIC 2 – Identification of candidate indicator species for each planning region in Indiana – 240 minutes**

*Now, I want to switch gears and start talking about candidate indicator species for each planning region in Indiana. We have three questions for each region and we will greatly appreciate ideas, comments, and suggestions from those of you who have expertise in each region. However, if you are not from or work in a particular region, but have opinions about what should be considered as indicators species for that region, we also welcome your inputs. Let's start with the Great Lakes Watershed. We will move on to the Kankakee River Watershed and the Eastern Corn Belt Plains this morning, and finish the two planning regions in the Ohio River Watershed after lunch.*

**Region 1 – Great Lakes Watershed** (Note: Show Region 1 map on screen.)

1. Based on the map you see on the screen, what are the habitat types of interest in Region 1? We would like to have you help us identify the unique habitat types for the region and/or habitat types that are particularly important for wildlife and biodiversity in the region. (10 minutes)
2. To build landscape-level habitat models for a set of indicator species, we will need to develop a suite of conservation action scenarios for each planning region. Generally speaking, what do you see as major conservation actions that are being taken or that should be taken to conserve habitat types of interest we just identified within Region 1? (Note: The facilitator needs to write down conservation actions identified by participants on a flip chart. For the facilitator to keep in mind, relevant conservation actions may include restoring natural streams, increasing habitat patch sizes, controlling invasives, creating corridors, and reducing urban sprawl, while it would be hard to incorporate conservation actions that focus on economic incentives, education, and capacity building into a spatial model.) (10 minutes)
- (3) Now, I want us to take a look at the list on the flip chart with all SGCN and representative species identified in the 2005 SWAP in Region 1. This list is also available in your Handout 2. Although we do not necessarily need to restrict our discussion to this list, we feel that this list does provide a good starting point for our discussion. Based on what you read in the handouts that we distributed prior to today's focus group, Dr. Zollner's presentation, and a summary of selection criteria on the screen, which of these species would you suggest to be used as indicator species for building landscape-level habitat models in Region 1? (20 minutes) (Note: The selection criteria should be shown on the screen to remind participants what they need to keep in mind. If participants start offering ideas, the facilitator will monitor the discussion to make sure everyone has an opportunity to speak. If no one offers any ideas, the facilitator could suggest participants going down the list together to eliminate species that obviously do not meet the selection criteria, and then focus on the remaining species to determine a pool of 15-20 candidate species.)

*Alright, we've come to agreeing to a pool of candidate indicator species for Region 1. Due to limited time, I would like to move us on to Region 2, the Kankakee River Watershed. We will be going through the same set of three questions as for Region 1. Are we ready to switch our mind out of the Great Lakes Watershed into the Kankakee River Watershed?*

## **Region 2 – Kankakee River Watershed** (Note: Show Region 2 map on screen.)

1. Based on the map you see on the screen, what are the habitat types of interest in Region 2? (10 minutes)
2. Generally speaking, what do you see as major threats to the habitat types of interest we just identified within Region 2 and what do you see as major conservation actions being taken or that should be taken to address these threats? (Note: The facilitator needs to write down threats and conservation actions identified by participants on a flip chart.) (10 minutes)
3. Now, I want us to take a look at the flip chart with all SGCN and representative species in Region 2. Again, we can use this list as our starting point. Based on the handouts, Dr. Zollner's presentation, and this summary of selection criteria, which of these species would you suggest to be used as indicator species for building landscape-level habitat models in Region 2? (20 minutes) (Note: The selection criteria should be shown on the screen to remind participants what they need to keep in mind. If participants start offering ideas, the facilitator will monitor the discussion to make sure everyone has an opportunity to speak. If no one offers any ideas, the facilitator could suggest participants going down the list together to eliminate species that obviously do not meet the selection criteria, and then focus on the remaining species to determine a pool of 15-20 candidate species.)

*Alright, thank you for your inputs on identifying candidate indicator species for Region 2. We will now move on to Region 3 and then we can have our lunch break. Region 3 is the Eastern Corn Belt Plains. We will again discuss three questions.*

**Region 3 – Eastern Corn Belt Plains** (Note: Show Region 3 map on screen.)

1. Based on this map, what are the habitat types of interest in Region 3? (10 minutes)
2. Generally speaking, what do you see as major threats to the habitat types of interest we just identified within Region 3 and what do you see as major conservation actions being taken or that should be taken to address these threats? (Note: The facilitator needs to write down threats and conservation actions identified by participants on a flip chart.) (10 minutes)
3. Please take a look at the flip chart with a list of SGCN and representative species in Region 3. Based on the handouts, Dr. Zollner's presentation, and this summary of selection criteria, which of these species would you suggest to be used as indicator species for building landscape-level habitat models in Region 3? (20 minutes) (Note: The selection criteria should be shown on the screen to remind participants what they need to keep in mind. If participants start offering ideas, the facilitator will monitor the discussion to make sure everyone has an opportunity to speak. If no one offers any ideas, the facilitator could suggest participants going down the list together to eliminate species that obviously do not meet the selection criteria, and then focus on the remaining species to determine a pool of 15-20 candidate species.)

*Alright, thank you for your inputs this morning. We will now take a 40-minute lunch break, and will reconvene at 12:40 to go through the last two planning regions this afternoon.*

*Thank you all for sticking around for this afternoon portion of our focus group meeting. We will go through our last two planning regions, both in the Ohio River Watershed. The first one is the Interior River Valleys and Hills, as shown on the screen here.*

**Region 4 – Ohio River Watershed: Interior River Valleys and Hills** (Note: Show Region 4 map on screen.)

1. Based on this map, what are the habitat types of interest in Region 4? (10 minutes)
2. Generally speaking, what do you see as major threats to the habitat types of interest we just identified within Region 4 and what do you see as major conservation actions being taken or that should be taken to address these threats? (Note: The facilitator needs to write down threats and conservation actions identified by participants on a flip chart.) (10 minutes)
3. Now, I want us to take a look at the species list on the flip chart. As I mentioned this morning, we do not necessarily need to restrict our discussion to this list, but this list can serve as a good starting point for our discussion. Based on the handouts you read prior to coming here today, Dr. Zollner's presentation this morning, and this summary of selection criteria, which of these species would you suggest to be used as indicator species for building landscape-level habitat models in Region 4? (20 minutes) (Note: The selection criteria should be shown on the screen to remind participants what they need to keep in mind. If participants start offering ideas, the facilitator will monitor the discussion to make sure everyone has an opportunity to speak. If no one offers any ideas, the facilitator could suggest participants going down the list together to eliminate species that obviously do not meet the selection criteria, and then focus on the remaining species to determine a pool of 15-20 candidate species.)

*Alright, thank you for your inputs on identifying candidate indicator species for Region 4. We will now move on to the last planning region with the same set of three questions.*

**Region 5 – Ohio River Watershed: Interior Plateau** (Note: Show Region 5 map on screen.)

1. Based on this map, what are the habitat types of interest in Region 5? (10 minutes)
2. Generally speaking, what do you see as major threats to the habitat types of interest we just identified within Region 5 and what do you see as major conservation actions being taken or that should be taken to address these threats? (Note: The facilitator needs to write down threats and conservation actions identified by participants on a flip chart.) (10 minutes)
3. Now, please take a look at the species list on the flip chart. Which of these species would you suggest to be used as indicator species for building landscape-level habitat models in Region 5? (20 minutes) (Note: The selection criteria should be shown on the screen to remind participants what they need to keep in mind. If participants start offering ideas, the facilitator will monitor the discussion to make sure everyone has an opportunity to speak. If no one offers any ideas, the facilitator could suggest participants going down the list together to eliminate species that obviously do not meet the selection criteria, and then focus on the remaining species to determine a pool of 15-20 candidate species.)

**FINAL REMARKS – 3 minutes**

*We've used up all our time today. On behalf of everyone involved in the 2015 SWAP process, I want to thank you all for your participation and great inputs. As I mentioned earlier, we will compile a list of candidate indicator species for each planning region based on our discussion today and this list will be used in an upcoming survey to solicit further feedback from the broader community of technical experts. Eventually, we will determine three to seven indicator species that best represent the needs of SGCN for each planning region. We will then develop landscape-level habitat models for these indicator species. If you have any additional thoughts that you would like to share with us, please feel free to contact us via email or phone. You can find our contact information in Handout 1 distributed earlier this morning. Thank you all very much again. Please take cookies with you on your way out.*

# SWAP | STATE WILDLIFE ACTION PLAN FACILITATION





# STATE WILDLIFE ACTION PLAN FACILITATION

December 2013

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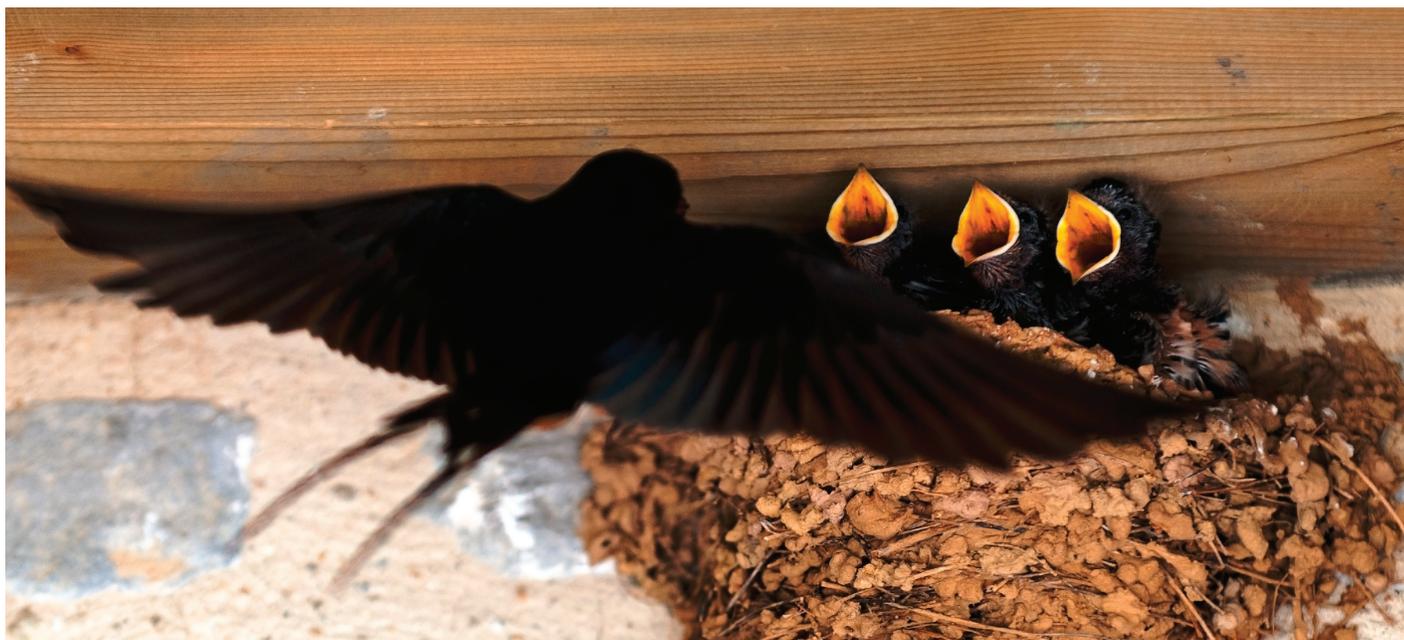
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# SWAP | FINAL RECOMMENDATION REPORT



Conservation doesn't just happen. It takes resources and collaboration.



## STATE WILDLIFE ACTION PLAN OVERVIEW

Indiana's 2015 State Wildlife Action Plan (SWAP), also known as the Comprehensive Wildlife Strategy, provides a comprehensive overview of conservation in Indiana. The plan identifies needs and opportunities to prevent species from becoming threatened or endangered in the future. Indiana has decided to take a habitat-based approach to wildlife conservation in an effort to avoid division among conservation interest groups that focus on single species conservation efforts. The eight habitat regions for the 2015 SWAP include:

- Agriculture
- Aquatic Systems
- Barren Lands
- Developed Lands
- Forests
- Grasslands
- Subterranean Systems
- Wetlands

The State Wildlife Action Plan must be completed to receive federal funding from programs such as the State and Tribal Wildlife Grants (SWG) program. The goal of the SWG is to prevent endangered species listings. All SWAPs are approved by the U.S. Fish and Wildlife Service (USFWS). Additionally, dedicated funding, such as the Wildlife Conservation and Restoration Program (WCRP), authorizes federal funding to state fish and wildlife agencies for wildlife conservation, recreation, and education; however, while the program is on file, it is not currently being funded.

State Wildlife Action Plans vary in approach from state to state but are developed with the same scope: species and habitat conservation. Indiana's approach to wildlife conservation relies on stakeholder collaboration from the greater conservation community to ensure a multi-scale effort is undertaken. Indiana's current SWAP was approved in 2006.

### EXHIBIT 1: STATE WILDLIFE ACTION PLAN REQUIREMENTS

All State Wildlife Action Plans must account for eight required planning elements in order to be approved by the USFWS (as listed verbatim from IN DNR):

1. the distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of wildlife of the State; (In subsequent discussions, these species were referred to as Species of Greatest Conservation Need or SGCN);
2. the location and relative condition of key habitats and community types essential to the conservation of each State's SGCN;
3. the problems which may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors which may assist in restoration and improved conservation of SGCN and their habitats;
4. the actions necessary to conserve SGCN and their habitats and establishes priorities for implementing such conservation actions;
5. the provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information or changing conditions;
6. each State's provisions to review its strategy at intervals not to exceed ten years;
7. each State's provisions for coordination during the development, implementation, review, and revision of its strategy with Federal, State, and local agencies and Indian Tribes that manage significant areas of land or water within the State, or administer programs that significantly affect the conservation of species or their habitats; and
8. each State's provisions to provide the necessary public participation in the development, revision, and implementation of its strategy.

### PRIMARY CHALLENGES

Key challenges to wildlife conservation for Indiana and its surrounding states include habitat loss/fragmentation, invasive species, and climate change. The updated plan for 2015 will continue to address these concerns by identifying goals and objectives for the next ten years. Additionally, a multi-level conservation scale approach is required to implement the updated SWAP. Conservation involves private landowners, nonprofit organizations, and state and federal agencies; therefore, planning for the collective efforts of Indiana's stakeholders is crucial.

## STATE WILDLIFE ACTION PLAN UPDATE: 2013 MEETING FACILITATION

The Indiana Department of Natural Resources (IN DNR) Division of Fish and Wildlife conducted stakeholder meetings to develop recommendations for the 2014 Request for Proposal for technical data collection and continued stakeholder involvement. IN DNR selected Indiana University's Eppley Institute for Parks and Public Lands to coordinate the SWAP's required meetings and stakeholder involvement. The Eppley Institute organized and facilitated a series of regional kick-off stakeholder meetings in Fall 2013, including the promotion, coordination, documentation, and follow-up work associated with these meetings. The process employed by the Eppley Institute strengthened conservation partnerships in the state. The Eppley Institute used its Pathfinder-SM process (see meeting summary report for details) to facilitate the stakeholder meetings.

The Eppley Institute organized three regional stakeholder events. The events were held on Thursday, September 26, 2013; Wednesday, October 2, 2013; and Thursday, October 3, 2013. A total of 150 stakeholders attended the regional events. The September 26 meeting was held at the Indiana Wildlife Federation office in Indianapolis, Indiana; the October 2 meeting was held at O'Bannon Woods State Park in Corydon, Indiana; and the October 3 meeting was held at the Newton Center in Lakeville, Indiana. Organizations represented at the events included Indiana DNR Division of Fish & Wildlife, Central Indiana Land Trust, Purdue University, Sycamore Land Trust, Ducks Unlimited, Duke Energy, The Nature Conservancy, Indiana State University, Indiana DNR State Parks & Reservoirs, and many more friends groups, as well as the State Wildlife Action Plan Advisory and Core Teams (see meeting summary report for full participant listing).

The Eppley Institute conducted an additional web-based stakeholder meeting on Friday, October 4, 2013 with individuals who could not attend a regional meeting. Twenty-one additional stakeholders attended this web-based meeting representing Pheasants Forever, Muskies, Inc., White River State Park, Tippecanoe Watershed Foundation, Brown County State Park, and many other organizations. This alternative meeting allowed the project team to report the initial findings of the three regional meetings along with gathering additional input from the group. The meeting served as a verification meeting, but also provided an opportunity to discover new stakeholder groups to contact moving forward in the planning process.

The Eppley Institute held a stakeholder follow-up meeting on Tuesday, October 29, 2013. The purpose was to provide a comprehensive meeting summary from the three in-person regional meetings and the alternative web-based webinar. The consultant team presented the preliminary framework for action strategies as they relate to the identified emerging themes (conservation community, environment, funding, and citizens).

Please refer to the PathfindersSM summary report for additional information and a more complete meeting synthesis.

## STATE WILDLIFE ACTION PLAN RECOMMENDATIONS

### RFP DELIVERABLES

As identified through regional stakeholder meetings, it is recommended that the 2014 RFP include the following deliverables in order to fulfill elements 1-8 of the federal requirements (see Exhibit 1: State Wildlife Action Plan Requirements):

Deliverable	Importance	Element(s) Satisfied							
		1	2	3	4	5	6	7	8
Technical Survey	To provide detailed information for Species of Greatest Conservation Need (SGCN).	✓	✓	✓	✓	✓			✓
Regional Stakeholder Meetings	To continue building collaborative conservation stakeholder community and sharing pertinent SWAP information.	✓	✓	✓	✓	✓	✓	✓	✓
Online Forums	To provide regular engagement that allows conservation community to provide continual input.	✓	✓	✓	✓	✓	✓	✓	✓
Social Media	To provide periodic updates and upcoming planning events.							✓	✓
Conservation E-Newsletter	To allow conservation stakeholder community to share success stories, partnership opportunities, and overall pertinent SWAP information.					✓		✓	✓
Conservation Stakeholder Database	To allow conservation stakeholder community to locate partner organizations and to have comprehensive communication database for SWAP communication efforts.							✓	✓
Formative Evaluation Process	To provide opportunity to explore and adjust plan implementation efforts during 10-year window on a regular basis.					✓	✓	✓	✓

## RFP REQUIREMENTS

Items 4 and 5 of the State Wildlife Action Plan (as found in Exhibit 1: State Wildlife Action Plan Requirements) require increased attention in the updated plan. As a response, the 2014 technical survey and process for evaluating the plan's outcomes are the main goals for the 2014 RFP. The 2014 RFP should outline a required format that includes broad conservation goals aided by management strategies/action items and an evaluation component. There were four prominent goals with corresponding action items that were identified through the regional stakeholder meetings (see the Appendix). It should be noted, however, that the four goal areas may not necessarily be the only goals identified for the updated SWAP's focus; instead, those identified goals serve as a starting point for identifying and selecting action items for the plan. The successful contractor(s) should be able to fulfill/aid in the attainment of the identified goals through information gathering related to the corresponding action items while successfully gathering information and identifying additional action item areas.

To ensure the updated SWAP meets its stated goals, it is imperative that the selected project team implement a carefully outlined evaluation process involving two types of evaluation methods: summative and formative. A summative evaluation, which assesses how a plan achieved its stated goals after its expiration, relies on different measurement techniques such as surveys and focus groups to explore how well a plan like the State Wildlife Action Plan was implemented. While very valuable for assessing a program's effectiveness, this approach of a summative evaluation leaves little to no time for efficient plan alteration before the next comprehensive plan is to be developed.

As a result, the use of a formative evaluation, or process evaluation, allows a plan like the State Wildlife Action Plan, to assess while it is in progress and current. This type of evaluation allows officials to gather information and report potential outcomes to decision makers that will guide plan improvement while the plan is in progress. A systematic formative evaluation would allow IN DNR to determine how efficiently the State Wildlife Action Plan is being implemented and allow staff and decision makers to consider altering plan implementation for increased effectiveness over the next ten years. This method of formative evaluation requires IN DNR to establish benchmarks, goals, and objectives in the State Wildlife Action Plan while instituting a continual assessment and alteration process during the plan's implementation. This approach creates a full lifecycle management approach that can be used for Indiana's conservation strategy.

## STAKEHOLDER INVOLVEMENT APPROACH

As identified through the regional stakeholder meetings, a comprehensive and multidisciplinary approach to stakeholder involvement is warranted to successfully implement the updated SWAP. To increase and maintain stakeholder communication, an intentional approach that ensures relevancy to each conservation stakeholder is required. For example, communication methods to reach private landowners may be different than techniques to communicate with non-profit conservation partners. The following describes a suggested matrix to successfully develop the suggested RFP deliverables as outlined above:

Deliverable	Format	Involved Partners	Approach
1. Technical Survey	1) Web-based  2) Mailed hard copy	1) Universities, Soil and Water Conservation Districts, Indiana Department of Natural Resources, Land Trusts, Non-profits, State Parks and Public Lands, Friends Groups 2) Private landowners and farming/agriculture community	Survey to include detailed questions pertaining to required elements 1-5. Imperative to have section asking for contact information and willingness to take certain action steps. Also, need to have descriptive section explaining overall purpose and intent of technical survey and ways to continue involvement.
2. Regional Stakeholder Meetings	Semi-annual gatherings, less than a full day (with refreshments/lunch)	People identified in the conservation stakeholder database	Use list of 2013 meeting participants for meeting invitation list. Continue to invite people listed in the stakeholder database. Consider utilizing mailed invitations to private landowners and farming/agriculture community.
3. Online Forums	1) Open chat forum 2) Directed/prompted discussion topics	Emphasis on stakeholders who have not attended in-person stakeholder meetings.	Use technical survey to continue gathering contact information from private landowners. Use contact information to send personal invitations to participate in open forums.
4. Social Media	1) Create conservation community group	All stakeholders who participate in in-person meetings are asked to join the group.	Create "State Wildlife Action Plan" group on LinkedIn for individual conservation community members to follow. Utilize Collaborative Environments to post SWAP events and updates.

5. Conservation E-Newsletter	A periodical that contains region-specific news such as: success stories, conservation partnerships, and conservation in your area. Also included are statewide conservation news and upcoming events and happenings.	Small, grassroots conservation entities and private landowners to be highlighted in document. Bigger conservation stakeholders usually have their own method of sharing information. Include large stakeholders but emphasize smaller scales of conservation to ensure their voice is heard.	Solicit and appoint regional points of contact to aid in information gathering. Newsletter would have sections based on North, Central, and Southern regions with discussions regarding each habitat area. Newsletter would also serve as additional mechanism to mention upcoming events/meetings.
6. Conservation Stakeholder Database	Published on Collaborative Environments portal and www.swap.dnr.in.gov	All identified people and organizations that participate directly or indirectly in Indiana's conservation efforts and who share their contact information.	Continuously mine and solicit contact information through social media announcements and e-newsletter. Publish database on SWAP website for viewing ease.
7. Formative Evaluation Process	Iterative document that includes: <ul style="list-style-type: none"> <li>• benchmarks</li> <li>• goals</li> <li>• objectives</li> <li>• monitoring methods</li> </ul>	Already established core and advisory teams.	Utilize core and advisory teams to periodically gather and monitor goal achievement after updated SWAP approval. Use in-person meetings to discuss predetermined metrics and benchmarks. Allow teams to discuss and strategically alter implementation strategies as needed.

## IMPLEMENTATION

The identified deliverables in the previous section are intended to provide a clear picture and approach to Indiana's conservation efforts. During the 2013 facilitation process, the notion of "all scale conservation effort" resonated with participants. There are organizations that have more people, resources, and notoriety in their efforts; however, conservation includes the smallest efforts, private landowners, and everyone in between.

To ensure a wide net is cast with the upcoming State Wildlife Action Plan, deliverables will benefit from an intentional design and implementation process. The most effective engagement efforts recognize that relationships are cultivated over time and extend well beyond the publication of the plan. The following provides a process description for each deliverable:

1. Technical survey
  - a. Formulate a working group consisting of at least 1-2 stakeholders representing different conservation scales within Indiana to help create a tool that is used by everyone
  - b. Obtain mailing addresses of rural property owners to create a statistically valid mail survey
2. Regional stakeholder meetings
  - a. Use Key Partner Group, with three Division of Fish and Wildlife staff, to lead a sub-committee responsible for planning meetings
3. Online discussion forums
  - a. Use one prompted discussion topic every month to stimulate dialogue
  - b. Use an open forum to allow stakeholders to communicate freely with DNR and other stakeholders
    - i. If an open forum question is more appropriately answered by a conservation stakeholder other than Fish and Wildlife, provide the opportunity for the conservation partner to answer the question and create dialogue
4. Social media use
  - a. Use to highlight events and interesting conservation news in between e-newsletter publications
  - b. Post one news article/story per week to "Indiana Conservation" group
  - c. Use Collaborative Environments in lieu of LinkedIn if user interactivity is deemed more appropriate through that mechanism
5. Electronic news feature
  - a. Appoint regional points of contact responsible for collecting conservation news
  - b. Use e-newsletter as a mechanism to disseminate funding opportunities, new conservation partnerships, and updates to Indiana's planning efforts
  - c. Use e-newsletter to publish formative evaluation results to stakeholder community
    - i. Regional stakeholder meetings revealed that many stakeholders wanted to know what the successes and failures were of the previous plan because they were not updated throughout the last process
6. Stakeholder database
  - a. Publish database on Collaborative Environments so stakeholders can search for conservation partners in their geographic area and areas of conservation interest
  - b. Provide tagline at bottom of every planning-related email that solicits action to submit contact information to the conservation database

6. Formative evaluation

- a. Use Core and Advisory Teams to discuss, establish, and assign responsibilities to conduct formative evaluation mechanisms after the plan is implemented
  - i. Utilize periodic satisfaction and awareness surveys
  - ii. Establish benchmarks for Species of Greatest Conservation Need (SGCN)
  - iii. Establish goals and objectives for specific habitat regions
  - iv. Report evaluation metrics on a biannual basis in the conservation e-newsletter
- b. Utilize university partners in evaluating conservation efforts
  - i. Ball State University
  - ii. Indiana State University
  - iii. Indiana University
  - iv. Indiana University-Purdue University Fort Wayne
  - v. Indiana University-Purdue University Indianapolis
  - vi. Manchester College
  - vii. Purdue University

Proposed Calendar	Task	Stakeholder Engagement	Duration
January	Release RFP	Create social media group. Create online forum portal. Partner database published.	~3 weeks
February	Award Contract		~2 weeks
Late February	<b>Project Initiation:</b> Establish project budget, project plan, and hold project team meeting.	Begin gathering information for stakeholder e-newsletter via online discussion forum.	~1 week
March	<b>Survey Development:</b> Review existing technical survey and create new survey based on needed data.	Conduct pre-survey webinar. Online open discussion forum.	~4 weeks
April	<b>Technical Survey:</b> Release online and written mail survey.	Online open discussion forum related to technical survey.	~3 – 4 weeks
May	<b>Survey Analysis:</b> Review gathered data and look for missing information or incomplete data.	Distribute stakeholder e-newsletter.	~4 weeks
June – July	<b>Stakeholder Meetings:</b> Conduct regional stakeholder meetings to validate survey results and receive omitted data.	Online open discussion forum.	~8 weeks
August – September	<b>Finalize Data Synthesis:</b> Synthesize technical survey data and regional stakeholder meeting information.	Webinar to provide final synthesis. Begin gathering information for stakeholder e-newsletter via online discussion forum.	~8 weeks
October – December	<b>Prepare for Plan Development and Implementation:</b> Create formative evaluation methods for plan implementation.	Distribute stakeholder e-newsletter. Hold regional stakeholder meetings to enlist partner conservation actions.	~12 weeks

## CONCLUSION

The 2014 RFP should include a combination of a technical survey, in-person meetings, and electronic/virtual discussion forums. To maximize stakeholder engagement, a mixed-methods approach will allow for increased conservation community involvement. Additionally, utilizing social media and virtual discussion forums can enhance citizen participation. A formal marketing or communications plan should be developed beyond the suggestions put forth in this document.

In-person meetings should also be continued as a communication tool between the IN DNR project staff and the larger stakeholder community. Participation may have been limited during the 2013 stakeholder meetings due to having only one regional meeting time. The alternative web-based meeting showed a conservation community interest in participating in online discussions. An online revolving discussion forum, such as weekly/monthly prompted discussions, may prove to be a useful tool to increase partner communication moving forward.

A centerpiece of discussion during the 2013 regional meetings was the creation of a partner database. The conservation community is eager to learn where, when, and how other partners are working within Indiana. Additionally, it was mentioned that having an understanding of partnering agencies, particularly their mission statements, is critical to enhancing a state conservation ethic that occurs at all levels.

It is also recommended that IN DNR staff be designated to implement the updated State Wildlife Action Plan. A dedicated staff may prove useful for several reasons. First, responsibility for a formative evaluation of the plan can be attributed to a person or persons. Second, having a dedicated staff will create familiarity within the conservation community of who they know to be the face associated with Indiana's conservation strategy. This will allow for a personal relationship to develop along with an understanding of who to go to with questions.

Finally, it is imperative that a formative evaluation process be established that allows for continual updates and dialogue within Indiana's conservation community. Meeting participants often asked questions related to lessons learned and what worked/did not work from the last plan. There is a desire to remain engaged with the plan throughout its implementation, and mechanisms must be put into place that allow for periodic monitoring of the plan's goals and objectives and periodic sharing of results with stakeholders.

# APPENDIX

## Emerging Themes with Corresponding Action Items

<b>Theme</b>	<b>Environment</b>
<b>Goal 1</b>	<b>Increase conservation habitat and land.</b>
<b>Action Strategies</b>	
<ul style="list-style-type: none"> <li>Acquire sites that target species with the greatest conservation need</li> <li>Improve acres of habitat of greatest conservation need</li> <li>Identify critical habitat areas and establish priorities</li> <li>Identify invasive areas and species, eradicate and control, and evaluate</li> </ul>	

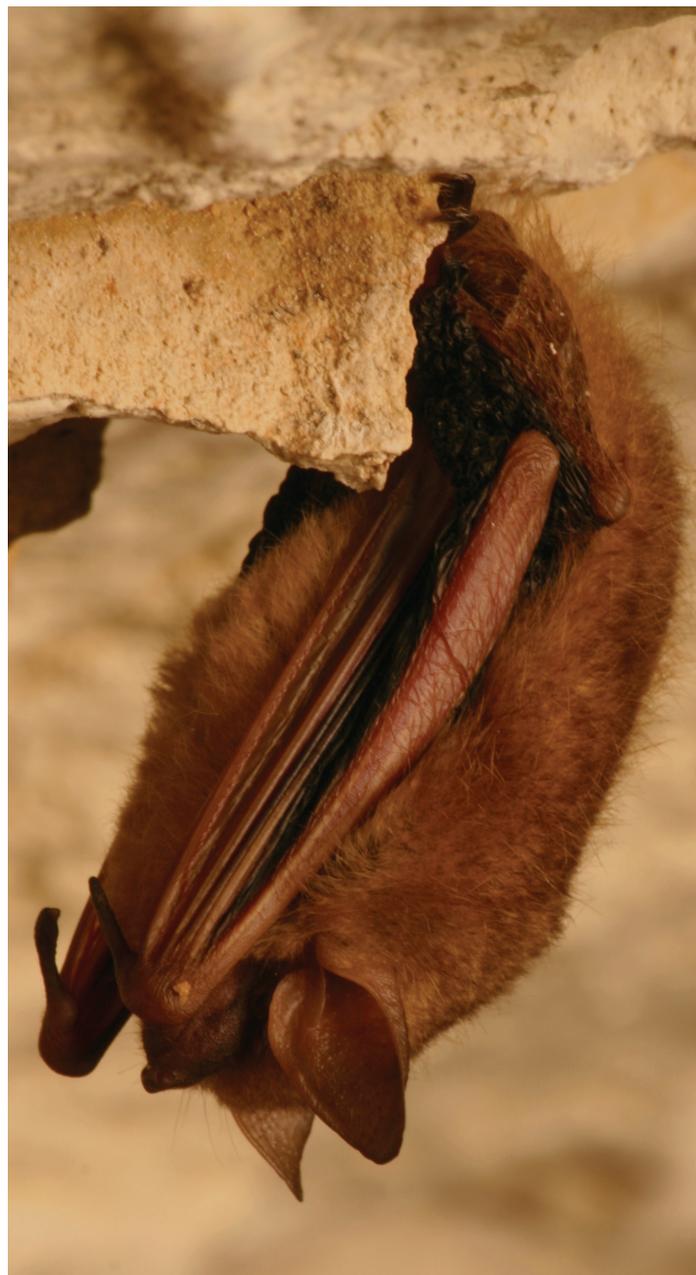
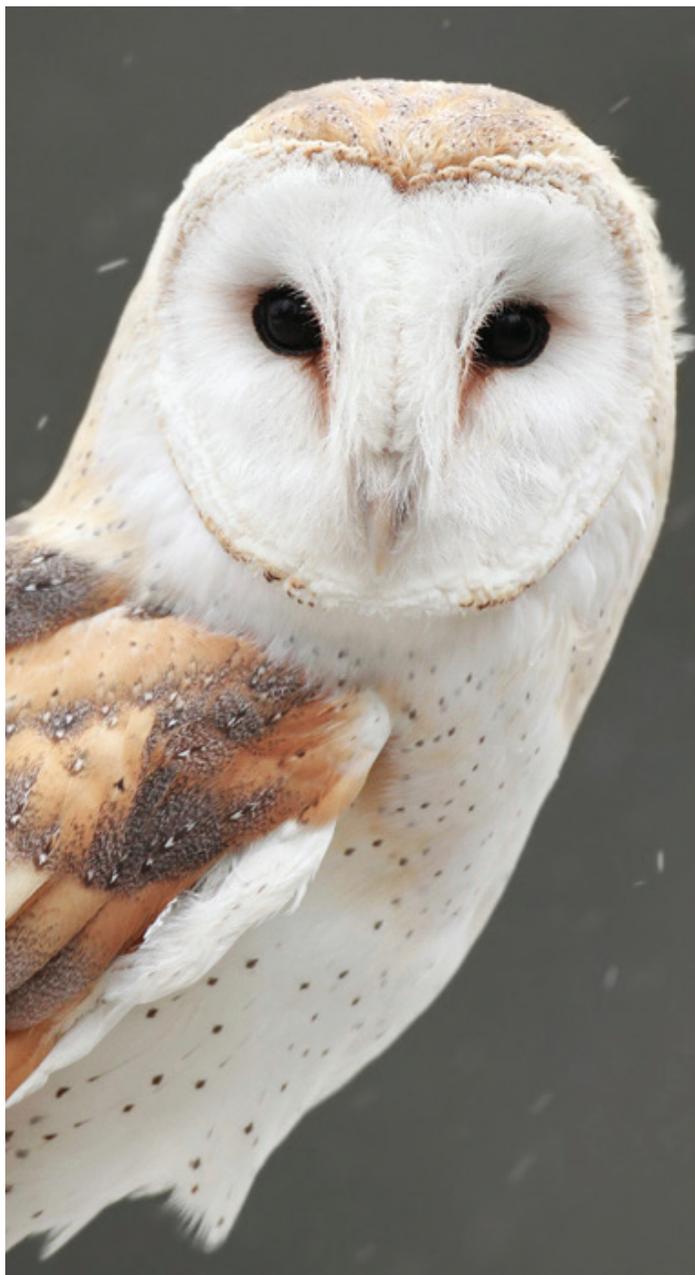
<b>Theme</b>	<b>Funding</b>
<b>Goal 2</b>	<b>Identify and acquire alternative and stable long-term funding sources</b>
<b>Action Strategies</b>	
<ul style="list-style-type: none"> <li>Lead a campaign for a conservation tax(es)</li> <li>Lobby individual federal legislators to keep conservation in Farm Bill, passed and ongoing</li> <li>Provide economic incentives to landowners/corporations (e.g., tax incentives, conservation easements)</li> </ul>	

<b>Theme</b>	<b>Conservation Community</b>
<b>Goal 3</b>	<b>Identify conservation partners and create communication platforms</b>
<b>Action Strategies</b>	
<ul style="list-style-type: none"> <li>Designate a State Wildlife Action Plan coordinator</li> <li>Develop a marketing plan to “sell” Indiana natural resources</li> <li>Create a communication plan that uses common language, allows for regular meetings/interfaces, identifies goals of partners, and identifies stakeholders inside and outside conservation community</li> </ul>	

<b>Theme</b>	<b>Citizens</b>
<b>Goal 4</b>	<b>Increase conservation action by the general public</b>
<b>Action Strategies</b>	
<ul style="list-style-type: none"> <li>Increase outdoor labs at schools by increasing awareness of funding</li> <li>Identify and educate land owner programs for habitat and working lands</li> <li>Increase literacy through K-12 programs and training for teachers</li> </ul>	



# SWAP | PATHFINDERS<sup>SM</sup> SUMMARY



Conservation doesn't just happen. It takes resources and collaboration.



## ABOUT PATHFINDERS<sup>SM</sup>

Pathfinders<sup>SM</sup> is a facilitated workshop of stakeholders who gather together to focus on the role, functions, and priorities of an organization or initiative, in this case the Indiana Department of Natural Resource Fish & Wildlife, and its State Wildlife Action Plan (SWAP) initiative. The name Pathfinders<sup>SM</sup> has been chosen to reflect the role of those attending the workshop to discover and show others a path or way forward. The workshop is designed to form consensus around choices that will inform a technical survey, or other means of a systematic information gathering method, in 2014.



There were three regional stakeholder Pathfinders<sup>SM</sup> events:

Date	Location	Region
Thursday, September 26, 2013	Indiana Wildlife Federation, Indianapolis, Indiana	Central
Wednesday, October 2, 2013	O'Bannon Woods State Park, Corydon, Indiana	South
Thursday, October 3, 2013	Newton Center, Lakeville, Indiana	North

A total of 150 participants attended a regional event. Organizations represented at the events included: Indiana DNR Division of Fish & Wildlife, Central Indiana Land Trust, Purdue University, Sycamore Land Trust, Ducks Unlimited, Duke Energy, The Nature Conservancy, Indiana State University, Indiana DNR State Parks & Reservoirs, and many more friends groups, as well as the State Wildlife Action Plan Advisory and Core Teams (see the Appendix for a full listing of participating organizations).

An additional web-based meeting was conducted on Friday, October 4, 2013 with stakeholders who could not attend a regional meeting. Twenty-one additional stakeholders attended representing Pheasants Forever, Muskies, Inc., What River State Park, Tippecanoe Watershed Foundation, and many other organizations. This alternative meeting allowed the project team to report the initial findings of the three regional meetings along with gathering additional input from the group. The meeting served as a verification meeting, but also provided an opportunity to discover new stakeholder groups to contact moving forward in the planning process.

This general summary of the Pathfinders<sup>SM</sup> events recaps the activities of the in-person workshops, with supporting information from the web-based meeting, and identifies the themes and findings that emerged out of the group work. A discussion of common themes is presented as a conclusion.

## REGIONAL PATHFINDERS<sup>SM</sup> WORKSHOPS

### WHERE WE ARE: A PERSPECTIVE ON THE STATE WILDLIFE ACTION PLAN (SWAP)

This module consisted of a panel discussion by Julie Kempf (SWAP co-coordinator) and two additional stakeholders depending on the meeting location. Panel members included:

- Central: Mike Sertle (Ducks Unlimited, Inc.) and John Bacone (IDNR – Nature Preserves)
- South: Chris Gonso (IDNR – Forestry) and Ginger Murphy (IDNR – State Parks & Reservoirs)
- North: Randy Showalter (National Wild Turkey Federation) and Justin Harrington (IDNR – State Parks & Reservoirs)

The purpose of this activity was to have the panel provide their perspectives on the State Wildlife Action Plan. The perspectives focused on providing background information for the planning process, describing the habitat groups that have been synthesized for the meetings, and introduce the four emerging themes to the stakeholders (environment, funding, conservation community, and citizens). In addition, panelists were able to represent their own organization/agency's unique position on why the new plan is important to their conservation efforts and the conservation efforts of the entire state. Each panelist had approximately six minutes to present their perspective. Upon completion, workgroups were prompted with the question, "What did you hear and what one question do you have?" Below is a brief synopsis of the information shared at the workshops. The first categorization is for the information the groups' heard followed by the collective synthesis of the types of questions asked to the panel.

#### *What We Heard:*

- Background information for the plan consisting of:
  - Required for funding
  - Habitat-based, landscape level plan
  - Focused management approach
  - Involves planning for species of greatest conservation need (SGCN)
- Needs for the plan as identified from the panel:
  - Collaboration from conservation community
  - Assess plan effectiveness
  - Public involvement
  - Dedicated/reliable funding sources
  - Highly usable, actionable plan to help manage habitat

### Questions for the Panel:

- Garnering engagement:
  - Process for engaging citizenry?
  - Receiving buy-in from other conservation partners (e.g., agriculture industry, private landowners, etc.)?
  - How to continue to achieve stakeholder engagement?
- Funding:
  - What are the funding objectives?
  - Dedicated funded staff?
  - How to secure additional funding?
- Previous plan:
  - Lessons learned?
  - What worked?
  - What didn't work?
- Current plan implementation:
  - Who implements the plan?
  - Who ensures the plan reaches the ground?
  - How will this plan be different than the last?
  - How will this plan trickle down to the local level?
  - Is the current plan focused on habitat or SGCN? Both?

Participants asked one question of their choice to any panel member. All questions were addressed with some questions deferred to later in the day because they directly related to one of the pre-planned activities. In this case, the group was allowed to select another question. Participants expressed their satisfaction with the activity, the answers received, and the context provided which made the proceeding activities easier to understand.

### THEMES EXPLORATION

Participants were asked to consider the four emerging themes that were presented in the panel discussion and that were also outlined in their meeting packets. They were then asked to develop a list of past projects that contributed to a local, regional, or statewide conservation strategy and current available resources their organizations have that could contribute to a conservation strategy. Most responses reflected these concepts as they related to the four emerging themes:

#### *Environment*

- Invasive Species Control
  - Species removal
  - Research and monitoring
- Water Quality
  - Dam Removal
  - West Bogs Renovation
- Habitat Management
  - Least Tern-Cane Ridge Wetland Reserve Program
  - Farm Bill programs
  - Land acquisition
  - Succession control
  - Conservation easements

#### *Conservation Community*

- Education and Outreach
  - Workshops
  - Programs
    - Backyard wildlife certification
    - HRI Healthy Rivers Initiative
    - Goose Pond
- Partnerships
  - Lake associations
  - Conservancy districts
  - Private landowners
  - Universities
  - Land trusts
  - Public support

## *Funding*

- Federal
  - 319 grant (Clean Water Act Section 319)
  - Farm Bill
  - Wildlife & Sport Fish Restoration Program (WSFR)
  - United States Department of Agriculture (USDA)
  - State & Tribal Wildlife Grants (SWG)
  - Great Lakes Restoration Initiative (GLRI)
- Local
  - Indiana Office of Community & Rural Affairs (OCRA)
- Private
  - Cost-share agreements
  - Private donations (e.g., Bass Pro Shops, Lilly)
  - Foundations
  - Research grants through universities
  - User fees

## *Citizens*

- Utilizing Locals
  - Volunteers
  - Environmental groups
  - Friends groups
- Outreach
  - Natural resource education
  - Hunter education
  - Social media
  - Citizen science
- Programs
  - Conservation Reserve Program
  - Wetland Reserve Program
  - 4H
  - FFA
  - Learning Tree

## *Available Resources*

1. Partnerships
  - Land acquisition
  - Habitat management and planning
  - Acquiring data
  - Market-based approaches
  - Resource and monitoring
  - Connectivity
2. Outreach and Education
  - User recruitment and retention
  - Local habitat programs
  - Local conservation programs
3. Knowledge and Expertise
  - Credibility
  - Research capacity
  - Legal clout
4. Funding
  - Cost share agreements
  - Foundations
  - Grants
  - Donations
  - License fees
  - Additional federal funding
  - Friends Groups

## WORKING LUNCH

For this working lunch exercise, each table of participants considered the question, “What do you perceive is needed to improve existing partnerships, resources, or programs focused on resource for conservation?” Groups were asked to think about the past and current resources identified from the last activity and the themes that had emerged so far during the planning process. The results were analyzed and categorized into seven major nodes or themes.

### Needed Improvements

#### 1. Communication and Information Sharing

- o Create partner communication tool or platform
- o Create a ListServ
- o Develop a common language
- o Hold annual meetings
- o Remove silos (create knowledge of ongoing projects, resources, who is doing what)
- o E-Newsletter
- o Share success stories
- o List of entities Collaborative Conservation Efforts and Management Approaches
- o Integrative strategies
- o Regional/habitat teams
- o Develop common goals and objectives
- o Conservation at all scales
- o Focus on big picture

#### 2. Community Outreach and Conservation Value

- o Understanding cumulative effects of conservation
- o Work with schools
- o Articulate and justify economic and ecological benefits to for-profits, landowners, and citizen
- o Regular public engagement opportunities

#### 3. Partnerships

- o Expand circle of influence with non-traditional resource management groups and broad base public support
- o Understand mission statements among different conservation groups
- o Focus on specific goals with involving volunteers
- o Determine partner expectations from DFW/DNR

#### 4. Funding and Dedicated Staff

- o Diversify funding sources
- o Evaluate proper funds distribution
- o Create a funding table (e.g., who has what and where is it coming from)
- o New funding sources (e.g., conservation tax, monetary incentive for landowners to allow hunting access on private lands)
- o Establish coordinator(s)
  - Volunteer management
  - SWAP implementation
  - Facilitating partnerships
  - Citizen science

#### 5. Data-driven Decision-Making

- o Base conservation on science, not emotion
- o Use evaluation methods to stop doing things that do not work and keep doing things that do work
- o More information regarding endangered species distribution and negative effects of invasives
- o Better understanding of human-wildlife conflicts

#### 6. Political Nexus

- o Cultivate the ear of legislation, county commissioners, and land-use groups
- o Encourage partners to advocate for more conservation resources

## PLANNING FOR THE FUTURE

In this exercise, tables were to formulate broad SWAP goals based on anything they have heard during the day's events and organized by the four emerging themes. Groups were reminded to consider time and resources. The four themes are listed below followed with commentary regarding the common goal areas.

**Environment** – acquiring land and increasing acres for biodiversity and species of greatest need was a strong goal theme. Subthemes included connecting management into larger systems, encouraging appropriate land use, increasing amount of conservation on private lands, invasive species management, setting measures of success, and prioritizing management approaches.

**Funding** – identifying and acquiring alternative and stable long-term funding sources was a strong goal theme. Subthemes included increasing non-consumptive users, increasing contributions to voluntary events, increasing efficiency through lobbying efforts and networking, develop prioritized funding strategies through developed funding goals, and retention of funding through demonstration of mutual benefit and success stories.

**Conservation Community** – identifying conservation partners and creating communication platforms were strong goal themes. Subthemes included creating buy-in through public outreach and marketing conservation resources, bridging the State Wildlife Action Plan with other initiatives, establishing a dedicated staff for SWAP, and constantly identifying new stakeholders and current resources/projects.

**Citizens** – increasing conservation action by the general public was a strong goal theme. Subthemes included incorporating existing and new social media, enhancing Citizen Science, recruiting new users by articulating the benefits of conservation and how they benefit all, and bridging the overall gap between private landowners, agriculture, and entire conservation community.

## **ACTION STRATEGIES**

The final exercise required groups to develop action items for specific goals. Participants were asked to identify who would be responsible for each action and a timeframe for completion. After actions were developed, individuals were asked to vote on their preferred items. The most popular action items are summarized below:

### *Land/Habitat*

- Acquire sites that target species with the greatest conservation need; assigned to DNR and partners and to be conducted annually (Theme: Environment – Goal: Improve and acquire habitat).
- Improve acres of habitat of greatest conservation need; assigned to DNR and partners and to be conducted annually (Theme: Environment – Goal: Improve and acquire habitat).
- Identify critical habitat areas and establish priorities; assigned to DFW/IDEM with citizen input and to be completed by 2017 (Theme: Environment – Goal: Improve water quality).
- Identify invasive areas and species, eradicate and control, and evaluate; assigned to Biologists and private conservation districts and to be completed immediately (Theme: Environmental – Goal: Exotic/invasive control).

### *Legislation*

- Lead a campaign for a conservation tax; assigned to all conservation partners and to be completed by 2020 (Theme: Funding – Goal: Stable and increased funding for conservation).
- Lobby individual federal legislators to keep conservation in Farm Bill, passed and ongoing; assigned to NGOs and individuals and is to be an ongoing process (Theme: Environment – Goal: Maximize conservation practices on private land).
- Provide economic incentives to landowners/corporations (e.g., tax incentives, conservation easements); assigned to legislative action and to be completed by 2015 (Theme: Environment – Goal: Increase land base for conservation).

### *Marketing and Communication*

- Designate a State Wildlife Action Plan coordinator; assigned to DFW and to be completed by 2014 (Theme: Conservation Community – Goal: Stronger conservation partnerships).
- Develop a marketing plan to “sell” Indiana natural resources; assigned to DNR and to be completed by 2015 (Theme: Citizens – Goal: Recruit new users).
- Create a communication plan that uses common language, allows for regular meetings/interfacing, identifies goals of partners, and identifies stakeholders inside and outside conservation community; assigned to SWAP coordinator and partners and to be completed by 2015 (Theme: Conservation Community – Goal: Big picture).

### *Outreach and Education*

- Increase outdoor labs at schools by increasing awareness of funding; assigned to federal grant programs and to be completed by 2014 (Theme: Citizens – Goal: Make wildlife important to urban populations).
- Identify and educate land owner programs for habitat and working lands; assigned to NGOs, Farm Bureau, federal grant programs and to be completed immediately (Theme: Environment – Goal: Maximize conservation practices on private land).
- Increase literacy through K-12 programs and training for teachers; assigned to Fish & Wildlife, conservation organizations, and volunteers and to be an ongoing effort (Theme: Citizens – Goal: Build public support for fish and wildlife conservation).

### *Funding*

- Seek permanent funding; assigned to dedicated SWAP staff/DNR and to be completed by 2016 (Theme: Conservation Community – Goal: Public relations/marketing to public/businesses and universities and legislators).

## CONCLUSION

Although three meetings were held in different regions, the conversations revolved around central topics. The resulting discussions were similar in nature and the Environment theme received the most attention in terms of action items; however, the other three themes were well represented. In addition to the four themes, seven categories emerged from the Needed Improvements activity that provides the basis for the popular action items listed in this document.

The alternative web-based meeting provided information that supported the results presented in this document. Stakeholders were given polling options to rate how much of a priority the most prevalent regional meeting action items were to them. The polling options found no information that did not result from the stakeholder meetings. In addition, comments and questions received during the web-based meeting reflected the questions presented from the first group exercise and needed improvements denoted in the working lunch exercise above.

A stakeholder survey will be distributed as the next engagement phase and the instrument will ask questions related to the categories list in this document as well as gather additional feedback for the final recommendation report. Moving forward, the recommendations derived from the public engagement process will serve as a framework for drafting a Request for Proposal (RFP) for a 2014 systematic data collection method.

# APPENDIX

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## PARTICIPATING ORGANIZATIONS

### CENTRAL MEETING

Amos Butler Audubon	Indiana National Wild Turkey Federation
Central Indiana Land Trust	Indiana Native Plant & Wildflower Society
Ducks Unlimited, Inc.	Indiana State Department of Agriculture
Duke Energy	Indiana State University
Eagle Creek Park Foundation	Indiana Wildlife Federation
Eastern Tallgrass Prairie & Big Rivers, LLC.	Natural Resources Conservation Service
Fishable Indiana Streams for Hoosiers (FISH)	Purdue University
Graybrook Lake Conservancy District	Quality Deer Management Association
Greene County Soil & Water Conservation District	Red-tail Land Conservancy
IDNR - Fish & Wildlife	Remenschneider Associates, Inc.
IDNR - Nature Preserves	The Nature Conservancy
IDNR - Reclamation	U.S. Fish and Wildlife Service
Indiana Farm Bureau	

### SOUTH MEETING

Daviess-Martin Joint County Parks and Recreation Department	Indiana Forest Alliance
Harrison-Crawford State Forest	Indiana Parks & Recreation Association
IDNR - Fish & Wildlife	O'Bannon Woods State Park
IDNR - Forestry	Patoka Lake
IDNR - Reclamation	The Nature Conservancy
IDNR - State Parks & Reservoirs	

### NORTH MEETING

DJ Case & Associates	Indiana Univeristy-Purdue University Fort Wayne
IDNR - Fish & Wildlife	Izaak Walton League
IDNR - Law Enforcement	Manchester University
IDNR - Reclamation	National Wild Turkey Federation
IDNR - State Parks & Reservoirs	Northwest Indiana Steelheaders
Indiana Native Plant & Wildflower Society	Taltree Arboretum & Gardens

### ALTERNATIVE WEB-BASED MEETING

Brown County State Park	Pheasants Forever
IDNR - Fish & Wildlife	Tippecanoe Watershed Foundation
Muskies, Inc.	White River State Park



# SWAP | CENTRAL MEETING



Conservation doesn't just happen. It takes resources and collaboration.



# PANEL #1

Table Name	Comments	Poster Number
Carson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Partnerships (government and NGOs)</li> <li>- Funding</li> <li>- Landscape planning</li> <li>- Species of greatest conservation need (GCN)</li> <li>- Habitat and science based</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- What about urban and suburban landscapes and SWAP?</li> <li>- What are the funding objectives?</li> </ul>	1
Leiber	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Maintain eligibility \$</li> <li>- Habitat based (regional)</li> <li>- Partnership and collaboration</li> <li>- Heritage database critical</li> <li>- Science based</li> <li>- Focused management</li> <li>- Landscape level</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- How continue partnership after SWAP developed?</li> <li>- How get buy-in from those outside focus areas?</li> </ul>	2
Pinchot	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- F&amp;W lead coordination of SWAP</li> <li>- Leveraging funding is key</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- Dedicated funded staff?</li> <li>- Detailed action plans?</li> </ul>	3
Thorea	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Partnerships</li> <li>- Stretching dollars</li> <li>- Involving citizens</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- How high in government is this important? Buy-in?</li> <li>- Will there be a prioritized areas of conservation?</li> <li>- How to keep stakeholders involved after plan complete?</li> </ul>	4
Emerson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Collaboration</li> <li>- Ties everyone together</li> <li>- Localized focus moving this direction (60 habitats to 8)</li> <li>- Landscapes</li> <li>- Habitat</li> <li>- 4 principle goals (conservation community, environment, funding, citizens)</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- Is collaboration about standardizing approach or about building a toll so we can learn about conservation community approaches?</li> <li>- We heard a lot about landscape and habitat but nothing about species? Where is the species intersection? Any targeted species?</li> </ul>	5A/5B



## EXERCISE #2

Table Name	Themes	Poster Number
Roosevelt	<u>Environment/Conservation Community:</u> - Lake association encourage farmers to use conservation practices (e.g., no till filter strips, etc.) sediment control, fish/WL habitat - SWCD/NRCS - Watershed boards - Conservancy district	11A
	<u>Funding:</u> - Private – Lilly - Local government – county, OCRA - Federal  <u>Citizens:</u> -Locals valued the lake as a focal point for recreation  <u>Resources:</u> - Property management - Grants	11B
Lacey	<u>Environment:</u> - Ongoing public lands management private – DNR  <u>Conservation Community:</u> - Backyard wildlife certification (City of Zionsville) - Conservation education and outreach – IWF  <u>Funding:</u> - NWTf – funding from non-profit to government agency  <u>Citizens:</u> - Invasive species removal	12
Muir	<u>Environment:</u> - Least Tern-Cane Ridge Wetland Reserve Program – Fed - Land and Water – Duke, DNR-Staff - Farm Bill programs – NRCS  <u>Conservation Community:</u> - HRI Healthy Rivers Initiative - Goose Pond - Public and private funds - Experts and staff support - Garnering public support and awareness  <u>Funding:</u> - See other headings - Creativity and science knowledge to justify  <u>Citizens:</u> - Eagle-viewing days – duke - Environmental cleanups - River festivals - Backyard Habitat Program - Users and volunteers - Environmental groups - Citizens	13A
		13B



Emerson	<u>Funding:</u> - WSFR funding for land acquisition - 319 grant - cost share agreements	16A
	<u>Environment:</u> - Protected 1,200 acres - Conservation practices to meet federal permit requirements - Habitat certification program  <u>Conservation Community:</u> - 319 grant  <u>Citizens:</u> - 319 grant - Private lands technical assistance  <u>Resources:</u> - Revolving loan (conservation community) - Grant programs (conservation community) - Landowner partnership/involvement (Environment and Citizens) - Expertise assistance (Funding and Environment) - Cost share/grant development (Conservation community) - Regional collaboration (Environment)	16B
Carson	<u>ISDA:</u> - Soil and water conservation – private landowners - Federal grants - Clean water Indiana  <u>Audubon:</u> - IBA – 41 sites throughout Indiana - Engage citizen scientists (habitat restoration, planning, science-based surveys) - Grants  <u>Land Trust:</u> - Holding managed easements and other land - Connectivity - Urban areas and agriculture areas - Utilize volunteers for restoration/removing invasive species  <u>INPAWS:</u> - Education and outreach about native plants - Grants – landowners – native plants  <u>DEW:</u> - LARE - Private lands - Public lands - Wildlife diversity and research - Fisheries - Environmental review - Grants - Contaminants - Conservation education - Outreach and public relations	17A
		17B
Pinchot	- Backyard Habitat program (Carmel parks and Zionsville – hubs) - Funding: donations etc., litigation funds (mitigation) - Citizens, education, volunteers - Land acquisition - Bicentennial Trust, IHT - Foundations/individuals	18

Leiber	<p><b>Past Projects:</b></p> <ul style="list-style-type: none"> <li>- Broad public education (INPAWS) (citizen and funding)</li> <li>- Data to support conservation – university research (env. and cons. comm)</li> <li>- Partners for F&amp;W – USFWS (private lands) (env., cons. comm. and funding)</li> <li>- Public lands – DFW (all 4 themes)</li> <li>- Grants: maximize limited state funds, 75% fed 25% state</li> </ul>	19
Thoreau	<ul style="list-style-type: none"> <li>- Non-game tax check off (funds and grants)</li> <li>- IWF – IN Cons. Alliance (citizens)</li> <li>- DFW – joint projects/partnerships (NGO's) other funding citizens, habitat</li> <li>- TNC/DFW – partnerships</li> <li>- Land/habitat preservation (HRI, Goose Pond)</li> <li>- Technical expertise to governmental agencies NRCS-FSA, SAFE program</li> <li>- Purdue/universities – research/student chapter projects/volunteers, extension</li> </ul>	20

## WORKING LUNCH – NEEDED IMPROVEMENTS

Table Name	Comments	Poster Number
Pinchot	<ul style="list-style-type: none"> <li>- Ensure financed long term coordinator in position</li> <li>- Silos – too many – intra and inter organizational</li> <li>- Legislation (state house legislators)</li> <li>- Must recognize value of public lands and environment</li> <li>- Need more data on endangered species distribution and negative effects overabundant/alien species</li> <li>- Citizen science</li> </ul>	21
Muir	<ul style="list-style-type: none"> <li>- Articulate and justify benefits to for profits, landowners, and all citizens (economic, ecological, public value)</li> <li>- Create a personnel/communication tool (platform to identify human and other resources across participating organizations and enable information sharing, will promote message consistency, and enhance old/build new partnerships)</li> <li>- Creative funding – think outside the box</li> <li>- Official mechanism to promote and enable collaborative brain-storming (social media)</li> <li>- Assigned coordinator to ensure commitments are kept/continual prioritizing mechanism</li> </ul>	22A  22B
Carson	<ul style="list-style-type: none"> <li>- Communication/networking with all partners</li> <li>- ID group representatives</li> <li>- ListServe/"membership" directory</li> <li>- Knowledge of ongoing project</li> <li>- Contacting public – various groups (green stewardship)</li> <li>- GIS interactive map – layers</li> </ul>	23
Deam	<p>Barriers to Participation:</p> <ul style="list-style-type: none"> <li>- Communication (lack of PR, misconceptions)</li> <li>- Narrow focus on organization</li> <li>- Small groups may feel helpless</li> <li>- Division between consumptive and nonconsumptive users</li> </ul> <p>Recommendations for Improvement:</p> <ul style="list-style-type: none"> <li>- Explicit outreach by organizations (flowchart, more clear mission statement, web fact)</li> <li>- Improved cross-organization communication tool</li> <li>- Improved and continued education on multi-species habitat conservation (ex. waterfowl and shorebirds)</li> <li>- Partner expertise</li> <li>- Interest matrix</li> </ul>	24

Leopold	- Be more diverse	25A
	- Public/partner support	
	- Connection of people to nature	25B
	- Tie efforts at landscape scales to local scale	
	- Get everyone to understand cumulative effects	
	- Integration of conservation efforts	
	- Find synergy that results in multiple conservation benefits	
	- Engage university social science staff	25C
	- Maintain communication among partners	
	- Make sure partners tell their story	
	- Integrate conservation strategies	
	- Stop doing things that do not work	
	- Use adaptive management	25D
	- Messages to youth	
Emerson	- Standard reporting format	26
	- Common language for collaboration and capacity and science	
	- Reason to collaborate	
	- SWAP coordinator/panel	
	- True SWAP partnership (umbrella)	
	- Public relations – get the word out!!	
Thoreau	- Need regional/habitat teams (by eco-region/watersheds)	27
	- Annual SWAP meetings (periodic) to track progress/report	
	- Have a conservation congress annual or biannual	
	- Broaden management goals to multispecies (landscape level)	
	- E-newsletter	
Leiber	- Improve communication between partners	28
	- Improve communication with public even though may not be partners – garner support	
	- Bring all partners together occasionally – Southern Indiana Conservation Happenings (statewide or regional, who organize?)	
	- Priority areas may pull more partners from those areas (could help with funding)	
	- All users pay to support resource	
Lacey	- Seek buy-in (common ground, shared vision)	29
	- Improve communications (ongoing stakeholder meetings, know what each other group is doing)	
	- Promote successful non-profit models	
	- Focus on areas of agreement	
	- Outdated statutes/policies	
	- Education	
Roosevelt	Existing Partnerships:	
	- Communication – central SWAP website, partners could identify projects	
	- Focus on big picture (i.e., focus on shared end results not motivations; we think SWAP can serve a role here!	
	Existing Resources:	30
	- Coordinate resources – through better communication	
	- Use SWAP to secure other funding/resources priority areas/grant funding	

# EXERCISE 3: GOALS

Table Name	Theme	Goals	Poster Number
Leiber	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Reassess species fitting into habitats</li> <li>- Control invasives to maximize native species diversity</li> <li>- Plan ID habitat in right places</li> <li>- Improve restoration and mitigation techniques</li> <li>- Improve science to make better management decisions</li> <li>- Focus on landscape scale and not individual species</li> </ul>	1,2
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Maximize value of dollar</li> <li>- Search for alternative funding sources</li> <li>- Balanced approach funding from consumptive and non-consumptive users</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Make wildlife important to urban populations</li> <li>- Education about harm of invasives</li> </ul>	
	<u>Conservation Communities</u>	<ul style="list-style-type: none"> <li>- Emphasis on adaptive management</li> <li>- Bring diverse stakeholders together to solve management challenges (deer vs. native plants)</li> </ul>	
Pinchot	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Stable or increasing population – all species of greatest conservation need</li> <li>- Private landowners maximizing conservation practices on land</li> <li>- Have agreed measurable benchmarks</li> <li>- Acquire land – additions within areas of conservation need</li> <li>- Protecting and maintain preserving existing resources</li> </ul>	1,2,3
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- A better educated public/elected officials citizens</li> <li>- Program for citizen science</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Obtain 25% of funds via non-government means</li> <li>- All users of resource contribute financially</li> </ul>	
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Align all conservation plans</li> <li>- Increase # working partners by 25%</li> <li>- Robust and self-sustaining</li> </ul>	
Muir	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Shoreline restoration</li> <li>- No new state-listed species (healthy wildlife populations)</li> <li>- State-wide strategic approach for permanent protection of conservation land/connect fragmented land</li> </ul>	1,2
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Articulate economic benefits of participation, promote</li> <li>- Lock-in active participation</li> <li>- Maximize involvement by effective advertisement to local entities (marketing)</li> <li>- Stronger conservation partners</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Create tools to promote private landowner collaboration and provide leadership opportunities</li> <li>- Increase public support for wildlife</li> <li>- Identify common interests between consumptive and non-consumptive users/interest groups</li> </ul>	

Deam	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Enhance biodiversity</li> <li>- Habitat quality improvement</li> <li>- Secure ecosystem functions for human survival</li> <li>- Enhance ecosystem resilience and sustainability</li> <li>- T&amp;E species recovery</li> <li>- Prevention of introduction and establishment of exotics and invasives</li> <li>- Develop efficient monitoring program to determine impact of climate change</li> </ul>	1
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Enhance communication</li> <li>- Obtain technical support to develop BMP to address wildlife diseases</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Science-driven BMP's</li> <li>- Sustain/increased commitment to conservation funding</li> <li>- Obtain sufficient funding to control overabundant/destructive species</li> <li>- Identify and enhance conservation infrastructure and funding capacity</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Dedicated focus on youth conservation education</li> </ul>	
Thoreau	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Stabilize or enhance species of greatest concern</li> <li>- Stabilize or enhance or connect existing habitat types</li> </ul>	1,2
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Generate support from administrators and lawmakers</li> <li>- Establish SWAP as the unified vision for natural resource conservation in Indiana</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Generate adequate resources to implement plan</li> <li>- Maintain eligibility</li> <li>- Prioritized strategies</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Generate/maintain partnerships to reach goals</li> <li>- Citizen participation</li> <li>- Develop a conservation ethic among citizens</li> </ul>	
Roosevelt	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Improve property management</li> </ul>	1
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Get all partners to see the big picture and know how to get engaged</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Maximize funding used for stewardship and land management</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Recognition and incorporation/adoption of existing plans</li> <li>- Increase functionality of SWAP to diverse groups without making it too generic</li> </ul>	
Carson	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Create recreation per government roadmap</li> <li>- List of statewide (metrics) measurable conservation/habitat objectives</li> </ul>	1,2
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Continual coordination of conservation efforts (workflow)</li> <li>- ID all partners</li> <li>- Method to report accomplishments</li> <li>- Public relations/marketing to public and universities/colleges and businesses</li> <li>- Regional/statewide conservation summit – networking/communication</li> <li>- Dedicated staff for SWAP (umbrella)</li> <li>- GIS statewide habitat and species info –visual and interactive</li> <li>- How does each organization fit in and contribute</li> <li>- How will SWAP affect my organization</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Search for private/public funding opportunities and set % goals</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Infographic/one page for public buy-in (state fair/HOE)</li> </ul>	

Lacey	<u>Environment</u>	- Improve existing habitat and acquire	1
	<u>Conservation Community</u>	- Stop conflicts and solve problems - Partner development - Accountability, feedback, oversight and management of SWAP	
	<u>Funding</u>	- Improve nongame funding	
Emerson	<u>Environment</u>	- Develop a mechanism to test success/progress of the overall SWAP - Develop a functional regional planning geography	1
	<u>Conservation Community</u>	- Develop a core list of partners that can leverage/contact/work with associated groups. - Develop a communication process between/amongst partners	
	<u>Funding</u>	- Meet the technical requirements for SWAP, address baseline issues and keep the document alive	
	<u>Citizens</u>	- Develop branding for SWAP. Getting the word out – social media. - Effectively engage private individuals/landowners	
Leopold	<u>Environment</u>	- Do something influential or innovative. Get something that models success - Update list of species of greatest need - Update guild list - Define the measure of success - Identifying and acting at appropriate scale – beyond state borders	A,B,C,D,E
	<u>Conservation Community</u>	- Model a new way to do conservation - Bridge SWAP with other initiatives - ID common ground among partners - Consistent schedule of collaborative meetings - ID & list partner groups and interest - Tie SWAP to land use planning - Development of new partnerships	
	<u>Funding</u>	- Access to broad base of \$ support - Refocus existing monitoring - Acquire funding for monitoring	
	<u>Citizens</u>	- Consistent schedule of collaborative meetings - SWAP awareness among municipalities, general public, other land use agencies	

# EXERCISE 4: SMART (# OF VOTES IN PARENTHESES)

## GOAL: MAKE WILDLIFE IMPORTANT TO URBAN POPULATIONS

Table Name	ACTIONS	WHO	WHEN	Poster Number
Leiber	Increase outdoor labs at schools by increasing awareness of funding (28)	FWS, HASTI, INPAWS, Industry grants, DNR-WET, WILD, Go Fishing	June 2014	1
	HOE	DNR Cons. Comm.	Annually	

## GOAL: MAXIMIZE VALUE OF DOLLAR

Leiber	Find alternative funding sources (14)	DNR, foundations, individuals, corporations, NGO	Always	2
	Avoid duplication of effort by meeting together (4)	DNR and divisions meet together, cons. orgs.	Quarterly annually	
	Develop ranking system for SWG funds (11)	DNR SWAP team, FWS	By 2015	

## GOAL: MAXIMIZE CONSERVATION PRACTICES ON PRIVATE LAND

Pinchot	Lobby individual federal legislators to keep conservation in Farm Bill, passed and ongoing (38)	NGOs and Individuals	Now, continual, especially every 4 years	1
	Identify and educate land owner programs for habitat and working lands available (27)	NGOs, Farm Bureau, NRCS, FSA, DNR, SWCD	Now, ongoing	
	Funding landowner incentives (10)	NGOs, Farm Bureau, NRCS, FSA, DNR, SWCD	Now, ongoing	
	Hire more regional biologists (6)	NCO state		

## GOAL: ROBUST AND SELF-SUSTAINING CITIZEN SCIENCE AND VOLUNTEER PROGRAM

Pinchot	Select suitable programs – CSs (4)	DNR		2
	Training programs (developed and implemented)	NGO, DNR	Within 1 year	
	Hire volunteer coordinator	DNR	ASAP (within year)	
	Recruit additional volunteers (1)	Coordinator, NGOs, DNR	ASAP (within year)	
	Increase # volunteers 10% annually		5 year goal 50% inc. volunteers	
	C.Sc. Webpage (opportunities and training)	DNR, NGOs		

## GOAL: STRONGER CONSERVATION PARTNERSHIPS

Muir	List of participating organizations by category (clearly organized with comprehensive TOC)	SWAP, all	6 months	1
	Designate a SWAP coordinator (36)	DFW	1 year	
	Schedule regular meetings for SWAP participants	Coordinator	Annual, beginning 2016	
	SWAP newsletter – monthly? web-site, online collaborative tool	Coordinator	Ongoing, 6 months after coordinator is hired	

## GOAL: LOCK-IN ACTIVE PARTICIPATION

Muir	Set expectations - Sales pitch – what are you doing? What have you accomplished?	Coordinator	Ongoing	2
	Avenue for recognition - Attractive marketing (make it sexy)		Ongoing/annual	
	Friendly competition - Advertise who is doing what, who's doing the best job, guilt non-participants (google model operating)	All	Ongoing	

## GOAL: IDENTIFY AND ENHANCE CONSERVATION INFRASTRUCTURE AND FUNDING CAPACITY

Deam	Identify potential partners (2)	SWAP Leadership	2015	1
	Self-assess capacity of partners (current and future)	Partners	2015	
	Synthesize of all capacity	SWAP Leadership	2015	
	Information dissemination (federal agencies and partners)	SWAP Leadership	2016	

## GOAL: PREVENTION OF INTRODUCTION AND EXPANSION OF EXOTIC/INVASIVE SPECIES

Deam	Engage invasive species committees to identify threats and to help them disseminate information (26)	DNR, Conservation partners	ASAP	2
	Risk Assessment (2)	University under direction of committee	ASAP	
	Prioritization			
	Policy making – seek funding	Legislature	2015-2016	
Management (Containment and/or eradication)	All partners		ASAP	

## GOAL: ESTABLISH SWAP AS THE UNIFIED VISION FOR NATURAL RESOURCE CONSERVATION IN INDIANA

Thoreau	Complete SWAP good vision (1)	SWAP Committee	2015	1
	Buy-in by partners, mobilize partners to generate support (2)	SWAP Committee, partners	2015-2016	
	Governor proclamation	DNR Executives	2015-2016	
	Develop Citizen Communication Plan (4)	SWAP Advisory Team	2015-2016	

## GOAL: STABILIZE AND ENHANCE AND CONNECT EXISTING HABITAT TYPES

Thoreau	Establish habitat baselines (2)	DNR, USFWS, NRCS	2014	2
	Identify target areas (7)	Regional or sub committee	2015	
	Prioritize projects and funding (6)	Regional or sub committee	2015	
	Detailed plan (1)	Local sponsor	2015-2016	
	Seek funding (4)	Local sponsor	2015-2016	
	Implement (16)	Local sponsor	2020	

## GOAL: BIG PICTURE

Roosevelt	Create communication plan (21)	SWAP Coordinator	2015	1
	Use common language	Partners	2015	
	ID overlapping goals of partners	Partnes	2015 and ongoing	
	ID stakeholders outside conservation community (from communications plan)	SWAP Coordinator	2014	

## GOAL: INCREASE FUNCTIONALITY OF SWAP

Roosevelt	ID users of SWAP (11)	SWAP Team	2013/14	2
	Provide drafts to interested parties for feedback and how it could be applied	SWAP team and partners	2013/14	
	Outreach campaign and increase awareness (funding for commercials, HOE/fair, brochures @ DNR properties)	DNR	2013/14	

### GOAL: DEDICATED STAFF

Carson	Funding (18)	Private foundations and conservation community,	2015	1
	Create representative panel to hire staff	DNR and funding partners	2015	
	Seek permanent funding		2016	
	Office space/facilities	DNR	2015	
	Define responsibilities of position (work profile)	DNR and funding partners	2015	

### GOAL: PUBLIC RELATIONS/MARKETING TO PUBLIC/BUSINESSES AND UNIVERSITIES AND LEGISLATORS

Carson	Create strategic marketing plan (5)	Dedicated SWAP staff	2015	2
	Implement marketing plan (3)	Partners, DNR, NGOs, etc.	2015	
	Organize regional meetings for conservation congress	Partners, DNR, NGOs, etc.	2016	
	Seek permanent funding (31)	Dedicated SWAP staff	2016	
	Social media plan	Dedicated SWAP staff	2015	
	Seek media contacts	Dedicated SWAP staff	2015-2016	
	Seek corporate partners (1)	Dedicated SWAP staff	2015	
	University site visits/internships	Dedicated SWAP staff	2015	

### GOAL: INDEPENDENT OVERSIGHT/SWAP

Lacey	Establish "board" (16)	Conservation Stakeholders	2015, annually	1
	Review progress reports from DFW/SWAP			

### GOAL: IMPROVE AND ACQUIRE HABITAT

Lacey	Acquire sites that target species with the greatest conservation need (61)	DNR and partners	Annually	2
	Improve acres of habitat of greatest conservation need (44)	DNR and partners	Annually	

## GOAL: EFFECTIVELY ENGAGE PRIVATE INDIVIDUALS/LANDOWNERS

Emerson	Develop a SWAP brand that private individuals recognize (15)	Core Team	March 2016	1
	Develop a group engagement format that includes 20% participation from private individuals/landowners	Advisory Committee	2018	
	Document continued participation of 50%	Advisory Committee	2019	
	Maintain a satisfaction index of 75%	Advisory Committee	2020	

## GOAL: DEVELOP A COMMUNICATIONS PROCESS BETWEEN/AMONGST PARTNERS

Emerson	Develop master list of partners (17)	Core Team	ASAP	2
	Test minimum of 3 social media mechanisms for partner communication, select most effective	Contract?	Contract?	
	Survey partners for effectiveness annually	Advisory Team	Advisory Team	
	Develop a web application to share performance info	Advisory team/contract	Advisory team/contract	

## GOAL: DEFINE THE MEASURE OF SUCCESS

Leopold	ID overall objectives	Each partner	Now	1
	Compile list of objectives	Advisory team	December 2013	
	Agree on common objectives	Partners and advisory team	Spring 2014	
	Agree on the metrics (12)	Partners with technical expertise	By final draft	
	ID relevant partners (8)	All of us	Now – SWAP submitted to USFWS	
	Common language development (7)	Advisory team	Now – early 2014	
	Review of measures of success by conservation community (1)	Partners	Prior to final draft	

## GOAL: IDENTIFY AND ACT AT PROPER SCALE

Leopold	ID proper scale to meet objective(s) for species or habitat (8)	Technical experts	Start 2016 after plan adoption	2
	Figure out who is active at that scale and who has authority to act	DNR, USFWS, Conservation partners	Follow	
	ID who is impacted by conservation actions	Partners	Sequentially	
	Bring relevant players together to form consensus on action	LCC	Sequentially	
	ID and overcome barriers to action at appropriate scale	Partners	Sequentially	



# SWAP | SOUTH MEETING



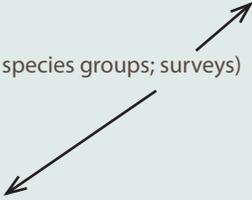
Conservation doesn't just happen. It takes resources and collaboration.



# PANEL #1

Table Name	Comments	Poster Number
Deam	<p>Questions:</p> <ul style="list-style-type: none"> <li>- How will SWAP help distribute conservation \$</li> <li>- How was the last SWAP used successfully</li> </ul>	1
Carson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- 3 divisions representing how to integrate the SWAP into current conservation efforts</li> <li>- The panel members are a part of the conservation community</li> <li>- Must be habitat based plan</li> </ul>	2
Leopold	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- funding?</li> <li>- Watersheds? <ul style="list-style-type: none"> <li>- forestry management</li> <li>- how does newer practices impact watershed?</li> </ul> </li> <li>-public involvement</li> </ul> <p>Questions:</p> <ul style="list-style-type: none"> <li>- What's the plan for continued user/stakeholder involvement in the process?</li> </ul>	3
Roosevelt	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Funds (past \$1 million)</li> <li>- Avoid random acts of conservation</li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- What non-NGOs and other non-traditional partners will be involved? <ul style="list-style-type: none"> <li>- Plan due 2015 → revision</li> <li>- Habitat based → 8 types</li> </ul> </li> </ul> <p>Statewide plan for all partners</p> <ul style="list-style-type: none"> <li>- What part of the plan is being revised → what have we learned from the last plan?</li> <li>- What will be used to get public involved?</li> <li>- Do we have results summarized from previous plan? <ul style="list-style-type: none"> <li>- Plan covers <ul style="list-style-type: none"> <li>○ Citizens</li> <li>○ Environment</li> <li>○ Conservation community</li> </ul> </li> </ul> </li> <li>- Funding</li> </ul>	4a
		4b
Thoreau	<p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- Julie: how will this plan be different than the last one?</li> <li>- What was learned from the last plan? Negatives? Positives?</li> </ul>	5
Lacey	<p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- How is funding distributed?</li> <li>- Panel Creditability</li> <li>- Who makes final decision?</li> </ul>	6
Emerson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>- Grant- \$1mil</li> <li>- Build partnerships</li> <li>- Habitat based plan tool for other agencies.</li> <li>- 2015 deadline</li> <li>- 4 Cat: <ul style="list-style-type: none"> <li>○ Eco</li> <li>○ # funding</li> <li>○ Con. Comm.</li> <li>○ Citizens</li> </ul> </li> </ul> <p><u>Questions:</u></p> <ul style="list-style-type: none"> <li>- How/who/do we get this plan on the ground?</li> <li>- How are private landowners involved?</li> </ul>	7a
		7b

# EXERCISE #2

Table Name	Themes	Poster Number
Emerson	<p>Species reintroduction                      Habitat improvement Projects (Blue River)                      Go Fishin' in the City                      SAFE</p> <hr/> <p>Environment - technical asst.                      Conservation Community - Facilities/equip                      Funding - \$ funding                      Conservation Community - established part                      Citizen - Public Outreach</p>	#1
Lacey	<ul style="list-style-type: none"> <li>- HEE (Purdue, Fish Wildlife, Forestry) current</li> <li>- Eastern Box Turtle (nongame, Purdue, FWS, sycamore land trust) current</li> <li>- Starve Hallow lake Renovation (forestry, fisheries management/hatch) current.                             <ul style="list-style-type: none"> <li>o Citizens - Hellbender Hustle, Purdue Extension Programs</li> </ul> </li> <li>- Indiana bat - nongame, forestry, USFWS, current</li> <li>- Wood rat - nongame, Purdue, forestry, private lands</li> <li>- Forest Wildlife Project - past</li> <li>- Public access - forestry</li> <li>- Rule/Regulation promulgation</li> <li>- Implementation - prop managers, biologist</li> </ul>	#2
Thoreau	<p><u>Fisheries</u></p> <ul style="list-style-type: none"> <li>- Technical expertise</li> <li>- \$</li> <li>- Partnerships</li> </ul> <p><u>Parks</u></p> <ul style="list-style-type: none"> <li>- Volunteers (citizens) g grant opportunities. Ex: warbler nesting box project</li> <li>- Environment</li> </ul> <p><u>Wildlife</u></p> <ul style="list-style-type: none"> <li>- Environment (working with species groups; surveys)</li> <li>- Also citizens groups</li> <li>- \$</li> <li>- Habitat management</li> </ul> <p><u>IFA(Indiana forest alliance)</u></p> <ul style="list-style-type: none"> <li>- Environment</li> <li>- Citizens (bringing different opinions &amp; interest)</li> <li>- Conservation groups</li> </ul> <p>Common Threads!</p> <p>-habitat (the details of this can look a lot different, but the same base can exist!)</p> 	#3

Roosevelt	<u>Environment</u> <ul style="list-style-type: none"> <li>- Managing habitat &amp; species</li> <li>- Use of renewable resources mgmt.</li> <li>- Buying land- conservation easements</li> <li>- Multiple partners manage use</li> <li>- CWMA to control invasive on private land</li> <li>- HRI</li> <li>- Columbia Mine</li> <li>- Communication of technical services &amp; conservation values</li> <li>- West Bogs Renovation</li> <li>- Research &amp; monitoring <ul style="list-style-type: none"> <li>o HEE</li> </ul> </li> </ul>	#4a
	<u>Conservation Community</u> <ul style="list-style-type: none"> <li>- DUG land acquisition</li> <li>- TNC</li> <li>- West Bogs state and local</li> <li>- American Chestnut Foundation</li> <li>- Slow the Spread- many partners</li> <li>- Universities</li> <li>- Species Restoration</li> <li>- HOE</li> <li>- Goose Pond</li> </ul>	#4b
	<u>Funding</u> <ul style="list-style-type: none"> <li>- BNT</li> <li>- Private foundations</li> <li>- Heritage trust</li> <li>- Private company support</li> <li>- WSFR           - SWG</li> <li>- USDA           - GLRI</li> <li>- User Fees       - Tax Check off</li> <li>- Farm Bill</li> </ul>	#4c
	<u>Citizens</u> <ul style="list-style-type: none"> <li>- Natural Resource Education Programs</li> <li>- Recruitment retention</li> <li>- Hunter education</li> <li>- Youtube/social media</li> <li>- WRP/CRP</li> <li>- Forestry program</li> <li>- Citizen science <ul style="list-style-type: none"> <li>o Breeding bird survey</li> </ul> </li> <li>- WET           - WILD</li> <li>- 4-H           - Learning Tree</li> <li>- FFA</li> </ul>	#4d

Leopold	<p><u>Past:</u>  <u>Conservation Community</u></p> <ul style="list-style-type: none"> <li>- IN Bass federation/ NWTF</li> <li>- Partnerships (labor/money)</li> <li>- Land trusts</li> </ul> <p><u>Funding</u></p> <ul style="list-style-type: none"> <li>- Bass pro donations</li> <li>- Creative funding strategies</li> <li>- Shared/non-traditional sources</li> </ul> <p><u>Citizens</u></p> <ul style="list-style-type: none"> <li>- Individuals in these organizations</li> <li>- Friends group</li> <li>- Citizen science (specific DNR position)</li> <li>- Input on decision process</li> <li>- Connect public to resource w/ sustainable trails</li> </ul> <p><u>Ecosystems</u></p> <ul style="list-style-type: none"> <li>- Land acquisitions <ul style="list-style-type: none"> <li>o BNT</li> </ul> </li> <li>- Heritage Trust</li> <li>- HRI <ul style="list-style-type: none"> <li>o Habitat restoration</li> </ul> </li> </ul>	#5
Carson	<p><u>Past Projects</u></p> <ul style="list-style-type: none"> <li>- North American waterfowl plan (4 themes)</li> <li>- Healthy rivers initiative (4 themes)</li> <li>- Goose Pond- (4 themes)</li> <li>- Friends Groups (3 themes)</li> <li>- Hardy lake Raptor Program Support (4 themes)</li> <li>- HEE (Hardwood ecosystem experiment) (4 themes)</li> <li>- NBCI &amp; other NGO's (4 themes)</li> <li>- Summer bat Monitoring -4 themes</li> </ul> <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> <li>- Expertise/man power: partnerships, Farm Bill</li> <li>- \$</li> <li>- Land</li> <li>- Interpretive programs/ education outreach</li> </ul>	#6
Deam	<p><u>Past:</u>  <u>Healthy rivers initiative</u>  Survey and monitoring of endangered and threatened species  Retention and recruitment events- which need to continue?</p> <p><u>Available resources:</u></p> <ul style="list-style-type: none"> <li>- Current and new land acquisitions</li> <li>- Knowledgeable DNR staff</li> </ul>	#7



Lacey	<ul style="list-style-type: none"> <li>- List of entities</li> <li>- Better communication between entities</li> <li>- What resources do entities have? (land, people, money, etc.)</li> <li>- Goals of entities- how can we work together?</li> <li>- List of possible things for volunteers to do</li> <li>- Consider hiring on person to be in charge of volunteers/volunteer programs. Must have established leader and set rules/ everyone involved must understand roles</li> <li>- Focus on specific goal with involving volunteers</li> </ul>	#7a
	<ul style="list-style-type: none"> <li>- New funding source</li> <li>- Tax on outdoor materials</li> <li>- Monetary incentive for landowner to allow hunting access on private lands</li> <li>- Lack of manpower able to show results for projects <ul style="list-style-type: none"> <li>o Ex: goose pond. Locals probably see benefits of this</li> </ul> </li> </ul>	#7b

## EXERCISE 3: GOALS

Table Name	Theme	Goals	Poster Number
Emerson	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Strengthen existing</li> <li>- Build new partnerships</li> </ul>	1/3
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Alternative sources</li> <li>- Web based funding listing</li> </ul>	
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Improve habitat connectivity on a landscape level</li> <li>- Reduce and restrict invasive sp. - Consistent ranking of threats and needs by qualifies individuals</li> </ul>	2/3
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Increased knowledge &amp; buy-in</li> <li>- Post Montgomery retirement</li> <li>- Vol. TV host!</li> </ul>	3/3
Lacey	<u>Funding</u>	<ul style="list-style-type: none"> <li>- New funding source</li> </ul>	Lacey 1/3
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Buy-in to our goals</li> <li>- Combat apathy</li> <li>- Education</li> <li>- Promote citizen advocacy</li> </ul>	
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Identify target species/ habitat</li> <li>- Rate significance</li> <li>- Improving water quality</li> <li>- Recommended mitigations</li> <li>- Assess success or failure</li> <li>- Invasive species management</li> <li>- Integrate game and nongame management</li> </ul>	Lacey 2/3
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Better communication</li> <li>- Create buy-in</li> <li>- More collaboration</li> </ul>	3/3

Deam	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Conservation corridors for animals</li> <li>- Control invasive species &amp; awareness</li> <li>- Increase ruffed grouse habitat</li> <li>- Restore wetlands</li> <li>- Re-establish fence rows</li> <li>- Reduce sediment load in streams</li> <li>- Dam removals</li> <li>- Pollution controls</li> </ul>	1
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Interagency cooperation</li> <li>- Improve school curriculum</li> <li>- Encourage field trips/days/public outreach</li> <li>- Develop media relations materials</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Additional taxes on outdoor products</li> <li>- Earmark \$ from- special product sales (tags and stamps)</li> <li>- Additional fees on hunting licenses</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Means for programs &amp; properties to display success stories</li> </ul>	
Roosevelt	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Maintain forum engagement</li> <li>- Expand to nontraditional partners</li> </ul>	1
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Marketing/showcasing Benefits/ accomplishments</li> <li>- Increase land base for conservation</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- More effective engagement of politicians</li> <li>- Develop list of sources/willing participants</li> <li>- Sustainable/untouchable/long-term funding</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Recognizes public perception</li> <li>- Create a stakeholder mentality</li> <li>- Local access to SWAP</li> </ul>	
Leopold	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Inform/reduce impacts of invasives</li> <li>- Tear down <u>silos</u></li> <li>- Marketing our resources</li> </ul>	1
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Interested/engaged</li> <li>- Farmers/private land owner involved</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Broadening support by connecting legis. and outside funders</li> <li>- Wider funding sources (camping, wildlife watchers, etc.)</li> </ul>	
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Identify/restore critical ecosystems</li> <li>- Landscape management approach</li> <li>- Management vs. preservation</li> <li>- Maintain/do species inventory</li> </ul>	
Thoreau	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Maintain and increase native biodiversity</li> <li>- Promote more habitat (contiguous – quantity and quality), strategic rather than opportunistic</li> </ul>	1
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Promote more habitat</li> <li>- Land donations</li> <li>- Strengthening partnerships (yearly statewide and regional conservation group convergence!)</li> </ul>	
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Sales tax to fund conservation</li> <li>- Strategic land acquisition (contiguous)</li> <li>- More money for invasive species control</li> <li>- Tying economics to conservation</li> <li>- Events! Field days.</li> </ul>	
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Exposure/conservation ethic as framework/grassroots action</li> <li>- Sales tax/lump sums?</li> <li>- Land donation/CRP</li> <li>- Organized events to engage with folks/share what we're up to</li> <li>- Field days on project success (with lunch!)</li> </ul>	

Carson	<u>Funding</u>	- Permanent stable SWG funding source - Investigate new funding sources (sales tax, landowner money incentives for access)	1
	<u>Environment</u>	- Baseline inventories - Invasive species control	
	<u>Conservation Community</u>	- Active/interactive engagement - Develop common objectives	
	<u>Citizens</u>	- Raise awareness/create interest	

## EXERCISE 4: SMART (# OF VOTES IN PARENTHESES)

### GOAL: DEVELOP ALTERNATE FUNDING SOURCES

Table Name	ACTIONS	WHO	WHEN	Poster Number
Emerson	Web based listing of needs/projects (16)	DNR	2015	#1
	Web based listing of avail. \$ grants.com			
	Conservation tax (23)	All cons. Partners	2020	
	Legacy/estate planning	TNC, CC's	2015	
	Landowner License- min fee	Fish/wild	2015	

### GOAL: CONSTANT RANKING

Emerson	Develop baseline of threats	CC	2015, bi-cent rpt.	#2
	Cause and effect	CC	2015-2017	
	Remedies	CC	2015-2029	
	Measurement & reporting	CC	2015-2020	
	Annual Report	CC	2015-2025	

### GOAL: INTEGRATING GAME AND NON-GAME MANAGEMENT

Lacey	Select representative species (13)	FW biologist	Now	#1
	Identify "special needs" SGCN	Nongame		
	Cross training (11)	DNR		

## GOALS: CITIZEN EDUCATION

Lacey	Move HOE to different regions every year (9)	DRN admin	Now	#2
	Surveys to assess effectiveness of programs Did they buy a license afterwards? (2)	?	2015+	
	Assess which programs are working (14)	?	2015+	

## GOAL: INCREASE RUFFED GROUSE HABITAT

DEAM	Public outreach (4)	F&W and USFS Forestry Other states private cons. Groups	3-5 yrs.	#1
	Identify suitable habitat	F&W Forestry Private landowners USGS Military sites	2-3y.	
	Identify management Tech + needs – Cost +funding (2)	Other states F7W Forestry Ruffed Grouse Soc.	1-3 y.	
	Implement habitat management & coordinate w/ all landowners(15)	same		
	Re-evaluate			

## GOAL: ENCOURAGE PUBLIC OUTREACH WITH SCHOOL GROUPS

Deam	Develop education program for schools Contact Schools (17)	F&W, State Parks, Forestry Public outreach coordinator	1-3y. Ongoing	#2
	Field Day (3)	F&W	School yr.	

## GOAL: CREATE A CONSERVATION ETHIC

Roosevelt	Template to schools for engaging in outdoor labs	IDNR/ local school systems/ existing NGO programs	2015-?	#1
	Outdoor curriculum part of school standards(9)	Legislative		
	Marketing Campaign for special places (5)	IDNR/Dept. of Tourism	2015-?	
	Conservation for better health (4)	Health, Industry	2015-?	

## GOALS: INCREASE LAND BASE FOR CONSERVATION

Roosevelt	Provide economic incentives to landowners/corporations i.e.: tax incentives, conservation easements (24)	Legislative action/landowners	2015	#2
	Federal land water conservation fund (increase access to funds) (4)	Fed representation	2015	
	Expand Healthy Rivers Initiative (14)	IDNR Legislative	now	
	PR funds & BNT to land conservation (2)	IDNR legislative	Now	
	Support classified forest and wild lands  Providing incentive for population density  Reduce sprawl (21)	IFwort	Now	

## GOAL: TEARING DOWN SILOS

Leopold	Hire a SWAP Coordinator(s) (2)	DFW	2014	#1
	Interactive website (3)	DNR	2015	
	Put together regular meetings between conservation agencies & universities	SWAP Coordinator	Annual, begins 2015	
	Regular meetings in DNR between staff (20)	DFW, SPR Forestry, NP	2014	
	Funding support for professional meetings	Division Directors Alliance	2015	
	Between public & staff? (1)	All	Ongoing	

## GOAL: CREATING AN INTERESTED/ENGAGED PUBLIC

Leopold	Consumptive R&R – continue	DFW	2015	#2
	General education programs	DNR/conservation groups	2015	
	Bio blitz	Universities/DNR	2015	
	Smartphone apps/workshops to ID wildlife/hunt/fish	DFW	2015	
	Local workshops for habitat development for farmers	DNR/Extension		
	Marketing campaign for public lands (25)	SWAP Coordinator		
	New incentives for private land-owners (5)	SWAP Coordinator	2015	

## GOAL: STABLE AND INCREASED FUNDING FOR CONSERVATION

Thoreau	Inventory of funding opportunities (existing) (1)	Partners	Start now!	#1
	Identify potential funding sources (i.e., grants, sales taxes)	Partners	After #1! (2014)	
	Leading a campaign for a conservation sales tax	Non-agency Partners (i.e., NWF, TNC)	Now - 2018	
	Non-agency leader in #3 – puts strategic (marketing) plan together (64)			
	Grassroots support to carry out plan	Everyone!	Now into future	

## GOAL: DECREASED FRAGMENTATION

Thoreau	Strategic purchasing (4)	Conservation Community	2015	#2
	Priority areas based on connectivity and availability of land (26)	Conservation Community	2015	
	Minimum sizes for species & habitat (1)	Conservation Community	Now	
	Clearinghouse of who owns what (3)	Conservation Community	Now	

## GOAL: RAISE AWARENESS/CREATE INTEREST (CITIZENS)

Carson	SWAP Facebook (3)	IDNR F&W	2014	#1
	Inform government and NRC elected officials of SWAP (9)	Conservation Community	2015	
	Incorporate SWAP in conservation education	Educators	2015+	
	Engage Indiana Farm Bureau (14)	Conservation Community	2015	

## GOAL: BASELINE INVENTORIES (ENVIRONMENT)

Carson	Prioritize inventory needs (ex, plant surveys = IDNR Nature Preserves) (19)	Technical Experts	1-3 years	#2
	Conduct inventories (2)	Technical Experts	2 years	
	Create shareable database among conservation community	Technical Experts	After above action	
	Analyze and monitor (2)			

# SWAP | NORTH MEETING



Conservation doesn't just happen. It takes resources and collaboration.



# PANEL #1

Table Name	Comments	Poster Number
Leopold	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Single species conservation projects actually benefit whole communities</li> <li>• Plan is useful &amp; versatile</li> <li>• DNR and NGOs can both use it</li> <li>• Tool for setting priorities</li> </ul> <p><u>Question:</u> - How can we use this plan to gain access to more money?</p>	1
Lacey	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Linking projects to T &amp; D Species</li> <li>• SWAP gives people a tool to help manage habitat</li> <li>• Habitat Based plan</li> </ul> <p><u>Question:</u> - How does SWAP facilitate funding for management for species other than SGCM?</p>	2
Roosevelt	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Collaborative Consultation</li> <li>• Landscape Level</li> <li>• Bigger than DNR</li> <li>• Revision due 2015</li> <li>• Required for funding</li> <li>• Core Team/Advisory team</li> <li>• SGCN</li> <li>• Habitat based</li> <li>• Themes (4) Env. Cons. Comm. Funding,Citizen</li> <li>• Leveraging for additional \$/Mgmt</li> </ul> <p><u>Questions:</u></p> <ol style="list-style-type: none"> <li>1. What is (the) process for engaging citizenry?</li> <li>2. How do we get buy-in from the agriculture industry?</li> <li>3. How will core advisory team communicate with people not at meetings?</li> </ol>	3a  3b  3c  3d
Carson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Multiple groups working towards common goals</li> <li>• Management of single species can benefit many other species</li> </ul> <p><u>Question:</u> - Do we know enough about the life history of rare and endangered species?</p>	4
Emerson	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Track record of results</li> </ul> <p><u>Question:</u> - How do we raise more state-matched \$?</p>	5
Deam	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• Species of Greatest Concern Habitat Enhancement</li> <li>• Reliable funding <ul style="list-style-type: none"> <li>○ Appropriation</li> <li>○ More permanent approach</li> </ul> </li> <li>• Availability of funding for others</li> </ul> <p><u>Question:</u> - How is money obtained through SWAP?</p>	6
Thoreau	<p><u>What we heard:</u></p> <ul style="list-style-type: none"> <li>• About process, and examples, plan</li> </ul> <p><u>Question:</u> - What is not in the old plan that you would like to see the new plan have?</p>	7

## EXERCISE #2-THEMES

Table Name	Comments	Poster Number
Thoreau	CRP-Farm Bill (Funding & Environment) (Citizens & CC) Managing the diversity @ Jasper Piteski (sp) Is good for game & non-game species (Citizens & Environment) Providing nursery stock for reforestation (Funding, environment, cc, citizens) Reintroduction of Trumpeter Swans (Funding, environment, cc, citizens) Stocking Fish-Trout & Salmon (Funding, environment, cc, citizens)	8a
Thoreau	NGO Land holder -Forest -Wetlands -Prairie Provide: Outreach, education, research *Oak tree preservation Monitoring publicly owned resources DNR-Repository of expertise	8b
Deam	Collaboration with Non-Game Org Benefits from Projects-Go back to More Projects All Projects Benefiting all species Farm Bill benefits Partners Allocate Money -PF -DV F & W staff oversee project Joint venture on Kankakee -WRP -Lots of opposition	9a
Deam	Additional Resources -License plate funds Find more funding source Birdwatcher funds Agency vs NGO -Strengths and weaknesses of each Special Interest Groups How do you sell a project to gain (the) most interest? How do you engage special interest groups for money?	9b
Emerson	-Watershed Programs -Related to ALL themes NPWS recruiting individuals to work on common projects (community) Friends of KANK -Film-Everglades of the North (community, citizens, funding) Fisheries Creel/Statewide Angler Survey (community)	10a
	Michigan City School Program -Program adopt an environmental curriculum	10b

Carson	<p><u>Env</u></p> <ul style="list-style-type: none"> <li>● Invasive Control</li> <li>● Succession Control</li> <li>● Habitat Management</li> <li>● Multi-spp Mgmt</li> <li>● Dam Removal</li> <li>● Water Quality</li> </ul> <p><u>CC</u></p> <ul style="list-style-type: none"> <li>● Education &amp; Outreach</li> <li>● Event, programs, workshops</li> <li>● Farm Bill</li> </ul> <p><u>Funding</u></p> <ul style="list-style-type: none"> <li>● Local user-groups</li> <li>● Funding partners</li> <li>● Farm Bill</li> <li>● Agency Funding (319)</li> <li>● SFR</li> <li>● Game &amp; Non-Game Organizations</li> <li>● Private Foundations</li> </ul> <p><u>CIT</u></p> <ul style="list-style-type: none"> <li>● Finding common ground-conflicting groups <ul style="list-style-type: none"> <li>○ Ag vs. hunters vs. non-hunters vs. lake users</li> </ul> </li> </ul>		11
Roosevelt	Theme	Project	12a
	Environment	Habitat Management	
	Citizen	Work with public - Nuisance work	
	Cons/ Comm	Previous SWAP survey to ID needs	
	Cons, Comm, Funding, Citizens, Env	MWTF funding projects and R/R events @ Roush	
	Funding	Seed w/donating Seed to FWA for food plots	
	Funding, Env. Cons. Comm	Participation with partners in NAWCA project grant	
	Available Resources -People -Tech expertise -Land -SWG, License \$, fed grant \$, check-off, donations, -Tax abatements		
-Farm Bill -HRI-BNT -Pvt. Co\$ -Foundation \$ -Partnership networks -human dimensions Research & Expertise -outreach & community			12d
Media Relations What Resources do we need? -Political connections -Buy-n from agriculture -public support & respect			12e

Lacey	Project	Theme	13a
	Habitat management practices	All	
	Land acquisition	All	
	Technical Assistance (private lands) Participate in fed funded projects NAWAC etc.	All	
	Research, Tech assistance, on land, regional, statewide projects		13b
	Available Resources <ul style="list-style-type: none"> <li>- Knowledge</li> <li>- Equipment</li> <li>- Funding</li> <li>- Credibility</li> <li>- Manpower/time</li> <li>- Research Capacity</li> <li>- Education &amp; Outreach</li> </ul>		
Leopold	<ul style="list-style-type: none"> <li>- Cisco-cold water community (eco)</li> <li>- Invasive species management-ecosystems</li> <li>- Hunter/angler recruitment-citizens</li> <li>- Looking for alternative funding (DFW)</li> <li>- Fish stocking <ul style="list-style-type: none"> <li>- Angler recruitment/retention</li> <li>- Ecosystem management (predator/prey)</li> <li>- Habitat management</li> </ul> </li> <li>- NR Fisheries-coordination with Muskie anglers (cons community)</li> <li>- PF, QF on game bird areas (acquisition/management)</li> </ul>		11a
	<ul style="list-style-type: none"> <li>- Continue working with other organizations to acquire more habitat (DFW, Cons, Community)</li> <li>- Coordination with municipalities to increase river health (HRI)</li> <li>- Providing in-kind support to research projects (cons community)</li> <li>- Data acquisition</li> <li>- Educational events partnering with other organizations (cc, citizens)</li> </ul>		

## WORKING LUNCH- NEEDED IMPROVEMENTS

Table Name	Comments	Poster Number
Roosevelt	Needs to improve <u>partnerships/resources/programs?</u>	15a
	<ul style="list-style-type: none"> <li>- Political connections</li> <li>- Communications network <ul style="list-style-type: none"> <li>a. partners not knowing what is going on</li> </ul> </li> <li>- Public support and respect</li> <li>- Engage gen. public with programs</li> <li>- Take advantage things people are interested in (clean H2O, clean air, Hunger Games, Archery)</li> <li>- Personal Contacts</li> <li>- Disney Movie <ul style="list-style-type: none"> <li>a. animals as real animals</li> </ul> </li> <li>- Better understanding of reason for human-wildlife conflicts</li> <li>- ID and address gaps in conservation</li> </ul>	15b
		15c
Carson	<ul style="list-style-type: none"> <li>- Diversity within partnerships</li> <li>- More volunteers</li> <li>- Sharing success stories</li> <li>- better communication <ul style="list-style-type: none"> <li>a. Local networking</li> <li>b. more meetings</li> <li>c. Intentionally engage those who are most difficult</li> <li>d. Get the right people at the table</li> <li>e. Get by-in through education and understanding the other side's view</li> </ul> </li> </ul>	16

St. Joe & Kankakee River Commissions  
 Lake Michigan Costal Program



## EXERCISE 3: GOALS

Table Name	Theme	Goals	Poster Number
Lacey	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Use existing money to get more funding</li> <li>- Appropriate use of funds</li> <li>- Be more transparent with our goals and objectives</li> <li>- Clarify mutual benefit</li> <li>- Identify potential sources of funding (networking)</li> <li>- Develop new source of permanent state funding for conservation</li> </ul>	Lacey Goals 1/4
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- ID stakeholders/ Partners (networking)</li> <li>- Know partners missions</li> <li>- Create formal way to organize partners</li> <li>- Enhance flexibility using partners</li> <li>- Get partners to accept ownership in conservation</li> </ul>	Lacey goals 2/4
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Education outreach why cons. Is important for everyone</li> <li>- Individual buy in to conservation</li> <li>- Promote our programs &amp; how they benefit all</li> <li>- Educate political leaders</li> </ul>	Lacey goals 3/4
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Land acquisition</li> <li>- Proper management of land</li> <li>- Prioritize</li> <li>- Invasive species proactive</li> </ul>	Lacey goals 4/4
Thoreau	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Managing wildlife diseases</li> <li>- Reduce new invasive species</li> <li>- Increase land holdings</li> <li>- Maintain/increase species diversity</li> <li>- Maintain healthy systems</li> <li>- Establishing survey standards</li> <li>- Setting measures of success for evaluations (are we there yet?)</li> <li>- Connecting management units into larger systems</li> <li>- Working with adjoining land owners to further our management goals</li> </ul>	1/4
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Increase partnership with ag/business entities</li> <li>- Identify common goals between groups</li> <li>- Understand strengths/resources/expertise of various con. orgs</li> <li>- Continuous /sustained engagement of various con. Orgs</li> <li>- Improve interface between outreach/education &amp; con org.</li> <li>- Recruit/increase volunteers/citizen scientists</li> </ul>	2/4
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Leveraging multiple revenue sources on focused projects</li> <li>- Broading/devifing/alternative funding sources</li> <li>- Distinguishing requiremens that come with various funding sources</li> <li>- Continue recruit and retain anglers/hunter &amp; people who value resources</li> <li>- Showing benefits for non-consumptive users</li> </ul>	3/4
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Build public support thru education</li> <li>- Increase understanding of the human dimension, component the public who value &amp; resources</li> <li>- Raising level of conservation n education of children</li> <li>- Showing benefits of conservation to non-consumptive groups</li> <li>- Identifying the groups that may value resources</li> </ul>	4/4

Carson	<u>Funding</u>	<ul style="list-style-type: none"> <li>- ID sources <ul style="list-style-type: none"> <li>o Local, state, federal</li> <li>o GFO's ,private</li> <li>o * Innovative, new sources</li> <li>o Grants</li> <li>o Donations</li> <li>o Wills &amp; trusts</li> </ul> </li> <li>- Lobby efforts</li> <li>- User fees</li> </ul>	1/2
	<u>Citizen</u>	<ul style="list-style-type: none"> <li>- Increase public awareness</li> <li>- Common-cause</li> <li>- Engage non-trad users w/ hands on activities</li> <li>- Public opinion-change</li> <li>- Legislative actions</li> <li>- * Bridge gap between ag and habitat</li> <li>- * Knowledge mgnt</li> </ul>	1/2
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Represent constituently through proper regulation</li> <li>- * Improve water quality</li> <li>- Habitat development/restoration</li> <li>- Exotic spp. Control</li> <li>- Appropriate population control</li> <li>- Reintroduction of extirpated spp/</li> <li>- Encourage appropriate land use</li> <li>- Enhance recreational opportunities</li> </ul>	2/2
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- * improve communication/ networking</li> <li>- * Educating stakeholders <ul style="list-style-type: none"> <li>o Share success</li> </ul> </li> </ul>	2/2
Leopold	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Engage citizenry</li> <li>- Educate citizens</li> <li>- Retain active users</li> <li>- Recruit new users</li> <li>- Marketing</li> </ul>	1/3
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- Alternative sources?</li> <li>- New partners/match?</li> <li>- Increase efficiency</li> <li>- Increase funding</li> </ul>	1/3
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Identify all potential partners</li> <li>- Engage said partners</li> <li>- Improve communications</li> <li>- Recruit users to more activity in the conservation community</li> </ul>	2/3
	<u>Ecosystems/Environment</u>	<ul style="list-style-type: none"> <li>- Inventory existing ecosystems</li> <li>- Satisfy demand for consumptive users</li> <li>- Satisfy demand for non-consump. uses</li> <li>- Increase imperiled species</li> <li>- Keep common spp. Common</li> <li>- Increase/conserves/critical/deficient/imperiled <ul style="list-style-type: none"> <li>o improve habitats</li> </ul> </li> <li>- Increase access to all users/citizens <ul style="list-style-type: none"> <li>o Distribution of public land</li> </ul> </li> <li>- Improve river health /water quality</li> </ul>	2/3 and 3/3

Deam	<u>Funding</u>	<ul style="list-style-type: none"> <li>- broaden knowledge of sources</li> <li>- Sustainable source</li> <li>- Permanent source</li> <li>→ Diversify</li> <li>- Recruit/retent</li> <li>- Partnership leveraging</li> </ul>	1/4
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Communicatie/sharing</li> <li>- Engagement</li> <li>- Recruitment → public to Ngo → NGO to agency</li> <li>- Goal sharing</li> <li>- Broaden def. of comm.</li> <li>- DEFINE →</li> </ul>	2/4
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Increasing conservation awareness</li> <li>- Buy in of entire idea</li> <li>- Incorporate new social media</li> <li>- Create advocates *</li> </ul>	3/4
	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Water quality*</li> <li>- Protection/enhancement</li> <li>- Restoration</li> <li>- Focus area</li> <li>- Forest halth</li> <li>- Continuing education</li> <li>- Invasice/succssion</li> <li>- Connectivity of conserv. Efforts</li> </ul>	4/4
Emerson	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Prioritize watersheds</li> <li>- Develop system of conservation lands all eco-types</li> <li>- Monito &amp; address invasives</li> <li>- Identify lands that need to be protected "for species"</li> <li>- Expand &amp; manage buffers</li> </ul>	#22a
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Ongoing collaborative stakeholders communication <ul style="list-style-type: none"> <li>o Annual, regional, etc.</li> </ul> </li> </ul>	#22b
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- More promotion of program</li> <li>- New sources of funds <ul style="list-style-type: none"> <li>o Comm foundations</li> <li>o Corporations</li> </ul> </li> <li>- Seek interns/staff for fundraising</li> </ul>	#22b
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- More conservation education</li> <li>- Monitor publicopion</li> <li>- Increase media outreach</li> <li>- Promote success stories</li> </ul>	#22c

Roosevelt	<u>Environment</u>	<ul style="list-style-type: none"> <li>- Maintain current levels of habitat</li> <li>- Maintain population levels of common species</li> <li>- Increase or enhance #s of SGCN</li> <li>- Increase habitat connectivity</li> <li>- Increase amount of conservation on private land</li> <li>- Increase access to conservation lands</li> </ul>	0/5 and 1/5
	<u>Conservation Community</u>	<ul style="list-style-type: none"> <li>- Increase # people engaged in cons. Comm</li> <li>- Increase awareness of less conspicuous wildlife</li> <li>- Increase communication among cons. Comm.</li> <li>- Increase networks</li> <li>- ID new partners</li> <li>- ID &amp; address gaps in conservation</li> </ul>	2/5 and 3/5
	<u>Funding</u>	<ul style="list-style-type: none"> <li>- ID new sources</li> <li>- ID ways to leverage existing funds</li> <li>- Get \$ out of non consumptive users</li> <li>- Increase contributions to voluntart events</li> <li>- Check off lic. Plate</li> </ul>	4/5
	<u>Citizens</u>	<ul style="list-style-type: none"> <li>- Increase awareness of less conspicuous wildlife</li> <li>- Get more people to pay into cons. Efforts</li> <li>- Increase conservation action by general public</li> <li>- Get more people to care about conservation</li> </ul>	5/5

## EXERCISE 4: SMART (# OF VOTES IN PARENTHESES)

### GOAL: DEVELOP NEW SOURCES OF PERMANENT STATE FUNDING FOR CONSERVATION

Table Name	ACTIONS	WHO	WHEN	Poster Number
Lacey	ID potential sources of funding (tax, user fees, lic. Plates, etc.) (25)	DNR & Partners	2015	#1
	Research support (politicians, public)	DNR & Partners	2015	
	Acquire partnership support (1)	DNR & Partners	2015	
	Set up fund acquisition task force (8)	DNR & Partners	2015	
	Research other states that have systems in place	DNR & Partners	2015	

### GOAL: LAND ACQUISITION

Lacey	Prioritize Critical areas/goals (15)	Partners DNR	(2015)	#2
	Buy Land (39)	Partners & state	As it comes available	
	Set up land acquisition task force (0)	DNR & Partners	2015 After prioritization	
	Develop management plans for potential sites (3)	DNR	As needed	

## GOAL: CITIZENS: BUILD PUBLIC SUPPORT FOR FISH & WILDLIFE CONSERVATION

Thoreau	Education: <ul style="list-style-type: none"> <li>- Recruit/retention skill set (29)</li> <li>- Literacy, wet/wild K-12, training for teachers</li> </ul>	F&W Cons. Org. volunteers	Continuing	#1
	<ul style="list-style-type: none"> <li>- Political bodies (5)</li> <li>- leaders</li> </ul>	F&W Tall tree volunteer	Continuing	
	<ul style="list-style-type: none"> <li>- Citizen scientists (6)</li> <li>- Bridging learning through active participation</li> <li>- active lifestyle; realization of quality of life</li> </ul>	F&W All of the above	Continuing	

## GOAL: MAINTAIN/INCREASE HEALTH ENVIRONMENTAL SYSTEMS

Thoreau	<ul style="list-style-type: none"> <li>- identify funding to increase holdings</li> <li>- prioritize acquisition targets</li> <li>- focus on sensitive environments ie: wetlands (4)</li> </ul>	F&W Con/ org	Continuing	#2
	<ul style="list-style-type: none"> <li>- build political support (2)</li> </ul>	F&W Con/ org	Continuing	
	<ul style="list-style-type: none"> <li>- create measures to evaluate success (5)</li> </ul>	F&W Con/ org	Continuing	

## GOAL: ENCOURAGE APPROPRIATE LAND USE

Carson	<ul style="list-style-type: none"> <li>- habitat/land use (5) inventory map</li> </ul>	DNR Fed/State/Local IDEM	Continuous- w/ annual reports	#1
	<ul style="list-style-type: none"> <li>- develop programs for specific regions (2)</li> </ul>	USACE NRCS	Continuous- w/ annual reports	
	<ul style="list-style-type: none"> <li>- offer incentives(3) ie: monetary tax reduction for habitat and land use</li> </ul>	<ul style="list-style-type: none"> <li>- Soil &amp; water (SWD)</li> <li>- Wetland conservation programs</li> </ul>	Continuous- w/ annual reports	
	EDUCATE (2)			

## GOALS: EXOTIC/INVASIVE CONTROL

Carson	Identify area and species	Biologist Private District cons.	Immediately	#2
	Irradiation and control	Self & professionally	Seasonal sensitivity Immediately	
	Follow up treatment & inspections	Self & professionally	As needed	

## GOALS: RECRUIT NEW USERS

Leopold	Increase intro. To shooting events- by 50% above current level (3)	DFW/ conservation clubs	2015	#1
	Increase beginner hunting workshops (spp specific) by 25% over current level (3)	DFW	2015	
	Increase beginner angling events by 25% over current level (1)	DFW/ conservation clubs/mun.	2015	

## GOALS: RECRUIT NEW USERS

Leopold	Develop a marketing plan to “sell” IN natural resources (35)	DNR	2015	#2
	Provide ad space to partners in H&T/F guides (1)	DFW	2015	
	Nongame/system education of current users- increase interest/passion (retention) (12)	DFW (WR, ng, fish)	2015	

## GOALS: IMPROVE WATER QUALITY

Deam	1 I.D. Critical habitat and establish priorities (39)	DFW/IDEM With citizen input	2017	#1
	1 I.D. Critical habitat and establish priorities (39)	DFW/IDEM/Universities/USDA	2017	
	3) education/ implementation (13)	DFW/ IDEM/ USD/ SWCD/ NGO's	Continuous education Implement 2017	

## GOALS: CREATE CITIZEN ADVOCATES

Deam	1) Identify potential appropriate constituents	DFW Numerous NGO's	Now	#2
	2) Develop educational strategies	Contractor		

## GOALS: PROMOTE MEDIA

Emerson	Identify/promote success (13)	IDNR + Partners	Continual	#2
	Expand network of media connection (3)	IDNR + Partners	Continual	
	Tie to tourism and recreation (6)	all	Continual	
	Identify regional media contacts (PR) – create list			

## GOALS: ONGOING COLLABORATIVE STAKEHOLDER COMMUNICATION

Emerson	Identify stakeholder (3)	IDNR (SWAP_	2015	#1a
	Establish districts (planning region) (1)	IDNR (SWAP)	2015	
	Determine/create communication channels(1)	District	2015	
	Plan Regional megs (1)	District	2015	
	Plan state mtgs. (5) Hold mtgs	IDNR District Leaders	2015	
	Brief Partners on state wide meeting	IDNR District Leaders		#1b

## GOALS: IDENTIFY & ADDRESS GAPS IN CONSERVATION EFFORTS

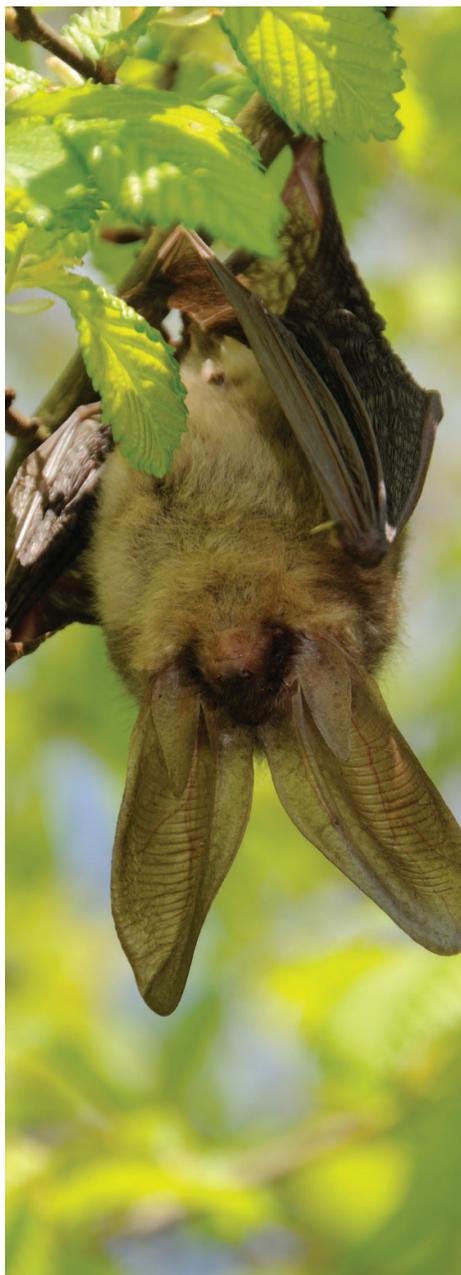
Roosevelt	- Survey conservation groups (15)	DNR	2014	#1
	- Synergize effort overlaps between groups (14)	Applicable conserve. Groups	2015- on	
	- ID SGCN in gaps	DNR	2015	
	- Develop conserve. plans for "orphaned" species (2)	DNR	2015	
	- Encourage action by conservation groups (4)	DNR	2015	

## GOALS: INCREASE COMMUNICATION AMONG CONS. ORGANIZATIONS

Roosevelt	Evaluate outreach efforts (HOE, BOW, R&R, Cons. Ed) (13)	All partners by program	Ongoing	#2
	Create database of partners projects (16)	National effort ?	ASAP	
	Use social media to share activities/ ideas (4)	Each partner	Now into future	

State Wildlife Action Plan Facilitation

# SWAP | ALTERNATIVE CYBER MEETING



Conservation doesn't just happen. It takes resources and collaboration.

# Indiana's State Wildlife Action Plan Kick-Off Webcast

URL: [connect.iu.edu/swap](http://connect.iu.edu/swap)

Conference Line: (800) 940-6112 or (812) 856-3600  
Pin: 000986#

October 4, 2013

## Webinar Basics: Editing Your Name

2

1. Click here

2. Click **Edit My Info...**

3. Enter your **full name and organization**

4. Click **OK**

IN Fish & Wildlife - SWAP (PowerPoint) - Adobe Connect

Meeting Layouts Pods Audio

Host

Attendee List

Hosts (1)  
Austin Hochstetler

Presenters (0)

Participants (1)  
nona

Chat (Everyone)  
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India's State Wildlife Action Plan  
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Presentation

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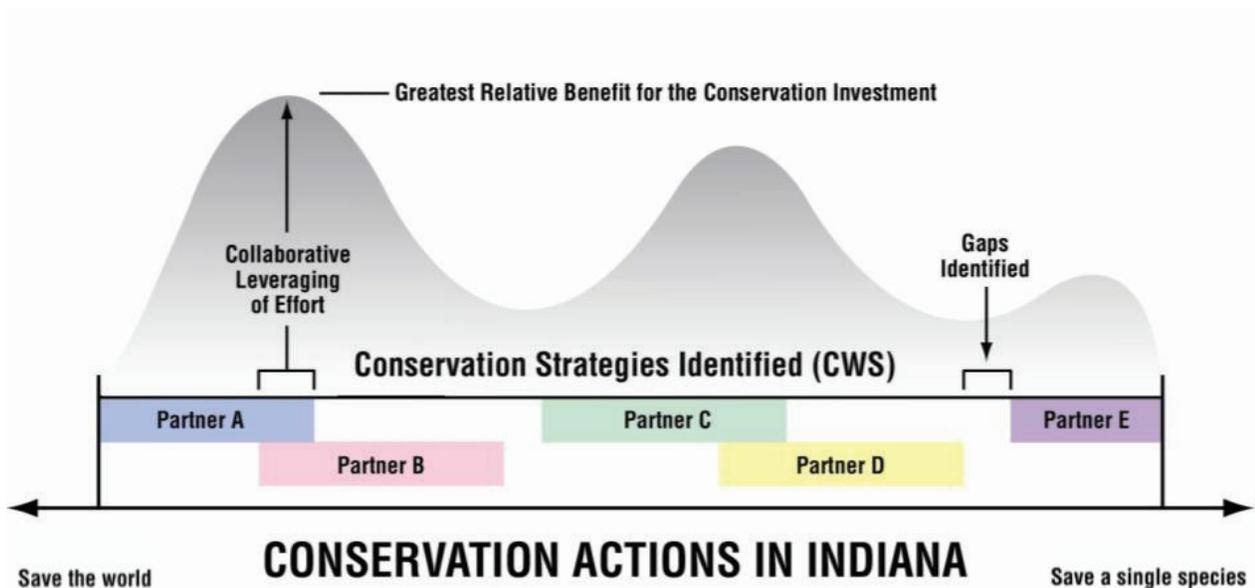
October 4, 2013

# Indiana's Vision

Indiana's State Wildlife Action Plan will be a national leader in guiding a diverse conservation community towards the shared goal of enhancing and conserving fish and wildlife resources.



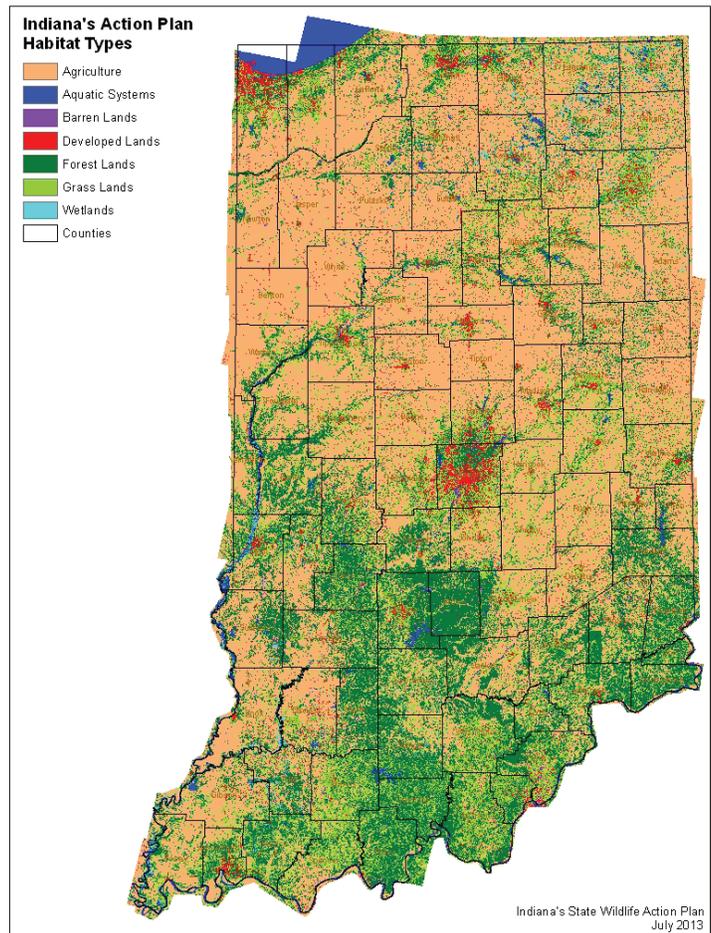
## Maximize Partnerships & Efforts



Identify conservation needs, existing partners, resources.  
Partnership overlaps identified = greater benefit  
Gaps identified = more resources needed

# Indiana's Habitats

- 60 habitats identified in 2005
- 8 major habitat types



## Major Habitat Types

- Agriculture
- Aquatic Systems
- Barren Lands
- Developed Lands
- Forests
- Grasslands
- Subterranean Systems
- Wetlands

# Four Emerging Themes

---

## □ Citizens

- refers to the public opinions and interests of Indiana, who all play a role in the state's natural resources in ways they might not even realize, such as consumption of resources, political opinions, or though recreation.

## □ Conservation Community

- refers to the collective groups of organizations and people who are involved in some way with conservation or natural resources.

# Four Emerging Themes Cont...

---

## □ Environment

- anything related to natural features or environmental conditions, such as fish, wildlife, plants, habitats, water quality, watersheds, ecosystems, landscapes, changing climate, invasive species, etc.

## □ Funding

- the monetary support for activities related to conservation or natural resources.



## 2013

- Follow-up report from kick-off meetings
- Check out the State Wildlife Action Plan website [www.swap.dnr.in.gov](http://www.swap.dnr.in.gov)
- Continue to collect potential partner information on the website
- Participate in the partner survey



## 2014

- Results of partner survey shared
- Technical survey to identify threats and potential actions for both species of greatest conservation need and habitats
- Results of technical survey shared
- Partner meetings to discuss actions and priorities
- Set actions and priorities for each region



# 2015 & Beyond

- Public meetings to share the actions and priorities
- State Wildlife Action Plan document completed and submitted to the Feds
- Take action
- Measure success

- 
- Questions at this time?
    - ▣ Please “raise hand” using the SET STATUS icon located at the top of the screen. Please use the drop down arrow to select “raise hand” feature.
    - ▣ We will call upon you one at a time to ask your question over the phone.
    - ▣ Reminder: Please continue to mute/unmute your phone.

# Thank You!

---

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**State Wildlife Action Plan Website**

[swap.dnr.in.gov](http://swap.dnr.in.gov)



# SWAP | STAKEHOLDER FOLLOW-UP MEETING



Conservation doesn't just happen. It takes resources and collaboration.

# Indiana's State Wildlife Action Plan Stakeholder Follow-up Meeting

URL: [connect.iu.edu/swap](http://connect.iu.edu/swap)

October 29, 2013

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Meeting Layouts Pods Audio

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Host  
Austin Hochstetler

Attendee List

Presenters (0)  
Participants (0)

Chat (Everyone)

Chat

Indiana's State Wildlife Action Plan  
Stakeholder Follow-up Meeting

URL: [connect.iu.edu/swap](http://connect.iu.edu/swap)

October 29, 2013

Everyone Sync

Indiana's State Wildlife Action Plan:  
Regional Meeting Summary

October 29, 2013

# Stakeholder Meetings

## Four Meetings:

- 9/26: Central
- 10/2: South
- 10/3: North
- 10/4: Web-based



## Descriptives:

- Approximately 170 stakeholders involved
- Participants spanning:
  - ▣ DNR divisions
  - ▣ State parks
  - ▣ Non-profit agencies
  - ▣ Friends groups
  - ▣ Academic institutions
  - ▣ General public - unaffiliated

# Where We Are: A Perspective

## What We Heard

- Background Info:
  - ▣ Required for federal funding
  - ▣ Habitat-based, landscape level plan
  - ▣ Focused management approach
  - ▣ Planning for species of greatest conservation need (SGCN)

## Questions?

- Garnering engagement
- Funding
- Lessons learned from previous plan
- Implementing this current plan

## Past/Current Conservation Projects

- Environment
  - ▣ Invasive species control
  - ▣ Water quality
  - ▣ Habitat management
- Conservation Community
  - ▣ Education and outreach
  - ▣ Partnerships



# Past/Current Conservation Projects

## □ Funding

- Federal
- Local
- Private

## □ Citizens

- Utilizing locals
- Outreach
- Programs



# Available Resources/Capacity



- Partnerships
- Outreach and education
- Knowledge and expertise
- Funding

# Needed Improvements

1. Communication and information sharing
2. Collaborative conservation efforts and management approaches
3. Community outreach and instilling conservation value
4. Partnerships
5. Funding and dedicated staff
6. Data-driven decision making
7. Political nexus

# Planning for the Future

- Environment
  - ▣ acquiring land and increasing acres for biodiversity and species of greatest need (SGCN)
- Funding
  - ▣ identifying and acquiring alternative and stable long-term funding sources

# Planning for the Future Continued...

---

- Conservation Community
  - ▣ identifying conservation partners and creating communication platforms
- Citizens
  - ▣ increasing conservation action by the general public

## Action Strategies (1 / 5)

---

- Land/Habitat
  - ▣ Acquire sites that target species with the greatest conservation need
  - ▣ Improve acres of habitat of greatest conservation need
  - ▣ Identify critical habitat areas and establish priorities
  - ▣ Identify invasive areas and species, eradicate and control, and evaluate

## Environment

## Action Strategies (2/5)

- Legislation
  - ▣ Lead a campaign for a conservation tax
  - ▣ Lobby individual federal legislators to keep conservation in Farm Bill, passed and ongoing
  - ▣ Provide economic incentives to landowners/corporations (e.g., tax incentives, conservation easements)

Conservation Community,  
Citizens, Funding

## Action Strategies (3/5)

- Marketing and Communication
  - ▣ Designate a State Wildlife Action Plan coordinator
  - ▣ Develop a marketing plan to “sell” Indiana natural resources
  - ▣ Create a communication plan that uses common language, allows for regular meetings/interfaces, identifies goals of partners, and identifies stakeholders inside and outside conservation community

Conservation  
Community, Citizens

## Action Strategies (4/5)

---

- Outreach and Education
  - ▣ Increase outdoor labs at schools by increasing awareness of funding
  - ▣ Identify and educate land owner programs for habitat and working lands
  - ▣ Increase literacy through K-12 programs and training for teachers

## Conservation Community, Citizens

## Action Strategies (5/5)

---

- Funding
  - ▣ Seek permanent funding

## Funding

# Conclusion(s)

---

- Central topics
  - ▣ Four emerging themes validated
- “Needed Improvements” has strong link to goals and action items identified

# Next Steps

---

- Stakeholder survey
- Recommendation report

# In Closing...

---

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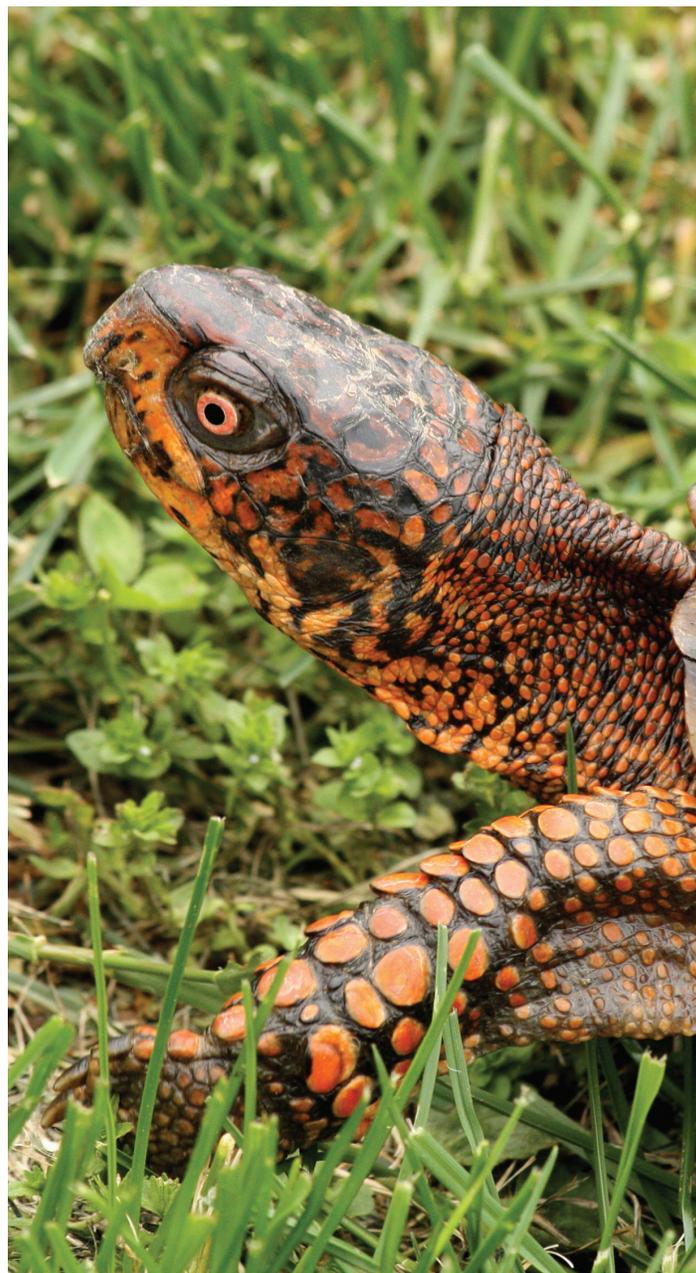
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**State Wildlife Action Plan Website**

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# SWAP | PROMOTIONAL MATERIALS



Conservation doesn't just happen. It takes resources and collaboration.



# SWAP | INTRODUCTION AND CONTACTS

*Conservation doesn't just happen. It requires resources and collaboration.*



Thank you for your interest and participation in Indiana's State Wildlife Action Plan. The future of Indiana's natural resources depends on you. Whether you are a researcher who provides information about species and habitats, a land manager who decides daily what actions to implement, a consumer of natural resources, or someone who simply likes to see our natural resources improve over time, you are vital to ensuring the future of our natural resources.

There are numerous ways to be involved, and Indiana's Action Plan is just one way to shape our state's fish and wildlife resources. Your feedback and interactions are invaluable and we appreciate the time you devoted to this significant effort.

Please visit [SWAP.dnr.IN.gov](http://SWAP.dnr.IN.gov) for more information about the Action Plan, including notes from past meetings and the entire Plan from 2005. This site is where you can find up-to-date information about the process and ways to get involved.

We would like to recognize the folks who have been critical to the revision of the State Wildlife Action Plan so far. The Core Team consists of staff within the Indiana Division of Fish and Wildlife. Taking actions to ensure the future of our state's fish and wildlife resources begins within the Division. The Core Team represents the diversity of programs within the division, are critical to shaping the plan and ensuring the completion of the revised Action Plan. The Division can't do this alone though, as many agencies, organizations, and people affect the fish, wildlife, and the habitats they depend on. Thus, an Advisory Committee was established to represent the diversity of organizations that have influence on our natural resources. They are essential in providing feedback and guidance on the direction of the Action Plan.



Get involved and stay updated at [swap.dnr.IN.gov](http://swap.dnr.IN.gov)

For information, contact Julie Kempf ([jkempf@dnr.IN.gov](mailto:jkempf@dnr.IN.gov)) or Amanda Wuestefeld ([awuestefeld@dnr.IN.gov](mailto:awuestefeld@dnr.IN.gov)).



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Steve Donabauer, Northern Fisheries Research Biologist  
Brant Fisher, Nongame Aquatic Biologist  
Kent Hanauer, Private Lands Wildlife Biologist  
Nate Levitte, Pigeon River FWA Property Manager  
Adam Phelps, Waterfowl Research Biologist  
Sam Whiteleather, Sugar Ridge FWA Property Manager  
Shannon Winks, Private Lands Wildlife Biologist

## Advisory Committee:

Dan Arndt, Duke Energy  
John Bacone, Indiana DNR, Nature Preserves  
David Bausman, Indiana State Department of Agriculture  
Greg Beilfuss, Indiana DNR, Outdoor Recreation  
Ramona Briggeman, Indiana DNR, Reclamation  
Cliff Chapman, Indiana Land Protection Alliance  
Kevin Crane, Indiana Department of Environmental Management  
Andrew DeWoody, Purdue University, Department of Forestry & Natural Resources  
Gary Dinkel, U.S. Forest Service  
Chris Gonso, Indiana DNR, Forestry  
Justin Harrington, Indiana DNR, State Parks and Reservoirs  
Laura Hilden, Indiana Department of Transportation  
Liz Jackson, Indiana Forest & Woodland Owners Association  
Jeff Kiefer, U.S. Fish and Wildlife Service  
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Mike Mycroft, Indiana DNR, State Parks and Reservoirs  
Brian Nentrup, Pheasants Forever  
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Justin Schneider, Indiana Farm Bureau  
Mike Sertle, Ducks Unlimited  
John Shuey, The Nature Conservancy  
Barb Simpson, Indiana Wildlife Federation  
Terry Smith, American Electric Power  
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Thank you again for your participation. We look forward to working with you.

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# SWAP | INDIANA'S STATE WILDLIFE ACTION PLAN

*Conservation doesn't just happen. It requires resources and collaboration.*



*The forest habitat is home to such species as the Great Horned Owl.*

## SWAP

*Creating positive change for Indiana's fish and wildlife through the work we do together is virtually limitless.*



*Indiana's aquatic systems are home to such species as the plains leopard frog.*

### The Vision

Indiana's State Wildlife Action Plan (SWAP) is a habitat-based model that incorporates all fish and wildlife species within the state. It identifies the condition of Indiana's wildlife species and habitats, the problems they face, and the actions needed to ensure the long-term success of these species and habitats. Efforts to revise Indiana's SWAP will expand and improve upon the existing information. More importantly, the SWAP will focus on strengthening partnerships to accelerate conservation in the state.

Indiana's SWAP will be a national leader in guiding a diverse conservation community toward the shared goal of enhancing and conserving fish and wildlife resources.

### A Track Record of Success

Indiana's SWAP has:

- Brought more than \$12 million since 2001 to Indiana for species of greatest conservation need.
- Protected species and habitats for Allegheny Wood Rat, Eastern Hellbender, Lake Sturgeon, Eastern Box Turtle, and many other species.
- Guided statewide conservation efforts for sister organizations and for programs like the Farm Bill.
- Created quality habitat across the state.

### Forging a Path for Future Success

By the end of 2015, Indiana will have revised the SWAP to:

- Be fully integrated throughout the state's diverse conservation community.
- Increase collaboration and bridge efforts among natural resource professionals and stewards.
- Continue protecting species of greatest conservation need.
- Establish a way to collectively track conservation activities and successes.

Creating positive change for Indiana's fish and wildlife through the work we do together is virtually limitless.



# SWAPs | STATE WILDLIFE ACTION PLANS

## *A Bold New Direction for Conservation*



In order to receive funds through the Wildlife Conservation and Restoration Program and the State Wildlife Grants Program, Congress charged each state and territory with developing a wildlife action plan. These proactive plans, known technically as “comprehensive wildlife conservation strategies,” assess the health of each state’s wildlife and habitats, identify the problems they face, and outline the actions that are needed to conserve them over the long term. The state wildlife action plans help conserve wildlife and vital natural areas before they become more rare and more costly to restore. As our communities grow, the SWAPs help us fulfill our responsibility to conserve wildlife and the lands and waters where they live for future generations.

All 50 States and five U.S. territories developed a State Wildlife Action Plan (SWAP) in 2005. State Wildlife Action Plans outline the steps that are needed to conserve wildlife and habitat before they become too rare or costly to restore. Taken as a whole, they present a national action agenda for preventing wildlife from becoming endangered. States are required to review and revise their state wildlife action plans at least every ten years.



# SWAPs | STATE WILDLIFE ACTION PLANS OVERVIEW



## Who developed the Wildlife Action Plans?

Primary responsibility for wildlife management has always rested with the States, so they have had the formal authority for developing and implementing the SWAPs. State fish and wildlife agencies have developed these strategic action plans by working with a broad array of partners, including scientists, sportsmen, conservationists, and members of the community. Working together, with input from the public, these diverse coalitions have reached agreement on what needs to be done for the full array of wildlife in every State.

## What do the Wildlife Action Plans look like?

The SWAPs are all required to assess the condition of each State's wildlife and habitats, identify the problems they face, and outline the actions that are needed to conserve them over the long term. By drawing together all of the scientific data, the SWAPs identify what needs to be done in each State to conserve wildlife and the natural lands and waters where they live— with benefits for both wildlife and people. Each SWAP reflects a different set of local issues, management needs, and priorities, so no two look alike. However, the States have been working together and with the U.S. Fish and Wildlife Service (USFWS) to ensure nationwide coordination.

## What Kinds of Actions are in the Wildlife Action Plans?

The SWAPs identify a variety of actions aimed at preventing wildlife from declining to the point of becoming endangered. By focusing on conserving the natural lands and clean waters that provide habitat for wildlife, the plans have important benefits for wildlife and people. In addition to specific conservation projects and actions, the plans describe many ways that we can educate the public and private landowners about effective conservation practices. Finally, the plans also identify the information we need in order to improve our knowledge about what kinds of wildlife are in trouble so we can decide what action to take.

## Action Plans with Deliverable Results

What makes the SWAPs different from other plans that have been drafted over the years? A focus on results for all wildlife in every State. These plans are proactive and address the needs of all wildlife in every State. By outlining the steps that need to be taken now, the SWAPs can save us money over the long term. Taken together, they create – for the first time – a nationwide approach to keeping wildlife from becoming endangered. Thus, the States play a major role in the federal endangered species program. Preventing costly endangered species listings is both cost effective and helps prevent populations from becoming too rare to restore. The USFWS endangered species program website features stories and videos of State and federal partnership to prevent and restore endangered species.

## 8 Required Elements

Congress identified eight required elements to be addressed in each state's wildlife action plan. Congress also directed that the plans must identify and be focused on the species in greatest need of conservation yet address the full array of wildlife and wildlife-related issues.

**(1) Species:** Information on the distribution and abundance of species of wildlife, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state's wildlife; and,

**(2) Habitats:** Descriptions of extent and condition of habitats and community types essential to conservation of species identified in (1); and,

**(3) Threats:** Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats; and,

**(4) Conservation Actions:** Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions; and,

**(5) Monitoring Species & Effectiveness:** Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions; and,

**(6) Review & Revision:** Descriptions of procedures to review the plan at intervals not to exceed ten years; and,

**(7) Partnerships with Land Management Agencies & Tribes:** Plans for coordinating the development, implementation, review, and revision of the plan with federal, state, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.

**(8) Public Participation:** Broad public participation is an essential element of developing and implementing these plans, the projects that are carried out while these plans are developed, and the species in greatest need of conservation.

*From The Association of Fish and Wildlife Agencies: <http://teaming.com/state-wildlife-action-plans-swaps>*

# HISTORY & BACKGROUND | INDIANA'S STATE WILDLIFE ACTION PLAN

*Conservation doesn't just happen. It requires resources and collaboration.*

## Timeline

### 2005

Indiana's first State Wildlife Action Plan published. It was known then as Indiana's Comprehensive Wildlife Strategy. Since then, over \$8 million in federal funding from the State Wildlife Grant program has come to Indiana for wildlife and conservation purposes.

### Late 2011

Leaders with Indiana Division of Fish and Wildlife recognized the need to further develop and implement the Action Plan within and outside of the agency. In concurrence with the required revision due in 2015, Amanda Wuestefeld and Julie Kempf were appointed project leaders for the Action Plan. The task assigned is two-fold: 1) complete the revision according to federal regulations in order to continue receiving funding and 2) use the Action Plan as a way to increase collaboration among partners and advancing effective conservation beyond Division programs.

### 2012-2013

To focus on greater implementation of the Action Plan with the Division of Fish and Wildlife, a Core Team consisting of ten members representing numerous parts of the division was formed in 2012. As the State Fish and Wildlife Agency, this team is also responsible to make sure the revised plan is completed in 2015. In 2013, the Advisory Committee was also created to represent the greater conservation community. That is, partners who have influence or use the state's natural resources.

Both the Core Team and the Advisory Committee have been instrumental in providing feedback and guidance on the Action Plan efforts. During the past year, these groups have met several times to have very open and honest discussions about the state of Indiana's natural resources and how the Action Plan can advance conservation. In this packet, you will find summaries of those conversations and ideas that were provided. (Meeting notes are available on DNR's website at [www.swap.dnr.in.gov](http://www.swap.dnr.in.gov).)

### TODAY

The greater conservation community and general public (that's you!) are made aware of the State Wildlife Action Plan efforts. You are asked for your opinions and feedback that will help shape the direction of the Action Plan.

After today's meeting, you or someone in our organization will receive an electronic survey to collect basic information about your organization and the habitats you work with. The survey will also identify programs related to natural resources, and best ways to continue communication and engagement with your organization.

### 2014

Experts on habitats, species, and ecological issues, will be consulted with to collect information in order to identify changes that have occurred since publication of the original Plan in 2005. Specific data sought will include the current status of species and habitats, along with threats to them. These experts will also be consulted on what actions are best to reduce threats and/or to increase or stabilize declining species populations or habitat quality.

The greater conservation community will have an opportunity to review the expert information and comment on it. Focus of feedback will be on what actions are most important, relevant, and feasible for each organization or person.

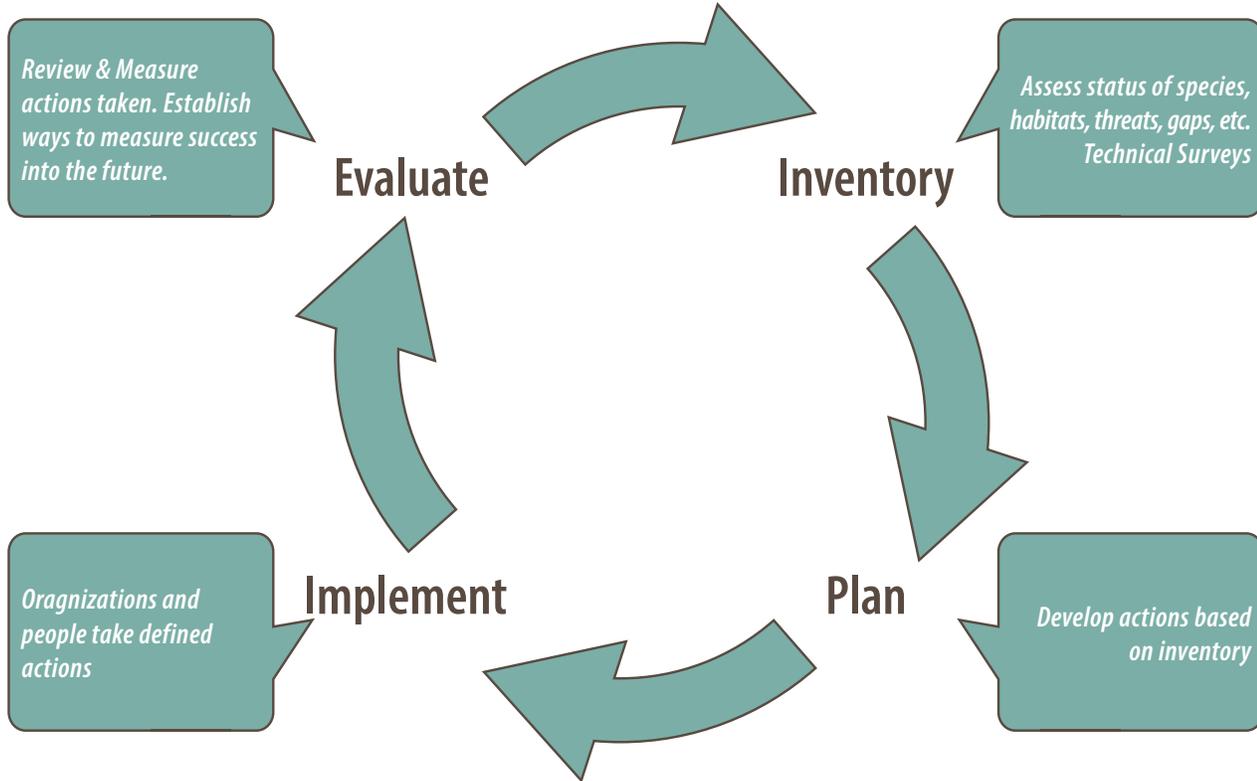
Based on the feedback from all the experts and members of the conservation community, priority actions will be identified. Actions are anticipated to be focused by habitat within each region for greatest relevancy and potential for implementation.

### 2015

Revision of the Action Plan will be finalized and submitted for federal approval to U.S. Fish and Wildlife Service.

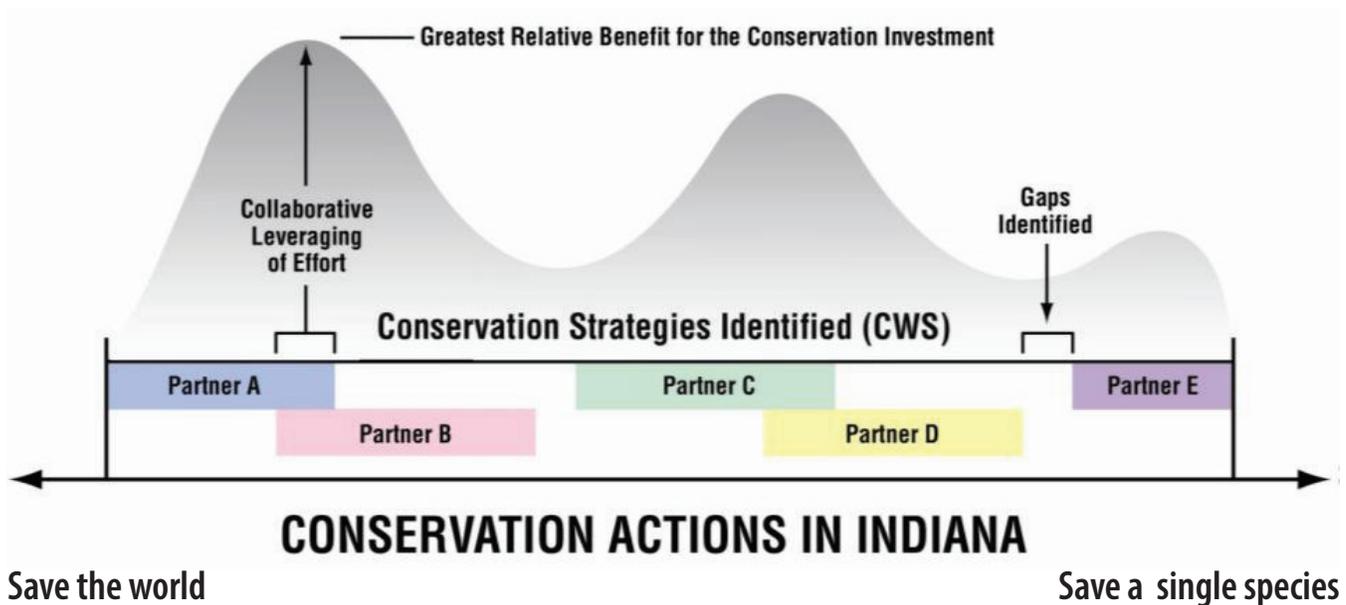
Implementation of the revised Action Plan will begin.

## Stages of the State Wildlife Action Plan



## The Concept Behind Indiana's Wildlife Action Plan

Indiana's State Wildlife Action Plan identifies where partners can or do work collaboratively towards a single goal, whether it is driven by habitat or species. Collaboration should lead to greater conservation benefit. Actions based on habitats should also lead to greater conservation benefit than a single species as multiple species can benefit on a single habitat. Identifying gaps are also important so that crucial conservation gaps can be filled in order to advance conservation. This concept originates with the 2005 Plan and remains relevant today.



## Vision & Mission

The Core Team (consisting of Division of Fish and Wildlife staff) worked early to develop a vision and mission about what they wanted the Action Plan to be and where it would take Indiana's community.

**Vision:** Indiana's State Wildlife Action Plan (SWAP) will be a national leader in guiding a diverse conservation community towards the shared goal of enhancing and conserving fish and wildlife resources.

**Mission:** The purpose of Indiana's State Wildlife Action Plan (SWAP) is to manage, conserve, and enhance habitat and population stability for diverse fish and wildlife resources. By 2025, the SWAP will be fully integrated throughout Indiana's conservation community. The SWAP will serve to bridge the efforts of dedicated natural resource professionals and stewards, which will ultimately enrich the quality of life for all Hoosiers.

## Strengths & Areas for Change

The earliest conversations reviewed both the state of natural resources in Indiana and the existing 2005 Action Plan. From those discussions, several areas of strengths and areas needing improvement were identified:

### Strengths

- Federal funds made available for Indiana through the Action Plan
- Opportunities for partnership began to form
- Action Plan established solid foundation for the status of habitats and species
- Plan influenced fish management within Indiana Division of Fish and Wildlife
- Recognition that conservation is bigger than Division of Fish and Wildlife. It takes everyone.

### Areas for Improvement

- Distribute and implement Plan more broadly within and outside of Division of Fish and Wildlife
- Stronger tie back to Division of Fish and Wildlife mission. (Plan was too focused on specific sections.)
- Plan identifies changes for conservation and is acted upon everyone moving toward same goals
- Need to acknowledge studies completed and results achieved
- Need to monitor and report on overall Action Plan goals and objectives

## Positive Change for Conservation in Indiana

Members of the Core Team and the Advisory Committee come from a variety of areas pertaining to natural resources, such as wildlife and fish biologists, researchers, watershed specialists, land management, regulatory agencies, industry groups, universities, non-profit organizations, and sportsmen's and recreation groups. Coming together presented a unique opportunity because we don't always speak the same language or agree on the specifics. However, when we began the conversations about what we valued about Indiana's natural resources, why we were invested in the Action Plan process, or what we hoped for the future of Indiana's resources, we quickly found a lot of common ground. Many members believe in needs for the conservation community to work more collaboratively towards common goals, to become more effective at conservation – avoiding “random acts of conservation,” and for people to generally care more about our land and resources. It was clear that we all came together to create positive change for Indiana and to accelerate conservation in the state.

## Opportunities for Indiana's State Wildlife Action Plan

Below is a sample of responses about the types of opportunities that might be presented by Indiana's Wildlife Action Plan.

- Provide guidance on fish and wildlife resources to organizations and people outside of the Division of Fish and Wildlife
- Increase frequency and effectiveness of partnerships
- Concentrate actions on habitats, ecosystems, and landscape conservation
- Expand political support for conservation
- Connect people and wildlife
- Focus where conservation funds are spent to increase effectiveness and avoid “random acts of conservation”
- Generate or leverage funds from sources not previously utilized
- Evaluate and demonstrate conservation successes

## Four Emerging Themes for Conservation

The Core Team and Advisory Committee were asked to complete the sentence: “We know Indiana has been successful at conserving and managing natural resources when . . .” The responses varied greatly from specific on-the-ground activities to broad changes at a 10,000-foot level. In general, though, all responses could be characterized within at least one of four different themes, or topics, listed below.

- **Environment** – anything related to natural features or environmental conditions, such as fish, wildlife, plants, habitats, water quality, watersheds, ecosystems, landscapes, changing climate, invasive species, etc.
- **Conservation Community** – refers to the collective groups of organizations and people who are involved in some way with conservation or natural resources.
- **Funding** – this is the monetary support for activities related to conservation or natural resources.
- **Citizens** – refers to the public opinions and interests of Indiana, who all play a role in the state’s natural resources in ways they might not even realize, such as consumption of resources, political opinions, or though recreation.

Whenever the groups met, the topics and issues during the Action Plan discussions always seemed to relate back to these four themes. The themes are also interconnected, as often times, components of the themes related back to the others. The following sections summarize in more detail the conversations for each theme and its significance or relevancy.

### Environment

The environment theme encompasses the natural features and environmental conditions relevant to functional ecosystems and their components. At the heart of State Wildlife Action Plan are the biological and ecological components. The Action Plan is intended to manage, conserve, and enhance habitat and population stability for diverse fish and wildlife resources. Habitats and species are obvious components of the environment, along with environmental conditions or landscape features that affect the presence of habitats and species or the quality of them. Examples include water quality and quantity; habitat size, composition, and functionality; and presence or absence of management activities.

Indiana contains a mosaic of natural communities managed across multiple jurisdictions. Functional and diverse ecosystems depend on a variety of factors, but having them is essential to the fish and wildlife in the state. As the environment is the foundation to fish, wildlife, and their habitats, the environment emerged as an obvious theme for the Action Plan.

### Conservation Community

Indiana’s conservation community is the collective group of organizations and people who are involved with the state’s natural resources and conservation. It is a broad and diverse group, ranging from public land managers to researchers, from consumptive users to preservation advocates. The conservation community consists of non-profits, for-profits, and government agencies. The Advisory Committee and the organizations they represent is just a sample of the conservation community.

The conservation community is not a formal or organized entity. Conservation is the common ground for the very diverse group, even though each group is driven towards conservation for an equally diverse number of reasons. Opportunities to share with each other are far and few in between. Building the community to form shared vision, goals, and priorities, as well as the opportunity for communication can be very powerful. With a united front, conservation actions can become more consistent and effective, doing and taking conservation to a whole new level. These are the primary reasons why the conservation community concept has been desired within the Core Team and Advisory Committee thus far. Bridging the efforts of dedicated natural resource professionals and stewards across the state begin with a strong conservation community.

## Funding

Money makes the world go round. That is no different when it comes to conservation. All conservation activities have financial support from somewhere. Being able to generate, plan, and direct funds that results in effective conservation is essential. The funding theme refers to the various types of monetary support for activities related to conservation or natural resources.

The State Wildlife Action Plan is a requirement in order for states to receive federal funds from the State Wildlife Grant program. Since the original Action Plan was published in 2005, the State of Indiana has received over \$8 million from this program. This is just a drop in the bucket, however, when you consider the full range of potential. The Action Plan is much bigger and influences conservation and funding from numerous other sources. Programs within the Farm Bill may refer to the Action Plans as a criterion to qualify for funding through the Farm Bill. Private funding programs, such as the Doris Duke Charitable Foundation, have directed funds to projects that tied directly to State Wildlife Action Plans. The high-priority actions listed by habitat within the Action Plan have been used to set property management plans. New legislation may require the Action Plans to be used in new funding programs. The possibilities are endless. Being able to leverage funds to advance conservation is the reason why funding has emerged as reoccurring them for the State Wildlife Action Plan.

## Citizens

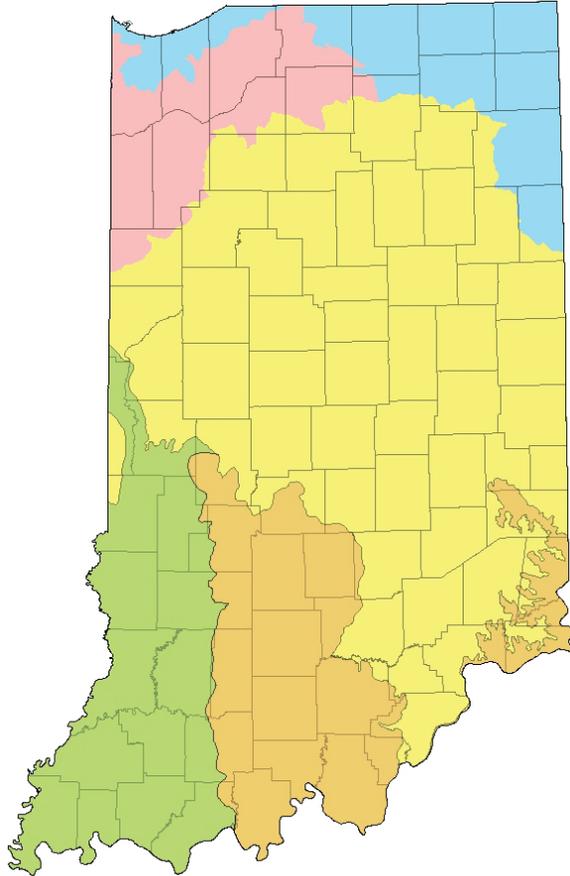
The state's fish and wildlife resources belong to the people of Indiana. The Indiana Division of Fish and Wildlife is charged, by state statute, to "provide for the protection, reproduction, care, management, survival and regulation of wild animals populations. . ." and to "pursue a program of research and management of wild animals that will serve the best interests of the resources and the people of Indiana."

All citizens have some impact on the state's fish and wildlife resources, either directly or indirectly. A landowner who establishes a prairie or wetland is creating habitat for wildlife, regardless of their motivation. Someone who consumes a lot of energy is likely unaware of the indirect effects their actions may have on the extraction of natural resources and thus potential loss of habitat. The visitors of our public lands who desire more recreational opportunities might result in less habitat, but at the same time, it may also bring a greater awareness of the environment to the people. In general, citizens help spread messages and education, they vote, and they have opportunities to provide input and participate in actions needed to conserve and manage natural resources.

There is no doubt why, then, people have been a reoccurring theme in the Action Plan discussions. Citizen interest, opinions, and engagement matters.



# PLANNING REGIONS FOR INDIANA STATE WILDLIFE ACTION PLAN (BASEMAP)



## Legend

- Great Lakes Watershed
- Kankakee R Watershed
- Eastern Corn Belt Plains
- Ohio R Watershed:  
Interior River Valleys  
and Hills
- Ohio R Watershed:  
Interior Plateau

Indiana's State Wildlife Action Plan needs to include planning regions to better focus actions and priorities based on regional resources, needs, and threats. The existing State Wildlife Action Plan identifies roughly 60 unique habitat types classified within 8 major habitat categories: agriculture, aquatic systems, barren lands, developed lands, forests, grasslands, subterranean systems, and wetlands. Each habitat category is, for the most part, viewed at the state level. Describing regions within Indiana's Action Plan explicitly recognizes that each habitat type varies across the state, including needs, threats, and actions associated with the habitat. A regional approach will also help identify priorities and focus organizations on most relevant actions for a given area.

The regions for Indiana's State Wildlife Action Plan were chosen to reflect both aquatic and terrestrial systems. It is important to consider both types not only because the Plan examines them, but also because of the need to bridge efforts across programs and organizations when possible to maximize the potential for conservation and management. The regions are broad yet reasonable representations of the wildlife and habitats within each region.

A variety of regional maps for Indiana were reviewed, including multiple watershed classifications using the hydrologic unit codes (HUC), Bird Conservation Regions, Omernik's ecoregions, Bailey's ecoregions, and Homoya's natural regions. For Indiana's State Wildlife Action Plan, regions chosen were first based on the three major watersheds present in Indiana: Kankakee River, Great Lakes, and Ohio River. The Kankakee and Great Lakes regions are adequate representations of their natural communities without further subdivision. However, the Ohio River watershed consists of 2/3rds of Indiana and contains too many differences of wildlife and habitats to be an effective planning region. Therefore, the Ohio River watershed was further divided using Omernik's level 3 ecoregions for southern Indiana: the Interior River Valleys and Hills and the Interior Plateau.

Regions based on Omernik's and Homoya's systems are very similar for southern Indiana. The main difference is another distinct region of southeast Indiana within Homoya's system. Omernik was chosen because the fish, wildlife, and habitats of southeast Indiana are similar enough to central Indiana for planning purposes. Using Omernik is also consistent with the existing plan that incorporates this classification for wadeable/large rivers in the Ohio River drainage area. If a need for a separate southeast Indiana region is identified in the near future, the classification could be modified.

The resulting regional map for Indiana's State Wildlife Action Plan will have 5 planning regions and are presented to the left.



Get involved and stay updated at [swap.dnr.IN.gov](http://swap.dnr.IN.gov)

For information, contact Julie Kempf ([jkempf@dnr.IN.gov](mailto:jkempf@dnr.IN.gov)) or Amanda Wuestefeld ([awuestefeld@dnr.IN.gov](mailto:awuestefeld@dnr.IN.gov)).

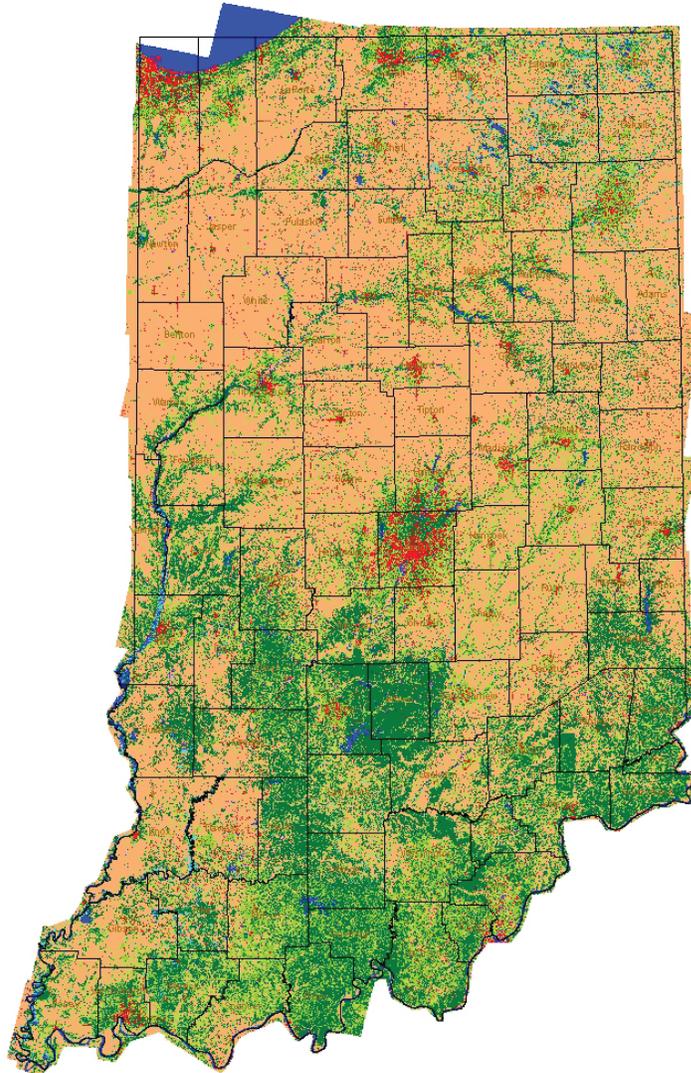


# SWAP | ALL HABITAT TYPES

*A composite of all major habitats found in Indiana.*

## Legend

-  Agriculture
-  Aquatic Systems
-  Barren Lands
-  Developed Lands
-  Forest Lands
-  Grasslands
-  Wetlands
-  Counties



# CONSERVATION ACTIONS NEEDS FOR HABITATS

*Ranked conservation efforts needed for each major habitat type.*

Conservation Action	All Habitats Combined	Agricultural	Aquatic Systems	Barren Lands	Developed Lands	Forest Lands	Grasslands	Subterranean Systems	Wetlands
<b>Habitat protection on public lands</b>	1	1 (tie)	5	2	3 (tie)	3	2	5	1
<b>Cooperative land management agreements</b> (conservation easements)	2		4	3 (tie)	3 (tie)	8	3	2	3
<b>Habitat restoration on public lands</b>	3	1 (tie)	3	3 (tie)	2	4	4	7 (tie)	4
<b>Habitat restoration incentives</b> (financial)	4	2 (tie)	1	3 (tie)	1 (tie)	7 (tie)	1	7 (tie)	9 (tie)
<b>Land use planning</b>	5		9 (tie)	3 (tie)	1 (tie)	2	7	4	6 (tie)
<b>Habitat protection incentives</b> (financial)	6	1 (tie)	6	3 (tie)	1 (tie)	5 (tie)	10	7 (tie)	7 (tie)
<b>Corridor development/protection</b>	7		8	3 (tie)	3 (tie)	5 (tie)	6	7 (tie)	5
<b>Succession control</b> (fire mowing)	8		10	3 (tie)	1 (tie)	5 (tie)	12		2
<b>Habitat restoration through regulation</b>	9	2 (tie)	9 (tie)	3 (tie)	3 (tie)	6	9 (tie)	7 (tie)	8
<b>Restrict public access and distribution</b>	10		7 (tie)	1	5 (tie)	7 (tie)	8	3	11
<b>Protection of adjacent buffer zone</b>	11		2	3 (tie)	4 (tie)	9 (tie)	13 (tie)	7 (tie)	6 (tie)
<b>Artificial habitat creation</b> (artificial reefs, nesting platforms)	12	2 (tie)	11		1 (tie)		13 (tie)	7 (tie)	7 (tie)
<b>Habitat protection through regulation</b>	13		12		5 (tie)	7 (tie)	11	6	10
<b>Technical assistance</b>	14	1 (tie)	13	3 (tie)	5 (tie)	9 (tie)	9 (tie)	1	12
<b>Selective use of functionally equivalent exotic species in place of extirpated natives</b>	15		14		7	1	5		13
<b>Managing water regimes</b>	16		7 (tie)		4 (tie)	9 (tie)	13 (tie)	7 (tie)	9 (tie)
<b>Pollution reduction</b>	17		7 (tie)	3 (tie)	6	9 (tie)	13 (tie)	7 (tie)	14

# CONSERVATION ACTION NEEDED FOR SPECIES IN EACH OF THE HABITATS

*Ranked conservation efforts needed for wildlife by each major habitat type.*

Conservation Action	All Habitats Combined	Agricultural	Aquatic Systems	Barren Lands	Developed Lands	Forest Lands	Grasslands	Subterranean Systems	Wetlands
<b>Population management</b> (hunting, trapping)	1		2		3 (tie)	2	1		2 (tie)
<b>Protection of migration routes</b>	2		4	2 (tie)	1	1 (tie)	4		3
<b>Habitat protection</b>	3	1	5	1	3 (tie)	1 (tie)	6	1 (tie)	5
<b>Reintroduction</b> (restoration)	4		1	2 (tie)	6 (tie)				1 (tie)
<b>Stocking</b>	5		6		6 (tie)				1 (tie)
<b>Food plots</b>	6		9 (tie)		3 (tie)	3	5		2 (tie)
<b>Regulation of collecting</b>	7		11 (tie)	2 (tie)	2	4	7 (tie)	1 (tie)	6
<b>Translocation to new geographic range</b>	8		3	2 (tie)	6 (tie)				9 (tie)
<b>Public education to reduce human disturbance</b>	9		11 (tie)	2 (tie)	4	6 (tie)	2	3	9 (tie)
<b>Threats reduction</b>	10		8	3	6 (tie)	5		2	8
<b>Exotic/invasive species control</b>	11	2	12 (tie)	2 (tie)	6 (tie)	6 (tie)	3		7
<b>Population enhancement</b> (captive breeding and release)	12		10	2 (tie)	6 (tie)	6 (tie)			
<b>Limiting contact with pollutants/contaminants</b>	13		11 (tie)	2 (tie)	5	6 (tie)	7 (tie)	4	
<b>Native predator control</b>	14		9 (tie)	2 (tie)	6 (tie)	6 (tie)	7 (tie)		9 (tie)
<b>Culling/selective removal</b>	15		7		6 (tie)	6 (tie)			9 (tie)
<b>Disease and parasite management</b>	16		12 (tie)		6 (tie)	6 (tie)			4

# PROBLEMS AFFECTING HABITATS

*Ranked threats to each major habitat type in Indiana.*

Habitat	All Habitats Combined	Agricultural	Aquatic Systems	Barren Lands	Developed Lands	Forest Lands	Grasslands	Subterranean Systems	Wetlands
Habitat degradation	1	2	2	1	2 (tie)	3	1	1	1
Commercial or residential development (sprawl)	2	3	5	4	1	1	4	2	4
Agricultural/Forestry practices	3	4	4	5	7	4	3	4	3
Habitat fragmentation	4	1	8	2 (tie)	8	2	5	6	2
Counterproductive financial incentives or regulations	5	7 (tie)	13	2 (tie)	4	7	6	13	6 (tie)
Point source pollution (continuing)	6	7 (tie)	6	7 (tie)	5	12	10	5 (tie)	6 (tie)
Invasive/non-native species	7	6 (tie)	11	3	10 (tie)	6	7	11	8
Nonpoint source pollution	8	8 (tie)	3	7 (tie)	9	11 (tie)	12	7	5
Successional change	9	5	14	6	12	5	2	12	6 (tie)
Stream channelization	10		1		2 (tie)	10	15	10 (tie)	10
Residual contamination (persistent toxins)	11	8 (tie)	10	8	3	13	8	5 (tie)	12
Drainage practices (stormwater runoff)	12	6 (tie)	7	7 (tie)	6	14	13	9	7
Mining/acidification	13	6 (tie)	12		13	9	9	8	11
Impoundment of water/Flow regulation	14		9		4	11 (tie)	16	10 (tie)	9
Climate change	15		15		11		11	3	13
Diseases (of plants that create habitat)	16		16		10 (tie)	8	14		14

# PROBLEMS AFFECTING WILDLIFE IN EACH MAJOR HABITAT TYPE

*Ranked threats to wildlife by major habitat type in Indiana.*

Habitat	All Habitats Combined	Agricultural	Aquatic Systems	Barren Lands	Developed Lands	Forest Lands	Grasslands	Subterranean Systems	Wetlands
<b>Habitat loss</b> (breeding range)	1	1	1	4 (tie)	8 (tie)	1 (tie)	1	1	1
<b>Habitat loss</b> (feeding etc.)	2	3	2	3	9 (tie)	1 (tie)	2	2	2
<b>Degradation of movement/migration routes</b>	3		4	6	1	2	6	5	5
<b>Dependence on irregular resources</b>	4	2	5	5 (tie)	8 (tie)	10	5	8	3
<b>High sensitivity to pollution</b>	5	7 (tie)	3		3	12	11	4 (tie)	10
<b>Predators</b> (native and domesticated)	6	4 (tie)	9	5 (tie)	9 (tie)	4	4	9	7
<b>Bioaccumulation of contaminants</b>	7	5	7		5	11 (tie)	7	4 (tie)	6
<b>Viable reproductive population size</b>	8		8	1	11	3	9	10	8
<b>Invasive/non-native species</b>	9	4 (tie)	6	7	7	8	3	13	11
<b>Diseases/Parasites</b>	10		10	2	2	5	12	12	13
<b>Specialized reproductive behavior</b>	11		6 (tie)	8 (tie)	12 (tie)	7	13	3	9
<b>Unintentional take</b>	12	8 (tie)	11	8 (tie)	9 (tie)	6	8	6	12
<b>Small native range</b> (high endemism)	13	6 (tie)	14	5 (tie)	14	9	10	7	14
<b>Near limits of natural geographic range</b>	14	6 (tie)	15	4 (tie)	13 (tie)	13	15	11	4
<b>Species overpopulation</b>	15		17		4	14			17
<b>Dependence on other species</b>	16	7 (tie)	12		10 (tie)	18	16		19
<b>Genetic pollution</b> (hybridization)	17	8 (tie)	16		6	16			15
<b>Large home range requirements</b>	18		19	10	13 (tie)	11 (tie)	14	15	16
<b>Unregulated take</b>	19		18	9	10 (tie)	15	18	14	18
<b>Regulated hunting/fishing pressure</b> (too much)	20		13		12 (tie)	17	17		20

# INDIANA'S SPECIES OF GREATEST CONSERVATION NEED

## STATE

**STATE ENDANGERED:** Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government that occur in Indiana.

**SPECIAL CONCERN:** Any animal species requiring monitoring because of known/suspected limited abundance or distribution or because of a recent change in legal status or required habitat.

## FEDERAL

**FEDERALLY ENDANGERED:** Any species that is in danger of extinction throughout all or a significant portion of its range. Designated with (FE).

**FEDERALLY THREATENED:** Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Designated with (FT).

**FEDERAL CANDIDATE:** These species have been submitted for review for protection under the Federal Endangered Species Act. If added to the federal list, they will automatically be considered a state endangered species. Designated with (FC).

### State Endangered

Gray Myotis (FE)  
Indiana Myotis (FE)  
Evening Bat  
Swamp Rabbit  
Franklin's Ground Squirrel  
Allegheny Woodrat

Myotis grisescens  
Myotis sodalis  
Nycticeius humeralis  
Sylvilagus aquaticus  
Spermophilus franklinii  
Neotoma magister



Ground Squirrel

### State Endangered

Trumpeter Swan  
American Bittern  
Least Bittern  
Black-crowned Night-Heron  
Yellow-crowned Night-Heron  
Osprey  
Northern Harrier  
Peregrine Falcon  
Black Rail  
King Rail  
Virginia Rail  
Common Moorhen  
Whooping Crane (FE)  
Piping Plover (FE)  
Upland Sandpiper  
Least Tern (FE)  
Black Tern  
Barn Owl  
Short-eared Owl  
Loggerhead Shrike  
Sedge Wren  
Marsh Wren  
Golden-winged Warbler  
Kirtland's Warbler (FE)  
Cerulean Warbler  
Henslow's Sparrow  
Yellow-headed Blackbird

Cygnus buccinator  
Botaurus lentiginosus  
Ixobrychus exilis  
Nycticorax nycticorax  
Nyctanassa violacea  
Pandion haliaetus  
Circus cyaneus  
Falco peregrinus  
Laterallus jamaicensis  
Rallus elegans  
Rallus limicola  
Gallinula chloropus  
Grus americana  
Charadrius melodus  
Bartramia longicauda  
Sternula antillarum  
Chlidonias niger  
Tyto alba  
Asio flammeus  
Lanius ludovicianus  
Cistothorus platensis  
Cistothorus palustris  
Vermivora chrysoptera  
Dendroica kirtlandii  
Dendroica cerulea  
Ammodramus henslowii  
Xanthocephalus xanthocephalus

## Mammals

### Special Concern

Smoky Shrew  
Pygmy Shrew  
Star-nosed Mole  
Southeastern Myotis  
Little Brown Myotis  
Northern Myotis  
Silver-haired Bat  
Eastern Pipistrelle  
Red Bat  
Hoary Bat  
Rafinesque's Big-eared Bat  
Plains Pocket Gopher  
River Otter  
Least Weasel  
Badger  
Bobcat

Sorex fumeus  
Sorex hoyi  
Condylura cristata  
Myotis austroriparius  
Myotis lucifugus  
Myotis septentrionalis  
Lasionycteris noctivagans  
Perimyotis subflavus  
Lasiurus borealis  
Lasiurus cinereus  
Corynorhinus rafinesquii  
Geomys bursarius  
Lontra canadensis  
Mustela nivalis  
Taxidea taxus  
Lynx rufus

## Birds

### Special Concern

Great Egret  
Mississippi Kite  
Bald Eagle  
Sharp-shinned Hawk  
Red-shouldered Hawk  
Broad-winged Hawk  
Sandhill Crane  
American Golden-Plover  
Solitary Sandpiper  
Greater Yellowlegs  
Ruddy Turnstone  
Buff-breasted Sandpiper  
Short-billed Dowitcher  
Wilson's Phalarope  
Common Nighthawk  
Whip-poor-will  
Black-and-white Warbler  
Worm-eating Warbler  
Hooded Warbler  
Western Meadowlark

Ardea alba  
Ictinia mississippiensis  
Haliaeetus leucocephalus  
Accipiter striatus  
Buteo lineatus  
Buteo platypterus  
Grus canadensis  
Pluvialis dominica  
Tringa solitaria  
Tringa melanoleuca  
Arenaria interpres  
Tryngites subruficollis  
Limnodromus griseus  
Phalaropus tricolor  
Chordeiles minor  
Caprimulgus vociferus  
Mniotilta varia  
Helmitheros vermivorum  
Wilsonia citrina  
Sturnella neglecta

### State Endangered

Northern Brook Lamprey	Ichthyomyzon fossor
Lake Sturgeon	Acipenser fulvescens
Redside Dace	Clinostomus elongatus
Pallid Shiner	Hybopsis amnis
Greater Redhorse	Moxostoma valenciennesi
Northern Cavefish	Amblyopsis spelaea
Bantam Sunfish	Lepomis symmetricus
Variagate Darter	Etheostoma variatum
Channel Darter	Percina copelandi
Gilt Darter	Percina evides

### State Endangered

Fanshell (FE)	Cyrogenia stegaria
White Catpaw (FE)	Epioblasma obliquata perobliqua
Northern Riffleshell (FE)	Epioblasma torulosa rangiana
Tubercled Blossom (FE)	Epioblasma torulosa torulosa
Snuffbox	Epioblasma triquetra
Longsolid	Fusconaia subrotunda
Pink Mucket (FE)	Lampsilis abrupta
White Wartyback (FE)	Plethobasus cicatricosus
Orangefoot Pimpleback (FE)	Plethobasus cooperianus
Sheepnose (FC)	Plethobasus cyphus
Clubshell (FE)	Pleurobema clava
Rough Pigtoe (FE)	Pleurobema plenum
Pyramid Pigtoe	Pleurobema rubrum
Fat Pocketbook (FE)	Potamilus capax
Rabbitsfoot	Quadrula cylindrica cylindrica

### State Endangered

Hellbender	Cryptobranchus alleganiensis
Green Salamander	Aneides aeneus
Four-toed Salamander	Hemidactylium scutatum
Red Salamander	Pseudotriton ruber
Crawfish Frog	Lithobates areolatus

### State Endangered

Alligator Snapping Turtle	Macrochelys temminckii
Eastern Mud Turtle	Kinosternon subrubrum
Spotted Turtle	Clemmys guttata
Blanding's Turtle	Emydoidea blandingii
Hieroglyphic River Cooter	Pseudemys concinna
Ornate Box Turtle	Terrapene ornata
Scarlet Snake C	emophora coccinea
Kirtland's Snake	Clonophis kirtlandii
Copperbelly Water Snake (FT)†	Nerodia erythrogaster
Smooth Green Snake	Opheodrys vernalis
Southeastern Crowned Snake	Tantilla coronata
Butler's Garter Snake	Thamnophis butleri
Cottonmouth	Agkistrodon piscivorus
Timber Rattlesnake	Crotalus horridus
Massasauga (FC)	Sistrurus catenatus

† Only the northern population of copperbelly water snake is federally threatened.

## Fish

### Special Concern

Pugnose Shiner	Notropis anogenus
Bigmouth Shiner	Notropis dorsalis
Longnose Dace	Rhinichthys cataractae
Longnose Sucker	Catostomus catostomus
Northern Madtom	Noturus stigmosus
Ohio River Muskellunge	Esox masquinongy ohioensis
Cisco	Coregonus artedi
Lake Whitefish	Coregonus clupeaformis
Trout-perch	Percopsis omiscomaycus
Slimy Sculpin	Cottus cognatus
Western Sand Darter	Ammocrypta clara
Spotted Darter	Etheostoma maculatum
Cypress Darter E	theostoma proeliare
Tippecanoe Darter	Etheostoma tippecanoe
Banded Pygmy Sunfish	Elassoma zonatum

## Mollusks

### Special Concern

Wavyrayed Lamppussel	Lampsilis fasciola
Round Hickorynut	Obovaria subrotunda
Ohio Pigtoe	Pleurobema cordatum
Kidneyshell	Ptychobranchus fasciolaris
Salamander Mussel	Simpsonia ambigua
Purple Lilliput	Toxolasma lividus
Ellipse	Venustaconcha ellipsiformis
Rayed Bean (FC)	Villosa fabalis
Little Spectaclecase	Villosa lienosa
Pointed Campeloma	Campeloma decusum
Swamp Lymnaea	Lymnaea stagnalis

\* It is illegal to take or possess live mussels and mussel shells of any species of native mussel from the waters of Indiana.

## Amphibians

### Special Concern

Common Mudpuppy	Necturus maculosus
Streamside Salamander	Ambystoma barbouri
Blue-spotted Salamander	Ambystoma laterale
Northern Cricket Frog	Acris crepitans
Plains Leopard Frog	Lithobates blairi
Northern Leopard Frog	Lithobates pipiens

## Reptiles

### Special Concern

Eastern Box Turtle	Terrapene carolina
Mud Snake	Farancia abacura
Rough Green Snake	Opheodrys aestivus
Western Ribbon Snake	Thamnophis proximus



Support the conservation of Indiana's nongame and endangered species by donating to the Nongame Fund. The money you donate goes directly to the protection and management of more than 750 wildlife species in Indiana. Look for the eagle logo on your Indiana state tax form to donate all or part of your refund. Or to donate directly write to:

Nongame Fund  
402 W. Washington St. Rm W273  
Indianapolis, IN 46204.

# STATE WILDLIFE ACTION PLANS

## Preventing Wildlife from Becoming

# ENDANGERED

*A State and Federal Partnership for Conserving Species & Ecosystems*

### State Wildlife Grants

The *State and Tribal Wildlife Grants Program* provides federal money to every state and territory for cost-effective conservation aimed at preventing wildlife from becoming endangered and keeping common species common. For more than a decade, states and their partners have used this program to combat invasive species, protect natural areas, restore habitat, conduct research, and implement monitoring programs that will provide better data on imperiled species and their habitats. The highly accountable program supports an existing infrastructure for addressing wildlife needs and has created thousands of jobs employing biologists, private contractors, and construction workers in rural and urban communities nationwide.

Funding through the *State and Tribal Wildlife Grants Program* enables the implementation *State Wildlife Action Plans*.



These plans, which have been developed by every state and territory, are a primary tool for keeping fish and wildlife healthy and off the list of federally threatened and endangered species. *State Wildlife Action Plans* are unique in that they were developed by the nation's top wildlife conservationists in collaboration with private citizens and community partners.

Each state and territory receives on average about \$1.2 million annually in apportioned funds through the program. Competitive grants are made available to tribes and to states for multistate projects. Although *State Wildlife Action Plans* have demonstrated continued successes in conserving fish and wildlife, complete effectiveness is limited without full implementation. **The principal barrier to implementation of the plans is a lack of sustainable funding. It is estimated that full implementation would exceed \$1 billion annually.** Funding for full implementation, however, is unattainable in the current financial climate. **At minimum, restoring funding to \$90 million is needed to maintain the current levels of success for this program.**



**TEAMING WITH WILDLIFE**  
*a natural investment*

The more than 6,300-member **Teaming With Wildlife Coalition** includes state fish and wildlife agencies, wildlife biologists, hunters, anglers, birdwatchers, hikers, nature-based businesses and other conservationists who support the goal of restoring and conserving our nation's wildlife.

#### Steering Committee

*American Fisheries Society  
Association of Fish and Wildlife Agencies  
Association of Zoos and Aquariums  
Congressional Sportsmen's Foundation  
Izaak Walton League of America  
National Audubon Society  
National Wild Turkey Federation  
National Wildlife Federation  
The Nature Conservancy  
Theodore Roosevelt Conservation  
Partnership  
The Wildlife Society  
Wildlife Conservation Society  
Wildlife Management Institute*



For more information regarding ongoing efforts to conserve our nation's wildlife visit [www.teaming.com](http://www.teaming.com)





## Investing in State Fish & Wildlife Conservation

### IMPORTANCE OF WILDLIFE CONSERVATION

The viability of fish and wildlife populations is essential to the future of the ecosystems to which they contribute and on which we depend for services, such as providing clean water through watershed protection, protecting our communities through flood prevention, and maintaining clean air through carbon sequestration. It is only through diverse representation of wildlife populations and the functions they sustain that our nation's ecosystems remain healthy and productive for future generations.

In the United States, fish and wildlife are a protected public resource, held in trust for all citizens. This is not solely the duty of one level of government; effective and efficient wildlife management requires a strong state and federal partnership.



All entities – ranging from policymakers to biologists – have a responsibility to be stewards of our nation's fish and wildlife and the habitats on which they depend.

### PROTECTING OUR NATURAL HERITAGE

At the beginning of the 20<sup>th</sup> century, Congress recognized its role as stewards of our nation's fish and wildlife and passed the Pittman-Robertson and Dingell-Johnson Acts in 1950 and 1963, respectively, dedicating an excise tax on firearms, ammunition, and sport fishing equipment to the conservation of wildlife. These acts have provided state fish and wildlife agencies with over \$10 billion in formula-based funding for the conservation of game species and serve as a model for successful collaboration between federal and state governments.

### A MAJOR GAP

Despite the success of these programs, many fish and wildlife species continue to decline. More than 95% of fish and wildlife held in public trust by the states are neither hunted nor fished and have no dedicated source of conservation funding.

While federally listed endangered and threatened species receive coverage, the vast majority of fish and wildlife species are left outside the purview of federal funding. The stewardship of the nation's fish and wildlife therefore falls heavily on the states, creating an imbalance in the state-federal partnership.

### BRIDGING THE GAP – STATE WILDLIFE ACTION PLANS

In 2001, Congress created the *Wildlife Conservation and Restoration Program* and *State and Tribal Wildlife*

*Grants Program*, which, for the first time, provided funding to state fish and wildlife agencies for the management of nongame species. The funding was distributed to states with the condition that each state develop a *State Wildlife Action Plan*.

Development of *State Wildlife Action Plans* in every state and territory was a historic accomplishment in 2005. At last, a comprehensive national plan was in place to conserve America's wildlife that opened doors for landscape-level coordination and planning.

The implementation of this national planning strategy to prevent endangered species listings and to keep common species common can only be accomplished if funded. **At minimum, restoring funding to \$90 million is needed to maintain the current levels of success for this program.**



**TEAMING WITH WILDLIFE**  
*a natural investment*

#### Teaming With Wildlife

444 North Capitol Street, NW Suite 725  
Washington, DC 20001  
[www.teaming.com](http://www.teaming.com)

# AGRICULTURE HABITAT SUMMARY

*Agricultural habitat is defined as lands devoted to commodity production, including intensively managed non-native grasses, row crops, fruit and nut-bearing trees. Nearly 55% of Indiana is agriculture.*



Eastern Bluebird

## Representative Species of Agriculture

The agricultural habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of agriculture.

- Western Harvest Mouse
- Killdeer
- Eastern Bluebird
- Brown-headed Cowbird
- Tiger Salamander
- Eastern Milksnake
- Horned Lark
- European Starling
- Common (Black) Kingsnake



Barn Owl

## Species of Greatest Conservation Need (SGCN) in Agriculture

SGCN are animal species whose populations are rare, declining, or vulnerable.

- Crawfish Frog
- Northern Leopard Frog
- Sandhill Crane
- Eastern Spadefoot
- Plains Leopard Frog
- Ornate Box Turtle
- Barn Owl

More than half of Indiana's land area is classified as agriculture. Agricultural areas are represented above by the dots throughout the state.



Legend  
■ Agriculture  Indiana Counties

## Threats to SGCN in Agriculture

- Habitat loss (breeding range)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Habitat loss (feeding/foraging areas)
- Predators (native or domesticated)
- Invasive/non-native species
- Bioaccumulation of contaminants
- Small native range (high endemism)
- Near limits of natural geographic range
- High sensitivity to pollution
- Dependence on other species (mutualism, pollinators)

## Threats to Agriculture

- Habitat fragmentation
- Mining/acidification
- Habitat degradation
- Drainage practices (stormwater runoff)
- Commercial or residential development (sprawl)
- Invasive/non-native species
- Agricultural/forestry practices
- Counterproductive financial incentives or regulations
- Successional change
- Point source pollution (continuing)

## Top High-Priority Conservation Actions for Agriculture

### Habitat protection through regulation

- Work with the State Chemist Office and others to develop herbicide and pesticide label directions that are protective of SGCN.
- Support compliance with all state and federal environmental regulations relative to agricultural lands.

### Habitat protection on public lands

- Support the use of agricultural/environmental BMPs on public lands to support the conservation of SGCN as a demonstration for private agricultural interest.
- Ensure herbicides and pesticides are applied according to label directions and to avoid contaminating the aquatic environments in which all amphibians and the species that depend upon them.

### Habitat restoration on public lands

- Encourage the use of restoration programs such as Farm Bill programs on public agricultural lands.

### Habitat protection incentives (financial)

- Support programs and practices, such as the Farm Bill Programs, that promote the use of soil and wildlife conservation BMPs for the benefit of SGCN.

## Top High-Priority Conservation Actions for SGCN in Agriculture

### Habitat Protection

- Provide technical support to rural planning efforts to retain wildlife values of rural landscapes.

### Exotic/invasive species control

- Work with the agricultural industry to avoid and minimize the use and spread of exotic invasive species to conserve more natural habitats for SGCN.

# AQUATIC SYSTEMS | HABITAT SUMMARY

*Aquatic systems habitat comprises of all water, both flowing and stationary.  
Only 2.36% of Indiana is covered by aquatic systems.*



Wood Duck

## Representative Species of Aquatic Systems

The aquatic system habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of aquatic systems. There are 67 representative species for various aquatic systems in Indiana. Below is a sample of representative species. The entire list can be found online at <http://www.in.gov/dnr/fishwild/7599.htm> in the Aquatic Systems habitat summary.

- Beaver
- Osprey
- Least Darter
- Ring-Billed Gull
- Lake Trout
- Channel Catfish
- Clubshell
- Smallmouth Bass
- Redspotted Sunfish
- Northern Pike
- Wood Duck
- Two-Lined Salamander



Plains Leopard Frog

## Species of Greatest Conservation Need (SGCN) in Aquatic Systems

SGCN are animal species whose populations are rare, declining, or vulnerable. There are 70 SGCN for aquatic systems in Indiana. Below is a sample of species of greatest conservation need. The entire list can be found online at <http://www.in.gov/dnr/fishwild/7599.htm> in the Aquatic Systems habitat summary.

- Hellbender
- Plains Leopard Frog
- Variegated Darter
- Least Tern
- Piping Plover
- Little Spectacled Case
- Northern Riffleshell
- Cisco (Lake Herring)
- Rayed Bean
- Snuffbox
- Blanding's Turtle
- Alligator Snapping Turtle

## Threats to Aquatic Systems

- Stream channelization
- Habitat degradation
- Nonpoint source pollution (sedimentation and nutrients)
- Agricultural/forestry practices
- Commercial or residential development (sprawl)
- Point source pollution (continuing)
- Drainage practices (stormwater runoff)
- Habitat fragmentation
- Impoundment of water/flow regulation
- Residual contamination (persistent toxins)

## Threats to SGCN in Aquatic Systems

- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Specialized reproductive behavior or low reproductive rates
- Invasive/non-native species
- Bioaccumulation of contaminants
- Viable reproductive population size or availability
- Predators (native or domesticated)
- High sensitivity to pollution

## Top High-Priority Conservation Actions for Aquatic Systems

### Habitat restoration incentives (financial)

- Promote the retention and development of sloughs, oxbows, and backwater habitats to benefit the banded pygmy sunfish, bantam sunfish and cypress darter in the lower Wabash River drainage.

### Protection of adjacent buffer zone

- Promote the establishment and maintenance of buffers on all aquatic systems to control sedimentation and to benefit aquatic SGCN, especially the blue spotted salamander, four-toed salamander, and plains leopard frog, ellipse, swamp lymnaea, bigmouth shiner and pallid shiner.
- Provide grassy, shrubby, and/or woody riparian cover along rivers and streams for resting, denning, and loafing sites for otters.

### Habitat restoration on public lands

- Create nesting islands for least terns in appropriate areas.
- Restore wetland habitats in floodplain areas to provide alternative habitats for aquatic species. Target wetlands in close proximity to rivers and streams.

### Cooperative land management agreements (conservation easements)

- Promote the protection of aquatic systems for SGCN by encouraging public and private entities to enter into cooperative land management agreements and conservation easements. Provide technical assistance on the species that benefit from such protection and potential enhancement measures.

## Top High-Priority Conservation Actions for SGCN in Aquatic Systems

### Reintroduction (restoration)

- Support the development and implementation of practical mussel restoration and evaluation techniques for use in appropriate situations for the restoration of extirpated or nearly extirpated mussel species, i.e., longsolid, orangefoot pimpleback, pink mucket, pyramid pigtoe, rough pigtoe, tubercled blossom, white catspaw and white wartyback.
- Monitor the abundance and distribution of newly restored aquatic-system-dependent species such as the river otter and osprey.

### Population management

- Determine factors affecting the distribution and relative abundance of rare aquatic-based wildlife such as the river otter.
- Refine and improve survey and monitoring programs for aquatic wildlife species such as river otters, mussels species and osprey.
- Implement harvest strategies (season dates, trap set techniques, etc.) to maximize take of targeted species and minimize unintentional take of otters.
- Determine age-specific reproductive parameters for river otters and mussel species.

### Translocation to new geographic range

- Support the development of technical assistance materials to heighten public awareness of the dangers of releasing aquatic species in new geographical areas (even SGCN).
- Track shifts in species geographic range for correlation to global warming trends and new ecological relationships.

# BARREN LANDS | HABITAT SUMMARY

All barren lands habitats are characterized by bare rock, gravel, sand, silt, clay or other earthen material, with little or no “green” vegetation present, regardless of its inherent ability to support life. Vegetation, if present, is more widely spaced and scrubby than that in the “green” vegetated categories; lichen cover may be extensive. The habitat encompasses the following sub-types: bare dunes, cliffs, rock outcrops and active quarries. Only 0.19% of Indiana is barren land.

## Representative Species of Barren Lands

The habitat guild for barren lands is represented by several species. These representative species “paint a reasonable mental picture” of barren lands.

- Rough-Winged Swallow
- Lark Sparrow
- Piping Plover
- Six-Lined Racerunner
- Green Salamander
- Black Vulture
- Allegheny Woodrat
- Eastern Phoebe

## Species of Greatest Conservation Need (SGCN) in Barren Lands

SGCN are animal species whose populations are rare, declining, or vulnerable.

- Crawfish Frog
- Green Salamander
- Plains Leopard Frog
- Piping Plover
- Allegheny Woodrat

## Threats to Barren Lands

- Habitat degradation
- Counterproductive financial incentives or regulations
- Habitat fragmentation
- Invasive/non-native species
- Commercial or residential development (sprawl)
- Agricultural/forestry practices
- Successional change
- Nonpoint source pollution (sedimentation and nutrients)
- Point source pollution (continuing)
- Drainage practices (storm water runoff)

## Threats to SGCN in Barren Lands

- Viable reproductive population size or availability
- Diseases/parasites (of the species itself)
- Habitat loss (feeding/foraging areas)
- Habitat loss (breeding range)
- Near limits of natural geographic range
- Small native range (high endemism)
- Predators (native or domesticated)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Invasive/non-native species



Left to right: Piping Plover, Black Vulture

## Top High-Priority Conservation Actions for Barren Lands

### Restrict public access and disturbance

- Minimize human and domestic pet use in areas used by foraging piping plovers and at sites with potential breeding habitat.

### Habitat protection on public lands

- Protect Lake Michigan sand dunes and allow natural dune processes to provide foraging areas and potential nesting habitat for piping plovers.
- Maintain large diameter, mast-producing tree species in proximity to woodrat colonies.
- Enter into cooperative agreements for management of woodrat habitats on State Forest and State Park/Reservoir properties.
- Investigate crayfish abundance, distribution and other factors impacting crayfish frog colonies to develop land management practices for crayfish frogs.

### Protection of adjacent buffer zone

- Provide for the development and/or maintenance of a forested buffer area around the bluffs occupied or suitable for occupancy by green salamanders.
- Provide buffer of mature forested habitats adjacent to cliff lines containing woodrat colonies.

## Top High-Priority Conservation Actions for SGCN in Barren Lands

### Habitat protection

- Protect Lake Michigan sand dunes and allow natural dune processes to provide foraging areas and potential nesting habitat for piping plovers.
- Ensure silvicultural techniques allow for an adequate annual supply of hard mast for Allegheny woodrats.
- Protect bluff lines and sparsely vegetated clay and sandy moist soil for the green salamander, crawfish frog and plains leopard frog, respectively.

### Regulation of collecting

- Investigate the role of intentional and/or unintentional take on the viability of SGCN in barren lands.

# DEVELOPED LANDS | HABITAT SUMMARY

*Developed lands are defined as highly impacted lands, intensively modified to support human habitation, transportation, commerce and recreation. This habitat encompasses the following subhabitat types: golf courses, industrial lands and roads/rails/bridges. Nearly 3.7% of Indiana is developed.*



Cliff Swallows

## Representative Species of Developed Lands

The developed lands habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of developed lands.

- Bullfrog
- House Mouse
- Norway Rat
- Kirtland's Snake
- Canada Goose
- Mallard
- American Robin
- Eastern Bluebird
- Peregrine Falcon
- European Starling
- Rock Pigeon
- Cliff Swallow



Peregrine Falcon

## Species of Greatest Conservation Need (SGCN) in Developed Lands

SGCN are animal species whose populations are rare, declining or vulnerable.

- Eastern Spadefoot
- Common Nighthawk
- Peregrine Falcon
- Kirtland's Snake
- Smooth Greensnake

## Threats to Developed Lands

- Commercial or residential development (sprawl)
- Habitat degradation
- Stream channelization
- Residual contamination (persistent toxins)
- Counterproductive financial incentives or regulations
- Impoundment of water/flow regulation
- Point source pollution (continuing)
- Drainage practices (stormwater runoff)
- Agricultural/forestry practices
- Habitat fragmentation

## Threats to SGCN in Developed Lands

- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Diseases/parasites (of the species itself)
- High sensitivity to pollution
- Species overpopulation
- Bioaccumulation of contaminants
- Genetic pollution (hybridization)
- Invasive/non-native species
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Habitat loss (breeding range)
- Predators (native or domesticated)

*Indiana's developed lands constitute 3.69% of Indiana, or 1,404 square miles (898,674 acres). While developed lands are sprinkled liberally throughout the state, particularly above Interstate 70, they are concentrated in areas that include Gary, South Bend, Fort Wayne, Indianapolis, Evansville, and Louisville, KY. There are fewer developed lands in south-central Indiana.*



## Top High-Priority Conservation Actions for Developed Lands

### Habitat protection incentives (financial)

- Encourage the use of gravel on flat-roofed buildings to provide nesting habitat for common nighthawks.

### Habitat restoration incentives (financial)

- Encourage the use of private funding sources for the development of open spaces in urban environments.

### Artificial habitat creation (artificial reefs, nesting platforms)

- Erect and maintain nesting boxes for peregrine falcons at industrial areas along Lake Michigan.

### Succession control (fire, mowing)

- Provide cover for smooth greensnakes and Eastern spadefoot toads by leaving unmowed areas during the growing season.

### Land use planning

- Provide technical assistance to and encourage urban/industrial/transportation/recreation land use planners to provide open spaces, use rock cover and provide connecting corridors for the benefit of SGCN, especially spadefoot toads, Kirtland's snake and smooth greensnake.

## Top High-Priority Conservation Actions for SGCN in Developed Lands

### Protection of migration routes

- Investigate methods to minimize the adverse impacts of man-made structures on SGCN, especially migrating birds.

### Regulation of collecting

- Develop technical assistance materials that promote leaving SGCN in the natural environment.

# FORESTS | HABITAT SUMMARY

The forest habitat guild is defined as a plant community extending over a large area and dominated by trees, the crowns of which form an unbroken covering layer or canopy. Almost 23% of Indiana is covered by forests. This habitat includes: deciduous, early forest stage, evergreen, floodplain forests, forested wetlands, mature or high canopy stage, old forest stage, pole stage, pre-forest stage, riparian wooded corridors/streams, suburban, upland and urban forests.



Great Horned Owl

## Representative Species of Forests

The forest habitat guild is represented by several wildlife species. These representative species "paint a reasonable mental picture" of forests.

- Spotted Salamander
- Wood Frog
- Great Horned Owl
- Eastern Chipmunk
- Fox Squirrel
- Red Bat
- White-Tailed Deer
- Southern Flying Squirrel
- Bobcat
- Eastern Box Turtle
- Red-Eyed Vireo
- Wood Thrush
- Whip-Poor-Will
- White-Eyed Vireo
- Prairie Warbler
- Ruffed Grouse
- Field Sparrow
- Eastern Towhee
- Pine Warbler
- Sharp-Skinned Hawk
- Cerulean Warbler
- Yellow-Throated Warbler
- Pileated Woodpecker
- Allegheny Woodrat
- Timber Rattlesnake
- Tuffed Titmouse
- Red-Shouldered Hawk
- American Robin
- Baltimore Oriole



Bobcat

## Species of Greatest Conservation Need (SGCN) in Forests

SGCN are animal species whose populations are rare, declining, or vulnerable. There are 44 SGCN for forests in Indiana. Below is a sample of species of greatest conservation need. The entire list can be found online at <http://www.in.gov/dnr/fishwild/7599.htm> in the Forests habitat summary.

- Blue-spotted Salamander
- Bobcat
- Four-toed Salamander
- Eastern Pipistrelle
- Green Salamander
- Eastern Red Bat
- Red Salamander
- Evening Bat
- Bald Eagle
- Gray Myotis
- Barn Owl
- Hoary Bat
- Black-and-white Warbler
- Indiana Myotis
- Black-crowned Night-Heron
- Least Weasel
- Broad-winged Hawk
- Cerulean Warbler

Almost 23% of Indiana is forested, comprising 8,686 miles<sup>2</sup> (more than 5.5 million acres). While forest lands dot the landscape in Northern Indiana (24%), heavier concentrations of woodlands follow the hillier geography of West Central (21% woodlands), South Central (46% woodlands) and Southeastern Indiana (9% woodlands).



## Threats to Forests

- Commercial or residential development (sprawl)
- Habitat fragmentation
- Habitat degradation
- Agricultural/forestry practices
- Successional change
- Invasive/non-native species
- Counterproductive financial incentives or regulations
- Diseases (of plants that create habitat)
- Mining/acidification
- Stream channelization

## Threats to SGCN in Forests

- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Viable reproductive population size or availability
- Predators (native or domesticated)
- Diseases/parasites (of the species itself)
- Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by catch, harvesting equipment, land preparation machinery)
- Specialized reproductive behavior or low reproductive rates
- Invasive/non-native species
- Small native range (high endemism)

## Top High-Priority Conservation Actions for Forests

### Land use planning

- Maintain or create landscapes dominated by forest in order to provide for needs of area sensitive species such as bald eagle, black-and-white warbler, black-crowned night-heron, broad-winged hawk, cerulean warbler, common nighthawk, hooded warbler, Mississippi kite, red-shouldered hawk, sharp-shinned hawk, whip-poor-will, worm-eating warbler, and yellow-crowned night-heron.
- Work with local units of government for protection and management of forested habitats.
- Encourage the retention of forested corridors to connect forest blocks for SGCN, especially Indiana bat and timber rattlesnake.

### Habitat protection on public lands

- Provide technical assistance to management plan development and implementation for state and federal forest properties.

## Top High-Priority Conservation Actions for SGCN in Forests

### Habitat protection

- Protect forest habitat especially forest in close proximity to wetlands, rocky glades or connecting corridors between forest blocks for copperbelly water snakes, rough green snakes, scarlet snakes, southeastern crowned snakes and timber rattlesnakes
- Determine what constitutes high quality foraging and roosting habitat for forest dwelling bats.
- Implement silvicultural strategies that provide for a continuous supply of large, dead and/or dying deciduous trees to provide roost sites for crevice-dwelling bats such as the Indiana bat.

### Protection of migration routes

- Investigate forest distribution in Indiana and provide adequate forestlands for migrating birds and bats.

# GRASSLANDS | HABITAT SUMMARY

*Grasslands are defined as open areas dominated by grass species. This habitat includes early successional areas, farm bill program lands, fescue, haylands, pasture, prairies, reclaimed minelands, savanna, vegetated dunes and swales, and shrub/scrub.*



Badger

## Representative Species of Grasslands

The grasslands habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of grasslands.

- Crawfish Frog
- Eastern Spadefoot
- Eastern Meadowlark
- Northern Harrier
- Eastern Mole
- Red Fox
- Badger
- Bull Snake
- Ornate Box Turtle
- Cottontail Rabbit
- Short-Tailed Shrew
- Franklin's Ground Squirrel
- Red-Winged Blackbird
- Northern Bobwhite
- Grasshopper Sparrow
- Bobolink
- Dickcissel
- Savannah Sparrow
- Eastern Wood-Pewee
- Red-Headed Woodpecker



Ornate Box Turtle

## Species of Greatest Conservation Need (SGCN) in Grasslands

SGCN are animal species whose populations are rare, declining or vulnerable.

- Blue-spotted Salamander
- Barn Owl
- Crawfish Frog
- Henslow's Sparrow
- Eastern Spadefoot
- Loggerhead Shrike
- Northern Leopard Frog
- Northern Harrier
- Plains Leopard Frog
- Sedge wren
- Blanding's Turtle
- Short-eared Owl
- Butler's Garter Snake
- Upland Sandpiper
- Kirtland's Snake
- Western Meadowlark
- Ornate Box Turtle
- Badger
- Smooth Green Snake
- Bobcat
- Spotted Turtle
- Franklin's Ground Squirrel
- Western Ribbon Snake
- Least Weasel
- American Bittern
- Plains Pocket Gopher

## Threats to Grasslands

- Habitat degradation
- Successional change
- Agricultural/forestry practices
- Commercial or residential development (sprawl)
- Habitat fragmentation
- Counterproductive financial incentives or regulations
- Invasive/non-native species
- Residual contamination (persistent toxins)
- Mining/acidification
- Point source pollution (continuing)

*Over 15% of Indiana is in grasslands, constituting prairies and reclaimed mine lands. Those areas are primarily in southern, central and extreme northern parts of the state. Grasslands comprise more than 5,800 miles<sup>2</sup> or 3.7 million acres.*



## Threats to SGCN in Grasslands

- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)
- Invasive/non-native species
- Predators (native or domesticated)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Bioaccumulation of contaminants
- Unintentional take/direct mortality (e.g., vehicle collisions, power line collisions, by catch, harvesting equipment, land preparation machinery)
- Viable reproductive population size or availability
- Small native range (high endemism)

## Top High-Priority Conservation Action for Grasslands

### Habitat restoration incentives (financial)

- Support farm programs that convert row-crop areas to grasslands to benefit a variety of birds including American bittern, barn owl, Henslow's sparrow, loggerhead shrike, northern harrier, sedge wren, short-eared owl, upland sandpiper, western meadowlark.
- Develop large-scale grassland restoration projects on reclaimed strip mined lands and assess their effectiveness for providing habitat for area-sensitive bird (SGCN) species.

## Top High-Priority Conservation Actions for SGCN in Grasslands

### Population management

- Determine distribution and relative abundance of grassland-dependent SGCN such as badger and Franklin's ground squirrel.
- Develop survey and monitoring programs for grassland-dependent SGCN such as badgers and Franklin's ground squirrels.

### Public education to reduce human disturbance

- Develop and promote implementation of BMPs that limit disturbance to nesting grassland birds (SGCN), especially on public conservation lands.

# SUBTERRANEAN SYSTEMS

# HABITAT SUMMARY

*Surface openings of subterranean features reaching as far as natural light can penetrate (i.e., twilight zone) and connected underground rooms and passages beyond natural light penetration. This habitat encompasses the following sub-types: caves and cave entrances.*

## Representative Species of Subterranean Systems

The Subterranean Systems habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of subterranean systems.

- Eastern Pipistrelle
- Indiana Myotis
- Cave Salamander
- Longtail Salamander
- Four-Toed Salamander
- Northern Cavefish

## Species of Greatest Conservation Need (SGCN) in Subterranean Systems

SGCN are animal species whose populations are rare, declining or vulnerable.

- Green Salamander
- Four-toed Salamander
- Northern Cavefish
- Gray Myotis
- Indiana Myotis
- Rafinesque's Big-eared Bat
- Eastern Pipistrelle
- Little Brown Myotis
- Northern Myotis
- Southeastern Myotis

## Threats to Subterranean Systems

- Habitat degradation
- Commercial or residential development (sprawl)
- Climate change
- Agricultural/forestry practices
- Residual contamination (persistent toxins)
- Point source pollution (continuing)
- Habitat fragmentation
- Nonpoint source pollution (sedimentation and nutrients)
- Mining/acidification
- Drainage practices (stormwater runoff)

## Threats to SGCN in Subterranean Systems

- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)
- Specialized reproductive behavior or low reproductive rates
- High sensitivity to pollution
- Bioaccumulation of contaminants
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
- Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by catch, harvesting equipment, land preparation machinery)
- Small native range (high endemism)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Predators (native or domesticated)



Left to right: Eastern Pipistrelle, Rafinesque's Big-eared Bat

## Top High-Priority Conservation Actions for Subterranean Systems

### Technical assistance

- Develop educational materials for landowners in karst topography about relationships between surface activities and subterranean systems.

### Cooperative land management agreements (conservation easements)

- Promote the use of cooperative land agreements to protect sensitive karst features for greensalamanders, four-toed salamander and subterranean systems that support northern cavefish and bat species of greatest conservation need.

### Restrict public access and disturbance

- Post signs at important cave sites to reduce/eliminate unauthorized human visitation.
- Erect physical barriers (i.e., fences, gates) where needed to protect important cave sites.

### Land-use planning

- Identify surface recharge areas for cave systems to identify sources of potential threats.

### Habitat protection on public lands

- Develop land management plans protective of subterranean systems and permit recreation use consistent with the conservation of SGCN.

## Top High-Priority Conservation Actions for SGCN in Subterranean Systems

### Habitat protection

- Protect wet areas around seeps and springs for the benefit of four-toed salamanders.
- Protect the water quantity and quality in subterranean streams to benefit northern cavefish populations.
- Inventory subterranean systems cave-dependent SGCN such as the Indiana bat and southeastern bat.
- Restrict human access to caves during seasonal use by Indiana bats and other cave-dwelling species. Erect physical barriers (gates, fences) as needed.

### Regulation of collecting

- Provide public notification materials throughout the karst region of Indiana regarding the adverse consequences of collecting or disturbing subterranean system SGCN.

# WETLANDS | HABITAT SUMMARY

*Wetlands include areas shallowly flooded temporarily or permanently to cover the base of plants but not prolonged inundation of the entire plant. Only 0.91% of Indiana is covered by wetlands. This habitat includes: emergent, ephemeral, forested, herbaceous marsh, mudflats, and permanent and shrub/scrub wetlands.*



Muskrat

## Representative Species of Wetlands

The wetlands habitat guild is represented by several species. These representative species "paint a reasonable mental picture" of wetlands

- Red-Winged Blackbird
- Common Yellowthroat
- Mallard
- Sora
- American Bittern
- Sedge Wren
- Canada Goose
- Great Blue Heron
- Marbled Salamander
- Spotted Salamander
- Plains Leopard Frog
- Star-Nosed Mole
- Yellow-Throated Warbler
- Western Chorus Frog
- Muskrat
- Spotted Turtle
- Eastern Massasauga
- Killdeer
- Least Sandpiper
- Green Heron
- Willow Flycatcher
- Spring Peeper
- Blanding's Turtle
- Copperbelly Water Snake



Whooping Crane

## Species of Greatest Conservation Need (SGCN) in Wetlands

SGCN are animal species whose populations are rare, declining, or vulnerable.

- Blue-spotted Salamander
- Black-crowned Night-heron
- Crawfish Frog
- Common Moorhen
- Eastern Spadefoot
- Golden-winged Warbler
- Four-toed Salamander
- Great Egret
- Northern Leopard Frog
- King Rail
- Plains Leopard Frog
- Least Bittern
- Blanding's Turtle
- Marsh Wren
- Butler's Garter Snake
- Sandhill Crane
- Copperbelly water Snake
- Sedge Wren
- Cottonmouth
- Virginia Rail
- Massasauga
- Whooping Crane
- Spotted Turtle
- Yellow-crowned Night-heron
- Western Mud Snake
- Yellow-headed Blackbird
- Western Ribbon Snake
- Bobcat
- American Bittern
- River Otter
- Black Rail
- Star-nosed Mole
- Black Tern
- Swamp Rabbit

## Threats to Wetlands

- Habitat degradation
- Habitat fragmentation
- Agricultural/forestry practices
- Commercial or residential development (sprawl)
- Nonpoint source pollution (sedimentation and nutrients)
- Point source pollution (continuing)
- Successional change
- Counterproductive financial incentives or regulations
- Drainage practices (stormwater runoff)
- Invasive/non-native species

## Threats to SGCN in Wetlands

- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Near limits of natural geographic range
- Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)

## Top High-Priority Conservation Actions for Wetlands

### Habitat protection on public lands

- Conserve and manage diverse wetlands on public lands for the benefit of SGCN, including mammals, birds, amphibians and reptiles.

### Succession control (fire, mowing)

- Manage plant succession using water level manipulation, fire, and other methods to conserve diverse wetlands for the benefit of SGCN, including mammals, birds, amphibians and reptiles.

### Cooperative land management agreements (conservation easements)

- Support the use of cooperative land management agreements to conserve and protect privately owned wetlands for the conservation of wetland SGCN.

### Habitat restoration on public lands

- Restore wetlands on public lands for the benefit of SGCN, including mammals, birds, amphibians and reptiles.
- Create wetland areas for black terns.
- Support the planting of appropriate native plant stocks to accelerate and enhance wetland restorations and to use for demonstration purposes.

### Corridor development/protection

- Promote the development and protection of wetland complexes, including connecting wetland habitats for the benefit of copperbelly water snakes and other SGCN.

### Land use planning

- Provide technical assistance to land-use planners that promotes the values and benefits of wetlands.

### Protection of adjacent buffer zone

- Promote the protection of adjacent buffer zones around wetlands to protect the wetlands and ameliorate benefits to SGCN.

## Top High-Priority Conservation Actions for SGCN in Wetlands

### Reintroduction (restoration)

- Determine feasibility of restoring wetland-dependent SGCN such as the swamp rabbit and star-nosed mole.

### Population management

- Determine distribution and relative abundance of rare wetland-dependent wildlife such as the swamp rabbit and star-nosed mole.
- Develop survey and monitoring programs for rare species associated with wetland habitats such as swamp rabbits and star-nosed moles.
- Investigate the impact of regulated species (e.g., raccoons and coyotes) on populations of Blanding's turtle, spotted turtle, and other wetland-dependent SGCN.

### Protection of migration routes

- Target the restoration, protection and acquisition of wetlands to provide for the needs of migrating SGCN.

### Disease/parasite management

- Investigate suspicious mortality or disease in wetland species to determine risk to wetland-dependent SGCN and appropriate protective measures.



# Indiana State Wildlife Action Plan

[Click Here For More Information](#)



# Save The Date

## Indiana State Wildlife Action Plan



**Conservation doesn't just happen.  
It takes resources and collaboration.**

### Background

The Indiana Division of Fish and Wildlife is beginning the process of updating the State Wildlife Action Plan. Indiana's Action Plan is a habitat-based model that incorporates all fish and wildlife species within the state. It identifies the condition of Indiana's wildlife species and habitats, the problems they face, and the actions needed to ensure their long-term success.

### Your Involvement

Partner input is crucial to this process. You have been identified as a key partner to this collaborative planning effort. We would like to take this opportunity to invite you to attend one of three stakeholder meetings. **We need your success stories and your assistance in shaping the future and establishing outcomes that we all believe are vital to the natural resource community at large.**

### Meeting Dates

Three meeting dates have been scheduled, each in a distinct geographical region for ease of attendance:

- Central Indiana** Thursday, September 26, 2013
- Southern Indiana** Wednesday, October 2, 2013
- Northern Indiana** Thursday, October 3, 2013

The exact time and location for the meetings will be updated shortly; however, if you know what meeting date and region suit you the best, please do not hesitate to RSVP today!

\*For those unable to attend any of the in-person meetings, an alternative input forum will be available at a later time. To receive maximum benefit, we strongly encourage in-person participation.

### RSVP

Please visit <http://b3.caspio.com/dp.asp?AppKey=311a10001b8ebccacaa46a4a7a7> to register your attendance at one of the three meetings (or the alternative input forum). Additional information about the meetings is also available on the website at [www.swap.dnr.in.gov](http://www.swap.dnr.in.gov).

### INDIANA'S STATE WILDLIFE ACTION PLAN ADVISORY COMMITTEE

- American Electric Power
- Ducks Unlimited, Inc
- Duke Energy
- Indiana Department of Environmental Management
- Indiana Department of Natural Resources
- Indiana Department of Transportation
- Indiana Farm Bureau
- Indiana Forest & Woodland Owners Association
- Indiana Land Protection Alliance
- Indiana State Department of Agriculture
- Indiana Wildlife Federation
- Natural Resources Conservation Service
- Pheasants Forever
- Purdue University, Department of Forestry & Natural Resources
- The Nature Conservancy
- U.S. Fish and Wildlife Service
- U.S. Forest Service



# YOU'RE INVITED



## Indiana State Wildlife Action Plan

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### Meeting Dates

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Central*	Southern	Northern
September 26, 2013	October 2, 2013	October 3, 2013
9:00am – 3:00pm	9:00am – 3:00pm	9:00am – 3:00pm
Indiana Wildlife Federation (Sol Center)**	O'Bannon Woods State Park (Group Camp)**	Newton Center**
708 E. Michigan St. Indianapolis, IN 46202	7234 Old Forest Road SW Corydon, IN 47112	601 N. Michigan St. Lakeville, IN 46536

\*Free parking on North and East sides of building

\*\*Lunch will be provided during each meeting

For those unable to attend any of the in-person meetings, an alternative input forum will be available at a later time. To receive maximum benefit, we strongly encourage in-person participation.

### RSVP

Please visit <http://b3.caspio.com/dp.asp?AppKey=311a10001b8ebccaccaa46a4a7a7> to register your attendance at one of the three meetings (or the alternative input forum). Additional information about the meetings is also available on the website at [www.swap.dnr.in.gov](http://www.swap.dnr.in.gov).

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- Indiana Land Protection Alliance
- Indiana State Department of Agriculture
- Indiana Wildlife Federation
- Natural Resources Conservation Service
- Pheasants Forever
- Purdue University, Department of Forestry & Natural Resources
- The Nature Conservancy
- U.S. Fish and Wildlife Service
- U.S. Forest Service



# Stakeholder Follow-up Meeting



## Indiana State Wildlife Action Plan

Conservation doesn't just happen. It takes resources and collaboration.

### MEETING DETAILS

Thank you to all those who participated in a regional stakeholder meeting for the State Wildlife Action Plan. Over 150 stakeholders in Indiana's conservation community shared their opinions, thoughts, and expertise. At this time, an online stakeholder follow-up meeting is scheduled. This meeting will present the preliminary results from the regional meetings and allow for subsequent discussion. If you were not able to participate in one of the regional meetings, that is okay because this meeting is for everyone!

For more information regarding the Indiana State Wildlife Action Plan please visit [www.swap.dnr.in.gov](http://www.swap.dnr.in.gov).

#### Virtual Meeting

Tuesday, October 29, 2013

1:00-3:00pm EDT

Adobe Connect URL

<https://connect.iu.edu/swap/>

\*Log in by typing your first and last name followed by your organization/agency's name into the "Guest" option.

### INDIANA'S STATE WILDLIFE ACTION PLAN ADVISORY COMMITTEE

American Electric Power  
Ducks Unlimited, Inc.  
Duke Energy  
Indiana Department of Environmental Management  
Indiana Department of Natural Resources  
Indiana Department of Transportation  
Indiana Farm Bureau  
Indiana Forest & Woodland Owners Association  
Indiana Land Protection Alliance  
Indiana State Department of Agriculture  
Indiana Wildlife Federation  
Natural Resources Conservation Service  
Pheasants Forever  
Purdue University, Department of Forestry & Natural Resources  
The Nature Conservancy  
U.S. Fish and Wildlife Service  
U.S. Forest Service





501 N. Morton St., Suite 101  
Bloomington, Indiana 47404

## Appendix V. SWAP Survey Participation and Acknowledgements.

- Acres Land Trust
- Adams County Soil & Water Conservation District
- Allen County Soil & Water Conservation District
- Alliance for the Great Lakes\*
  - Angela Larson\*
- American Chestnut Foundation
- American Electric Power
- American Tree Farm System
- Amos Butler Audubon Society\*
  - Don Gorney\*
- Aquatic Control
- Aquatic Weed Control
- Arrowhead Country Resource, Conservation, & Development
- Association of Indiana Taxidermists\*
  - Brad Jones\*
- Ball State University\*
  - James Eflin\*
  - Kamal Islam\*
  - John Taylor\*
- Banning Engineering PC
- Bartholomew County Conservation Council, Inc.\*
  - Jim Mahoney\*
- Bartholomew County Soil & Water Conservation District
- Bass Lake Conservancy District
- Bass n' Gals
- Battle Ground Conservancy District
- Ben Davis Conservancy District
- Benton County Soil & Water Conservation District\*
  - Michelle Scherer\*
- Bernardin, Lochmueller and Associates, Inc.
- Big Blue River Conservancy District
- Big Oaks Conservation Society
- Blackford County Soil & Water Conservation District
- Blocksom & Jenckes Conservancy District
- Blue Heron Ministries\*
  - Nate Simons\*
- Blue Lake Conservancy District
- Boone County Soil & Water Conservation District
- Brevoort Levee Conservancy District
- Brown County Soil & Water Conservation District\*
  - Cathy Paradise\*
- Buffalo Trace Land Trust
- Busseron Conservancy District

- Butler, Fairman, & Seufert, Inc.\*
  - Neal Bennett\*
- Butler University
- Cain's Homelike Farms\*
  - Kenny Cain\*
- Cardno\*
  - Will Ditzler\*
- Carmel Urban Forestry Committee
- Carroll County Soil & Water Conservation District
- Cass County Soil & Water Conservation District\*
  - Judy Buttice\*
- Central Hardwoods Joint Venture\*
  - Todd Jones-Ferrand\*
- Central Indiana Land Trust
- Central Indiana Trout Unlimited
- Central Indiana Fur Takers, Chapter 7B\*
- City of Elkhart\*
  - Daragh Deegan\*
- Clark County Soil & Water Conservation District
- Clark's Valley Land Trust
- Clay County Soil & Water Conservation District
- Clear Creek Conservancy District
- Clinton County Soil & Water Conservation District
- Commonwealth Biomonitoring
- Cordry Sweetwater Conservancy District\*
  - Larry Kolar\*
- Crane Naval Base\*
  - Steve Andrews\*
- Crawford County Soil & Water Conservation District
- Damon Run Conservancy District
- David Dale Owen Land Trust\*
- Daviess County Soil & Water Conservation District
- Dearborn County Soil & Water Conservation District
- Decatur County Soil & Water Conservation District
- DeKalb County Soil & Water Conservation District
- Delaware County Soil & Water Conservation District
- Delta Waterfowl
- DePauw University\*
  - James Gammon\*
- DJ Case & Associates
- Dubois County Soil & Water Conservation District\*
  - Judi Brown\*
- Ducks Unlimited\*
  - Dave Seger\*
  - Mike Sertle\*
- Duke Energy\*
  - Dan Arndt\*
- Dunes-Calumet Audubon Society
- EA Engineering, Science, & Technology, Inc.

- Eagle Creek Park Foundation\*
  - John Pankhurst\*
- Eagle Slough Natural Area\*
  - Greg Meyer\*
- Earlham College
- Earth Source, Inc.
- East Central Fur Takers, Chapter 7D
- Elk Creek Conservancy District
- Elkhart County Soil & Water Conservation District
- Environmental Solutions & Innovations, Inc.
  - Virgil Brack, Jr.\*
  - Dale Sparks\*
- Evansville Audubon Society
- Falling Waters Conservancy District
- Farm Services Agency
- Fayette County Soil & Water Conservation District
- Field Museum of Natural History\*
  - Alan Resetar\*
- Fish Lake Conservancy District
- Fishable Indiana Streams for Hoosiers (FISH)\*
  - Gary Moody\*
- Floyd County Soil & Water Conservation District
- Fountain County Soil & Water Conservation District
- Franklin College\*
  - Ben O'Neal\*
- Franklin County Soil & Water Conservation District\*
  - Chris Fox\*
- Friends of Patoka River National Wildlife Refuge
- Ft. Hayes State University
- Fulton County Soil & Water Conservation District
- Fur Takers of America\*
  - Tim Rose\*
- Gibson County Soil & Water Conservation District
- Glacial Ridge Historic Land Trust
- Goose Pond State Fish & Wildlife Area Volunteer\*
  - Lee Sterrenburg\*
- Good Woodling Woods\*
  - Robert Woodling\*
- Grace College
- Grant County Soil & Water Conservation District
- Graybrook Lake Conservancy District\*
  - Tom Kramer\*
- Great Lakes Basin Fish Habitat Partnership
- Great Lakes Commission
- Greene County Soil & Water Conservation District
- Greenfield Bayou Levee & Ditch Conservancy District
- Halderman Farm Services\*
  - Hugh Pence\*
- Hamilton County Soil & Water Conservation District\*
  - John South\*

- Hamilton Lake Conservancy District\*
  - Peter Crowl\*
- Hancock County Soil & Water Conservation District
  - Cindy Newkirk
- Hanover College
  - Andrew Hoffman
- Hants Lake Conservancy District
  - Robert Morrison
- Hardwood Tree Improvement Regeneration Center\*
  - Lenny Farlee\*
  - Charles Michler\*
- Harrison County Soil & Water Conservation District
- Hart Lake Conservancy District\*
- Heaton Lake Conservation Club\*
  - David Simmons\*
- Hendricks County Soil & Water Conservation District
- Henry County Soil & Water Conservation District
- Hillsdale College\*
  - Anthony Swinehart\*
- Historic Hoosier Hills Resource, Conservation, & Development
- Holy Cross College
- Hoosier Aquatic Management, Inc.\*
  - Matthew Kerkhof\*
- Hoosier Backcountry Horsemen
- Hoosier Environmental Council
  - Tim Maloney\*
- Hoosier Heartland Resource, Conservation, & Development
- Hoosier Hikers Council\*
  - Pete Banta\*
- Hoosier Tree Dog Alliance
- Howard County Soil & Water Conservation District
- Heartland Restoration Services\*
  - Michael Van Laeken\*
- Huntington County Soil & Water Conservation District
- Illinois Natural History Survey
- Independence Hill Conservancy District\*
  - Brian Smolar\*
- Indiana Academy of Science
- Indiana Arborist Association\*
- Indiana Association of Cities & Towns
- Indiana Association of Consulting Foresters\*
  - Mike Warner\*
- Indiana Association of Soil & Water Conservation Districts
- Indiana Audubon Society\*
  - Jeff Canada\*
  - Carl Wilms\*
- Indiana Bass Federation
- Indiana B.A.S.S. Nation
- Indiana Beaglers Alliance\*
  - Jack Hyden\*

- Indiana Beef Cattle Association
- Indiana Bowhunters Association\*
  - Terry Bowling\*
  - Herb Higgins\*
- Indiana Catfish Association
- Indiana Chamber of Commerce
- Indiana Chapter of the American Fisheries Society
- Indiana Chapter of the Society of American Foresters
- Indiana Chapter of The Wildlife Society
- Indiana Conservation Alliance
- Indiana Deer Hunters Association\*
  - Joe Bacon\*
- Indiana Department of Environmental Management\*
  - Angie Brown\*
  - Martha Clark Mettler\*
  - Kevin Crane\*
  - Ali Meils\*
  - Stacey Sobat\*
  - Kayla Werbianskyj\*
  - Leanne Whitesell\*
- Indiana Department of Natural Resources – Asset Management\*
  - Greg Sorrels\*
- Indiana Department of Natural Resources – Communications\*
  - Phil Bloom\*
- Indiana Department of Natural Resources – Engineering
- Indiana Department of Natural Resources – Entomology & Plant Pathology\*
  - Kallie Bontrager\*
  - Phil Marshall\*
- Indiana Department of Natural Resources – Executive Office\*
  - Chris Smith\*
  - Mike Smith\*
- Indiana Department of Natural Resources – Finance
- Indiana Department of Natural Resources – Fish & Wildlife\*
  - Rob Ackerson\*
  - Gary Armstrong\*
  - Steve Backs\*
  - Thomas D. Bacula\*
  - Robert Bell\*
  - Jim Bergens\*
  - Gregory Biberdorf\*
  - Robin Bruegmann\*
  - Matthew Buffington\*
  - Linda Byer\*
  - Dan Carnahan\*
  - Tony Carroll\*
  - Sandy Clark-Kolaks\*
  - JoAnne Davis\*
  - Tom Despot\*
  - Cindy J. Devine\*
  - Zach DeYoung\*
  - Ben D. Dickinson\*

- Steve Donabauer\*
- Dan Eckstein\*
- Rod Edgell\*
- Brad Feaster\*
- Eric Fischer\*
- Brant Fisher\*
- Warren Gartner\*
- Jason Gilbert\*
- Chris Grauel\*
- Josh Griffin\*
- Kent Hanauer\*
- Cassie Hudson\*
- Craig Jansen\*
- Dan Jessup\*
- Scott Johnson\*
- Amy Kearns\*
- Doug Keller\*
- Julie Kempf\*
- Debra King\*
- Sarabeth Klueh-Mundy\*
- Larry Koza\*
- Dericke Lavoine\*
- Neil Ledet\*
- Ted Leverman\*
- Nate Levitte\*
- Ron Lorman\*
- Justin Lynton\*
- Mitch Marcus\*
- Patrick Mayer\*
- Scott McCormick\*
- Dave Meuninck\*
- Steve Mund\*
- Matt O'Neill\*
- Jamie Pejza\*
- Adam Phelps\*
- Mark Pochon\*
- Mike Porto\*
- Jeremy Price\*
- Mark Reiter\*
- Andy Richards\*
- Shawn Rossler\*
- Scott E. Salmon\*
- Brian Schoenung\*
- Ray Shepard\*
- Dylan Sickles\*
- Jeremy Sobecki\*
- Reed Stiller\*
- Travis Stoelting\*
- Robert Sullender\*
- Jeff Thompson\*
- Angie Tilton\*
- Lance Tresenriter\*

- Budd Veverka\*
- Jason Wade\*
- Dave Welsheimer\*
- Sam Whiteleather\*
- Shannon Winks\*
- Rhett Wisener\*
- Nathan Yazel\*
- Dean Zimmerman\*
- Indiana Department of Natural Resources – Forestry\*
  - Darrell Breedlove\*
  - Allison Cline\*
  - Janet Eger\*
  - Tim Eizinger\*
  - John Friedrich\*
  - Chris Gonso\*
  - Brenda Huter\*
  - James Potthoff\*
  - Barbara Ramey\*
  - Brad Rody\*
  - Donna Rogler\*
  - Allison Royer\*
  - John Seifert\*
  - Dwayne Sieg\*
  - Zachary Smith\*
  - Amy Spalding\*
  - Phil Wagner\*
  - Jayson Waterman\*
- Indiana Department of Natural Resources – Heritage Trust Foundation\*
  - Bourke Patton\*
- Indiana Department of Natural Resources – Historic Preservation & Archaeology
- Indiana Department of Natural Resources – Law Enforcement\*
  - Tyler Brock\*
  - Steve Hunter\*
- Indiana Department of Natural Resources – Management Information Systems
- Indiana Department of Natural Resources – Nature Preserves\*
  - John Bacone\*
  - Margaret A. Byrne\*
  - Ron Hellmich\*
  - Jason Larson\*
  - Derek Nimetz\*
  - Emily J. Stork\*
- Indiana Department of Natural Resources – Oil & Gas\*
  - Herschel McDivitt\*
- Indiana Department of Natural Resources – Outdoor Recreation\*
  - Greg Beilfuss\*
  - Steve Morris\*
- Indiana Department of Natural Resources – Purchasing
- Indiana Department of Natural Resources – Reclamation\*
  - Ramona Briggeman\*
  - Jack McGriffin\*
  - Mark Stacy\*
  - Steve J. Weinzapfel\*

- Indiana Department of Natural Resources – State Parks\*
  - Brandt Baughman\*
  - Sam Boggs\*
  - Ted Bohman\*
  - Dan Bortner\*
  - Larry Brown\*
  - Tom Carr\*
  - Mike Clingerman\*
  - Tim Cordell\*
  - Todd Eubank\*
  - Vernon Gillum\*
  - Rob Gutsell\*
  - Justin Harrington\*
  - Ronnie Hileman\*
  - Ryan B. Lemley\*
  - Jim Lynch\*
  - Mike Mycroft\*
  - Tom Riley\*
  - Jim Roach\*
  - Teresa Rody\*
  - Dave Sarver\*
  - Bob Sawtelle\*
  - Aron Showalter\*
  - Paul Sipples\*
  - Matt Taylor\*
  - Nicole Thiele\*
  - Gary Warmouth\*
  - Rex Watters\*
  - Dennis Weber\*
  - Jon Winne\*
  - Brad Young\*
  - Indiana Department of Natural Resources – Water\*
  - Shirley Fitzwater\*
  - Leah J. Kopp\*
  - Mike Neyer\*
- Indiana Department of Transportation\*
  - William Fielding\*
  - Laura Hilden\*
- Indiana Farm Bureau\*
  - Justin Schneider\*
- Indiana Forest & Woodland Owners Association (IFWOA)\*
  - Warren Baird\*
  - Liz Jackson\*
- Indiana Forest Alliance\*
  - Myke Luurtsema\*
  - Audrey Moore\*
- Indiana Hardwood Lumberman’s Association (IHLA)\*
  - Ray Moistner\*
- Indiana Hunter Education Association\*
  - John Gano\*
- Indiana Invasive Species Council
- Indiana Karst Conservancy\*

- Keith Dunlap\*
- Indiana Lakes Management Society\*
  - Sara Peel\*
- Indiana Land Resources Council
- Indiana Native Plant and Wildflower Society\*
  - Steve Dunbar\*
  - Wendy Ford\*
  - Tom Hohman\*
  - Betsy Ingle\*
  - Amy Perry\*
  - Steve Sass\*
  - Marc Woernle\*
- Indiana Rural Water Association
- Indiana Smallmouth Alliance\*
  - Nathan Mullendore\*
- Indiana Society of American Foresters
- Indiana Soybean Alliance
- Indiana Sportsmen's Roundtable\*
  - Gene Hopkins\*
- Indiana State Climate Office
- Indiana State Department of Agriculture\*
  - Sue Gerlach\*
  - Jordan Seger\*
- Indiana State Personnel Department\*
  - Amanda Foor\*
- Indiana State Trappers Association\*
  - Fred Philips\*
- Indiana State University\*
  - Steven Lima\*
  - Brianne Walters\*
- Indiana University\*
  - Mike Lannoo\*
  - Curt Lively\*
  - Vicky Merestsky\*
  - Angie Shelton\*
  - Thomas Simon\*
- Indiana University Northwest\*
  - Ken Brock\*
- Indiana University South Bend
- Indiana University Purdue University – Fort Wayne\*
  - Bruce Kingsbury\*
- Indiana University Purdue University – Indianapolis (Center for Earth & Environmental Science)\*
  - Pamela Martin\*
- Indiana Urban Forest Council
- Indiana Walnut Council
- Indiana Watershed Leadership
- Indiana Wildlife Federation\*
  - Doug Allman\*
  - Barb Simpson\*

- Indianapolis Fly Casters
- Invasive Plant Advisory Committee\*
  - Ellen Jacquart\*
  - Tom Tremain\*
- Ivy Tech Community College
- Izaak Walkton League of America\*
  - Chuck Bauer\*
- Izaak Walkton League of America – Alexandria Chapter
- Izaak Walkton League of America – Argos Chapter
- Izaak Walkton League of America – Cass County Chapter
- Izaak Walkton League of America – Clinton Chapter
- Izaak Walkton League of America – DeKalb County Chapter
- Izaak Walkton League of America – Diana Chapter\*
  - Randy Armstrong\*
- Izaak Walkton League of America – Evansville Chapter\*
  - Jeff Chandler\*
- Izaak Walkton League of America – Fort Wayne Chapter
- Izaak Walkton League of America – Gene Straton Porter Chapter
- Izaak Walkton League of America – Glen Park Chapter
- Izaak Walkton League of America – Griffith Chapter
- Izaak Walkton League of America – Howard County Chapter
- Izaak Walkton League of America – Huntington County Chapter
- Izaak Walkton League of America – Indiana Division\*
  - Tim Russell\*
- Izaak Walkton League of America – Miami County Chapter
- Izaak Walkton League of America – Michigan City #7 Chapter
- Izaak Walkton League of America – Miller Chapter
- Izaak Walkton League of America – Porter County Chapter\*
  - Jim Sweeney\*
- Izaak Walkton League of America – St. Joseph County Chapter
- Izaak Walkton League of America – Terre Haute Chapter
- Izaak Walkton League of America – Wabash Chapter\*
  - Benny Ward\*
- Jackson County Soil & Water Conservation District
- Jasper County Soil & Water Conservation District
- Jay County Soil & Water Conservation District
- Jefferson County Soil & Water Conservation District
- Jennings County Soil & Water Conservation District
- Je-To Lake Conservancy District\*
  - Mary Dugan\*
- Johnson County Soil & Water Conservation District
- Jonar Enterprises, Inc.\*
  - Joseph Navarro\*
- Jordan Creek Conservancy District
- Keep Indianapolis Beautiful
- Kentland Conservancy District
- Knapp Lake Area Conservancy District
- Knox County Soil & Water Conservation District
- Kosciusko County Soil & Water Conservation District
- LaGrange County Soil & Water Conservation District\*

- Martin Franke\*
- Lake Bruce Conservancy District
- Lake County Soil & Water Conservation District
- Lake DeTurk Conservancy District
- Lake Edgewood Conservancy District\*
  - Jesse Hubbard\*
- Lake Holiday Conservancy District
- Lake Lemon Conservancy District
- Lake Maxinkuckee Environmental Council\*
  - Kathy Clark\*
- LaPorte County Conservation Trust
- LaPorte County Soil & Water Conservation District
- Lawrence County Soil & Water Conservation District
- Lawrenceburg Conservancy District
- Lawrenceburg, Manchester, & Sparta Conservancy District
- Lincoln Hills Resource, Conservation, & Development
- Little Raccoon Conservancy District
- Little River Wetlands Project, Inc.
- Madison County Soil & Water Conservation District\*
  - Steve Schmidt\*
- Manchester University
- Marshall County Soil & Water Conservation District
- Martin County Soil & Water Conservation District
- Merrillville Conservancy District
- Merry Lea Environmental Learning Center\*
  - Luke Gascho\*
- Miami County Soil & Water Conservation District
- Middle Fork Conservancy District
- Middle Patoka River Watershed Committee
- Midwest Aquatic Plant Management Society
- Midwest Glacial Lakes Partnership
- Midwest Invasive Plant Network\*
  - Katherine Howe\*
- Mill Creek Conservancy
- Monroe County Soil & Water Conservation District
- Montgomery County Soil & Water Conservation District\*
  - Connie Cleek\*
- Morgan County Soil & Water Conservation District
- Morocco Conservancy District
- Morocco Conservancy District – Indiana Snowmobilers\*
  - Daniel Blaney\*
- Mud Creek Conservancy District\*
  - Frank Smietana\*
- Muddy Fork of Silver Creek Conservancy District
- Muncie Sanitary District – Bureau of Water Quality
- Muskies, Inc. – Webster Lake Musky Club\*
  - David Cates\*
- National Association of Conservation Districts\*
  - Tom Crowe\*

- National Fish & Wildlife Foundation\*
  - Todd Hogrefe\*
- National Park Service – Indiana Dunes National Lakeshore
- National Wild Turkey Federation\*
  - Ryan Boyer\*
  - Bud Dennemann\*
  - Rick Horton\*
  - Randy Showalter\*
- Natural Resources Commission
- Natural Resources Conservation Service\*
  - Ken Collins\*
  - Ben Lambeck\*
  - Jill Reinhart\*
  - Dave Stratman\*
- Nature Works Conservancy District\*
- New Paris Conservancy District
- Newton County Soil & Water Conservation District
- NICHES Land Trust\*
  - Susan Ulrich\*
- NIPSCO
  - Paul Noveroske\*
- Noble County Soil & Water Conservation District
- Northern Indiana Spoonpluggers\*
  - John Bales\*
- Northwest Indiana Paddling Association\*
  - Dan Plath\*
- Northwest Indiana Steelheaders, Inc.
- Northwest Territory Resource, Conservation, & Development
- Northwestern Indiana Regional Planning Commission\*
  - Kathy Luther\*
- Nyona South Mud Conservancy District
- Oak Heritage Conservancy
- Oak Park Conservancy District
- Ohio County Soil & Water Conservation District
- Ohio River Basin Fish Habitat Partnership\*
  - Donovan Henry\*
- Ohio River Conservancy
- Ohio River Valley Water Sanitation Commission (ORSANCO)
- Orange County Soil & Water Conservation District
- Owen County Soil & Water Conservation District
- Oxbow, Inc.\*
  - Jon Seymour\*
- Parke County Soil & Water Conservation District
- Perry County Soil & Water Conservation District\*
  - Darlene Fischer\*
- Pheasants Forever\*
  - Dean Farr\*
  - Brian Nentrup\*
- Pike County Soil & Water Conservation District
- Pine Lake Conservancy District
- Porter County Soil & Water Conservation District\*

- Michelle Benson\*
- Posey County Soil & Water Conservation District
- Potawatomi Audubon Society
- Pretty Lake Conservancy District
- Prides Creek Conservancy District
- Pulaski County Soil & Water Conservation District
- Purdue University\*
  - Joseph Camp\*
  - Andrew DeWoody\*
  - John “Barny” Dunning\*
  - Elizabeth Flaherty\*
  - Bill Hoover\*
  - Jason Hoverman\*
  - Jeffrey Lucas\*
  - Brian MacGowan\*
  - Lindsey Purcell\*
  - Robert Swihart\*
  - Peter Waser\*
  - Rod Williams\*
- Purdue University North Central
- Putnam County Soil & Water Conservation District\*
  - Sue Crafton\*
- Quail & Upland Game Alliance
- Quail Forever
- Randolph County Soil & Water Conservation District\*
  - Stacy White\*
- Red-Tail Land Conservancy
- Reel Women – Reel Men
- Remenscheider Associates\*
  - Ken Remenschneider\*
- Reservoir Fisheries Habitat Partnership
- Ripley County Soil & Water Conservation District
- River Fields, Inc.
- Robert Cooper Audubon Society\*
  - Sarah McKillip\*
- Rock Creek Cass Carroll Conservancy District
- Rock Creek Wells Conservancy District
- Rome City Conservancy District
- Ruffed Grouse Society\*
  - Eric Ellis\*
- Rush County Soil & Water Conservation District
- Sam M. Shine Foundation, Inc.
- Sassafras Audubon Society
- Save Maumee Grassroots Organization\*
  - Abigail King\*
- Save the Dunes\*
  - Nicole Barker\*
- Scott County Soil & Water Conservation District
- Shelby County Soil & Water Conservation District
- Shirley Heinze Land Trust
- Sierra Club – Dunelands Group

- Simonton Lake Conservancy District
- South Bend-Elkhart Audubon Society\*
  - Victor Riemenschneider\*
  - Steve Sass\*
- Southeast Indiana Fur Takers
- South-West Lake Maxinkuckee Conservancy District
- Southern Indiana Cooperative Invasives Management
- Southern Indiana Fur Takers
- Spence Restoration Nursery\*
  - Kevin Tungesvick\*
- Spencer County Soil & Water Conservation District
- St. Joe River Valley Fly Fishers\*
  - John Law\*
- St. Joseph's College\*
  - Robert Brodman\*
- St. Joseph County Soil & Water Conservation District\*
  - Richard Glassman\*
- St. Joseph River Watershed Initiative
- St. Mary's College\*
  - Cassie Majetic\*
- Starke County Soil & Water Conservation District
- Steuben County Soil & Water Conservation District\*
  - Kayleen Hart\*
- Stucker Fork Conservancy District
- Sullivan County Soil & Water Conservation District
- Sustain Our Great Lakes
- Switzerland County Soil & Water Conservation District
- Sycamore Land Trust\*
  - Christian Freitag\*
- Sycamore Trails Resource, Conservation, & Development
  - Ron Ellis\*
- Taltree Arboretum & Gardens\*
  - Alexis Faust\*
- Taylor University
- The Nature Conservancy\*
  - Ted Anchor\*
  - Cassie Hauswald\*
  - John Shuey\*
  - Joe Tutterrow\*
- The Xerces Society
- Thirty Nine North Conservancy District
- Tippecanoe County Soil & Water Conservation District
  - Angie Miller\*
- Tippecanoe Fly Fishers\*
  - Don Werden\*
- Tippecanoe Watershed Foundation
- Tipton County Soil & Water Conservation District
- Town of Rome City\*
  - Leigh Ann Pranger\*
- Tree Lafayette\*
  - Gregory Shaner\*

- Tri County Conservancy District
- Twin Creeks Conservancy District
- Twin Rush Creek Conservancy District
- U.S. Army Corps of Engineers – Indianapolis
- U.S. Army Corps of Engineers – Michiana\*
  - Aaron Damrill\*
- U.S Fish & Wildlife Service\*
  - Jeff Keifer\*
  - Melinda Knutson\*
- U.S. Fish & Wildlife Service – Big Oaks National Wildlife Refuge\*
  - Joe Robb\*
- U.S. Fish & Wildlife Service - Eastern Tallgrass Prairie & Big Rivers Landscape Conservation Cooperative
- U.S. Fish & Wildlife Service – Genoa Fish Hatchery\*
  - Doug Aloisi\*
  - Nathan Eckert\*
- U.S. Fish & Wildlife Service – Muscatatuck National Wildlife Refuge\*
  - Susan Knowles\*
- U.S. Fish & Wildlife Service – Patoka National Wildlife Refuge
  - Heath Hamilton\*
  - Bill McCoy\*
- U.S. Forest Service – Hoosier National Forest\*
  - Gary Dinkel\*
  - Judi Perez\*
  - Richard Winstead\*
- U.S. Geological Survey\*
  - Ralph Grundel\*
  - Teresa Newton\*
- Union County Soil & Water Conservation District
- University of Evansville\*
  - Donald Batema\*
- University of Notre Dame
- University of Saint Francis
- University of Southern Indiana\*
  - James Bandoli\*
- USDA – Wildlife Services\*
  - Judy Loven\*
- Valley Watch
- Valparaiso Lakes Area Conservancy District\*
  - Robert Minarich\*
- Vanderburgh County Soil & Water Conservation District
- Vermillion County Soil & Water Conservation District\*
  - Meg Leader\*
- Vigo County Soil & Water Conservation District\*
  - Ryan Hendricks\*
- Wabash County Soil & Water Conservation District
- Wabash River Heritage Corridor Commission\*
  - Penny Cox\*
  - Steve Eberly\*
  - Ralph Weinzapfel\*
- Wabash Valley Audubon Society\*

- Phillip Cox\*
- Waldron Conservancy District
- Warren County Soil & Water Conservation District
- Warrick County Soil & Water Conservation District
- Washington County Soil & Water Conservation District
- Wawasee Area Conservancy Foundation\*
  - Heather Harwood\*
- Wayne County Soil & Water Conservation District
- Wells County Soil & Water Conservation District
- Wesselman Nature Society\*
  - Neal Bogan\*
  - Susan Haislip\*
- West Central Conservancy District
- West Central Indiana Fur Takers\*
  - Brad Collings\*
- WEST, Inc.
- White County Soil & Water Conservation District\*
  - Sharon Watson\*
- White Lake Conservancy District
- White Oak Conservancy District
- White River Resource, Conservation, & Development
- Whitewater Valley Land Trust
- Whitley County Soil & Water Conservation District
- Wildlife Land & Resource Management\*
  - Bruce Marheine\*
- Wildwood Dam Conservancy District\*
  - Jon Bricker\*
- Wood-Land-Lakes Resource, Conservation, & Development
- Unaffiliated Participants\*
  - Tom Hougham\*
  - Claude Issacson\*
  - Patricia Lodato\*
  - Max Jacobus\*
  - Mike McKeown\*

\* - *Participated in SWAP Survey*