

## **MONITORING AND ADAPTIVE MANAGEMENT (*ELEMENT 5*)**

Monitoring is intended to determine long-term trends of species and habitats, and evaluate the efficacy of conservation actions to provide information used in an adaptive management framework. Successful monitoring is a huge undertaking that will require coordination among conservation partners, consideration of current monitoring efforts, sound monitoring design, probability statistics, information management systems, and principles of adaptive management.

### **Coordination and Approach**

The IDFG will form a Monitoring Oversight Team comprised of conservation partners involved in monitoring efforts from private entities (e.g., The Nature Conservancy), state and federal agencies (e.g., Bureau of Land Management), and universities (e.g., University of Idaho). The primary purpose of this team is to develop an overall strategy and framework for monitoring species and habitats in the state. They will review existing efforts, identify needs, and set priorities. It is clear that given the scope of monitoring needs, the number of potential cooperators, and the size of the land area that individual monitoring teams will have to be identified and organized to develop the specifics of individual monitoring programs. One of the main duties of the Monitoring Oversight Team will be to break the monitoring “elephant” up into bite-sized pieces to organize monitoring teams around. In addition, the Team will develop a results management framework template to guide the monitoring teams in developing performance indicators, evaluating effectiveness, and adopting an evaluation and reporting schedule.

Some monitoring teams already exist (e.g., Partners in Flight) and some monitoring efforts are currently adequate (e.g., bighorn sheep, game fish). But much needs to be done. This is an effort that will likely take several years and significant monetary and personnel resources to fully implement. Initially, the Monitoring Oversight Team will meet frequently to achieve their primary goals of reviewing existing efforts, identifying needs, priorities, and monitoring teams and developing the results management framework. Once that is accomplished the individual monitoring teams need to be organized. This will require outreach to potential partners to inform them of the needs and opportunities and recruit team members. The Monitoring Oversight Team will meet periodically to review the progress of the monitoring teams, assess the program, and provide assistance to the monitoring teams.

Currently, monitoring exists at a local scale throughout the state, primarily for gamebirds, nongame birds, and species associated with the federal Endangered Species Act (e.g., ESA-listed species). Relatively few of the identified species in greatest need of conservation in Idaho are monitored on a statewide or rangewide basis. Moreover, it is unrealistic to consider monitoring every species. Therefore, the monitoring teams will review existing monitoring projects and consider additional single species efforts based on the following criteria:

1. population size, population trend, and threats;
2. knowledge gaps;
3. designated legal status (e.g., ESA-listed species);
4. habitat conditions; and
5. species that are indicators of ecosystem health and biodiversity.

In most cases the monitoring teams will consider a multi-species or indicator species approach whenever practical or ecologically relevant. A multi-species approach can be used across a broad array of species. Methods will entail monitoring the presence and absence of multiple species and predicting relationships of individual species with environmental patterns. This methodology is not as informative as a single species approach, but it is more efficient, may detect warning signs, and will help prioritize single species monitoring (Manley et al. 2004). Indicator species can be used to gauge ecosystem health and biodiversity or to represent the status of associated species of interest when monitoring for those species is not feasible (Landres et al. 1988, Niemi et al. 1997).

The Idaho CWCS uses ecological systems (55) as the basic classification scheme of remotely sensed imagery to characterize wildlife habitats (18) at the landscape level. Similarly, the Northwest ReGAP Analysis—which includes Oregon, Washington, Idaho, Montana, and Wyoming—will also use ecological systems as the basic classification unit. When completed (ca. 2009), ReGAP will provide a more up to date and accurate distribution of ecological systems than is currently available. Site-level assessment of plant communities using standard natural heritage methodologies (i.e., element occurrence rank [EO rank]) will provide a relative measure of the condition of ecological systems. This approach will provide baseline assessments and account for relative changes in habitat conditions over time. In addition, the Monitoring Team will consider the approach suggested by Schoonmaker and Luscombe (2005) that includes the following for monitoring habitat:

1. identify available information sources;
2. determine whether existing data are adequate to establish baseline;
3. secure or enhance GIS data layers;
4. determine the most appropriate organization for monitoring;
5. evaluate conservation actions and employ an adaptive management framework;
6. identify a timetable and mechanisms for data management and updates; and
7. develop a data distribution strategy.

### **Information Management**

Information management is an important component of the statewide monitoring strategy. This entails implementation of quality assurance standards, information distribution, and data interpretation. The transfer of local scale species information to an appropriate central repository will be facilitated by reporting systems such as the Idaho Fish and Wildlife Information System (IFWIS) at the IDFG. IFWIS is a

comprehensive information system for standardizing data on fish and wildlife in Idaho. IFWIS is a framework built to capture data at or near its origin and store it in standardized databases and applications which are geo-referenced to a common coordinate system. IFWIS is accessible via the Web, geographic information systems (GIS) and commonly used desktop software programs.

The IDFG has developed an observations database as part of the IFWIS in conjunction with the development of the CWCS. In addition, IDFG maintains a number of other databases for game species including the standard stream survey protocols maintained by IDFG, Streamnet. These databases are populated with information gathered by IDFG personnel, cooperating agencies, educational institutions, citizen scientists and the general public from museum specimens, field surveys, monitoring data, and incidental observations. They are used to update the species conservation status databases and element occurrence records of the IDCDC Biotics database. In addition, the IDCDC manages habitat information in a database consistent with the format used for CWCS. This database tracks the distribution, ecological condition, and status of habitats at varying spatial scales.

It is essential that reports are produced that interpret the data and the effectiveness of the monitoring and management efforts. These reports will be available for review by multiple agencies and used in an adaptive management context. Attention will be paid to ensure that the information within these reports is useful, and that biologists adjust protocols based on their feedback. The information will be meaningful at the statewide level and available to managers, researchers, and decision makers.

### **Current Monitoring Efforts**

Design of a statewide monitoring program will start by evaluating existing monitoring efforts. Current long-term statewide monitoring already occurs for nongame birds, fisher, woodland caribou, Columbia spotted frog (Owyhee population), northern Idaho ground squirrel, ESA-listed mollusks, and game species. Likewise, information pertaining to the ecological condition of statewide habitats is managed by IDCDC.

#### **Habitat**

Numerous habitat inventory and monitoring activities are currently conducted in Idaho by a wide variety of entities including Bureau of Land Management, US Forest Service, IDFG, Idaho Department of Environmental Quality, US Department of Energy, Idaho Department of Lands, Native American Tribes, and private landowners. IDCDC collects and manages data on the ecological condition of habitats. However, there is no central repository or database system to store, manage, and disseminate all habitat monitoring data.

#### **Birds**

The Idaho Department of Fish and Game has recently initiated a statewide coordinated all-bird monitoring program called the Idaho Bird Inventory and Survey (IBIS). Initial efforts to implement IBIS have focused on reviewing existing monitoring programs, filling information gaps where they are found to occur (e.g., conducting a statewide inventory of waterbirds), and identifying high priority management issues. Where possible, existing bird monitoring programs that might be species specific (e.g., harlequin duck, long-billed curlew), or habitat specific (e.g., Northern Region Landbird Monitoring Program), will be incorporated into the overall IBIS framework. In particular, enhancing the Breeding Bird Survey in Idaho (by reducing bias, increasing precision, and adding routes) is expected to be a significant part of the landbird component of IBIS. Consequently, IBIS encompasses existing monitoring efforts as well as new ones, is designed to provide an umbrella under which all monitoring can occur, and is intended to facilitate standardization of sampling designs and protocols, coordinated data collection, and data sharing.

IBIS is also designed to be part of a Coordinated Bird Monitoring (CBM) effort being developed at the national level. Both IBIS and CBM are joint efforts by managers and bird monitoring specialists to improve the success of bird monitoring programs, and make the information available to all partners. Their approach focuses on: (1) providing information on specific land-management issues from reliable monitoring data; (2) describing focal species and quantitative survey objectives for each management issue; (3) choosing survey methods and estimating needed sample sizes; (4) storing all data in permanent, widely available data repositories; (5) analyzing data using methods endorsed by the appropriate professional societies; and (6) using effective methods for communicating results to decision-makers.

IBIS has focused primarily on establishing a statewide waterbird monitoring program, with an emphasis on conducting surveys at Idaho's Important Bird Areas (see Appendix H for more information on the IBA program and specific monitoring recommendations). Most recently, landbird monitoring has been initiated in eastern Idaho at Camas National Wildlife Refuge, and at Mud Lake and Market Lake WMAs. These early IBIS programs are designed to complement the following list of existing monitoring efforts that will collectively provide critical information about the distribution, abundance, and population trends of Idaho's avifauna.

- Breeding Bird Survey (BBS)
  - There are currently 58 BBS routes in Idaho, the majority of which (90%) are surveyed on a regular basis.
- Christmas Bird Counts (CBC)
  - There are currently 38 CBC count circles in Idaho, 60% of which are surveyed annually.
- Northern Region Landbird Monitoring Program
  - Point counts are conducted along 300 permanently-marked transects within the USFS Northern Region (northern Idaho and western Montana).
- Idaho Bird Observatory (IBO)

- IBO conducts raptor migration monitoring each fall at Boise Peak and Lucky Peak, as well as standardized annual monitoring of the migration of small forest owls, targeting flammulated and northern saw-whet owls.
- IBO operates constant-effort mist-netting stations for songbirds at Lucky Peak and at Camas National Wildlife Refuge.
- Breeding season point-count surveys for songbirds are also conducted throughout southern Idaho.
- Raptors
  - Breeding bald eagles, golden eagles, peregrine falcons, prairie falcons, American kestrels, northern goshawks, ferruginous hawks, and burrowing owls are monitored by various agencies (IDFG, USGS, BLM, IBO, Boise State University, and private organizations/individuals [e.g., Potlatch Corporation, Merlin Systems, Idaho Power Company]).
  - Northern goshawk productivity has been tracked for more than a decade in both eastern (Caribou-Targhee National Forest) and south-central (Sawtooth National Forest) Idaho.
  - Wintering bald eagle populations are monitored as part of a national survey effort that includes over 70 survey routes, at least 60 of which are surveyed annually by USGS, BLM, IDFG, USFS, and Idaho Power Company.
  - Bald eagle territory occupancy and nest productivity are monitored annually by IDFG and partners throughout the state.
  - Similarly, peregrine falcon breeding is monitored on an annual basis.
- Monitoring Avian Productivity and Survivorship (MAPS)
  - There are 5 MAPS stations, which monitor breeding bird populations through constant-effort mist-netting, in Idaho.
- Waterfowl
  - Since the 1950s, state and federal agencies (e.g., IDFG, U.S. Fish and Wildlife Service [USFWS]) have conducted approximately 5 aerial surveys each year for wintering waterfowl.
  - In April, there is a statewide survey of Canada goose breeding pairs.
  - Wings of harvested waterfowl are assessed at the Pacific Flyway level as part of a nationwide survey.
  - Idaho bird hunters are required to participate in the USFWS' Migratory Bird Harvest Information Program (HIP) whereby they are randomly selected to provide information on the kind and number of migratory birds they harvested during the hunting season.
  - Nest surveys and wintering populations of trumpeter swan are counted in eastern Idaho in conjunction with surveys in Montana and Wyoming.
  - Streams in northern and north-central Idaho are surveyed for harlequin duck breeding pairs, and later for broods.
- Webless Migratory Game Birds
  - In September, a flight is conducted to survey sandhill crane populations in eastern Idaho.

- Spring “coo–counts” for mourning dove are conducted annually along established roadside survey routes.
- Upland Game Birds
  - Greater sage–grouse and sharp–tailed grouse leks are inventoried annually using aerial and ground surveys.
  - Wings from greater sage–grouse, sharp–tailed grouse, ruffed grouse, spruce grouse, blue grouse, California quail, gray partridge, and chukar are collected and analyzed to estimate demographic parameters of the hunted populations.
  - IDFG sends harvest surveys to those hunting greater sage–grouse, sharp–tailed grouse, wild turkey (spring and fall seasons), and ring–necked pheasant on WMA lands.
  - Depending on the location, IDFG also conducts population trend monitoring of ring–necked pheasant (crow counts and brood surveys), gray partridge (brood counts), California quail (brood counts), and chukar (pre–season).

### ***Mammals***

Populations of the ESA–listed northern Idaho ground squirrel have been monitored since 1999 (Evans Mack and Haak 2004). A final recovery plan detailing the monitoring protocols and conservation actions is in preparation. In addition, protocols for establishing a bat monitoring program are currently in draft review (Western Bat Working Group, in prep.).

In 2003, IDFG established 28 snowtrack routes to collect baseline data primarily on American marten, fisher, Canada lynx, and wolverine. Data are also gathered on snowshoe hare, red squirrel, bobcat, coyote, mountain lion, and gray wolf. Since the winter of 2004, state and federal agencies, timber companies, Tribes, and environmental groups have deployed a noninvasive genetic sampling to delineate the geographic range of fisher in the northern Rocky Mountains. In addition, IDFG uses aerial surveys to provide an annual measure of caribou, moose, elk, mule deer, and white–tailed deer populations. Mountain goat and bighorn sheep populations are monitored by conducting ground and aerial counts in known habitats.

Annual harvest data are collected by IDFG for furbearers and big game. Mandatory trapper harvest reports provide data for American badger, American beaver, bobcat, coyote, American marten, American mink, common muskrat, northern river otter, northern raccoon, red fox, western spotted skunk, striped skunk, ermine and long–tailed weasel. Similarly, data are gathered on big game at check stations and mandatory harvest report surveys for white–tailed deer, mule deer, elk, American black bear, mountain lion, moose, bighorn sheep, and mountain goat.

### ***Amphibians and Reptiles***

There are currently 9 established monitoring programs for reptiles and/or amphibians in Idaho. Nearly 50 surveys have been conducted since the late 1970s. A draft statewide plan to monitor reptiles and amphibians has been developed (C. Peterson, ISU, pers. comm.).

### ***Invertebrates***

The 5 species of ESA-listed aquatic snails that occur in the Snake River of southern Idaho are targets of surveys conducted by Idaho Power Company, USFWS, BOR, and other entities. This program has been designed primarily to address short-term data needs concerning compliance with regulations affecting the operation of dams.

The Idaho Department of Environmental Quality conducts surveys of streams under the Beneficial Use Reconnaissance Project (BURP). The purpose of BURP is to determine if the designated beneficial uses of a body of water are being met by measuring chemical, physical and biological attributes. Biological attributes that are sampled include macroinvertebrates and fishes.

### ***Fishes***

Fish population monitoring is currently being conducted on a regular basis by several state, tribal, and resource management agencies for several anadromous game fishes. Some of these include ESA-listed species and stocks (e.g., Chinook salmon, sockeye salmon, and steelhead). Monitoring programs for these species assess long term, inter-annual, and life stage specific trends in abundance, productivity, spatial structure, and diversity at basin, watershed, and tributary scales.

Standardized survey protocols have been developed and implemented by IDFG for lowland lakes and alpine lakes. Survey intervals vary depending on need, opportunity, and funding. High priority waters with key species (Yellowstone, Bonneville, and westslope cutthroat trout; bull trout, and Bear Lake endemics) are surveyed on a regular basis. Standardized statewide stream monitoring and data sharing protocols have been developed.

### **Adaptive Management**

Adaptive management is an essential component of managing species and their habitats. It is the ongoing process by which managers incorporate new information and changing conditions into future management efforts. When planning management activities, an important component of adaptive management is identifying alternative strategies and assumptions. Predicting outcomes of alternative approaches and the mechanisms behind these outcomes can be formulated using conceptual models. After a conservation action is applied, parameters will be monitored to determine if the desired outcome is achieved, i.e., increased species abundance or distribution (improved S-rank), or improved habitat conditions (improved plant community EO ranks). Based on new findings and changes in ranks, management activities can be

appropriately adjusted (Walters and Holling 1990). Tracking and communicating the stages of adaptive management at the local scale will help improve management activities in other parts of the state. Sharing this information will greatly decrease the cost and increase the efficiency of conservation actions.