



## Indiana Lake Michigan Coastal Grants Program 2009 Funding Cycle Summaries

### LAND ACQUISITION

**Applicant:** DNR – Division of Nature Preserves

**Project Title:** Bur Oak Savanna Protection

**Project Type:** Natural Area Preservation

**Federal Request:** \$150,000

**Local Share:** \$150,000 (NRDA/IHT)

Remnants of Bur Oak Savanna are extremely rare in Indiana and are considered critically endangered habitat in the state. Characterized by massive trees in excess of 3-foot-diameter, and surrounded by prairie and wetlands, they are confined to an area near Hobart. Approximately 300 acres remain. More study is required to accurately classify our example, but NatureServe lists a variety of bur oak-dominated habitat all of which are globally significant.

The St. Sava Tract is the last large parcel of this community that has not been protected. At 40 acres, it is over 70% wooded and provides essential connectivity between the other protected units. Like our other remnants of Bur Oak Savanna, it is not in pristine condition as a variety of disturbances have altered the vegetation. However, the potential for restoration is extremely high due to the persistence of the oaks, and the proximity to refugia on nearby units.

This remnant is a strong candidate for Dedication as State Nature Preserve. The property is immediately adjacent to Robinson Park, and is within walking distance of Oak Savanna Trail. While no final decisions have been made, the existing road frontage is suggestive of open public access.

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**Applicant:** Lake County Parks and Recreation Department

**Project Title:** Appleton Acquisition at Oak Ridge County Park

**Project Type:** Natural Area Preservation

**Federal Request:** \$30,000

**Local Share:** \$30,000

The Appleton Acquisition at Oak Ridge Prairie will entail the fee-simple purchase of approximately 5 acres of upland oak savanna and a few small areas of wetlands. Lake County Parks purchased 80 acres from the same family back in 1991. This property is classified as dry-mesic sand forest from a past botanical survey conducted in the mid-1990's by the Natural Land Institute.

### LOW COST CONSTRUCTION

**Applicant:** Town of Dune Acres

**Project Title:** Dune Acres Cowles Bog Restoration

**Project Type:** Natural Area Restoration/Enhancement

**Federal Request:** \$15,000

**Local Share:** \$15,000

Great Marsh is an inter-dunal peat base wetland in a dune-beach complex less than one-mile from Lake Michigan. The wetland sits between two large dune systems. The southern perimeter is delineated by the Calumet Dunes, which are approximately 10,000 years in age. The Toleston Dunes, which are only 3,000 years in age, delineate Great Marsh's northern perimeter. Great Marsh is the largest interdunal wetland associated with Lake Michigan. Cowles Bog Wetland of CBWC was examined and exaltedly written about by many early 20th century scientists including European participants in the 1913 Phytogeographical Excursion. It provided an inspirational focal point for Henry Cowles, one of the fathers of ecology in America. CBWC includes one of only four raised fens in Indiana and was designated a National Natural Landmark on December 2, 1965.

Starting in the mid-1960's, CBWC exhibited rapid degradation being transformed from a botanical marvel with diverse fauna habitat to a homogenous structure of shrubs and hybrid

cattail (*Typha* spp.). However, vestiges of its floristic uniqueness remains as demonstrated by the presence of 15 state listed species and 41 special floristic elements.

Twenty-six acres of CBWC is parkland owned by the Town of Dune Acres and 171 acres is owned by the National Park Service; Indiana Dunes National Lakeshore. Dune Acres' parkland is east of and adjacent to Indiana Dunes National Lakeshore's parkland and adjacent to Mineral Springs Road. Its location allows for a wetland view-shed for National Park Service visitors and Dune Acres visitors and residents.

In 2008, Indiana Dunes National Lakeshore initiated restoration of CBWC. As part of a restoration plan generated by Indiana Dunes National Lakeshore, Dune Acres' parklands desired wetland types were designated seasonally inundated shallow marsh, deep marsh, and sedge meadow. The Town of Dune Acres is requesting funding to accomplish the following restoration goals:

- Reduce hybrid cattail presence by 80 percent and eradicate all common reed.
- Reduce cover and frequency of shrub/tree species except for poison sumac (*Rhus vernix*), winterberry (*Ilex verticillata*), and yellow birch (*Betula alleghaniensis*) by 70 percent.

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**Applicant: Schererville Park Department**

**Project Title: Scherwood Park Environmental Enhancement Plan**

**Project Type: Natural Area Restoration**

**Federal Request: \$30,000**

**Local Share: \$30,000**

The project will involve the restoration and enhancement of four areas on the west side of Scherwood Park. The 9 acre park site was acquired in 2004 and is currently under development. Recent improvements include parking, paved trail and relocation of a historic log cabin. The proposed project includes riparian restoration of an existing channel, heirloom landscaping enhancements for the historic Hilrbich log cabin, woodland restoration, and other landscaping enhancements including a butterfly garden.

The current Park and Recreation Master Plan identifies improving the site landscaping, detention areas. The goal of the project is to restore and enhance these sections of the park to a more natural state through the use of native landscaping. The restoration would provide park users will a more diverse experience, reduce park maintenance, provide habitat for wildlife, and improve water quality. The project would also educate the public by incorporating signage identifying the different plant species. The current Park and Recreation Master Plan lists improvements to the site landscaping, log cabin and drainage area in the action plan.

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**Applicant: DNR- Division of Nature Preserves**

**Project Title: Calumet Prairie Typha Control**

**Project Type: Natural Area Restoration/Enhancement**

**Federal Request: \$13,500**

**Local Share: \$13,500 (REHAB)**

The Indiana Department of Natural Resources (INDNR), Division of Nature Preserves is interested in the active management and restoration of Calumet Prairie, located in Lake County, Indiana. This property is approximately 141 acres and it is comprised of wet sand prairie and dry-mesic sand prairie. Calumet Prairie provides habitat for state listed plant and animal species.

Numerous invasive plant species occur at Calumet Prairie. Several of these species are aggressive and are capable of drastically altering the plant community in which they are found. This project will include the treatment of such vegetation through foliar broadcast spray and wick herbicide applications. This restoration project involves approximately 15 acres of cattail and common reed control. The restoration of this area will improve the overall biodiversity and habitat potential for the property.

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**Applicant: Lake County Parks and Recreation Department**

**Project Title: Gibson Woods Nature Preserve: Restoration**

**Project Type: Natural Area Restoration/Enhancement**

**Federal Request: \$20,000**

**Local Share: \$20,000**

Gibson Woods Nature Preserve is a state-dedicated nature preserve within Lake County, Indiana which protects the very rare dune and swale topography formed thousands of years ago during the retreat of Lake Chicago. Communities found here include: dry-mesic sand savannah with an overstory of black oak and understory of bracken fern, mesic sand prairie dominated by big bluestem and tall coreopsis; wet-mesic forest dominated by pin oak and speckled alder. It is the intention of Lake County Parks Department to restore and maintain the high-quality natural features of the nature preserve. This restoration project will improve the black oak savannah and prairie plant communities by controlling invasive, woody plant species including exotic and aggressive native shrubs and trees. The project treatment area will restore approximately 10 acres of dune and swale topography. This project will involve one contract, and it will incorporate a combination of mechanical equipment and some delicate hand treatment restoration methods. Invasive shrubs and trees that are cut by hand will be hauled out of the treatment area to improve restoration results.

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**Applicant: DNR – Division of Nature Preserves**

**Project Title: Pine Station South Savanna Restoration**

**Project Type: Natural Area Restoration/Enhancement**

**Federal Request: \$20,000**

**Local Share: \$20,000 (NRDA)**

The Indiana Department of Natural Resources, Division of Nature Preserves is interested in the active management and restoration of Pine Station Nature Preserve, located in Lake County, Indiana. This property is approximately 258 acres and it contains a mixture of globally rare dune and swale topography, sand-mined areas, two ponds and several hundred feet of frontage on the Grand Calumet River. Pine Station Nature Preserve provides habitat for numerous State listed plant and animal species and is comprised of sand savanna, sand prairie, wet prairie, sedge meadow, emergent marsh, and shrub swamp plant communities.

The goal of this project is to significantly reduce the presence of invasive woody plant species at Pine Station near the Grand Calumet River. Numerous invasive woody plants occur on the property. Several of these species are aggressive and are capable of drastically altering the plant community in which they are found. This project will include the treatment of such vegetation through the cutting and removal of the woody species with chainsaws or brushcutters, applying herbicide to the cut stump and also herbiciding any woody resprouts. This restoration project involves approximately 10 acres at Pine Station Nature Preserve and it will target an overgrown black oak savanna near the Grand Calumet River.

The project objective is to reduce the presence of targeted invasive woody plant species within the treatment area. This project will consist of one contract. The restoration of this area will improve the overall biodiversity and habitat potential for the site and reduce the spread of invasive shrubs and trees into previously restored areas of the property.

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**Applicant: DNR – Division of Nature Preserves**

**Project Title: Norco Tract, Hoosier Prairie, Phase II**

**Project Type: Natural Area Restoration**

**Federal Request: \$30,000**

**Local Share: \$30,000 (REHAB)**

The grant will be directed towards restoration of 9.5 acres of wetland and 5 acres of prairie on the recently acquired Norco tract at Hoosier Prairie Nature Preserve. This work will be a continuation of work done under a previous coastal grant and will expand on that work. The goal is a 90% reduction in woody invasive species that threaten to dominate and shade out desired

native herbaceous vegetation. It is anticipated the the work will be done by contract with a private vendor during the winter season Nov. 2009 - March 2010 with a follow-up treatment in June of 2010.

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**Applicant: Northwestern Indiana Regional Planning Commission**

**Project Title: Native Landscaping Demonstration Project**

**Project Type: Natural Area Restoration/Enhancement**

**Federal Request: \$12,500**

**Local Share: \$12,500**

The purpose of this project is to begin the transformation of the current traditional turfgrass landscaping at the Northwestern Indiana Regional Planning Commission(NIRPC) with native plantings and green infrastructure such as rain gardens. This location is highly visible to local decision makers as NIRPC and the Northwest Indiana Forum host thousands of elected officials, business, and community leaders at regular meetings and special events throughout the year. Our goals are to demonstrate the many benefits a native landscape surrounding a public building and parking lot can provide including: maintenance cost savings, reduction in energy use and air pollution, stormwater runoff treatment, increase in biodiversity and native plant pollinators.

This request consists of organizing a design, build, and stewardship committee of conservation groups, agencies, and companies who participate in NIRPC programs and committees; designing and building native gardens and vegetated swales; ecological monitoring for the first growing season of these new native landscapes. Informational signage will be placed in highly visible locations to explain to NIRPC.

NIRPC undertakes this project in partnership with the Portage Redevelopment Commission who owns the property, the Portage Parks Department that currently maintains the property, the MS4 Community Partnership who will host a public involvement rain garden workshop, and the Wildlife Habitat Council another tenant of the building.

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**Applicant: Department of Natural Resources, Division of State Parks and Reservoirs**

**Project Title: Natural Resource Management Plan Implementation**

**Project Type: Natural Area Restoration/Enhancement**

**Federal Request: \$7,715**

**Local Share: \$7,715 (REHAB/IN-KIND)**

Project is to continue work in accomplishing the implementation of the 2005-2010 natural resource management plan. Focus in the last three years has been primarily on the eradication of herbaceous and woody invasive species such as oriental bittersweet (*Celastrus orbiculata*), bush honeysuckles (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*), privet (*Ligustrum* spp.), and garlic mustard (*Alliaria petiolata*) per the NRMP. Increased focus per the NRMP is to monitor populations during the treatment process (pre and post eradication). Other tasks will include those ID'd in the NRMP, such as; mapping invasive populations, progress measurement/documentation, and fire break construction for protection of infrastructure. Project will include two 90 day stewardship positions and materials such as herbicides/surfactants, and prescribed fire equipment.

#### EDUCATION AND OUTREACH

**Applicant: Indiana University Northwest – Center for Data & Analysis**

**Project Title: Introductory GIS in the NW IN LMCP Region**

**Project Type: Coastal Resource Education/Training**

**Federal Request: \$12,750**

**Local Share: \$12,750**

This project will benefit the Northwest Indiana Lake Michigan Coastal region by providing Geographic Information Systems (GIS) education to persons within the Indiana Counties of Lake, Porter and LaPorte to help address a variety of environmental issues affecting

our watershed. Using GIS can provide a valuable visual aid within project reports and presentations to describe spatially related data. The program is intended to expand the knowledge and use of GIS tools within the Lake Michigan Watershed.

What is GIS? A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. Basically, it links database information to the map.

The Northwest Indiana Center for Data & Analysis at Indiana University Northwest has been actively involved in GIS technology for the last ten years. Through its partnership with the Northwest Indiana GIS Forum, numerous training sessions have been hosted at the IUN GIS lab for regional GIS professionals. Data Center personnel have also served as adjunct faculty in the IUN College of Arts and Sciences teaching an Introductory GIS course through the Department of Geosciences. The Data Center has also administered grant funding provided by the US EPA and the US Federal Geographic Data Committee to provide digital geospatial metadata outreach and training regionally. In addition to acting as co-chair of the Northwest Indiana GIS Forum, other partnerships exist on the regional and state level including the Northwestern Regional Planning Commission, Save the Dunes Conservation Fund, Indiana Geological Survey and the Indiana Geographic Information Council. These important partnerships will provide avenues for outreach to an audience for this basic GIS education program.

This project will provide basic knowledge of Geographic Information Systems technology. Those persons within the region involved in issues affecting the Lake Michigan watershed as well as the general public and Indiana University Northwest students, faculty and staff will be targeted for this GIS outreach/education program.

The following hands-on, educational modules related to GIS will be prepared in conjunction with this program. Half day training sessions will be limited to 15 attendees or less and can be offered multiple times to accommodate interest.

1. Basic Introduction to Geographic Information Systems

This session will provide an explanation of what GIS is, how it works and examples of applications.

2. GIS Mapping Resources Available over the Internet

Many online mapping services exist that can be helpful if you learn some tips on how to use them. This module will examine services such as Google Earth and Existing Web Mapping Services such as the IndianaMap.

3. Locating Regional Tabular and Spatial Data for use in a GIS

Much data (both digital geographic and database) already exists that can be imported into GIS software. This session will discuss online sources for data.

4. Using GIS Software (ESRI)

ESRI designs and develops the leading GIS software currently available. This module will offer instruction for the free ArcExplorer software. Also included will be an explanation and demonstration of the ArcGIS 9.3 software.

5. A Hands-on Introduction to Global Positioning System equipment (GPS)

This session will include information about how GPS works as well as hands-on experience with basic GPS equipment. Once data points have been captured, we will learn how to import them into the GIS software.

6. Documenting Digital Geospatial Datasets with Metadata

If you are creating new geospatial datasets, or editing existing data, it is important to record how they were created or changed for future users. This module will include instruction on the most important aspects of data to document so that it can be successfully used in the future.

Hands on training sessions will be held in the GIS Computer Lab located in the library at Indiana University Northwest, Gary, Indiana. The lab houses 18 computers.

The intention of this program is to begin with basic instruction of Geographic Information techniques. Attendees will be surveyed to determine additional topics of interest related to GIS to determine future courses.

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**Applicant: Save the Dunes Conservation Fund**

**Project Title: Natural Resource Management Vocational Training**

**Project Type: Coastal Resource Education/Training**

**Federal Request: \$67,500**

**Local Share: \$67,500**

Traditionally, lower level positions (usually referred to as field technicians, summer-help, and/or interns) in natural resource management (NRM) are laborious positions with an extraordinarily high rate of turnover. Consequentially, valuable resources are used every season to train new recruits in common NRM techniques. Moreover, due to the increase of indoor activities associated with modern culture, fewer students are aware of the necessary skills and job opportunities associated with NRM.

There is a need for trained field technicians to improve the efficiency of NRM activities and implement dozens of regionally and locally planned restoration projects. The goals of this program will be to create a local green collar workforce and improve the efficiency of NRM project budgets. Students will learn NRM techniques through hands-on field training at various publicly and privately owned natural areas. In addition, students will learn and be tested on various principles of NRM through classroom training events and seminars. Students will graduate from the program with a low to moderate level of technical expertise in NRM. The graduates will improve the efficiency of NRM activities in the area by increasing the skilled labor pool for restoration and reducing the need to funnel valuable budgetary dollars into training.

The objectives of this project will be to (1) create and implement a curriculum to train program students in various NRM practices commonly used in the Great Lakes Region including but not limited to: invasive species identification and control; general plant identification using technical plant terminology and single-access keys; installation of restoration materials (seed, plugs, erosion control materials); monitoring conservation lands and restoration projects (monitoring methods including the implementation of Floristic Quality Assessments); mapping vegetation communities (mapping methods and use of technical equipment such as ArcGIS and Magellan Mobile Mapper CX); and plant propagation (seed collection, recording, storage, stratification, germination, greenhouse maintenance), (2) build a skilled labor pool for NRM, (3) educate students about the value of and threat to conservation lands, (4) educate students about Best Management Practices (BMPs), (5) create a list of skilled green collar candidates for distribution to land managers, and (6) identify additional resources for program continuance.

Additionally, there is potential to develop an outdoor environmental classroom in the near future. Students performance will be evaluated/graded by accumulating 540 points in the following manner. Attendance will account for 45% of the grade, Effort (evaluated by homework completion [1/3] and field work [2/3]) will account for 20%, 9 quizzes will account for 10%, and 2 Tests will account for 25%. Students who accumulate 90% or more of the points will receive a certificate from SDCF as a trained field technician as well as high school credits. Students who accumulate 60% to 89% of the points will pass and receive high school credits. Students failing to accumulate 60% of the points will fail and receive no high school credits.

Measurable outcomes will be 36 field training and 9 classroom training events, a labor pool of skilled green collar candidates, students learn to identify at least 28 invasive plants and their associated life cycles and control methods, students learn how to construct at least 2 types of BMPs, 1 contact list of skilled green collar candidates for distribution to land managers, the number of acres treated or restored, and at least 4 partnering organizations.



In early 2008, the La Porte Countywide 20-year comprehensive plan was adopted. By definition, the comprehensive plan is a holistic generalized long range policy document. The plan assesses the current conditions of a municipality. This includes: housing, zoning, economy, land-use, tourism, and the environment. It also includes, at minimum, all related physical issues that affect the future of a community (roads, drainage, utilities, parks, school sites, and future land-use). Governments typically use the developmental policies of the comprehensive plan to create their more specific regulatory controls. Our project is focusing on this next step of the process. La Porte County is partnering with the Cities of Michigan City and La Porte to craft a new zoning ordinance, subdivision control ordinance, and zoning map update that is consistent with the policies and recommendations of our Comprehensive plan.

The comprehensive plan acknowledges, via population projections, that the majority of LaPorte County's future growth will be within the upper third of our county. This area unfortunately coincides with the Lake Michigan Coastal Program watershed boundary and most definitively will have an adverse effect on this sensitive area of our county. Through the creation of local standards and controls, the county, and its cities will have the tools available to mitigate potential negative effects of development within the watershed. The following controls may include: smarth growth and smart code principles, conservation design and low-impact development techniques, buffers, minimum and maximum setback requirements, stormwater best management practices, and overlay districts that will protect sensitive resources within the watershed and help preserve the overall water quality and biodiversity of Lake Michigan and its tributaries. With this project being countywide, the Cities and the County will be adopting the same zoning ordinances thus making the development process more predictable and equitable for developers of La Porte County.

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**Applicant: Porter County Convention, Recreation and Visitor Commission**

**Project Title: Porter County Ecology Trail**

**Project Type: Coastal Land Use, Planning, Development / Recreational/Public Access**

**Federal Request: \$75,000**

**Local Share: \$75,000**

In 2005, the PCCRVC contracted with Nichols Tourism Group to conduct a destination audit of Porter County. The purpose of the study was to identify our strengths, weaknesses, opportunities and threats as a destination, and identify new product that could be developed to enhance and increase the economic vitality of our destination. The product development criteria given to our consultant was that new or enhancements to existing product had to be unique, quality, compliment our communities, be beneficial to both visitors and residents, and some of the suggested new product needed to benefit the entire county. Out of this study came several important suggestions that included creating an observation tower at the Indiana International Port of Burns Harbor, an Industrial Museum to tell the story of steel, the international port and trains, and the creation of an Ecology / Heritage Trail that would thread the entire county together through thematic trails.

The Indiana Dunes are the destination driver for Porter County. They attract nearly three million visitors annually. Just as the dunes are a major strength to our destination they are also a weakness, because the average length of stay is two to six hours. A visitor can enjoy the Indiana Dunes National Lakeshore (NPS) for several hours, and leave Porter County without spending any money within our destination. The challenge is to create product that will motivate these visitors to stay longer by managing the flow of the visitors to the Indiana Dunes. This will help Porter County economically, but it will have huge benefits for both the Indiana Dunes State and National Parks, because it can help protect the dunes. The NPS recognizes that visitors to the dunes are not getting the full dunes experience by only staying a few hours, and by spending the majority of their time at the beaches. The NPS determined that it would take two days to get the full experience of the dunes. They are working to create more of an awareness of the vast array of experiences outside of the beaches. The ecology trail will help the NPS to meet this goal, but it

goes further, because it exposes visitors to the wonderful ecological assets throughout the county.

The dunes coupled with the unique topography of Porter County make us an ecological wonder with many positive assets throughout all of our communities. The ecology trail is the only product development project that threads all of our communities together. Unfortunately, the packaging of these assets into a compelling experience for visitors is a difficult endeavor. The goal of the ecology trail is to take the current assets, and link them together via themes that are shown on thematic maps. We would also create all the necessary full-color marketing / educational materials to enhance the trail experience for the visitor. We will also identify new assets that are needed to improve the trail, and how we can enhance current assets to make them more experiential. This is all done in phase I, which is already being completed, and paid for by the PCCRVC and a small LMCP grant.

Phases II through IV have been modified since our pre-proposal based on further conversations with Fermata, our hired consultants / project managers for all the phases of the ecology trail.

Phase II will use the development of a website as a way to organize the information gathered in phase one, to perfect the interpretive messages developed in phase one, and to begin to connect visitors (both current and potential) to the nature and recreational resources of the region. Fermata believes in using web development as a cost-effective means of organizing the education, marketing, and tourism information that will allow us to create additional tools to effectively promote and interpret the trail in future phases.

A recent study of “NEXTgen” travelers by Y-Partnership reveals that “seven out of ten (71%) use the Internet to search for travel information, while 41% have taken a virtual tour of a destination, and 38% have built a trip itinerary online.” Given the importance of the internet to reaching these “NEXTgen” travelers, we believe it critical to develop an advanced web presence as early as possible in the overall development of the trail. Therefore phase II will be devoted to web development.

The web development will not be limited to the nuts and bolts of web engineering. This phase will accomplish far more, particularly related to design and messaging. In this phase we will conduct a brand summit, with the expressed purpose of developing a unique brand and style for the trail. The results of the summit will be used to help design the website, as well as the collaterals being proposed for phase III. The deliverables would include a logo, tag line, and a style guide to be used to unify the look of the various trail partners and sites.

In Phase II we will also expand the interpretive framework for Phase I. This interpretive strategy will be used to organize the web site and future elements such as signage and printed materials. Experience has shown that the web is the most effective means of perfecting this interpretive strategy, since errors, edits, and changes are easily made within this electronic medium.

Finally, in Phase II we will complete the development of a website suitable for use with the traveling public. We strongly believe in the web as an organizational medium, but a website has to be suitable for public use. Please review [www.kansaswetlandsandwildlifescenicbyway.com](http://www.kansaswetlandsandwildlifescenicbyway.com) for an example of Fermata's recent work on this type of website development.

The Porter County Ecology Trail will accomplish three important missions:

- Move people to places,
- Masses to messages, and
- Markets to merchandise

The website, along with the various collateral products and programs, will move people to places in Porter County that exhibit unique natural and ecological resources. The interpretive plan is intended to connect the masses who visit to a set of important messages about Indiana, Indiana Dunes, Porter County, and the Great Lakes (specifically, Lake Michigan). The ecology trail will help visitors better understand Lake Michigan and the forces that shaped and formed both the lake and the landscape through which the trail courses. The third mission for the trail, which is to

better connect markets to merchandise, will be addressed in the final phase of the project.

Phase III will focus on developing the interpretive signage, printed materials, and cutting-edge electronic tools to help nurture, facilitate, and inform travel along the trail. The resources and products recommended will include:

- Interpretive signage strategically placed along the trail
- Pod trails that would be available for downloading from the new website
- Audio podcasts, also for download from the website
- Interpretive materials (nature checklists, maps, guides) available for download from the website
- RSS feeds, such as eBird, for integration into the website

Porter County is best served by developing a diversity of products and programs to stitch the trail and its sites into a seamless offering. All should be made available through the web (including the interpretive signage, available as downloads). The graphical concepts developed in Phase II will be used to help unify what are otherwise separate elements.

Finally, phase IV would involve the organization of a sustainable development strategy, focused on sustainable recreation and tourism, for the region that will allow Porter County to attract sustainable / "green" businesses and create new jobs. The following two books are excellent resources for this type of endeavor:

- "Who's Your City" by Richard Florida
- "The Restoration Economy" by Storm Cunningham

Of course an interpretive trail such as this will attract new visitors and put "heads in beds." Yet there are additional benefits that are derived from this type of green or sustainable effort. Many people who will visit will be unaware of this stretch of Lake Michigan or of the remarkable recreational resources within close proximity of Chicago. In addition, many visitors whose previous experiences have been limited to a summer trip to the lake will be exposed to the diversity of these resources for the first time. Many who visit will be aware of the extensive industrial development in this area, and unaware that there are significant natural sites coexisting with industry. They will leave with a very different perspective of the region than they came with. Such a revelation will place Porter County in an inevitable position related to attracting new residents and new business, since these natural resources are critical quality of life assets of the region.

As pointed out in a recent national survey by CEOs for Cities, American communities who wish to compete for the next generation of workers must be "clean, green, safe, and inviting." This ecological trail will serve to highlight the "green" component in that equation. Therefore we propose to develop a sustainable tourism and development strategy that will help Porter County best take advantage of this trail. We will investigate ways in which the traditional economic development interests in the region can best utilize the trail to communicate the quality of life in the region, and to identify those green business and services that might be attracted to the region by this effort.

Last, the PCCRVC is actively involved in the master planning of not only our destination, but Porter County in general, Northwest Indiana and Northern Indiana as well. We continue to be actively involved in the development of the Marquette Plans I and II, Greenways & Blueways study, the US 12 and 20 Corridor Plan, the Porter County Corridor Study, the Northern Indiana Art and Earth Trail Development and the Northern Indiana Tourism Development Commission's 2009 - 2011 Strategic Plan projects. Many of the studies listed above are visionary studies, and are still waiting for an action plan. The Ecology Trail is an actual project that will compliment and enhance these visionary plans.

**EMERGING ISSUES: APPLIED RESEARCH**

**Applicant: Purdue University**

**Project Title: Concurrent fine-scale mapping of nearshore water quality and larval fish dynamics: Insights to potential climate change impacts on fish recruitment**

**Project Type: Great Lakes Climate Change Impacts**

**Federal Request: \$99,127**

**Local Share: \$99,166**

This project will perform a novel baseline field study that will correlate native and invasive larval fish distributions and growth patterns with observable environmental features and prey fields in Lake Michigan, for the purpose of assessing the vulnerability of these species to climate change. We focus on larval fish, since larval fish survival is often the determining factor in fishery populations. The environmental conditions experienced by larval fish play a key role in growth and recruitment, and this study will focus on obtaining direct in-situ measurements of larval fish growth and relating them to direct observations of zooplankton prey distributions, lake water temperatures, and other chemical properties. The proposed study will primarily target ecologically and economically important native species (yellow perch and walleye) and invasive species (alewife and round goby), and will be conducted from the spring to late summer seasons. We expect that this study will be the first field season in what we hope will be a long-term effort to categorize changing conditions in Indiana Lake Michigan waters by Purdue University.

Larval fish and zooplankton prey will be collected from a Purdue research vessel using instrumented nets capable of targeting certain species at different times of the year. In tandem with these collections, we will use an autonomous underwater vehicle (AUV) to measure the lake water properties where the larval fish are obtained. To our knowledge this is the first application of an underwater vehicle in the Great Lakes for the purpose of characterizing water quality. The autonomous vehicle will measure lake water temperatures, turbidity, pH, Chlorophyll, dissolved oxygen, blue-green algae, and conductivity, and will be deployed and recovered from the research vessel or from shore. On shore, the larval fish samples will then be analyzed using benchtop techniques that quantify fish growth over the past 1-10 days, and these growth rates will be related to the observed physical, chemical, and biological conditions derived from the autonomous vehicle and zooplankton collections.

The final portion of the proposed project involves the interpretation of our results in the context of potential Great Lakes climate change, and the dissemination of our results. Recent studies have shown that larval fish growth may be highly correlated with water temperature, and that individual species can have quite different temperature characteristics. It is not yet clear that the warming of Lake Michigan water will necessarily have an adverse effect on fish populations. We plan to compile the summary results for each species collected, and attempt to assess the potential species vulnerability under different Lake Michigan warming scenarios. The information will be made accessible to both the public as well as state and federal agencies such as the Indiana Department of Natural Resources, and United States Fish and Wildlife Service, and the Indiana Dunes National Lakeshore. It is hoped that this project will form the beginning of a longer-term effort by Purdue University researchers to better understand nearshore the coupling of biological and physical dynamics along the Indiana lakeshore.