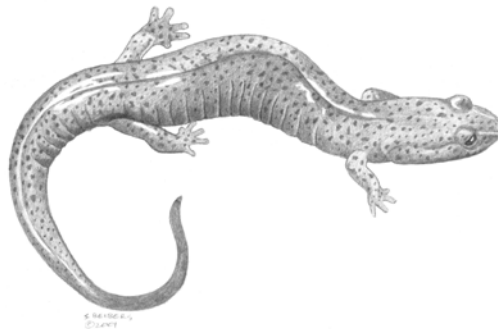


CHAPTER V: STATUS AND TREND MONITORING AND SURVEY AND RESEARCH NEEDS



Evaluating the effectiveness Mississippi's CWCS will be accomplished through an approach which incorporates short-term performance measures of actions implemented, progress toward goals and additional planning, and long-term monitoring status of SGCN populations their habitats and key biological communities. The extent to which the strategy is implemented and actions performed should provide initial indications of effectiveness of the CWCS. Examples of initial indicators may include acres or stream miles enhanced or protected, conservation plans completed and basic research and survey projects initiated or completed. Due to limited baseline information and the strategic scope of this document, performance measures are necessarily broad and must realistically remain adaptive as new information becomes available and methods improve. Over the next ten years as data become more available and the CWCS is "stepped down" into more detailed species, habitat or community specific conservation plans, target performance benchmarks should be developed and pursued.

Significant changes in status of SGCN, habitat and biological communities are generally evident only through longer-term monitoring. However, baseline information must be established to most effectively assess changes over time. Substantial baseline information is currently available for some SGCN and key communities. Information available for others is limited and must be acquired before changes may be adequately tracked. This need for additional baseline information must be addressed early in the implementation of the CWCS. A list of identified survey and research needs is included at the end of this chapter.

Numerous programs, projects and plans to monitor species, habitat, communities and conservation actions currently exist and will be used as a foundation for monitoring the CWCS. Although MDWFP regularly performs these activities, many others are carried out through other international, national, regional, state and local programs. To effectively monitor the success of Mississippi's CWCS implementation, it is essential that the efforts of all stakeholders be identified, coordinated and included.

Monitoring Species

The Mississippi Natural Heritage Program (NHP) maintains a Biological Conservation Database (BCD) of species occurrence records that is used to track species population trends over time. All records in this BCD are currently being prepared for transfer into an updated and more powerful Biotics 4 format under the guidance of NatureServe, the international heritage program parent organization. The transfer is expected to be completed by December 2005. In preparation for this data transfer the MNHP has been in the process of updating and field verifying all records currently stored in the database. The MNHP database will serve as a primary centralized repository for information related to SGCN and will be responsible for acquiring, managing and disseminating information for monitoring SGCN under the CWCS. Information related to species status will be collected through agency sponsored species surveys and inventories and MDWFP Scientific Collection Permit reports and incorporated into the MNHP database annually. Additional information available through other sources such as scientific literature, governmental agency technical reports, conservation organizations and academic experts will be solicited and added into the database when possible.

Monitoring status of individual species is necessary but may be relatively costly and time consuming. Methodologies that monitor species guilds and/or use indicator species can be less extensive and more cost-effective to perform. These are recommended when monitoring individual species is less feasible. Alternative monitoring tools discussed in this section will be used for monitoring species in situations limited by the need for additional information.

Monitoring Habitat

Mississippi's CWCS recognizes the importance of dedicating resources to conservation of individual species with unique requirements for long-term survival. However, traditional conservation methods that focus on single species may fail to capture important information related to complex interactions between target and non-target species and their environments. To facilitate greater return on investments, a primary goal of this strategy is to identify common threats and apply conservation actions to benefit biological communities with greater numbers and higher priority SGCN. Assessing the success of these actions will require monitoring changes at the level of community, habitat or guild. Monitoring changes to quantity of areas affected by actions may be the most feasible short-term method of monitoring actions related to communities and habitats. Upon implementation of the CWCS,

estimates of stream miles and acres of key habitat improved, restored, placed in conservation programs or otherwise protected will be the primary indicators of success.

Effectively monitoring changes in condition or quality of habitat can be problematic due to the need for a better understanding of our biological systems and improved more cost-effective methodologies to assess them. Monitoring programs such as those performed by the Mississippi Department of Environmental Quality (MDEQ) contribute significantly to our ability to monitor land, air and water quality. Successful implementation of CWCS should be reflected in environmental and community data collected by agencies and organizations such as MDEQ, The Nature Conservancy (TNC), the U. S. Geological Survey (USGS), the U. S. Environmental Protection Agency (EPA), the U. S. Fish and Wildlife Service (USFWS), the USDA Natural Resources Conservation Service (NRCS), the U. S. Forest Service (USFS) and others.

Land cover assessments and geographic information system (GIS) programs are important for monitoring key habitats. Information available from the Mississippi GAP Analysis Program, Aquatic GAP, the Mississippi Automated Resource Information Center (MARIS), U. S. Geological Survey (USGS), the Mississippi Department of Marine Resource's Coastal Resource Management Program (CRMP), NatureServe and others can be used to track landscape changes over time. These programs are especially valuable for remotely assessing status of private lands. Although programs provide a strong foundation for tracking habitats, further refinement to mapping and GIS capabilities is needed to meet CWCS long-term goals. Land cover information must be updated periodically to be useful in tracking long-term changes.

Because the CWCS is statewide strategy developed to provide guidance to facilitate conservation on all public and private lands. Inclusion of monitoring activities performed by all public and private individuals and entities is essential. Information from the Landowner Incentive Program (LIP), Farm Bill conservation programs such as the Conservation Reserve Program (CRP), the Wetland Reserve Program (WRP) and the Wildlife Habitat Incentives Program (WHIP), Ducks Unlimited (DU) and the Joint Ventures partnerships, the Forest Legacy Program and others such as The Nature Conservancy's Conservation Area Partnerships that facilitate conservation practices should provide indications of success action on private lands. Organizations and agencies such as the NRCS and the USDA Farm Services Agency (FSA), Mississippi Forestry Commission (MFC), the Mississippi Soil and Water Conservation Commission (MSWCC) and Wildlife Mississippi work closely with landowners and can be valuable resources for assessing accomplishments on private lands. Several lands trusts have also been established in the state and can provide information related to private lands.

Existing Monitoring

Capturing necessary information to effectively monitor the CWCS will depend on a coordinated effort of all stakeholders. It is critical for success to further strengthen partnerships established through the CWCS Advisory Committee and pursue new cooperative efforts to monitor success. A system for

acquiring data from partners and compiling and disseminating this information to stakeholders and the public must be developed.

Although many existing monitoring programs have been identified further work to incorporate these will be needed during the implementation of the CWCS. A database of conservation actions and monitoring activities performed by partners is needed to document progress and identify gaps. When possible protocols for standard data collection and monitoring should be adopted or developed.

Protocols for monitoring certain taxonomic groups have been developed by various organizations such as Partners In Flight (PIF), Partners in Amphibian and Reptile Conservation (PARC), The American Fisheries Society (AFS) and others. The CWCS recommends the continued development and adoption of recognized standardized monitoring protocols.

Monitoring Actions

Significant changes in status of species and condition of habitat potentially resulting from conservation actions may become evident only through long-term monitoring. Until these can be adequately assessed, monitoring the number and extent of actions performed will be the most effective method to determine successful implementation of the CWCS.

Performance indicators useful for tracking actions have been identified, and information based on these indicators will be compiled annually for use in reporting and for adaptive management. Within three to five years this information will be evaluated to determine whether the CWCS has been effectively implemented and priority objectives are being addressed.

Although overlap occurs, recommended conservation actions have been generally categorized into four types as indicated in Chapter II, *Approach and Methods*: 1) applied research, status surveys, inventories; 2) habitat and species management and protection; 3) education and outreach; 4) planning and policy. Potential performance indicators which may be enumerated for each of these categories are summarized below:

POTENTIAL PERFORMANCE INDICATORS

1. Research, Status Survey and Inventories

- Research projects initiated or completed
- Status surveys initiated or completed
- Populations, species, guilds or areas or monitored
- New or verified NHP element records occurrences
- Air, water, soil quality assessments performed

2. Habitat and Species Management and Protection

- Acres or stream miles protected
- Acres or stream miles restored
- Acres or stream miles enhanced
- Acres placed under conservation agreements
- Threats removed
- Species or individuals added to area

3. Education and Outreach

- Educational events held
- Individuals reached
- Educational tools/publications produced
- Websites developed or updated
- Reports and publications completed
- Public/stakeholder surveys performed

4. Planning and Policy

- Species added to or removed from SGCN list
- Planning events
- Plans completed or revised
- Sampling protocols/data standards established
- Projects funded
- Partnerships/cooperative agreements established
- Information exchanges performed
- Threats assessed/updated
- Population or habitat goals developed or reached
- Mapping updates completed
- Permits issued, reviewed, commented on
- Technical guidance provided

Survey and Research Needs

Limited base knowledge of many SGCN, habitats and biological communities presents a significant obstacle for the most effective conservation of SGCN in Mississippi. Additional survey and inventory work (e.g. distribution, population, biodiversity assessments) and biological research (e.g. life history, reproduction, recruitment, competition, predation, habitat selection, disease studies) have been identified as primary needs for most SGCN and their habitats. Comprehensive lists of specific research and survey needs have not been developed for this CWCS; however, some major needs were identified by the Expert Team who responded to the surveys performed in 2003 (see Appendix III for survey). A list of

these needs is presented in Appendix XIII. A summary of this information, which should be considered preliminary, is presented below by the three systems: 1) Marine and Estuarine, 2) Lotic and Lentic, and 3) Terrestrial, Wetland, Subterranean and Anthropogenic.

I. MARINE AND ESTUARINE SYSTEMS SURVEY AND RESEARCH NEEDS

Fishes and Invertebrates

- Develop list of marine/estuarine fishes/invertebrates of greatest conservation need using the marine faunal inventory developed by the University of Southern Mississippi's Gulf Coast Research Lab.
- Perform status surveys of potential marine/estuarine fishes/invertebrates of greatest conservation need.

Reptiles

- Conduct status surveys of turtles of SGCN.
- Determine distribution of Kemp's Ridley turtles and determine whether these turtles over winter in deep channels.
- Study impacts of non-point source pollution on turtle SGCN.
- Determine the impacts of shrimp trawlers on seagrass beds habitat used by turtles.
- Conduct necropsies of all turtles found dead on beaches and in coastal waters to determine causes of death.
- Study frequency of incidental hooking of turtles by recreational fisherman fishing offshore oil rigs.

Birds

- Update presence and abundance records of species using coastal areas. Specifically determine the status of birds using barrier island and mainland beaches.
- Conduct additional status surveys/research in demography (including home range studies/winter status surveys).
- Perform studies related to breeding biology, productivity, survival, estimates of nesting abundance and success.
- Monitor known populations.
- Compare present extent of habitat versus historical levels.
- Assess needs to eradicate introduced species and invasive predators.

2. LOTIC AND LENTIC SYSTEMS SURVEY AND RESEARCH NEEDS

Crustaceans

- Conduct status surveys to document ranges and abundances.
- Develop list of SGCN.

Mussels

- Conduct status surveys for riverine mussels to determine range and abundance for smaller streams in the state (especially within Tombigbee drainage), Bayou Pierre drainage, large Delta rivers (i.e. Coldwater River), the lower Pearl River and headwater streams.
- Monitor known populations for evidence of decline or recovery. Monitoring is recommended specifically for larger streams.
- Conduct phylogenetic analysis of *Lampsilis cardium/satura* complex.
- Determine effects of poor water quality on a statewide basis, but especially for streams that support a high diversity of mussel species.
- Assess and monitor the effects of agriculture usage of ground water on the Mississippi Delta streams especially in the Sunflower River basin streams.
- Assess and monitor the effects of industrial water withdrawals especially the Tennessee-Tombigbee drainage.
- Phylogenetic analysis is recommended for *Strophitus* sp., *Uniomerus* sp., the *cardium/satura* complex, the *Obovaria subrotunda/unicolor/jacksoniana* complex, and several Delta mussels.
- It is recommended that captive propagation be implemented for some mussel species (i.e. *Quadrula metanevra*) to enable their reintroduction into stream systems where previously extirpated.

Fishes

- Perform status surveys and monitoring within historic ranges and previously non-sampled areas, and in specific large river systems (Yazoo, Big Black, Pascagoula, Pearl Rivers and Mississippi deep water habitats).
- Establish programs to monitor fish populations after baseline studies and status surveys were completed.
- Determine habitat quality (habitat assessment) and species' habitat requirements (habitat association), including relationship of habitat to life cycle stages.
- Develop more detailed life histories of fish species (age, movement, growth and fecundity).
- Perform genetic analyses of certain poorly studied species (Mobile versus Mississippi River basin strains and a particular species, *Stizostedion vitreum*), and continue ongoing genetic research of critically imperiled species.
- Develop programs to reintroduce species extirpated from parts of their range, where possible.
- Interview commercial fishermen about observations and types of fish harvested.

Amphibians

- Perform additional surveys (especially during breeding periods and in areas where species were previously reported that have not been verified in recent years).
- Compare status of Mississippi populations with those of neighboring states.
- Additional widespread and thorough status surveys are needed to improve the conservation status

of this group.

Reptiles

- Perform status surveys and basic research to determine abundance, survival rates, distribution beyond known collection sites, habitat use and movements. More survey work in small streams was suggested.
- Determine effects of endocrine mimicking chemicals in streams.
- Determine degree of exploitation of reptiles by trot line fishing.

Birds

- Continue statewide program that effectively monitors the occurrence and success of bald eagle nests.
- Continue to monitor other SGCN birds (i.e., population surveys of osprey, Christmas bird counts and document of species numbers and nesting success of colonial water birds).

3. TERRESTRIAL, WETLAND, SUBTERRANEAN AND ANTHROPOGENIC SYSTEMS SURVEY AND RESEARCH NEEDS

Crustaceans

- Conduct status surveys, and population monitoring.
- Perform life history studies.
- Complete taxonomic revisions on several species.
- Identify habitat requirements.
- Develop list of SGCN.

Amphibians

- Perform monitoring and status surveys to determine population sizes, and ranges.
- Develop statewide range maps of amphibian populations.
- Determine habitat requirements.
- Conduct population status surveys of cave species.
- Survey for potential range extensions of *Plethodon websteri* in areas with appropriate soil and cover types east of the Pearl River in central Mississippi.
- Continue monitoring dusky gopher frog population. Rehabilitate potential breeding ponds to provide suitable habitat and develop propagation and re-dispersal program for this species. Explore potential for management of this species on private lands. Develop methods for controlling effects of anuraperkinsus disease.

Reptiles

- Status surveys are recommended to determine status and trends of reptile SGCN.
- Develop regional population monitoring programs.
- Study the effects of fire ants on reptiles, their eggs and offspring and further investigate the potential for use of biological controls (i.e. phorid flies) on fire ant colonies.
- Study the effects of site preparation and timber harvesting on reptile SGCN.
- Explore the potential for reintroduction of the gopher tortoise and other SGCN into portions of their former range.
- Reintroduce the southern hognose snake and eastern indigo snake into coastal areas.
- Determine the relative distributions of *Regina rigida deltae* and *R. R. sinicola*.

Birds

- Conduct population status surveys.
- Perform studies of breeding, reproduction, nesting success and survival.
- Study the influence of cowbird activities on bird SGCN in Mississippi.
- Determine distribution, movement and habitat preferences of bird species in the state.
- Implement studies of breeding and over-winter status surveys (especially within Pearl and Pascagoula watersheds) and determine the importance of Mississippi habitats for less well known wintering birds
- Determine food availability for some of the poorly known species and food requirements of juvenile birds.
- Determine the significance of crawfish as prey for the Mississippi sandhill crane.
- Increase focus on monitoring of colonial water bird nesting areas.
- Study the merits of applying predator controls around colonial nesting areas.
- Determine whether breeding populations of wood stork in Mexico, Florida, and Georgia are distinct (if found to be distinct, reconsider status of Mississippi populations).
- Monitor populations of birds which frequent catfish ponds and develop ways to prevent predation on commercial catfish ponds.
- Study river regimen and watershed characteristics as relating to sand bar genesis and stability and determine methods to manage sandbars to allow their use by bird species.
- Study how field border management affects birds during the breeding season.
- Continue implementation of the Lower Mississippi Valley Joint Venture.
- Nest box and translocation programs are recommended for recovery of the red cockaded woodpecker.
- Participate in the northern bobwhite quail initiative to address the decline in numbers of this species across the state.

Mammals

- Perform status/distributional surveys of mammal SGCN.
- Perform status surveys (fall/winter, breeding season or yearlong, etc) of bats.
- Determine effects of landscape pattern on bat migration routes.
- Study effects of pesticides on populations of bat prey animals.
- Document buildings and bridges that harbor significant maternity bat populations so that repair or replacement work may be scheduled during non-maternity periods.
- Continue studies to assess black bear status and distribution. Pursue potential for propagation and reintroduction activities. Investigate potential for establishment of forested corridors to improve opportunities for bears to disperse from established populations.