CHAPTER 6

# MONITORING FOR RESULTS AND ADAPTIVE MANAGEMENT

MONITORING OF SPECIES AND HABITATS IS IMPORTANT TO (1) gain a long-term understanding of trends in populations or ecosystem health, (2) provide greater understanding of species responses and needs relative to problems and changing environmental conditions, and (3) assess the results and effectiveness of conservation actions – the key to adaptive management. The first two purposes are collectively referred to as status monitoring, while the last is called effectiveness monitoring.

## 6.1. The Standards for Measuring Effectiveness of Actions

The 2005 SWAP provided a comprehensive summary of the species and habitat status monitoring conducted by TWRA, other government agencies, academic institutions, and volunteer organizations (see TWRA 2005, pp. 188-198). TWRA has long conducted status monitoring programs to assess and track various wildlife populations (see TWRA 2005, Appendix H "Sampling Protocols for Select Faunal Groups"), both for purposes of management and to identify problems. The results of individual conservation projects are likewise tracked, although often final assessments may consist of cataloguing actions successfully completed.

However, the Association of Fish and Wildlife Agencies in its 2011 *Measuring the Effectiveness of State Wildlife Grants* report notes that, "it has been much more difficult [for state agencies] to bring these two sets of data together to attribute changes in species or habitat status to the effects of any one action" (AFWA 2011). In Tennessee, much of the difficulty lies in ascertaining the status of resources at different spatial

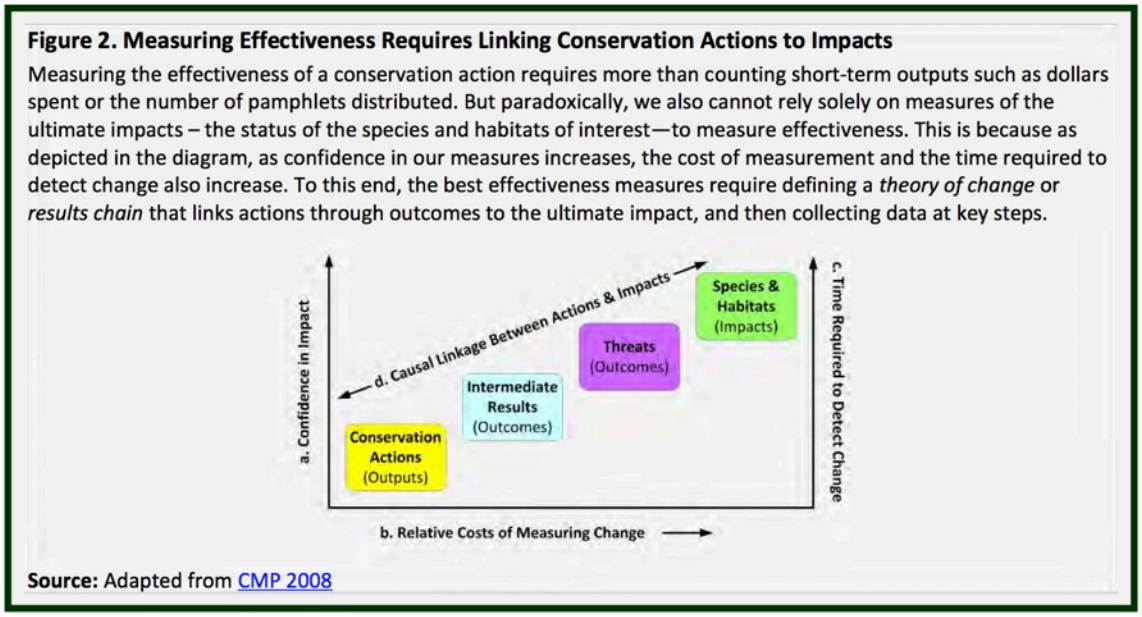
Waterfall at Short Springs State Natural Area - Byron Jorjorian

**Summary: Monitoring and adaptive management goals in the 2015 SWAP**

1. Focus on improving effectiveness monitoring in Tennessee. The 2005 SWAP provided an inventory of TWRA and partner status monitoring programs for species and habitats. The 2015 SWAP introduces effectiveness monitoring and outlines steps for integrating these approaches into existing agency programs and planning cycles.
2. Be explicit about metrics of conservation effectiveness. TWRA has developed a crosswalk of the TN-SWAP specific conservation actions to the U.S. Fish and Wildlife Service's Wildlife/TRACS Reporting System strategy hierarchy. TRACS reporting units have also been assigned for each set of desired changes articulated for the state's Conservation Opportunity Areas.
3. Develop an effectiveness measures framework. TWRA will incorporate status monitoring objectives and effectiveness measures into its existing planning cycles through triennial SWAP reviews and updates.
4. Begin using the Wildlife/TRACS Reporting System. TWRA plans to adopt the format of TRACS conservation measures, using TRACS as an overarching method for tracking and reporting on nongame wildlife monitoring and conservation projects in the state. TWRA will also assess current monitoring data and protocols to incorporate specific effectiveness monitoring approaches for key species and sites.
5. Maximize knowledge and conservation effectiveness through participation in shared monitoring databases.

scales and the connection between different types of conservation actions and results, particularly at landscape scales that necessarily must include at least some private lands. To assist states with making the connections between different types of monitoring, AFWA developed guidance on how to measure the effectiveness of conservation actions funded through the State Wildlife Grants (SWG), including recommendations for how to track and report that effectiveness. The importance of this tracking ultimately goes beyond a consideration of dollars and cents; it cuts to the heart of the stewardship enterprise by providing insight into the overall effectiveness of planning, management, and adaptation to benefit species and habitats.

Figure 10. Measuring effectiveness requires linking conservation actions to impact




The Effectiveness Measures report developed a framework for use by states and their partners in

evaluating the effectiveness of actions funded under State Wildlife Grants, as well as broader conservation strategies outlined in SWAPs (see Figure 10, taken from AFWA's 2011 Effectiveness Measures report). The report also provides comprehensive examples of connecting conservation actions to outcomes, including suggested objective statement formats and monitoring indicators for 11 generic conservation actions. All of these actions are identified in the 2015 TN-SWAP, and conservation partners are encouraged to use these examples as a resource to help design and implement successful conservation projects.

TWRA Wildlife Diversity Coordinator Chris Simpson (left) and TWRA Fisheries Program Manager Mark Thurman seining for GCN fish species in the Roaring River State Scenic River - Mime Barnes, TWRA

## 6.2. TWRA Adoption of Standardized Effectiveness Measures

The Effectiveness Measures report made several overarching recommendations to states. TWRA will be implementing the following recommendations:

1. Adopt the proposed effectiveness measures framework to improve accountability and project management of State Wildlife Grants.

TWRA has developed a crosswalk of the TN-SWAP specific conservation actions to the U.S. Fish and Wildlife Service's **Wildlife/TRACS Reporting System** Category (Level 1) and Strategy (Level 2) hierarchy (Appendix K). TRACS reporting units have also been assigned for each set of desired changes articulated for the state's Conservation Opportunity Areas (Appendix I).

2. Integrate the effectiveness measures framework into agencies' adaptive management, grant application, and reporting processes; this includes the use of these measures in reporting through the Wildlife/TRACS Reporting System.

***TWRA will incorporate monitoring objectives and effectiveness measures into its existing planning cycles through triennial SWAP reviews and updates.***

TWRA intends to incorporate status monitoring objectives and effectiveness measures

into its existing planning cycle through triennial SWAP reviews and updates (see Table 20, Ch. 7). These reviews will provide an opportunity to assess conservation achievements in COAs; to prepare and analyze monitoring results; to make adaptive management decisions; and to identify emerging issues and appropriate responses. These reviews will then influence allocation of SWG funds and development of new partnerships. TWRA staff were trained in 2015 how to report these measures for SWG-funded projects in the Wildlife/TRACS Reporting System.

TWRA Wildlife Diversity Coordinator Rob Colvin holding an Alligator Snapping Turtle - TWRA staff

Development and implementation of an effectiveness measures framework will help TWRA and its conservation partners in the following ways:

✦Provide a means to evaluate conservation actions so that successful ones can be replicated and communicated while less successful ones are improved or abandoned;
✦Establish a standardized and accessible body of project performance data to help guide current and future wildlife managers;
✦Provide a cost-efficient mechanism for reporting to Congress, other policy makers, conservation partners, and taxpayers about the value of the SWG program and SWAPs (AFWA 2011).

## 6.3. Integrating Monitoring and Reporting with TRACS

Through report language in SWG appropriations, Congress has specifically instructed the U.S. Fish and Wildlife Service to work with states to adopt common mapping, data, and measurement standards to facilitate national evaluation and reporting. The Service developed the Wildlife/TRACS Reporting System to track and report on the effectiveness of SWG-funded conservation actions and to make full use of the effectiveness measures developed by AFWA. TRACS will allow data to be collected and aggregated from state and national level databases.

TWRA plans to adopt the format of TRACS conservation measures as an overarching method for tracking and reporting on nongame wildlife monitoring and conservation projects in the state. This will improve the agency's results accounting, project

TWRA Wildlife Diversity Coordinator Scott Dykes with a Golden Mouse - TWRA Staff

monitoring, grant reporting, and determination of SWAP conservation strategies.

Another important goal is to generate spatial project 'footprints' in the TWRA GIS system to provide planners a better overview of their activities in a region.

According to AFWA (2012), TRACS will enhance overall SWAP effectiveness monitoring because it will accomplish the following:

✦Format data in a consistent manner, and encourage conservation partners to provide standardized information.
✦Incorporate the Effectiveness Measures approved by AFWA.
✦Demonstrate effectiveness in a format usable by the U.S. Congress and the Office of Management and Budget (OMB).
✦Provide industries that pay sporting excise taxes with information on the disposition of excise tax dollars and the return on investment of those tax dollars.
✦ Provide accountability and transparency while demonstrating the benefits of wildlife funding programs.

TWRA Wildlife Diversity Biologist Chris Ogle (left) and Wildlife Diversity Coordinator Josh Campbell place a monitoring band on a federally endangered Gray Bat. – Chris Simpson, TWRA

TWRA will begin this process by assessing its current monitoring data and protocols, including status monitoring performed by partners and used by the agency, to define specific effectiveness monitoring approaches for key species and sites where conservation work is planned or ongoing. For example the following programs could be adapted to incorporate effectiveness monitoring objectives:

TWRA Wildlife Manager Bill Smith with Northern Bobwhite - Chris Ogle

✦Shorebird and point count data can be aggregated to develop analyses of responses to habitat change (from restoration, management, climate change, etc.).
✦The use of drift fence monitoring of amphibians at breeding sites could be used to assess the species assemblages pre- and post-

management or pre- and post-restoration, with a particular focus on key projects, such as TWRA's early successional habitat initiative and Quail Focal Areas established in collaboration with the National Bobwhite Conservation Initiative.

✦The SWAP GIS database incorporates updates to land use data from the National Land Cover Database (NLCD) as it becomes available. The NLCD is the definitive Landsat-based, 30-meter resolution, land cover database for the U.S. Comparing land use from one update to the next would provide a comprehensive picture of changes in wildlife habitats at a state scale.

Long-term monitoring is essential to determine the success of species reintroduction efforts, such as reintroduction of the Pale Lilliput mussel into the Duck River in 2014. Crew left to Right: Todd Fobian, Alabama Aquatic Biodiversity Center (AABC); Andrew Henderson, TVA; Paul Johnson, AABC; Steve Ahlstedt (slightly in front), U.S. Geological Survey (retired); Jeff Powell, USFWS; Allen Pyburn, TWRA; Don Hubbs, TWRA; Michael Buntin, AABC; Stephanie Chance, USFWS - photo by Sally Palmer, TNC

## 6.4. Regional-scale Monitoring Collaborations

One example of how agencies can assess wildlife responses to management is through replicating project strategies and analyzing multiple sets of results over time. In addition, monitoring habitats and populations

Steve Ahlstedt, USGS (retired) and Don Hubbs, TWRA preparing to place mussels into the Duck River - Sally Palmer, TNC

TWRA's Statewide Instream Flow Coordinator Pandy English holding two Northern Black Racers - Scott Dykes, TWRA

over a sufficient geographic area and timeframe can provide insight into how wildlife populations are changing or responding to change. Both of these objectives can be achieved when agencies (1) cooperate to leverage one another's work and knowledge by using monitoring standards that make data comparable, and (2) consolidate data in formats that promote collaborative use.

Jeremy Dennison, TWRA Wildlife Diversity Biologist, holding a Hellbender. - Rob Colvin, TWRA

Several examples of significant monitoring efforts and information sharing include the Tennessee River watershed Index of Biotic Integrity (IBI) work conducted by the Tennessee Valley Authority (TVA); the Great Smoky Mountains National Park All Taxa Biotic Inventory (ATBI); inventory and monitoring conducted by the U.S. Forest Service on federal forest lands; stream flow and biological monitoring managed by the U.S. Geological Survey; and multi-state freshwater mollusk recovery and monitoring activities with the U.S. Fish and Wildlife Service and academic institutions. These program activities, as well as those of many other partners, provide foundational habitat and species population status information that is instrumental to making sound management decisions over time.

Dustin Thames, TWRA Wildlife Diversity Biologist, attaching a radio transmitter to an Indiana Bat - Chris Simpson, TWRA

Solidifying relationships under Memoranda of Understanding or other types of network arrangements can be important mechanisms to ensure this type of critical partnership work is sustainable into the future.

For wide-ranging species such as many birds, TWRA recognizes that regional, national, or flyway-wide databases will enhance each state's ability to manage and conserve these species across broad and biologically meaningful geographic areas. Specifically, the **Avian Knowledge Network** (AKN) is currently developed, supported, and used by many federal, state, and non-profit organizations and has

TWRA Fisheries Program Manager Bart Carter holding a Paddlefish - Scott Dykes, TWRA/below: Carl Williams, TWRA Biologist, using mist net to monitor crayfish, which are released after collecting data. - Bart Carter, TWRA

proven to be extremely effective in providing secure data storage capabilities and facilitating the application of monitoring standards to make datasets comparable across institutions and political boundaries. TWRA considers the exchange and integration of avian data into a permanent centralized data management system a priority action to be accomplished by 2020.

The AKN's Eastern Avian Data Center is an online node that could serve as Tennessee's data entry, storage, and retrieval website. In fact, the AKN already hosts some data from TWRA as well as agency partners. The benefit of this system is an online data interface that allows project or program leaders to easily enter and retrieve data. Another advantage is the community of users that can develop shared tools to analyze data for specific projects and also help to incorporate Tennessee data into larger scale analyses of phenomena such as migration patterns.

Since 2005, TWRA has also invested in the reorganization of its internal data management systems. The new database portals allow consolidation of a variety of project and monitoring data managed internally by TWRA. Compilation of these data ultimately will improve TWRA's ability to share information with other partners and participate in regional-scale monitoring efforts.