

Chapter 5: Monitoring and Adaptive Management

This chapter focuses on, the monitoring that will be undertaken to address the requirements of element 5 of this CWCS.

It describes:

- 1) Biological monitoring efforts for GCN species and key habitats at several scales;
- 2) How the effectiveness of conservation actions will be measured; and,
- 3) Adaptive management.

Biological Monitoring of GCN Species and Key Habitats

Connecticut will continue ongoing ecological and biological monitoring efforts and, as necessary, undertake new efforts that assess biological parameters important to GCN species. In addition, DEP BNR will implement appropriate new monitoring efforts for assessing or determining the abundance, distribution, location, and health of GCN species and key habitats.

Monitoring will be undertaken at a variety of geographic scales, including international, national, regional, state, and local. National and regional monitoring protocols for a variety of species have been established through programs like Partners In Flight (PIF), Southeast and Northeast Partners for Amphibian and Reptile Conservation (PARC), and others. Participation will continue in these monitoring efforts and others such as, Long Island Sound Study Program (LISSP) and the Connecticut Coastal and Estuarine Land Conservation Plan (CELCP). DEP BNR also will also participate in monitoring efforts prescribed in plans developed by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), Partners In Flight Bird Conservation Regions (BCR), National Bat Conservation Initiative, and others (see Appendix 1e).

A future example of employing a regional effort to monitor several GCN species in Connecticut is the Southeast and Northeast PARC program. PARC hopes to identify herptile monitoring with standardized protocols for the Northeast region. By employing future PARC monitoring protocols, Connecticut will use the standardized regional protocols for herptile monitoring in the appropriate geographic context. An example of monitoring at a finer scale would include inventory efforts, such as site-specific sampling for the least shrew, which is a GCN species documented at only one site in Connecticut. On a larger geographic scale, monitoring to evaluate the stopover habitat for the red knot, a long-range coastal migrant, will contribute data to global status assessments.

Monitoring will be undertaken at several biological levels including individual species, guilds, or natural communities. Many ongoing statewide or habitat-wide efforts will be used to monitor the status of GCN species or ecological conditions that affect these species. Examples include the:

- Hisenhoff Biotic Index (HBI) surveys conducted by the Water Bureau,
- Trawl Survey conducted by the Marine Fisheries Division,
- Colonial Waterbird Survey conducted by the Wildlife Division,

- U.S. Geological Survey's (USGS) Breeding Bird Survey (BBS) that uses DEP staff and volunteer "citizen-scientists."

Many guild specific and species-specific monitoring efforts are mentioned in the Priority Inventory, Research, and Monitoring sections described under each habitat in Chapter 4. For example, a guild level effort will be used to "*Monitor population trends of GCN forest interior birds*". This is a priority monitoring need for upland forest habitats. Also, a species-specific survey will be implemented to "*Determine and map the distribution of blue-spotted salamanders*" in several habitats.

For some species (e.g., common nighthawks, salt marsh sharp-tailed sparrow), reliable monitoring methods do not exist. Therefore, a research need is identified in Chapter 4 to develop an appropriate monitoring protocol. For other species, such as some of the invertebrates and small mammals, basic data on distribution and abundance must be collected prior to developing an appropriate monitoring protocol.

If monitoring is not identified for a GCN species or species group, Chapter 4 describes monitoring actions for other species that occupy the same habitats. These recommended actions are prioritized to benefit the overall habitat, community, or assemblage, and may include many other GCN species.

Habitats important to GCN species will be monitored at many levels from regional to specific vegetative communities.

The DEP will participate in regional efforts to update the Southern New England Gap Analysis Program (SNE GAP). Also, DEP will cooperate in regional efforts with federal and private "partners" to map the distribution of invasive species (a key threat to GCN species) by participating in the Invasive Plant Atlas of New England and the Nuisance Aquatic Species Projects.

On a statewide scale, satellite imagery from the University of Connecticut's Center for Land Use Education and Research (CLEAR) program will be used to identify changes in Connecticut's land use and vegetation cover that affect GCN species.

At a much finer scale, mapping of individual key vegetative communities using aerial photo interpretation and ground-truthing is an ongoing program of DEP's Natural History Survey. Recent mapping has been completed for a variety of these habitats (e.g., bogs, fens, Atlantic White Cedar swamps) that are important to GCN species, especially invertebrates. This effort has resulted in data on distribution, abundance, and condition of these habitats. The data can be used as a baseline to monitor changes over time. This mapping will be continued and expanded during the next ten years.

Other ongoing efforts include the mapping of wildlife management areas (WMAs). In 2004, the Wildlife Division completed comprehensive natural resource inventories including vegetation surveys at Goshen WMA (Goshen) and Babcock Pond WMA (East Haddam-Colchester). These WMAs are actively managed and exemplary areas that

harbor several key habitats and vegetative communities for GCN species. The completed comprehensive surveys will provide a baseline to measure the effectiveness of conservation actions conducted at these sites to benefit GCN species.

Conservation Actions – Monitoring the Outcomes

Overall, the success of implementing conservation actions(CAs) will be measured by the improved status for GCN species and by increased acreages of key habitats protected. Specific measures of success are provided for every CA listed in Chapter 4. These measures provide a means of assessing the effectiveness of individual CAs. For example, if the conservation action is to increase grassland habitat, then the measure would be to quantify the number of newly acquired grassland acres subject to proper grassland management. By using performance indicators, Connecticut DEP will track the implementation and effectiveness of the conservation actions discussed in the previous chapter. Examples of performance measures for various CAs are shown in Table 5.1.

Connecticut will use the annual performance report requirement for State Wildlife Grant (SWG) funded projects as a base for an annual assessment tool for monitoring the effectiveness of CAs. An annual summary will be prepared that describes CAs and performance indicators.

Table 5.1. Performance Measures for Conservation Actions.

Conservation Action Category	Example Performance Measures
Research	<ul style="list-style-type: none"> • Number of populations located • Quantify and map breeding populations and wintering habitat use • Compilation of new data collected on distribution
Monitoring	<ul style="list-style-type: none"> • Number of populations located • Develop effective monitoring protocols • Number of new monitoring sites or species protocols established
Land protection (acquisition, easements, buffers)	<ul style="list-style-type: none"> • Number of vernal pools and spawning areas identified and protected • Number of acres protected in buffers, conservation easements, and fee purchase • Number of protection plans developed
Habitat and watershed management	<ul style="list-style-type: none"> • Number of wetland restoration projects conducted and acres restored • Number of habitat management strategies developed and implemented • Number of early successional habitat projects implemented and acres maintained or created
Population management	<ul style="list-style-type: none"> • Number of nesting sites identified and protected • Number of conservation plans prepared

	and updated
Data standards development, data management	<ul style="list-style-type: none"> • Number of GIS data layers produced • Percentage of GCN moth species and flies for which data have been collected and incorporated into a database • Percentage of newly collected data compiled
Program coordination, cooperation	<ul style="list-style-type: none"> • Number of projects implemented with partners • Number of cooperative habitat protection projects • Number of mitigation strategies developed and implemented
Outreach products, programming, surveys	<ul style="list-style-type: none"> • Number of informational and outreach products developed • Number of presentations given
Technical guidance, permit review	<ul style="list-style-type: none"> • Number of plans or permits on which comments were provided • Number of estuarine habitats evaluated • Number of technical assistance and outreach products developed and distributed

A newly developed and evolving CWCS database will facilitate the SWG grant administration process, as well as track species and habitat changes and project accomplishments.

Performance measures also will be used as the basis for making improvements and adjustments to the conservation actions (adaptive management) to better achieve their intended goal.

Adaptive Management

Adaptive management is a tool routinely used in conservation management to continually improve species and habitat conservation activities by incorporating lessons learned from past successful and unsuccessful management efforts into future efforts.

As information gaps identified in Chapter 4 are addressed, the status and condition of species and habitats will be updated. DEP, the Endangered Species Scientific Committee (ESSAC), key stakeholders, and implementation partners will regularly review conservation actions to determine if performance measures are being achieved or if new or adaptive management measures are needed. The effectiveness and adaptability of this CWCS will be measured by the frequency and degree of its use by DEP's many programs, as well as those of stakeholders and partners.