

## Upper Mississippi River and Great Lakes Region Joint Venture Science Team Meeting Minutes, 12-13 April 2007

JV Technical Committee members present: John Castrale (IN DNR), John Coluccy (DU), Dave Ewert (TNC), Bob Gates (OSU), Dan Holm (IL DNR), Dave Luukkonen (MI DNR), Mike Roell (MO DNR), Greg Soulliere (FWS-JV), and Wayne Thogmartin (USGS). Members absent: Todd Bishop (IO DNR) and Ron Gatti (WI DNR).

JV Ad hoc Bird-group Subcommittee members present: Pat Brown (MI NFI), Steve Lewis (FWS-MB), Mike Monfils (MI NFI / MSU), Brad Potter (FWS-JV), Bob Russell (FWS-MB), and Tom Will (FWS-MB). Members absent: Mike Eichholz (SIU), Melinda Knutson (FWS-Refuges), Charlotte Neilson (SIU), and Mark Shieldcastle (OH DNR).

The Joint Venture Science Team met at the FWS East Lansing Field Office, beginning at 8:30 AM Thursday and adjourning at noon on Friday. **Primary objectives of the meeting were to 1) refine bird-group strategy goal statements, 2) develop research and monitoring objectives and prioritize needs, and 3) share associated information.**

New Technical Committee members (Todd Bishop, Ron Gatti, and Wayne Thogmartin) were announced, and meeting visitor Troy Wilson, Reynoldsburg FWS Office, was also introduced. Troy has a keen interest in birds and is considering a 2-3 week detail (work assignment) with the JV Science Office in East Lansing.

### Plan Status and Decision Support Maps

A review of the JV Implementation Plan development process and update presentation on bird-group strategies was provided by Greg Soulliere. Brad Potter reviewed a process to develop decision-support maps that combine conservation target areas for individual JV focal species. Several helpful comments on decision maps were provided by the group.

Suggestions included:

- Develop separate maps for major cover-types (grasslands, forest, non-forest wetlands)
- Separate maps into habitat maintenance (acquisition) vs. restoration and enhancement
- Incorporate additional data layers
  - Public ownership / conservation lands
  - Land values (economics layer)
  - Pre-settlement vegetation
  - Strip mining and other major land use influencing bird habitat and planning
  - Expert-based migration corridors for groups without stopover data (landbirds, waterbirds)

- Document meta data, assumptions, concerns, and other information (e.g., landbirds based on breeding only) to accommodate scientists and educate administrators
- Considering ecoregional analysis (by BCRs)
- Considering weighting factor for highest priority species if they appear to lack adequate representation in final product

### **CBM and Upcoming AFWA Grant Meeting**

Tom Will reviewed the importance of national and regional monitoring initiatives in adaptive management; monitoring is essential to a contemporary planning process. Tom also provided information on the Northeast Coordinated Bird Monitoring (CBM) framework as well a grant opportunity (via Association of Fish and Wildlife Agencies) for a nationwide effort to improve monitoring coordination. Tom will be attending a late April meeting in South Carolina to brain storm on grant application wording and effective ways to use funding (e.g., hire 2-3 CBM coordinators). He hopes a state agency scientist is able to join him at the meeting, better supporting interests of the Midwest. Andy Paulios and Ryan Brady (WI DNR) were suggested as top candidates to attend the meeting because Wisconsin has advanced substantially in CBM planning.

**Action item:** Andy Paulios and Ryan Brady of the Wisconsin DNR will be solicited by Tom Will to attend the CBM grant application meeting in South Carolina by 20 April. Greg Soulliere will determine if JV funds can be used to help state agency personnel with travel to this meeting and Greg will inform Tom by 18 April.

### **Research and Monitoring Priorities**

Much of the meeting was spent in subcommittee breakout sessions, refining research and monitoring (R/M) objectives and prioritizing needs for each bird group. R/M objectives and priorities provided by subcommittees are listed below (Page 4). The Landbird Subcommittee added a sentence to each research objective stating the desired outcome, what information we are after and why the research is important for JV goal achievement. Bob Gates provided a distinction between research and monitoring, which was helpful in the discussion of R/M priorities and needs.

*We distinguish monitoring from research in that monitoring is designed and implemented to measure progress toward meeting JV population goals and habitat objectives. Research, on the other hand, is designed to answer specific questions that arise from uncertainties or assumptions inherent in conservation planning and implementation.* Robert Gates, JV Science Team Meeting, Spring 2007

We also collectively discussed over-arching priorities for the JV all-bird plan. An exercise coordinated by Tom Will to develop an all-bird priority list was instructive, resulting in a draft list of primary monitoring themes used for discussion. Tom tried to cluster ideas in this attempt to identify and synthesize commonalities.

**Action item:** Greg Soulliere will use the subcommittee R/M lists to refine priority monitoring themes from the exercise, plus he will develop similar themes for the research portion of the all-bird plan. This document will be provided to the Science Team for review by 1 May.

The group spent time discussing optimal allocation of resources as there will be conflicts in conservation for various bird groups (e.g., forest vs. grassland). Decision-making and habitat management must make sense relative to land capabilities, species population status, and other factors (e.g., landscape initiatives/concerns ... water quality, human population trends, climate change, wind-power, bio-fuels, forest succession). Bird scientists in the Southeast are working on optimal allocation decisions, and we should consider this as a goal for the next iteration of JV plan.

### **May JV Management Board Workshop**

A draft agenda for the 23-24 May workshop with members of the JV Management Board at the Pere Marquette Lodge was reviewed and discussed. Volunteers from each bird-group subcommittee were solicited to attend the meeting, where they will provide a brief overview of how population and habitat objectives were developed by their subcommittee. Volunteers included John Coluccy - Waterfowl, Bob Gates - Shorebirds, Greg Soulliere - Waterbirds, Wayne Thogmartin - Landbirds, and Greg Soulliere and Brad Potter – All-bird Plan and GIS Applications.

**Action Item:** Room reservations must be made by 23 April for a \$60/night reduced rate (call 618-786-2331; ask for room in “Joint Venture meeting” block). The Lodge location is at the Pere Marquette State Park, Illinois Route 100, 13653 Lodge Boulevard, Grafton, IL 62037. Technical committee members in need of financial assistance for travel must contact acting JV Coordinator Paul Richert (Paul\_Richert@fws.gov) to complete necessary paperwork.

**Action Item:** Greg Soulliere will work with Technical Committee members attending the workshop to review expectations and provide maps and other planning tools from the various draft bird-group plans by 4 May.

### **Other Items**

The next JV Science Team meeting will be held in conjunction with the Midwest Fish and Wildlife Conference in Madison Wisconsin, December 2007. Funding R/M priorities should be a topic for discussion at this meeting.

Tom Will mentioned a Partners In Flight fall workshop focused on providing guidance for setting bird population objectives at the JV regional level. He will provide Greg with details to forward to the rest of the group.

## **Bird-group Strategy Goal plus Research and Monitoring Objectives and Priorities**

### **Waterfowl**

**Strategy goal:** *“Establish efficient habitat conservation to maintain or increase carrying capacity for populations of priority waterfowl species consistent with continental and JV regional goals.”*

#### **Research Objectives:**

By 2010, research will be underway to refine models that predict how populations of priority breeding waterfowl species (JV focal species) respond to habitat change. Specifically, research should address:

1. Identifying factors limiting breeding season vital rates (e.g., nest success, duckling survival, etc.),
2. Understanding how vital rates influence population growth,
3. Predicting distribution and abundance of priority waterfowl populations in response to habitat conservation alternatives.

By 2012, research will be developed to build bioenergetics models to evaluate habitat carrying capacity for populations of priority migrating and wintering waterfowl (JV focal species). Specifically, research should address:

1. Retrospective analyses of carry capacity, and
2. Prospective analyses that forecast expected carrying capacity in the face of changing habitat conditions (e.g., climate change, wet vs. dry years, with/without habitat programs, continued habitat loss, etc.).

By 2012, research will be developed to understand migration corridors, movement chronology, and human disturbance for migrating and wintering waterfowl to better predict habitat needs and target conservation areas. Specifically, research should address:

1. Optimum spatial arrangement of wetland types within and between migrating and wintering habitat, including 1) inter-wetland distances, and 2) juxtaposition with upland cover types such as cropland, urban areas, other human developments, and permanent natural cover.
2. An understanding of how potential human-induced limiting factors (e.g., disturbance, water quality, pollutants, contaminants, and sedimentation) can be most effectively and efficiently mitigated.

#### **Monitoring Objectives:**

By 2010, a monitoring protocol will be developed to track spatial and temporal patterns in distribution, abundance, and habitat for populations of priority breeding waterfowl species (JV focal species). Specifically, the protocol will include tracking

1. Habitat characteristics that influence waterfowl such as wetland abundance, landscape composition, and quality. Examples of quality concerns are
  - a. Climate change
  - b. Invasive species
  - c. Human disturbance
  - d. Contaminants
2. Vital rates most important to population sustainability.
3. Population size (CV 20%) and progress toward plan population objectives,

By 2012, a monitoring protocol will be developed to track populations of priority migrating and wintering waterfowl species (JV focal species). Specifically, the protocol will inventory:

1. Primary and secondary use areas,
2. Characteristics that influence habitat quality,
3. Body condition related to nutrition and habitat quality,
4. Survival and harvest rates to better understand mechanisms causing changes in abundance, and
5. Estimates of population size, timing and duration of stay, and use days will also be determined.

### **Means to improve monitoring**

*Cross-scale Integration.* Integrate and coordinate bird and environmental monitoring at continental, regional, and local scales so that patterns of change in bird demographics or habitat at one scale are informative of ecological processes responsible for patterns at other scales.

*Data Management and Accessibility.* Improve data management and retrieval protocols to provide conservation planners and researchers with rapid access to spatially-referenced data on waterfowl demographics and habitat.

*New Technologies.* Implement new and emerging technologies to supplement traditional monitoring databases and improve opportunities to learn about waterfowl responses to environmental variation at multiple scales.

## **Landbirds**

**Strategy goal:** *“Establish efficient habitat conservation to maintain or increase carrying capacity for populations of priority landbird species consistent with continental and JV regional goals.”*

## Research objectives:

Research objectives are listed in order of priority. Within each category of research we prioritized specific topics. Specific topics have not yet been prioritized across objectives.

Research objective 1. Identify habitats and landscapes associated with high productivity and/or survivorship, including source populations. This information is needed to ensure there are viable breeding populations that meet population goals of focal species in the Joint Venture.

1. Determine proportion of area occupied (site occupancy models), and consistency of occupancy as a surrogate for productivity (higher proportion and more consistent use associated with higher productivity). Test these assumptions with field studies.
2. Identify and prioritize optimal allocation of habitats/landscapes for focal species.
3. Evaluate patch size and landscape interactions for intermediate altered landscapes to determine if source populations (e.g., Allegan, Baraboo, Fort Custer, Barry State Game Area). Summarize results from ongoing studies at these sites.
4. Evaluate effects of connectivity on productivity and survivorship in landscapes with different patch sizes and proportion of natural cover.
5. Project future land use of private land owners in focal landscapes where productivity and survivorship is known or thought to be high.
6. Consider working collaboratively outside JV for those species where the JV is a particularly important part of the breeding range (Kirtland's Warbler, Golden-winged Warbler, Henslow's Sparrow etc.).
7. Identify relative survivorship and condition of birds in different post-breeding habitats.
8. Identify effects of anthropogenic effects, such as pesticides, invasives, overbrowsing, on food supply and breeding success.
9. Evaluate spatial autocorrelation of population dynamics of focal species or suites of species with similar ecology.
10. Identify population dynamics in understudied systems (e.g., boreal-hardwood transition, central mixed grass prairie, riparian forests, wet meadows, shrub wetlands, savannas, urban-rural interface).
11. Contrast Golden-winged Warbler demographics in early aspen succession with shrubby habitats with long persistence.

Research objective 2. For migrating birds, identify a network of sites to meet their energetic needs. Document/describe key landscape and site features of important stopover sites or suites of stopover sites, especially near the Great Lakes and in agricultural and urban landscapes. This information is needed to ensure there are sufficient stopover sites for all groups of birds in the Joint Venture that maintain or enhance populations of these species.

1. Identify stopover hotspots, including relative importance of patch size and patch isolation.

2. Apply energetics model to predict relative patch richness and connectivity, relative importance of sites along migratory pathways.
3. Establish linkage between breeding, wintering, and migratory routes.
4. Evaluate altitude of migration relative to shoreline and other factors, specifically relationship to towers, wind turbines.
5. Evaluate anthropogenic effects, such as pesticides, invasives, overbrowsing, on food supply and condition of migrants in different landscapes.

Research objective 3. Refine breeding density estimates across the JV; use data to improve models to calculate habitat objectives. Focal species whose habitat requirements exceed habitat available to be done first. This information is necessary to determine the location and amount of habitat in the Joint Venture to meet population objectives of focal species in the Joint Venture.

1. Analysis/meta analysis of literature/BBS studies to derive population densities for species-specific JV models.
2. Develop HSI or other models for focal species, starting with species with the most complex habitat requirements (or simplest?). Test with “real” data.
3. Implement studies of density across the JV in landscapes with different patch sizes, intactness, and connectivity.

Research objective 4. Improve understanding of habitat requirements and management needs and landscape attributes for species of high conservation concern: Kirtland’s Warbler, Black-billed Cuckoo etc. This information is needed to develop site specific management protocols to maintain population goals of focal species.

1. Focus on species where there is a mismatch between habitat availability and population objectives
2. Continue research and management for Kirtland’s Warbler.

Research objective 5. Quantify fine scale site characteristics important to JV focal species. This information is needed to develop site specific management protocols to maintain population goals of focal species.

1. Provide information for explicit habitat prescriptions for focal species; identify research/monitoring needs for fine scale characteristics that are unknown.

**Monitoring objectives (repeated activities required to assess progress toward goals), in order of priority:**

Monitoring objective 1. Estimate population size and track changes in abundance and distribution of focal species toward meeting population goals in the Joint Venture; improve monitoring of patch or subpopulation persistence, extinction, and colonization.

Monitoring objective 2. Track habitat change. Monitor land use changes on lands and waters in targeted breeding and migration areas; track bird population change in relation to habitat change.

Monitoring objective 3. Evaluate response to habitat conservation strategies (restoration, protection and enhancement)

Monitoring objective 4. Incorporate detectability considerations in existing surveys, standardize monitoring protocols and address biases.

Monitoring objective 5. Establish protocols to measure abundance and distribution during migration, especially landbirds.

Monitoring objective 6. Develop taxa-specific (e.g., early breeders, owls, caprimulgids, raptors) monitoring protocols for species inadequately monitored by BBS.

## Shorebirds

**Strategy goal:** *“Establish efficient habitat conservation to maintain or increase carrying capacity for populations of priority shorebird species consistent with continental and JV regional goals.”*

We distinguish monitoring from research in that monitoring is designed and implemented to measure progress toward meeting population goals and habitat objectives. Research, on the other hand, is designed to answer specific questions that arise from uncertainties or assumptions inherent in conservation planning and implementation. On this basis, we further distinguish two kinds of research as; 1) *hypothesis-driven questions* that relate to assumptions related to formulating population goals and translating these into habitat objects; and 2) *evaluative questions* that relate to understanding how and why habitat conservation strategies and implementation of these strategies achieves or fails to achieve their intended results. There is a degree of overlap and complementarity between these forms of research, but the former are questions that are best addressed at large spatial and long temporal scales, while the latter are often best addressed at more subregional or local (e.g. project-specific) scales.

### Monitoring Progress Toward Achieving Population Goals

The strategic planning process began with setting shorebird population goals for the JV that were stepped down from continental population goals. With current (but imperfect) estimates of status and trends of breeding and migrating shorebird populations, we have better knowledge of where the JV stands and where it needs to be, with respect to fulfilling the JV’s responsibility to support continental shorebird population goals. Therefore, an effective and efficient monitoring strategy is required to measure progress toward meeting JV shorebird population goals and habitat objectives.

#### *Research and Monitoring Goal No. 1*

By 2012, a monitoring program will be developed to 1) validate and improve estimates of breeding and migrating shorebird populations in the JV region; and 2) estimate



population trends of shorebirds (emphasizing JV focal species) that breed or migrate through the JV region. including 1) estimates of population size, timing and duration of stay, and use days; and 2) status and trends of focal shorebirds species and progress toward the JV's shorebird population goals.

Objectives:

1.1. Validate and improve population estimates of key species of breeding and migrating shorebirds in the JV region by:

A. Initiating short-term ( $\leq 5$  years) surveys of migrating shorebirds, to improve or validate estimates of key species, including;

*Coastal migrants*—Sanderling, Ruddy Turnstone, Semipalmated Sandpiper, Dunlin, Black-bellied Plover, Piping Plover. These surveys would be conducted during autumns and spring via a stratified random sampling approach using a network of volunteers (adopt-a-beach).

*Interior-migrating plovers*— American Golden Plover, Black-bellied Plover, Killdeer

These surveys would be conducted during spring migration only and focus on interior wetlands and flooded croplands. Surveys will be conducted on stratified random plots or roadside transects within counties in Illinois, Indiana, and Ohio that are known/historic staging areas.

*Interior-migrating shorebirds*— Black-bellied Plover, Pectoral Sandpipers, Greater and Lesser Yellowlegs, Wilson's and Red-necked Phalarope. These surveys would be conducted during spring migration and will focusing on interior wetlands, coastal marshes and estuaries using cluster sampling or a stratified random plot design.

b. Long-term ( $> 5$  years) annual surveys of key breeding shorebirds, including;

Regional surveys of Upland Sandpipers, stratified based on state Breeding Bird Atlas records

Singing (winnowing)-ground survey for Wilson's Snipe, similar to or coincident with Woodcock surveys. Will be conducted in northern portion of JV (above line from northeastern OH to, Chicago, and Minneapolis). This is a hunted species with no population surveys or monitoring.

c. Use state Breeding Bird Atlas in combination with the Breeding Bird Surveys to examine/validate population estimates distribution, status, and long-term trends (Killdeer, Spotted Sandpiper, Wilson's Phalarope, Woodcock, and Wilson's Snipe).

1.2 Limited opportunity exists to obtain meaningful “migration trend” estimates, given interior habitats, annual variation in weather and habitat conditions.

Breeding populations will be monitored at continental level, update migrant population estimates based on changes in continental populations.

1.3. Distribution relative to habitat complexes and coastal concentration areas/migration corridors.

### **Hypothesis-driven Research**

Research is also needed to test the biological foundation and assumptions inherent in the JV’s Shorebird Habitat Conservation Strategy.

Research and Monitoring Goal 2:

By 2012, research will be developed to build/refine empirical models that relate shorebird (emphasizing JV focal species) population responses to landscape/habitat changes. This requires: 1) understanding of how habitat factors influence population vital rates; 2) knowledge of how vital rates influence population growth and sustainability; and 3) identification of factors that limit population vital rates (e.g., survival, and nesting/fledging success).

Objectives:

2.1. Improve understanding of how habitat quantity and quality affect population vital rates.

a. Breeding populations of shorebirds,  
Nesting success.  
Fledging rates.  
Indirect measures (age ratios?)

b. Migrating populations of shorebirds  
Utilization rates (bird use-days/ha or wetted perimeter)  
  
Indirect measures (body mass, nutrition, physiological condition)

2.2 Increase knowledge of the relationship between population vital rates and abundance (population growth).

a. Population viability analysis and modeling of breeding focal species.

Goal 3:

By 2012, research will be developed to build bioenergetics models to evaluate landscape/habitat carrying capacity for priority migrating shorebirds (JV focal species) including 1) analyses of energetic carry capacity), and 2) habitat characteristics important to shorebird abundance and population dynamics (e.g., distribution and abundance of shorebirds in relation to indices like wetland abundance and landscape composition).

### 3.1. Estimate carrying capacity (energetic density) of habitat types

On-going refinement and updating of population estimates (see Objective 1.1)

- a. Compare food availability in cropland vs. shoreline vs. wetland habitats
- b. Quantification of energetic carrying capacity—area vs. wetted perimeter
- c. Determine renewal rates of energetic density, emphasizing invertebrate food resources
- d. Determine diet composition during autumn and spring by foraging guild
- e. Measure energy content of diet items by foraging guild.

### 3.2. Compare quality and quantity of agricultural vs. wetland habitats

- a. Energetic carrying capacity (see objective 2.1)
- b. Harvest/tillage condition
- c. Hydrology

### 3.3. Quantify Fall and Spring Migration Behavior

- a. Estimate stopover duration/turnover
- b. Determine no. of stops and distance between stops for short, intermediate, and long-distance migrants—refueling rates, migration energetics, eventually telemetry when technology permits
- c. Determine migration routes and corridors—  
extend the Skagen et al. biogeographical profile study to JV region, use ISS data, refuge counts, etc., emphasis on migration phenology.

## **Evaluative Research**

Evaluative research goals and objectives were developed to determine the effectiveness of regional and subregional habitat conservation strategies and local projects.

### Goal 4:

By 2012, a monitoring protocol will be developed to track priority migrating shorebirds (JV focal species) in order to 1) identify primary and secondary use areas, 2) characteristics that influence habitat suitability, and 3) bird health (e.g., body condition) as related to nutrition and habitat suitability.

### Objectives:

4.1. Quantify habitat changes—quantity and quality of wetland types and adjacent upland habitats affected by JV implementation plan and other sources of habitat gains and losses.

- a. Updated NWI to quantify wetland habitat changes
- b. Soil moisture, hydric soils and elevation data layers to quantify ephemeral wetlands under wet, average, and dry water conditions
- c. Update and track habitat changes, esp. NWI layer: Administrative tracking of accomplishments vs. quantification of habitat change (i.e. losses in the face of accomplishments)

4.2. Development of criteria and data layers to support restoration potential data layer

- a. Elevation, Surface/subsurface soils, geology, topography
- b. Historic wetland and drainage district maps?

4.3. Compatibility of waterfowl mgt. regimes vegetation management, shorebirds vs. waterfowl

- a. Effects of waterfowl habitat management on quality of habitat for shorebirds
- b. Shorebird migration phenology in relation to seasonal water-level fluctuations and management regimes.
- c. Relationship between autumn vegetation growth and production and invertebrate food resources (especially in spring).

4.3. Non-habitat limiting factors (Low priority):

- a. Disturbance—human activity and development
- b. Contaminants—agricultural pesticides, heavy metals
  - Effect on vital rates (prod. and survival)
  - Sublethal effects
  - Effects on food abundance (carrying capacity)
- c. Effect of communication towers and wind power development
- d. Light pollution
- e. Disease (botulism)

## **Waterbirds**

**Strategy goal:** *“Establish efficient habitat conservation to maintain or increase carrying capacity for populations of priority waterbird species consistent with continental and JV regional goals.”*

Specific waterbird research and information needs required to improve planning efficiency and effectiveness include (in priority order):

## **Research Objectives**

1. Assessment of distribution, abundance, and population trend data for all waterbird species to refine population estimates and objectives and associated habitat conservation objectives, and to measure management performance over time.
2. Identification of critical migration staging areas, migration corridors, and migration timing for species of greatest concern to refine migration habitat conservation planning.
3. Identification of breeding and winter areas for waterbirds that use the region primarily for migration, and assessment of potential limiting factors in the life cycles of individual species.
4. Determination of habitat and landscape preferences (area requirements, connectivity, beneficial and hostile adjacent habitats) of waterbird groups, particularly the secretive marshbirds, during breeding and migration periods.
5. Determination of the relationship between particular habitat conservation actions and population responses, plus the potential tradeoffs between species for a given action. Especially important is the need to assess the effects of wetland restoration, enhancement, and management on marshbird abundance and reproductive success.
6. Assessment of the effects and trends of invasive species (e.g., *Phragmites australis*) expansions on breeding and migrant waterbirds to guide wetland management and enhancement.
7. Assessment of the effects of disturbance by humans (e.g., cormorant management activities, researchers, and the public) and predators on colonial waterbird productivity, distribution, and habitat use.

Examples of current priority waterbird research needs that relate to several JV focal species follow (this is not an exhaustive list):

1. The King Rail is an important JV focal species for which a rangewide conservation plan will be completed by the U.S. Fish and Wildlife Service in 2007. The plan will include prioritized research needs that the JV should help to address.
2. A need has been identified for the Yellow Rail to determine current distribution of the species in the Upper Midwest, evaluate habitat and landscape factors that influence its occurrence and abundance, evaluate spatial and temporal changes of wetlands used by Yellow Rails, and assess future risks to those habitats.
3. There is a need to examine nesting patterns and habitat use of the Black Tern (a JV focal species) and Forster's Terns in Great Lakes coastal marshes to delineate boundaries and coastal marshes important for these species.

### **General Waterbird Monitoring Needs**

Monitoring serves two primary functions. First, monitoring provides data needed to inform management decisions that are based on resource status. Second, analysis of monitoring data can help identify the causes of demographic changes and provide an improved basis for future habitat management decision-making. Four general monitoring

issues and needs are discussed in the NAWCP. Each has relevance to the JV because of its importance in improving regional waterbird conservation decisions. More details on this information are available in the NAWCP (Kushlan et al. 2002: 32-33).

1. *Monitoring goal.* The monitoring goal of the NAWCP is to be able to detect >50% change over 10 years or 3 generations. This goal mirrors one proposed by the World Conservation Union in their criteria for identification of species at risk.
2. *Standard methodologies.* Large-scale monitoring programs must use techniques that allow population and habitat data collected in different locations and across multiple geographic or temporal scales to be compared and combined. A specific need is the ability to sample at large scales using various methods and still meet trend detection goals. Developing and testing monitoring methods and then evaluating their precision and power to detect trends are crucial for effective conservation.
3. *Centralized data storage and access.* The National Bird Population Data Center has developed a data repository to archive data on waterbirds throughout their ranges, regardless of survey locality or survey method. This centralized database is publicly accessible and allows managers to submit and retrieve data over the World Wide Web ([www.mp2-pwrc.usgs.gov/cwb/](http://www.mp2-pwrc.usgs.gov/cwb/)). Ultimately, it will be linked to other databases covering specific bird groups and regions.
4. *Filling the information gaps.* With a data repository and standard methodologies in place, partners will be able to identify gaps in current population survey efforts and coordinate an integrated network of statistically valid, long-term, waterbird population monitoring programs throughout the region and the continent.

### **Waterbird Monitoring Objectives**

Specific waterbird monitoring needs required to improve planning efficiency and effectiveness include (in priority order):

1. Work with partners to implement the North American Marshbird Monitoring Program. This program, which is under development, will provide a statistically-based sampling framework within which Conway's (2004) protocol will be used. It will provide critical information on marshbird distribution, abundance, and trends.
2. Support the fourth decadal Great Lakes Colonial Waterbird Survey from 2007-2009. The results of the survey will be used to refine the protocols, sampling framework, and survey frequency so that species-specific changes in distribution and abundance of Great Lakes colonial waterbirds can be determined with greater accuracy and at lower cost.
3. Work with partners to obtain updated and consistent land-cover inventory data (e.g., updated National Wetland Inventory (NWI) and National Land Cover Data) to track regional changes in the quantity and quality of cover types important to

- waterbirds. Current digital spatial data available through the NWI date back to the 1970s and 1980s for the JV region, and updates are critical for planning.
4. Work with partners to enhance existing surveys and initiate new ones to monitor, in a standardized manner, the distribution, abundance, and trends of priority colonial waterbird species (e.g., Common, Black, and Forster's Terns and Black-crowned Night-herons) in areas outside of the Great Lakes, especially along major river systems.
  5. Support the development and implementation of surveys and other tools (i.e., banding, telemetry, stable isotope analyses) that will provide information on migration stop-over sites, key wintering areas, and factors that affect the movements and distribution of waterbirds between breeding and wintering areas.
  6. Support the development and implementation of standardized, systematic waterbird surveys in near-shore and pelagic waters of the Great Lakes to determine distribution, abundance, trends, and migration chronology. One application of this information will be to evaluate proposals for offshore wind power development