

# HABITAT HANDBOOK



## ABOUT

The New Mexico Department of Game and Fish Habitat Handbooks provide conservation measures to minimize impacts of land use and development projects on wildlife and wildlife habitats. This Handbook addresses pre-construction wildlife studies necessary to assess project impacts. For more information on this topic, please call 505-476-8114.

The primary author of this Habitat Handbook is Rachel Jankowitz.

## ERT for NM

The **Environmental Review Tool** (ERT) for New Mexico is a web-based system that quickly screens land use and development projects for potential impacts to wildlife and wildlife habitats. The ERT provides best management practices and guidance to mitigate these impacts. Evaluate your project with the ERT at: [www.wildlife.state.nm.us/conservation/habitat-information](http://www.wildlife.state.nm.us/conservation/habitat-information)

## EEP DIVISION

The Ecological and Environmental Planning Division coordinates the Department's environmental review process, and works with community, private sector, state and federal government, nongovernmental organizations, and other project proponents to protect and enhance wildlife habitats. The Division implements the **Share with Wildlife program** and maintains **BISON-M**, a database of New Mexico's wildlife species. It also participates in the development and application of wildlife-related information management and planning tools.

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# Baseline Wildlife Study Guidelines

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Photo: Lee Fitzgerald

This guideline is provided to assist in conducting inventories which thoroughly document wildlife and wildlife habitat presence, diversity, relative abundance, and distribution within the proposed project area and area of potential effects. Information obtained from baseline studies can be used for the purpose of preparing a Baseline Data report for a New Mining Permit from the NM Mining and Minerals Division, evaluating potential existing conservation lands or easements, or in support of large-scale planning efforts. The guideline may be used in whole or in part, depending on the purpose of the study; it is intended to be used in its entirety for purposes of the NM Mining Act New Mine permit application. Baseline studies can establish pre-disturbance conditions or an alternate standard against which to evaluate the effects of project activities, identify mitigation measures for construction and operational activities, or serve to establish measurable goals and objectives (desired conditions) for reclamation and/or restoration efforts.

Baseline surveys should grow out of a clear and concise statement of the ultimate objectives of the investigation. Different objectives require different sampling designs. A clear and concise statement of objectives is essential to select appropriate locations for inclusion in the study, take relevant and meaningful measurements at these locations, and perform analyses that will provide a basis for the conclusions necessary for meeting the stated objectives. Studies associated with specific proposed actions should be designed to gather information on key wildlife species and important wildlife habitats based on anticipated project-specific effects.

Surveys, inventories, and monitoring are carried out using protocols. Protocols are detailed study plans that explain how data are to be collected, managed, analyzed, and reported, and are a key component of quality assurance for natural resource monitoring and inventory programs.

Sampling design, including determination of sample size, replication, stratification, and statistical analysis, is as important to a baseline study as survey or inventory method. These considerations will influence the conclusions that can be drawn from collected data and appropriate application of findings to impacts analysis or management decisions. If sufficient resources are available, sampling design should be reviewed by a biological statistician prior to expenditure of money and effort.

Investigations of wildlife likely present in the project area and area of potential effects should begin by accessing existing information. Wildlife and habitat information is often available to the public, and may be archived in online searchable databases. Much information on the distribution, status, habitat affinities and natural history of New Mexico's wildlife is housed in the Biota Information System of New Mexico (**BISON-M**) searchable database, which contains species accounts for all New Mexico vertebrates and selected invertebrates, and the [New Mexico Environmental Review Tool](#).

Special attention should be given to documenting the presence or potential occurrence of state and federally listed species, candidate and sensitive species. Special training and certification is often required to survey for state and/or federally listed species. Permits may also be required from the U.S. Fish and Wildlife Service and NMDGF to conduct surveys for certain species, particularly if these species are listed, or if trapping, handling, and/or collecting of wildlife is necessary. For threatened and endangered, candidate and sensitive species, consultation with agency species biologists may be necessary to document potential occurrence within a project area or area of potential effects of a proposed project. Some of this information may not be accessible by the public, and in the case of federally listed species, may require informal or formal consultation with the USFWS.

Some occurrence data for wildlife and plants of conservation concern is housed at Natural Heritage New Mexico. For custom, site-specific database searches on plants and wildlife, go to <https://nhnm.unm.edu/data>. For state-listed plants, call NM State Forestry Division at 505-827-5830 or go to <http://nmrareplants.unm.edu/index.html>. For federally listed and candidate species, go the USFWS Information for Planning and Consultation website at <https://ecos.fws.gov/ipac/>.

## **I. The Wildlife Inventory**

Wildlife, as used here, means both terrestrial and aquatic vertebrates and some invertebrate species. Both game and non-game species should be included in the surveys, and each should receive attention in reclamation plans. Suggested survey methods are intended to provide comparable data and yet retain flexibility in methodology. Advance review of sampling plans with the NMDGF may help to avoid delays and requests for supplemental surveys and analysis. The Appendix to this guideline presents a matrix of published survey methods and protocols for specific habitats and species. More detailed technical information about sampling design and data analysis is available from NMDGF on request.

Wildlife information should allow:

- Determination of existing wildlife diversity, densities, and habitat utilization.
- Assessment of impacts upon wildlife and wildlife habitat as a result of completion and operation of the project.
- Assessment of the need to mitigate the impacts of construction for any species or class of wildlife on or near the proposed project site.
- Evaluation of the effectiveness of mitigation or reclamation plan as it pertains to wildlife.
- Comparison of habitat quality in potentially affected habitats before and after project activities.

**A. Description of the Area**

Briefly describe the character of the study area, and additional affected area if applicable. To accomplish this objective, prepare a general statement of location (county, township, range, and section(s), topography, elevation ranges, geologic features and drainages), and vegetative communities (grassland, desert scrub, woodlands, etc.).

**B. Wildlife Habitats**

A qualified wildlife biologist should determine habitat types. These should correspond to the vegetation types identified in the vegetation baseline survey. There may also be additional habitats that are not vegetative types, but need to be sampled for wildlife occurrence and/or use (such as, but not limited to, rimrock or ponds). Photographs of each habitat type (preferably taken from a vantage point that can be used throughout the duration of the construction and post-construction phases) should be included. Habitat typing and mapping should include the project area plus a one mile perimeter beyond the proposed area. Include acreages for all habitat types and the total length of linear habitats (such as, but not limited to, arroyos or cliffs) on the proposed area.

Landscape scale satellite imagery of vegetation data is available through the Southwest Regional Gap Analysis Project (SWReGAP, <http://swregap.nmsu.edu/>). We recommend using SWReGAP habitat types for wildlife habitat assessments. Field surveys are required to ground-truth SWReGAP model information. We also recommend consulting the State Wildlife Action Plan for New Mexico (SWAP) (<http://nmswap.org/>) to identify important habitat types (macrogroups). The SWAP identifies Species of Greatest Conservation Need (SGCN) for each habitat type, including state- and federally-listed, sensitive, rare, endemic and declining species. Baseline surveys may focus on a suite of SGCN within the project area and area of potential effects.

**C. Description of Vertebrate Fauna; Wildlife Inventory**

**Potential Species List.** This includes all known species that occur in the area according to literature sources and reliable sightings by local residents. Compile this list as soon as the habitat types are known, but before undertaking actual field work.

**Observed and Final Species List.** Observed species include all species actually detected on the project site or adjacent area. Indicate the method of detection and documentation on this list (observed, tracks, scat, etc.). Observations will rarely, if ever, reflect the entire list of wildlife that actually occurs at a given site. The final list should also include

the potential species that were not detected, but are expected or have a reasonable possibility of occurrence on the site.

**Habitat Affinity.** Whenever an animal or its sign is located, the habitat in the area should be identified. Determining habitat utilization and preference is one of the most important aspects of the gathering of baseline data and cannot be made with just a few days of data collection. Several systematic surveys conducted seasonally provide the best information on habitat affinity. Data collected incidentally to other work may augment, but are not an appropriate alternative, to systematic observations.

#### **D. Seasonal Data Collection**

One year is the **minimum** survey period necessary to obtain data on all classes of wildlife. It is not necessary, however, for all species to be sampled during all seasons. The following guidelines reflect the season and sampling intensity that may be required for various groups of wildlife.

**Big Game.** Numbers, distribution, and habitat affinity. Winter occurrence (January – February) and reproductive success (August – September) are particularly important data that must be obtained to provide a minimal assessment of big game status.

**Other Mammals.** Distribution and relative abundance – trapping or other surveys during Fall (August – October)

**Birds.** Determine raptor nest activity status, without disturbing nesting birds (February – July). Other breeding bird densities (April – August). Timing of surveys should be adjusted relative to the expected local peak breeding activity, which depends on latitude. Winter occurrence and abundance of all birds, especially raptors (December – February).

**Reptiles and Amphibians.** Species occurrence and relative abundance (May – September). Document breeding ponds for amphibians after periods of precipitation.

**Fishes.** Occurrence and abundance (any season).

#### **E. Techniques (suggested)**

A collecting permit is required for take (sacrifice, capture, salvage or possession) of some species. Contact NMDGF for necessary permits.

**Big Game.** On large sites, aerial surveys may be required. These should be augmented by ground surveys, either by vehicle or on foot. Determine and document the existence of seasonal concentration areas and migration routes or other habitat linkages. Note the density, sex and age class of animals observed during all seasonal inventories.

**Other Mammals.** Determine small mammal species composition by live-trapping on plots or along transects that have been randomly located within habitat types on the project area. Place at least two plots, each a minimum of one acre in size, or two transects that are each at least 200 meters long, in each habitat type with a goal of 300 trap-nights on each site. Trapping for relative density estimates should entail a minimum duration of three days at each location.

Occurrence of medium-sized mammals can be determined from sign or observation. Lagomorphs can be sampled by means of driving or walking transects. If driving is the method used, the width illuminated by the vehicle headlights can be used as a belt transect. Spotlighting at night is also useful in detecting other nocturnal mammals. Conducted night surveys just after dark, when there is no precipitation, and when the wind velocity is less than 15 mph. Authorization to conduct spotlighting must be obtained in **advance** from NMDGF law enforcement personnel.

Survey bats through the use of mist nets, and/or by remote monitoring of bat echolocation calls (e.g., Anabat) to determine species presence and abundance. Identification to species level using Anabat devices must include a local calibration of bat echolocation calls with individuals of known species identity.

**Passerine and Upland Game Birds.** Conduct bird surveys on the area during the breeding season and again during the winter. Survey during migration seasons if the project area includes potentially important stopover areas, such as riparian zones or shelter trees. A variety of survey methods are available (Emlen strip, belt transect, point counts, area searches, spot mapping, etc.). Photographic vouchers or high-quality audio recordings or songs and calls can often be used to identify species. All surveys must be stratified by habitat type with at least two transects, totaling 1000 meters or a single transect totaling 2000 meters, conducted in each type. A single all-inclusive search of one plot per type, encompassing not less than 10% of the area of the type, may be used in lieu of transects. Selection of transects or plots will often depend on the size of the area, local topography and biotic features. Randomly select plot location or starting points and orientation of transects. Conduct a minimum of four surveys, at one or two-week intervals, to take into account weather and temporal variation.

**Waterfowl and Shorebirds.** Survey all areas of permanent or ephemeral water to determine species and numbers of waterfowl, shorebirds and wetland associated species that occur on the area. Any species observed nesting should be documented.

**Raptors.** Appropriate species specific raptor survey techniques are available from NMDGF. Determine locations of raptor nests within the area and a one-mile perimeter. Nests may be located opportunistically during aerial surveys for big game, while the location of others will entail ground surveys. Indicated relative density of wintering raptors in the report. Any roosts and feeding areas which are observed should be documented.

**Reptiles and Amphibians.** Determine occurrence by live-trapping, capture, observation, and calls. Drift fences are effective for collecting some species. Reptiles and amphibians can often be located, identified and left unharmed. Only take individuals necessary for positive identification as voucher specimens. Photographic vouchers can often be used. Many frogs and toads can be identified by their calls, but small numbers of voucher specimens may nonetheless be obtained and deposited with the UNM Museum of Southwestern Biology (after consultation with NMDGF herpetologist). Any take of state or federally protected species must have prior authorization by permit.

**Rare and Endangered Species.** Thoroughly search all suitable habitat within the proposed site boundaries for federal/state threatened or endangered species of plants and animals, as well as all federal candidate species or other species of special concern. If any sensitive species is found on the area, a full assessment of its abundance, habitat requirements and status on the site must be made in order to determine the impact of construction.

Determine and map any active prairie dog towns on the area, recording the size of the colony and density of burrows. A ferret survey may be required in some instances. Ferret surveys must follow techniques approved by NMDGF. Other species associated with the colonies, such as burrowing owl, should also be surveyed. Burrowing owl survey guidelines are available from NMDGF on-line at <http://www.wildlife.state.nm.us/download/conservation/habitat-handbook/project-guidelines/Burrowing-Owl-Surveys-and-Mitigation-2007.pdf>.

**Fishes.** Conduct surveys to document the status of fish species for all waters capable of supporting fish. Electro-shocking is appropriate for surveys (contingent upon approval by NMDGF), but this methodology should be supplemented with other methods such as seines, dip and gill nets, depending on water chemistry and other habitat characteristics.

**Aquatic Invertebrates.** The importance of surveying aquatic invertebrate communities lies in their value as biological indicators of water quality. Design surveys to assess the health of a specific stream or pond for baseline comparison to subsequent monitoring. Species lists alone are of limited value and thus, the relative abundance of major taxa is required. Make a determination of the importance of individual waters prior to initiating studies. An important stream or lake need not be within the area to receive

attention for impact assessment if activities are likely to affect water quality or quantity via runoff, drawdown, concentration, diversion, etc.

#### **F. Special Studies**

Often, companies and/or proponent agencies will encounter circumstances on sites that require specialized studies to obtain more detailed data than is generally required in a baseline inventory. Examples of unique situations may include blockage of big game migration route, or studies of the effects of noise on wildlife that require measurement of noise levels and behavioral or physiological responses to noise. Studies of longer duration and greater depth may therefore be required and should be coordinated with NMDGF.

#### **G. Data Presentation**

Correlate all discussion of wildlife data to habitat use by species. The text should reference all tables and maps included in the report. Tables should be easy to understand and adequately labeled and footnoted for clarity. Include a map of habitat types, transect locations, and other important features (e.g., raptor nests). Scale should be appropriate to the scale of the project area but not smaller than 1:1000. If more than one map is submitted for different aspects of the baseline information, they should all be of the same scale.

Summarize the characteristics of the habitats in the area, animal use of those habitats, and provide a discussion of the anticipated short and long term impacts associated with construction and operation of the project being permitted, in the results section of the report. Impacts should also be assessed (with proper documentation) as to their regional importance.

## **II. Mitigation and Habitat Reclamation**

NMDGF supports the preservation, maintenance and improvement of fish and wildlife resources, and the public use thereof, in connection with impacts caused by construction projects. The primary objective is prevention or avoidance of impacts through modification of the project, e.g., design, scheduling, etc. When adverse impacts cannot be avoided through planning and/or design alternatives, NMDGF encourages project proponents to take appropriate measures necessary to fully offset those impacts. This may consist of: a) off-setting impacts by restoration, rehabilitation or replacement by an appropriate quantity of similar resource, or in certain instances, b) direct compensation.

Once companies and/or proponent agencies have assessed potential impacts, methods to minimize impacts to wildlife during and after construction should be presented (including post-construction land management policies, e.g., grazing practices).

### **III. Monitoring**

Companies and/or proponent agencies should monitor wildlife on the area during and after construction and operations. This can occur in less detail than the baseline study, but should consist of general species composition, habitat, and seasonal use on the area, especially on reclaimed sites. Potential presence of special status species may need to be monitored immediately prior to and continuously during construction to assess disturbance.

### **IV. Appropriate State and Federal Laws**

Project managers should be aware of the provisions of the Migratory Bird Treaty Act, which provides protection for all migratory birds. If it becomes necessary to handle, capture, relocate or destroy migratory birds, their nests or eggs, permits must be obtained from the U.S. Fish and Wildlife Service (USFWS) and NMDGF. The Bald and Golden Eagle Protection Act protects bald and golden eagles. The USFWS and NMDGF should also be consulted about disturbance of eagles or their nests. The Endangered Species Act and New Mexico Wildlife Conservation Act protect endangered and threatened species of wildlife. Those species on current and proposed lists (available from either agency) should receive special attention during the pre-construction survey and subsequent monitoring programs. Power lines and transmission facilities should be constructed to prevent electrocution of eagles and other large birds. Specifications are set forth in: Avian Power Line Interaction Committee (APLIC) (2006). Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC and Sacramento, CA. <http://www.aplic.org>.

### **V. Format**

Format of the report should closely correspond to the following scheme:

#### **1. Description of the Area**

- Location
- Topography
- Vegetative Character
- Habitat Types



## 2. Methods

- Big Game
- Other Mammals
- Birds
- Reptiles and Amphibians
- Fishes
- Aquatic Invertebrates
- Rare or Endangered Species

## 3. Results and Discussion

- Big Game
- Other Mammals
- Birds
- Reptiles and Amphibians
- Fishes
- Aquatic Invertebrates
- Rare or Endangered Species
- Species Lists

## 4. Habitat Affinities (may be combined with Results)

## 5. Assessment of Impact (Include: direct, indirect, short term, long term and cumulative impacts).

## 6. Mitigation and Monitoring Plans

## VI. Personnel and Documentation

The name(s) of the company or organization and personnel involved in a wildlife study should be included in the report as well as a brief listing of the qualifications of the personnel conducting or associated with wildlife and plant inventories and monitoring should also be documented. Also, include all correspondence between the company and any governmental agency concerning the scope of the study or requests for information.

**WILDLIFE BASELINE STUDY GUIDELINE  
APPENDIX**

**WILDLIFE BASELINE STUDY MATRIX  
METHODS AND PROTOCOLS  
NEW MEXICO DEPARTMENT OF GAME AND FISH**

**June 2010 (links updated 2019)**

**Introduction**

This document provides an overview to consultants and others preparing environmental analyses, monitoring plans, or management plans of the range of available survey and inventory methods and techniques applicable to baseline studies of terrestrial wildlife and their habitats. The selection of methods presented here is by no means complete but is offered as a starting point for those designing wildlife baseline studies. These guidelines are a companion document to "Wildlife Baseline Study Guideline Design and Data".

CATEGORY	APPROACH	REFERENCE
<b>COMPILATIONS OF METHODS AND PROTOCOLS</b>		
Species Management Abstracts, prepared by The Nature Conservancy	Various	Online at <a href="http://conserveonline.org">http://conserveonline.org</a>
Reptiles and amphibians, birds, and mammals	Monitoring of following road de-commissioning	Townsend and Switalski (2004)
Wildlife, fish, and rare plants	Species Protocol Technical Guide with inventory and monitoring protocols using the Forest Service technical guide format	Vesely et al. (2006)
Plants and animals	Comprehensive guides	Elzinga et al. (2001); Thompson et al. (1998); Cornelissen et al. (2003)
Forest amphibians, birds, mammals, terrestrial mollusks, vascular plants	Survey protocols for species closely associated with late successional-old growth forests of Oregon and Washington (Survey and Manage Program of the Northwest Forest Plan)	Online at <a href="http://www.blm.gov/or/plans/surveyandmanage/sp.htm">http://www.blm.gov/or/plans/surveyandmanage/sp.htm</a>
Birds, mammals, amphibians (plethodontid salamanders), reptiles (snakes), and terrestrial arthropods	Inventory methods manuals (British Columbia Integrated Land Management Bureau, Resources Information Standards Committee)	Online at <a href="http://ilmbwww.gov.bc.ca/risc/pubs/tebiodiv/">http://ilmbwww.gov.bc.ca/risc/pubs/tebiodiv/</a>
Waterfowl and other waterbirds, cranes, raptor nests, and large ungulates (e.g., pronghorn)	Aerial survey estimation procedures	Pollock and Kendall (1987); Guenzel (1997) for pronghorn

CATEGORY	APPROACH	REFERENCE
<b>VEGETATION</b>		
<b>Comprehensive</b>		
Terrestrial vegetation	Protocol for monitoring biodiversity	Roberts-Pichette and Gillespie (1999)
Vegetation	Vegetation monitoring guide	The BLM Interagency Technical Team (1999)
Vegetation	Vegetation sampling methods	Bonham (1989); Stohlgren et al. (1995)
Plants and soils	Comprehensive reference manual for ecological monitoring on military lands	CEMML (2006)
Lichens, trees, indicator plants, downed woody debris, soils	Protocols for sampling lichens, measuring the regeneration of seedlings and saplings, recording the flowering times for indicator plant species, recording downed woody debris in terrestrial systems, and recording average daily soil temperature at a single depth	The Ecological Monitoring and Assessment Network of Environment Canada, online at <a href="http://www.eman-rese.ca/eman/ecotools/protocols/">http://www.eman-rese.ca/eman/ecotools/protocols/</a>
<b>Grasslands</b>		
Grassland plant communities	Annotated bibliography of sampling techniques applicable to grasslands	Sorrells and Glenn (1990)
Rangeland vegetation	Site-specific, field-based protocols for monitoring structural characteristics of rangelands	NRCS (1997); Elzinga et al. (1998); and Barnett and Stohlgren (2003) ; Spaeth (2003)

CATEGORY	APPROACH	REFERENCE
<b>VEGETATION CONT'D</b>		
<b>Rangeland vegetation</b>	Assessment protocol	Pellant et al. (2000, 2005); Pyke et al. (2002)
Intermountain West rangeland vegetation	Rangeland indicators useful in describing rangeland health and functionality: noxious weeds, ground cover, species composition, and shrub cover	O'Brien et al. (2003)
BLM rangeland vegetation	BLM ecological site inventory protocols	Habich (2001)
<b>Forests</b>		
Wildlife, fish, and rare plants	Species Protocol Technical Guide with inventory and monitoring protocols using the Forest Service technical guide format	Vesely et al. (2006)
Vascular plants	Survey protocols for species closely associated with late successional-old growth forests of Oregon and Washington (Survey and Manage Program of the Northwest Forest Plan)	Online at <a href="https://www.blm.gov/or/plans/surveyandmanage/protocols/">https://www.blm.gov/or/plans/surveyandmanage/protocols/</a>
<b>Soils</b>		
Soil and vegetation	Monitoring manual for rangeland assessment	Herrick et al. (2005)
Soils	Soil management assessment framework	Andrews et al. (2004)
Soils	Sampling field book	Schoeneberger et al. (2002)
<b>Invasive Species</b>		
Invasive plants	Assessment protocol; monitoring guide; rapid assessment protocol	Morse et al. (2004); Dewey and Andersen (2004); Haber (1997); CNPS Vegetation Committee (2004)

CATEGORY	APPROACH	REFERENCE
<b>HABITAT ASSESSMENT METHODS</b>		
	Protocol documentation for metrics used in habitat ecological integrity assessments	NatureServe, online at <a href="https://www.natureserve.org/conservation-tools/ecological-integrity-assessment">https://www.natureserve.org/conservation-tools/ecological-integrity-assessment</a>
Wildlife habitat	Aspects and methods of measuring wildlife habitat	Cooperrider et al. (1986); Bookhout (1996), Morrison et al. (1992)
Wildlife habitat	Monitoring techniques applicable to wildlife restoration	Morrison (2002)
Wildlife habitat	Design of monitoring to evaluate the success of restoration for wildlife	Block et al. (2001)
Riparian habitats in the Southwest	Integrated, multi-resource method for rapid assessment of functional condition	Stevens et al. (2005)
Wildlife habitat	Habitat Evaluation Procedures (HEP): a quantitative method to account for changes in the suitability of habitat for selected species resulting from project actions	USFWS (1980)

CATEGORY	APPROACH	REFERENCE
<b>MAMMALS</b>		
<b>Compilations</b>		
Mammals	Standard measuring and monitoring methods	Wilson et al. (1996)
Mammals	Cites books and articles on management of given species that present specific management techniques, including inventory and monitoring; also makes general recommendations regarding sampling	Feldhamer et al. (2003).
Mammals in winter	Evaluated winter tracking protocols as a method for monitoring mammals in Alberta	Bayne et al. (2005)
Mammals caught in traps	Lure point transects and trapping point transects	Buckland et al. (2006)
Marked mammals	Mark/recapture or mark/resight techniques	Pollack et al. (1990), White (1996); Borchers et al. (2002)
<b>Taxon-Specific</b>		
Prairie dogs ( <i>Cynomys</i> sp.)	Methods to estimate population densities and monitoring protocol	Severson and Plumb (1998) and Plumb et al. (2001) ; Magle et al. (2007 ); Facka et al. (2008); Pruett et al. (2009)
Black-footed ferret	Technique for evaluating black-footed ferret habitat and survey protocol	Biggins et al. (1993) and BLM (2005)
River otter	Monitoring data collection protocols	Breaux et al. (2002), CDOW (2003), Maxfield et al. (2005), and Boyle (2006)
Bobcat	Use of cameras to estimate abundance	Heilbrun et al. (2006)
American marten	Winter surveys and track detection survey methods	Corbould and Hengeveld (1998) and Zielinski and Kucera (1995)
Snowshoe hare	Fecal pellet count methods and comparison to mark-recapture methods	Keith et al. (1968), Murray et al. (2002), and Mills et al. (2005)
Tree squirrels	Survey and monitoring techniques	Gurnell et al. (2001)
Black bear	Mast survey methods	Costello et al. (2003)
Bears	Manual of inventory methods for bears in British Columbia	The British Columbia Resources Inventory Committee (1998)
<b>Bats</b>		
New Mexico bats	Bat survey methods applicable to New Mexico bat species	Western Bat Working Group, 2003, online at <a href="http://www.wbwg.org/speciesinfo/survey_matrix/survey_matrix.html">http://www.wbwg.org/speciesinfo/survey_matrix/survey_matrix.html</a> .
New Mexico bats	Bat bibliography for New Mexico that includes numerous publications that address species-specific bat survey methods	Stuart (2005)
Long-nosed bats (Genus <i>Leptonycteris</i> ) in New Mexico	Roost survey protocol	Weise (2005)

CATEGORY	APPROACH	REFERENCE
<b>MAMMALS CONT'D</b>		
<b>Bats Cont'd</b>		
New Mexico bats	Bat monitoring protocol using mist-netting applicable to New Mexico bat species	Petryszyn (1994)
Western bats	Overview of techniques available for monitoring bat populations in specified habitats or vegetation types	Thomas and West (1989)
Bats in mines	Mine survey and gating protocol	The North American Bat Conservation Partnership (NABCP) Management subcommittee
Bats in mines	Guidelines for developing a bat survey and inventory program for pre-mine closure planning	Altenbach et al. (2001)
Bats in mines	Guidelines for survey and monitoring of mines	Riddle (1995)
Bats	Bat surveys and monitoring in the context of bat conservation	The NABCP State Planning Guide for Bats (Tuttle 2004)
Bats under bridges	Guano collection techniques and analysis for conducting bridge surveys	Ormsbee et al. (2005)
Bats in buildings	Survey protocol for bats occupying buildings in Pacific Northwest	Joyner (2006)
Bats	Bat study and sampling design	British Columbia Resources Inventory Committee (1998)
<b>Food Habits</b>		
Vertebrates; raptors	Methods for investigating the food habits of terrestrial vertebrates; statistical power necessary for dietary analysis from fecal samples; methods for assessing raptor diet	Litvaitis (2000); Trites and Joy (2005); Lewis et al. (2004)
<b>Body Condition</b>		
Deer and elk	Protocol for evaluating relative body condition of harvested deer and elk in New Mexico	Bender (2003)
<b>State-listed mammal species</b>		
Spotted bat ( <i>Euderma maculatum</i> )	survey methodology	Pierson and Rainey (1998)
Western yellow bat ( <i>Lasiurus xanthinus</i> )	Survey methods for <i>Lasiurus</i> bats; recommendations for complimentary research methodologies applicable to <i>Lasiurus</i> species	Stokes et al. (2003)
White-sided jackrabbit ( <i>Lepus callotis</i> )	Inventory methods for hares and cottontails that likely apply to white-sided jackrabbit	The British Columbia Ministry of Environment, Lands and Parks (1998)
<b>Small mammals</b>		
Small mammals	Census methods	Davis (1982)

CATEGORY	APPROACH	REFERENCE
<b>MAMMALS CONT'D</b>		
<b>Small mammals Cont'd</b>		
Small mammals	Capture-recapture methods	Williams et al. (2002)
Small mammals	Comparison of capture–recapture or removal sampling techniques with distance-sampling methods (e.g., transect lines or trapping webs)	Parmenter et al. (2003)
Small mammals	Field and statistical methods for surveys of closed populations	Russell (2003)
Small mammals	Trapping protocol to determine small mammal abundance	Converse et al. (2004)
Small mammals	Comprehensive evaluation of field methods	Sibbald et al. (2006)
Small mammals, including shrews, voles, mice and rats	Inventory methods	The British Columbia Ministry of Environment, Lands and Parks (1998)

CATEGORY	APPROACH	REFERENCE
<b>BIRDS</b>		
<b>Compilations</b>		
Birds	Monitoring methods	Bart (2005).
Quail and songbirds	Survey protocols	Burger et al. (2004)
Birds	Eleven bird survey methods	Bart (2003)
Birds	Survey techniques for monitoring native birds in MT	Young et al. (2005)
Birds	Bird census techniques	Bibby et al. (2000)
Birds	Distance sampling methods	Buckland et al. (1993, 2001, 2004); Thomas et al. (2002); Norvell et al. (2003); Strindberg et al. (2004)
Crossbills	Lure point transects and trapping point transects for crossbills	Buckland et al. (2006)
Birds	Bird census and survey techniques; bird survey techniques used in Europe	Gregory et al. (2004) and Bibby et al. (1998).
Birds in New Mexico	Population inventory and monitoring	New Mexico Partners in Flight Research and Monitoring Database, online at <a href="http://hawksaloft.org/">http://hawksaloft.org/</a>
Birds	Guide to site selection, layout of points/plots, numbers of samples to take, which species to choose, adaptive management versus status monitoring issues, and counting techniques; stepwise approach to determining what methods and sampling design will address project goals and objectives	The Patuxent Wildlife Research Center “Managers' Monitoring Guide; How to Design a Wildlife Monitoring Program”, online at <a href="https://www.usgs.gov/centers/pwrc">https://www.usgs.gov/centers/pwrc</a> ; Hamel et al. (1996)

CATEGORY	APPROACH	REFERENCE
<b>BIRDS CONT'D</b>		
<b>Compilations Cont'd</b>		
Landbirds	Field methods for monitoring landbirds, including mist-netting, nest searches, and census methods	Ralph et al. (1993)
Landbirds	Monitoring methods	Altman (1995); Bonney et al. (1999); Rosenstock et al. (2002)
Birds of SW riparian and scrub habitats	Comparison of variable circular-plot and spot-map methods applied to desert riparian and scrub habitat in the Southwest	Szaro and Jakle (1982)
Songbirds	Survey methods for birds and vegetation, statistical methods, and methods for identifying and aging birds	The Point Reyes Bird Observatory, online at <a href="http://www.prbo.org/tools/index.html">http://www.prbo.org/tools/index.html</a>
Point Counts:		
Birds	Point counts	Ralph et al. (1995)
Birds	Survey methods that account for individuals present but not detected	Thompson (2002)
Grassland birds	Bird counts that consider species detection rates	Diefenbach et al. 2003)
Birds	Point counts and other count-based survey methods	McCallum (2005)
Birds	Distance sampling	Buckland et al. (2001)
Birds	Removal Models	Farnsworth et al. (2002); Moore et al. (2004)
Birds	Double observer sampling	Nichols et al. (2000); Moore et al. (2004)
Birds	Double sampling	Manly et al. (1996); Bart and Earnst (2002)
Birds	Six approaches for estimating point survey detection probabilities	Wintle et al. (2004)
Birds caught in mist nets	MAPS (Monitoring Avian Productivity and Survivorship) program	DeSante et al. (2005)
Birds	Monitoring of migrants using mist-netting	Hussell and Ralph (1995)
Landbirds	A method for landbird migration monitoring at a single station	Thomas et al. (2004)
Birds	Breeding Biology Research and Monitoring Database (BBIRD) Program	Conway and Martin (1999)
Breeding Bird Survey		
Birds	Breeding Bird Survey (BBS) as applied to landbirds and comparison of BBS to the Breeding Bird Census and Breeding Bird Atlas	Rosenberg and Blancher (2005)
Landbirds	Methods applicable to landbird species not adequately monitored by the Breeding Bird Survey	Altman and Bart (2001)
<b>Gallinaceous Birds</b>		
Gould's turkey	Survey methodology	New Mexico Game and Fish
Rio Grande wild turkey	Literature review of population estimation techniques	Butler (2003)
Rio Grande turkey	Using roads as transects for distance sampling	Butler et al. (2005)
Rio Grande wild turkey	Comparison of techniques for counting at winter roosts	Butler et al. (2006)
Lesser prairie chicken	Survey protocol	Massey and Dunn (2000)



CATEGORY	APPROACH	REFERENCE
<b>BIRDS CONT'D</b>		
<b>Gallinaceous Birds Cont'd</b>		
Scaled quail	Bibliography of literature on population estimation and food habits analysis	Lerich (2006)
Greater sage grouse	Lek survey and count methodology	Western Association of Fish and Wildlife Agencies (2004)
<b>Raptors</b>		
Burrowing owl	Survey and monitoring protocol	New Mexico Burrowing Owl Working Group (2004)
American peregrine falcon	Monitoring protocols	USFWS (2003) and Daw et al. (2004)
Bald eagle	Standardized breeding and wintering monitoring protocols; protocol for surveying bald eagle winter roost sites; survey techniques to identify bald eagle use of potential habitat in site assessments for proposed projects	Steenhof et al. (2002); BLM (2005); Jackman and Jenkins (2004)
Golden eagle	Population monitoring methods	Fuller et al. (2001) and Good et al. (2004)
Raptors	Inventory methods	British Columbia Ministry of Sustainable Resource Management (2001)
<b>Marsh Birds</b>		
Black rail, least bittern, yellow rail, sora, Virginia rail, American bittern, common moorhen, purple gallinule, american coot, and pied-billed grebe	Standardized monitoring protocols	Conway (2006)
Rails and bitterns	Survey methods for secretive marsh birds	Conway and Nadeau (2006) and Conway and Gibbs (2005)
Hérons, egrets, ibises, gulls, terns	Species-specific survey methods for colonial waterbirds	Steinkamp et al. (2003)
Colonial waterbirds	Standardization of survey protocols	Steinkamp et al. (2005)
Aquatic birds	The Coordinated Bird Monitoring Plan in New Mexico: Bird Monitoring Regions (BMR) and species that regularly use each BMR	Hartley (2004) and Bart and Manning (2006)

CATEGORY	APPROACH	REFERENCE
<b>BIRDS CONT'D</b>		
<b>Marsh Birds Cont'd</b>		
Hérons, egrets, bitterns, ibises, pelicans, cormorants, gulls, terns, grebes, herons, egrets, waterfowl, Forster's and black terns, common snipe, sandhill cranes, northern harriers, belted kingfishers, marsh wrens, red-winged and yellow-headed blackbirds, common yellowthroats, and migrating shorebirds	Survey protocols that should be applicable to New Mexico	Moulton et al. (2004)
Marsh birds	Protocols	Seglund et al. (2005)
<b>Shorebirds</b>		
Snowy plover, mountain plover, black-necked stilt, American avocet, willet, marled godwit, dunlin, wandering tattler, whimbrel, long-billed curlew, western sandpiper, and Wilson's phalarope	Monitoring protocols for shorebirds	Howe et al. (2000)
Long-billed curlew	Protocol for conducting range-wide breeding population surveys	USFWS (2005) and Saunders (2001)
Mountain plover	Survey protocols and guidelines; monitoring methods	Williams (1997); BLM (2005); USFWS (2002); Dreitz et al. (2006); Royle and Nichols (2003)
Hérons and egrets, nesting gulls and terns, shorebirds, and waterfowl	Data collection protocols for monitoring of wetland birds	Wetland Regional Monitoring Program for San Francisco Bay, Bird Focus Group, Wetland Regional Monitoring Program (2002)
Shorebirds	Sampling design and approaches to regional shorebird monitoring	Bart et al. (2005)
<b>Cavity-nesters</b>		
Cavity-nesting birds	Field protocol for monitoring	Dudley and Saab (2003)
<b>Other Species</b>		
Black swift	Survey protocol	Earnst and Heltzel (2005) and Schultz and Levad (2001)
Crossbills	Survey methods	Buckland et al. (2006)
<b>State-listed bird species</b>		
State-listed passerine landbirds	Can be surveyed using standardized methods described elsewhere in this document	

CATEGORY	APPROACH	REFERENCE
<b>BIRDS CONT'D</b>		
<b>State-listed bird species Cont'd</b>		
Common black-hawk ( <i>Buteogallus anthracinus</i> )	Monitoring strategy	Boal (2001)
Neotropic cormorant ( <i>Phalacrocorax brasilianus</i> )	Survey methods and sampling designs, including measuring detection probability	Steinkamp et al. (2003)
Whooping crane ( <i>Grus americana</i> )	Aerial census flights	Pollock and Kendall (1987)
Common ground-dove ( <i>Columbina passerina</i> )	Count methods and sampling design; fixed radius point count surveys; unlimited distance point count surveys; point-transect distance sampling	Rivera-Milan (1995); Askins and Ewert (1991); Wauer and Wunderle (1992)
Hummingbirds	Protocols applicable to hummingbirds, including point-transects and on-road and off-road point counts that focus on known or suspected use areas	Altman and Bart (2001)
Boreal Owl and Whiskered Screech Owl	Owl Survey playback protocol; nocturnal survey protocol; night-time call-back surveys for boreal owls that target suitable habitat	Cannings (2005); Takats et al. (2001), Takats Priestley (2004); Grosshuesch (2006); British Columbia Ministry of Sustainable Resource Management (2001)
Brown pelican ( <i>Pelecanus occidentalis</i> )	Survey protocol	Lewis et al. (1988), online at <a href="https://www.nps.gov/index.htm">https://www.nps.gov/index.htm</a>
White-tailed ptarmigan ( <i>Lagopus leucurus</i> )	Inventory survey protocol	British Columbia Ministry of Environment, Lands and Parks (1997)
Gray vireo ( <i>Vireo vicinior</i> )	Monitoring methods	Winter and Hargrove (2004)

CATEGORY	APPROACH	REFERENCE
<b>AMPHIBIANS AND REPTILES</b>		
<b>Compilations</b>		
Terrestrial reptiles and amphibians	Drift fences with pitfalls or funnel traps, or a combination of both	Row and Blouin-Demers (2006)
Terrestrial reptiles and amphibians	Pitfalls or funnel traps with visual encounters, cover boards, and anuran calling surveys	Block and Morrison (1998); Ryan et al. (2001); Marsh and Goicochea (2003); Zorn et al. (2004)
Terrestrial reptiles and amphibians	Pitfalls and funnel traps associated with drift fences	Ryan et al. (2001)
Plethodontid salamanders	Comparison of mark-recapture and depletion methods	Bailey et al. (2004a)
Terrestrial salamanders	Method for estimating site occupancy and species detection probability parameters	Bailey et al. (2004b)
Amphibians	Method for estimation of detection probability through double sampling	Pollock et al. (2002)

CATEGORY	APPROACH	REFERENCE
<b>AMPHIBIANS AND REPTILES</b>		
<b>Compilations Cont'd</b>		
Reptiles and amphibians	Guide to site selection, layout of points/plots, numbers of samples to take, which species to choose, adaptive management versus status monitoring issues, and counting techniques	The Patuxent Wildlife Research Center "Managers' Monitoring Guide; How to Design a Wildlife Monitoring Program", online at <a href="https://www.usgs.gov/centers/pwrc">https://www.usgs.gov/centers/pwrc</a>
Amphibians	Standard methods for measuring and monitoring biological diversity	Heyer et al. (1994)
Reptiles caught in traps	Lure point transects and trapping point transects	Buckland et al. (2006)
Diurnal lizards	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Slevin's bunchgrass lizard ( <i>Sceloporus slevini</i> )	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Reticulate Gila monster ( <i>Heloderma suspectum</i> )	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Mountain skink ( <i>Eumeces callicephalus</i> )	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Gray-checked whiptail ( <i>Aspidoscelis dixonii</i> )	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Canyon spotted whiptail ( <i>Aspidoscelis burti stictogrammus</i> )	Time-constrained searches or transect surveys	Persons and Nowak (2006)
Terrestrial life stages of pond or wetland-breeding amphibians	Fences and pitfall traps placed around the perimeter of ponds or wetlands	Pierce, Pers. Comm. (2006)
Boreal toad ( <i>Bufo boreas boreas</i> )	Fences and pitfall traps placed around the perimeter of ponds or wetlands	Pierce, Pers. Comm. (2006)
Sonoran desert toad ( <i>Bufo alvarius</i> )	Fences and pitfall traps placed around the perimeter of ponds or wetlands	Pierce, Pers. Comm. (2006)
Great Plains narrow-mouthed toad ( <i>Gastrophryne olivacea</i> )	Fences and pitfall traps placed around the perimeter of ponds or wetlands	Pierce, Pers. Comm. (2006)
Snakes	Inventory methods	British Columbia Ministry of Environment, Lands and Parks (1998)
<b>Taxon-Specific</b>		
Jemez Mountains salamander ( <i>Plethodon neomexicanus</i> )	Survey and monitoring protocols; Bandelier National Monument protocol for non-destructive long-term monitoring of the Jemez Mountains Salamander using sampling with artificial cover	New Mexico Endemic Salamander Team (2000); Persons and Nowak (2006); Fellers and Drost (1994)
Sacramento Mountains salamander ( <i>Aneides hardii</i> )	A formal inventory protocol specifically for the Sacramento Mountains salamander has not been developed, but the protocol developed for the Jemez Mountains salamander is used	New Mexico Endemic Salamander Team (2000); Persons and Nowak (2006); Fellers and Drost (1994)

CATEGORY	APPROACH	REFERENCE
<b>AMPHIBIANS AND REPTILES</b>		
<b>Taxon - Specific Cont'd</b>		
Barking frog ( <i>Eleutherodactylus augusti</i> )	Standardized call surveys; visual location on paved highways following rains; methods for monitoring population size, including mark-recapture, distance sampling, call counts, and visual encounter surveys	North American Amphibian Monitoring Program (2005); Painter, Pers. Comm. (2006); Goldberg and Schwalbe (2004).

CATEGORY	APPROACH	REFERENCE
<b>TERRESTRIAL INVERTEBRATES</b>		
Arthropods in terrestrial ecosystems	Protocols for monitoring	Finnamore et al. (1998); Battigelli (2004); Stambaugh and Schieck (2006)
Sacramento Mountains checkerspot butterfly ( <i>Euphydryas anicia cloudcrofti</i> )	Population estimation methods used	USFWS et al. (2004)
<b>State-listed invertebrate species</b>		
Woodlandsnails ( <i>Ashmunella hebari</i> and <i>Ashmunella macromphala</i> )	Survey procedures for terrestrial mollusks	Duncan et al. (2003)

CATEGORY	APPROACH	REFERENCE
<b>PROTOCOLS FOR FEDERALLY-LISTED SPECIES, INCLUDING PROPOSED AND CANDIDATE SPECIES</b>		
Flat-tail horned lizard ( <i>Phrynosoma mcallii</i> )	Protocols for population monitoring, distribution monitoring, project evaluation monitoring, and fencing and removal survey	Flat-tailed Horned Lizard Interagency Coordinating Committee (2003)
Sand dune lizard, ( <i>Sceloporus arenicolus</i> )	Recommended survey methodology for surveys	Painter et al. (1999)
Ridgenose rattlesnake ( <i>Crotalus willardi</i> )	Methods used to survey in New Mexico	Holycross and Painter (2000)
Yellow-billed cuckoo ( <i>Coccyzus americanus occidentalis</i> )	Standardized protocol to determine presence or absence; comparison of three census techniques used for cuckoos on the Gila River and Rio Grande in New Mexico: standard point counts, tape playbacks, and single-species spot-mapping; survey and monitoring protocol for California	Magill and Halterman, (1999); Woodward et al. (2003); Laymon (1998)
Applomado falcon ( <i>Falco femoralis</i> )	Survey methods used in a study of falcon abundance and distribution in the northern Chihuahuan Desert	Young et al. (2004)

CATEGORY	APPROACH	REFERENCE
<b>PROTOCOLS FOR FEDERALLY-LISTED SPECIES, INCLUDING PROPOSED AND CANDIDATE SPECIES CONT'D</b>		
Piping plover ( <i>Charadrius melodus</i> )	Sampling and field methods	Erwin et al. (2003)
Interior least tern, ( <i>Sterna antillarum</i> )	Range-wide monitoring protocol to assess abundance	Guilfoyle et al. (2004)
Mexican spotted owl ( <i>Strix occidentalis lucida</i> )	Survey and inventory methods	Forsman (1983); US Forest Service (1986, 1989, 1990); USFWS (1989); Ward et al. (1995); USFWS (1995); Franklin et al. (1996); Arundel (1999); Ganey and Benoit (2002); Bowden et al. (2003); and Ganey et al. (2004)
Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> )	Official survey protocol	Sogge et al. (1997) and USFWS (2000)
Black-capped vireo ( <i>Vireo atricapillus</i> )	Procedures for determining presence/absence	Environmental Defense, Inc. and U.S. Fish and Wildlife Service (2000)

CATEGORY	APPROACH	REFERENCE
<b>PROTOCOLS FOR FEDERALLY-LISTED SPECIES, INCLUDING PROPOSED AND CANDIDATE SPECIES</b>		
Mexican long-nosed bat, ( <i>Leptonycteris nivalis</i> ) and Southern long-nosed bat, ( <i>Leptonycteris curasoae yerbabuena</i> )	Roost survey protocol	Weise (2005)
Black-footed ferret ( <i>Mustela nigripes</i> )	Habitat evaluation technique; survey protocol	Biggins et al. (1993) and BLM (2005)
Jaguar ( <i>Panthera onca</i> )	Method for conducting jaguar abundance surveys using camera traps; comparative study of track measurement techniques, camera-trap methods, and scent lures to study jaguars, and track collection protocols	Silver (2004); Miller (2001)
Gray wolf ( <i>Canis lupus</i> )	Standard Operating Procedures for howling surveys, ground telemetry, aerial telemetry, and intensive winter wolf monitoring	The Adaptive Management Oversight Committee (2005) for re-introduction of the Mexican gray wolf into Arizona and New Mexico
San Xavier talussnail ( <i>Sonorella eremite</i> ) and Wet canyon talussnail ( <i>Sonorella macrophallus</i> )	Guidelines for development of a monitoring plan for Wet Canyon talussnail and its habitat; survey procedures used for land snails in southern New Mexico; survey procedures for terrestrial mollusks that include methods specific to talus habitats	USFS (1999); Lang (2000); Duncan et al. (2003)

## References Cited

- Adaptive Management Oversight Committee. 2005. Standard Operating Procedures for the Mexican Wolf Blue Range Reintroduction Project. Interagency Field Team. U.S. Fish and Wildlife Service, Arizona Game and Fish Department, New Mexico Department of Game and Fish, USDA APHIS Wildlife Services, USDA Forest Service, and White Mountain Apache Tribe.
- Altenbach, J.S., R. Sherwin, and P. Brown. 2001. Pre-Mine Closure Bat Survey and Inventory Techniques. Pg. 115-126. In K. C. Vories and D. Throgmorton, Eds. Proceedings of Bat Conservation and Mining, a Technical Interactive Forum held November 14-16, 2000 at the Airport Hilton, St. Louis, Missouri. U.S. Department of Interior, Office of Surface Mining, Alton, Illinois and Coal Research Center, Southern Illinois University, Carbondale, Illinois. Available online at: <https://www.osmre.gov/programs/tdt/bats.shtm>.
- Altman, B. 1995. Neotropical migratory landbirds in Oregon and Washington: An overview of the development of monitoring programs. Report submitted to the Oregon-Washington Chapter, Partners in Flight. 48 pp plus appendices.
- Altman, B. and J. Bart. 2001. Special Species Monitoring and Assessment in Oregon and Washington: Landbird Species not Adequately Monitored by the Breeding Bird Survey. [http://community.gorge.net/natres/pif/Monitoring/2001\\_10\\_special\\_species\\_monitoring\\_assessment.pdf](http://community.gorge.net/natres/pif/Monitoring/2001_10_special_species_monitoring_assessment.pdf).
- Andrews, S.S., D.L. Karlen, and C.A. Cambardella. 2004. The Soil Management Assessment Framework: A Quantitative Soil Quality Evaluation Method. Soil Sci. Soc. Am. J. 68:1945-1962.
- Arundel, S. 1999. Developing a sampling frame to guide quadrat selection for a program to monitor population trend of the Mexican spotted owl: Methodology. Unpublished paper on files at: U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station, Flagstaff, AZ.
- Askins, R.A., and D.N. Ewert. 1991. Impact of Hurricane Hugo on bird populations on St. John, U. S. Virgin Islands. *Biotropica* 23:481-487.
- Bailey, L.L., T.R. Simons, and K.H. Pollock. 2004a. Comparing population size estimators for plethodontid salamanders. *Journal of Herpetology* 38:370-380.
- Bailey, L.L., T.R. Simons, and K.H. Pollock. 2004b. Estimating Site Occupancy and Species Detection Probability Parameters for Terrestrial Salamanders. *Ecological Applications* 14:692-702.
- Barnett, D., and T.J. Stohlgren. 2003. A nested intensity sampling design for plant diversity. *Biodiversity and Conservation* 2:255-278.
- Bart, J. 2003. Development of a Coordinated Bird Monitoring Plan for Canada and the United States. Unpublished report. Steering Committee of the Coordinated Bird Monitoring Program. U.S. North American Bird Conservation Initiative Monitoring Committee. Arlington, VA, USA. Available online at <http://www.nabci-us.org/assets/resources/monitoringreportfinal0307.pdf>.
- Bart, J. 2005. Monitoring the Abundance of Bird Populations. *The Auk* 122:15-25.
- Bart, J. and S.L. Earnst. 2002. Double sampling to estimate bird density and population trends. *Auk* 119:36-45.
- Bart, J. and A. Manning. 2006. The Intermountain West Coordinated Bird Monitoring Project. Available online at <https://s3.amazonaws.com/sfc-dynamic-content/uploadfiles/152/NBII%20Great%20Basin%20Info%20Project.pdf>.
- Bart, J., B. Andres, S. Brown, G. Donaldson, B. Harrington, V. Johnston, S. Jones, G. Morrison, and S. Skagen. 2005. The Program for Regional and International Shorebird Monitoring (PRISM). Pg. 893-901. In C.J. Ralph and T.D. Rich, Editors. Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference. 2002 March 20-24; Asilomar, California, Volume 1. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 651 pp. Available online at [http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/Asilomar/](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/).
- Battigelli, J.P. 2004. Revised terrestrial arthropod sampling protocols for the Alberta Biodiversity Monitoring Program: Examining the biodiversity of soil mesofauna (Acari and Collembola) in Alberta. Alberta Biodiversity Monitoring Program. Earthworks Research Group. 49 pp. Available online at <https://www.abmi.ca/home/publications/51-100/65>.

- Bayne, E., R. Moses, and S. Boutin. 2005. Evaluation of winter tracking protocols as a method for monitoring mammals in the Alberta Biodiversity Monitoring Program. Integrated Landscape Management Group, Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada. Alberta Biodiversity Monitoring Program. 53 pp.
- Bender, L. 2003. Evaluation of deer and elk body condition in New Mexico. Annual Report, 1 October 2002 – 30 September 2003. New Mexico Cooperative Fish and Wildlife Research Unit. U.S. Geological Survey, New Mexico State University, Las Cruces.
- Bibby, C.J. 2004. Bird diversity survey methods. Pg. 1-16. In Sutherland W.J., Newton I. and Green R. E. [Eds.]: Bird Ecology and Conservation; a Handbook of Techniques. Oxford University Press, Oxford. Available online at <https://global.oup.com/ukhe/product/bird-ecology-and-conservation-9780198520863?cc=us&lang=en&>.
- Bibby, C., M. Jones, and S. Marsden. 1998. Expedition Field Techniques: Bird Surveys. Royal Geographical Society, London.
- Bibby, C.J., N.D. Burgess, D.A. Hill, and S.H. Mustoe. 2000. Bird Census Techniques. 2nd ed. Academic Press, London.
- Biggins, D.E., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pages 73-88. In J.L. Oldemeyer, D.E. Biggins, and B.J. Miller, Editors. Proceedings of the symposium on the management of prairie dog complexes for the reintroduction of the black-footed ferret. Biological Report 13. U.S. Fish and Wildlife Service, Washington, D.C.
- Bird Focus Group, Wetland Regional Monitoring Program. 2002. Data Collection Protocol, Wetland Bird Monitoring. San Francisco Bay Area Wetlands Regional Monitoring Program. Available online at <http://legacy.wrmp.org/protocols.html>.
- Block, W.M. and M.L. Morrison. 1998. Habitat relationships of amphibians and reptiles in California oak woodlands. Journal of Herpetology 32:51-60.
- Block, W., A. Franklin, J. Ward, J.L. Ganey, and G. White. 2001. Design and Implementation of Monitoring Studies to Evaluate the Success of Ecological Restoration on Wildlife. Restoration Ecology 9:293-303.
- Boal, C.W. 2001. Strategies for Monitoring Common Black-Hawk (*Buteogallus anthracinus*) Populations in North America. Draft- Common Black Hawk Species Account. North American Raptor Monitoring Strategy - Section 6. In Collaboration with the Raptor Research Center. USGS Forest and Rangeland Ecosystem Science Center. Snake River Field Station. Available online at <http://srfs.wr.usgs.gov/pdf/BUANstrategy.pdf>.
- Bonham, C. D. 1989. Measurements for terrestrial vegetation. John Wiley and Sons, Inc., New York, New York, 338 pp.
- Bonney, R., D.N. Pashley, R.J. Cooper, and L. Niles, eds. 1999. Strategies for Bird Conservation: The Partners in Flight Planning Process. Cornell Lab of Ornithology. Available online at <http://birds.cornell.edu/pifcapemay>.
- Bookhout, T.A., Editor. 1996. Research and management techniques for wildlife and habitats. Fifth ed., rev. The Wildlife Society, Bethesda, MD. 740 pp.
- Borchers, D.L., S.T. Buckland, and W. Zucchini. 2002. Estimating Animal Abundance: Closed Populations. Springer, London, 314 pp.
- Bowden, D.C., G.C. White, A.B. Franklin, and J.L. Ganey. 2003. Finite population sampling to estimate total size with correlated sampling unit estimates. Journal of Wildlife Management 67:1-10. Available online at [http://www.rmrs.nau.edu/publications/bowden\\_2003/bowden\\_2003.pdf](http://www.rmrs.nau.edu/publications/bowden_2003/bowden_2003.pdf).
- Boyle, S. 2006. North American River Otter (*Lontra canadensis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. 55 pp. Available online at <http://www.fs.fed.us/r2/projects/scp/assessments/northamericanriverotter.pdf>.
- Breaux, A., T. Kucera, and W. Zielinski. 2002. Data Collection Protocol Monitoring River Otter (*Lutra [Lontra] canadensis*). San Francisco Bay Area Wetlands Regional Monitoring Program Plan. 11 pp. Available online at <http://legacy.wrmp.org/protocols.html>.



- British Columbia Ministry of Environment, Lands and Parks. 1997. Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Upland Gamebirds: Grouse, Quail and Columbids. Version 1.1. Ministry of Environment, Lands and Parks, Resource Inventory Branch, Terrestrial Ecosystem Task Force, Victoria, British Columbia. Prepared for Resources Inventory Committee. Resources Information Standards Committee. Available online at <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity>.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Species Inventory Fundamentals. Standards for Components of British Columbia's Biodiversity No. 1. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory Methods for Bats – Standards for components of British Columbia's Biodiversity No. 20. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory Methods for Bears – Standards for components of British Columbia's Biodiversity No. 21. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory for hares and cottontails. Standards for Components of British Columbia's Biodiversity No. 23. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory Methods for Small Mammals: Shrews, Voles, Mice and Rats. Standards for Components of British Columbia's Biodiversity No. 31. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Environment, Lands and Parks. 1998. Inventory Methods for Snakes. Standards for Components of British Columbia's Biodiversity No. 38. Ministry of Environment, Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- British Columbia Ministry of Sustainable Resource Management. 2001. Inventory Methods for Raptors Standards for Components of British Columbia's Biodiversity No. 11. Prepared by Ministry of Sustainable Resource Management, Environment Inventory Branch for the Terrestrial Ecosystems Task Force, Resources Inventory Committee.
- Buckland, S.T., D.R. Anderson, K.P. Burnham, and J.L. Laake. 1993. Distance Sampling: Estimating Abundance of Biological Populations. Chapman and Hall, London. 446pp. Available online at <http://distancesampling.org/downloads/distancebook1993/>.
- Buckland, S.T., D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers, and L. Thomas. 2001. Introduction to distance sampling: Estimating abundance of biological populations. Oxford University Press, Oxford UK. 448 pp.
- Buckland, S.T., D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers, and L. Thomas, Editors. 2004. Advanced Distance Sampling. Estimating abundance of biological populations. Oxford University Press, Oxford. 434 pp. <http://distancesampling.org/downloads/distancebook1993/>.
- Buckland, S.T., R.W. Summers, D.L. Borchers, and L. Thomas. 2006. Point transect sampling with traps or lures. *Journal of Applied Ecology* 43: 377-384.
- Bureau of Land Management (BLM). 2005. Wildlife Survey Protocol for Coal Bed Natural Gas Development. Powder River Basin Wildlife Taskforce. Buffalo Field Office, Buffalo, WY. Available online at <http://www.oilandgasbmps.org/docs/WY036-PowderRiverBasinWildlifeSurveyProtocol.doc>.

- BLM Interagency Technical Team. 1999. Sampling Vegetation Attributes. Interagency Technical Reference. Technical Reference 1734-4. Bureau of Land Management National Applied Resource Sciences Center. BLM/RS/ST-96/002 +1730. Available online at [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1044175.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044175.pdf).
- Burger, L.W., M.D. Smith, R. Hamrick, B. Palmer, and S. Wellendorf. 2004. CP33- Upland Habitat Buffers Monitoring Protocol. Southeast Quail Study Group, Research Committee. Natural Resources Conservation Service. Conservation Effects Assessment Project National Assessment. Available online at <http://teamquail.tamu.edu/publications/HabitatBuffersforUplandBirdsCP33.pdf>.
- Butler, M.J. 2003. An evaluation of population estimation techniques for Rio Grande wild turkeys in the Texas panhandle and southwest Kansas. Research proposal, Dept. Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock. Available online at [https://www.researchgate.net/publication/237831755\\_AN\\_EVALUATION\\_OF\\_POPULATION\\_ESTIMATION\\_TECHNIQUES\\_FOR\\_RIO\\_GRANDE\\_WILD\\_TURKEYS\\_IN\\_THE\\_TEXAS\\_PANHANDLE\\_AND\\_SOUTHWEST\\_KANSAS](https://www.researchgate.net/publication/237831755_AN_EVALUATION_OF_POPULATION_ESTIMATION_TECHNIQUES_FOR_RIO_GRANDE_WILD_TURKEYS_IN_THE_TEXAS_PANHANDLE_AND_SOUTHWEST_KANSAS).
- Butler, M.J., M.C. Wallace, W.B. Ballard, S.J. DeMaso, and R.D. Applegate. 2005. From the field: The relation of Rio Grande wild turkey distributions to roads. *Wildlife Society Bulletin* 33:745-748.
- Butler, M.J., W.B. Ballard, M.C. Wallace, S.J. Demaso, and R.D. Applegate. 2006. Comparing techniques for counting Rio Grande wild turkeys at winter roosts. Pg. 112-117. In J.W. Cain III and P.R. Krausman, Eds. *Managing Wildlife in the Southwest: New Challenges for the 21<sup>st</sup> Century*. Proc. Symposium, August 2005. Southwest Section of The Wildlife Society.
- Center for Environmental Management of Military Lands (CEMML). 2006. Technical Reference Manual: Ecological Monitoring on Military Lands. Range and Training Land Assessment Program, Center for Environmental Management of Military Lands, Colorado State University, Fort Collins. Available online at <https://www.cemml.colostate.edu/>.
- California Native Plant Society (CNPS) Vegetation Committee. 2005. California Native Plant Society – Vegetation Rapid Assessment Protocol. November 5, 2001, Revised November 21, 2005. Available online at <https://www.cnps.org/>.
- Cannings, D. 2005. The BC-Yukon Nocturnal Owl Survey 2005. Bird Studies Canada. Naramata, British Columbia. Available online at <https://www.bsc-eoc.org/download/BCOwlnews2005.pdf>.
- Colorado Division of Wildlife (CDOW). 2003. State of Colorado river otter recovery plan, June 2003. Unpublished report. Colorado Division of Wildlife, Denver, CO.
- Conn, P.B., A.D. Arthur, L.L. Bailey, and G.R. Singleton. 2006. Estimating the Abundance of Mouse Populations of Known Size: Promises and Pitfalls of New Methods. *Ecological Applications* 16:829–837.
- Converse, S.J., B.G. Dickson, G.C. White, and W. M. Block. 2004. Estimating small mammal abundance on fuel treatment units in southwestern ponderosa pine forests. Pg. 113-120. In C. van Riper III and K.L. Cole (editors). *The Colorado Plateau: cultural, biological and physical research*. University of Arizona Press, Tucson, AZ. Available online at [http://www.rmrs.nau.edu/publications/converse\\_2004/converse\\_2004.pdf](http://www.rmrs.nau.edu/publications/converse_2004/converse_2004.pdf).
- Conway, C.J. 2006. Standardized North American Marsh Bird Monitoring Protocols. Wildlife Research Report #2005-04. U.S. Geological Survey, Arizona Cooperative Fish and Wildlife Research Unit, Tucson, AZ. Available online at <https://ecos.fws.gov/ServCat/DownloadFile/45214?Reference=44474>.
- Conway, C.J. and J.P. Gibbs. 2005. Effectiveness of call-broadcast surveys for monitoring marsh birds. *Auk* 122:26–35.
- Conway, C.J. and T.E. Martin. 1999. The Value of Monitoring Demographic Parameters and Associated Habitat: The BBIRD Program. In Bonney, R., D.N. Pashley, R.J. Cooper, and L. Niles, eds. 1999. *Strategies for Bird Conservation: The Partners in Flight Planning Process*. Cornell Lab of Ornithology. Available online at <http://birds.cornell.edu/pifcapemay>.
- Conway, C.J. and C.P. Nadeau. 2006. Development and field testing of survey methods for a continental marsh bird monitoring program in North America. Wildlife Research Report # 2005-11. USGS Arizona Cooperative Fish

- and Wildlife Research Unit, Tucson. Available online at <https://ecos.fws.gov/ServCat/DownloadFile/104090?Reference=64546>.
- Cooperrider, A.Y., R.J. Boyd, and H.R. Stuart, compilers and editors. 1986. Inventory and Monitoring of Wildlife Habitat. USDI Bureau of Land Management Service Center, Denver, CO. 858 pp.
- Corbould, F.B. and P.E. Hengeveld. 1998. Donna Creek Winter Furbearer Surveys. Peace/Williston Fish and Wildlife Compensation Program Report No. 179. 20 pp. plus appendices. Available online at <https://www.bchydro.com/index.html>.
- Cornelissen, J.H.C., Lavorel, S., Garnier, E., Diaz, S., Buchmann, N., Gurvich, D.E., Reich, P.B., ter Steege, H., Morgan, H.D., van der Heijden, M.G.A., Pausas, J.G. and Poorter, H, Eds. 2003. Handbook of protocols for standardised and easy measurement of plant functional traits worldwide. Australian Journal of Botany 51:335-380.
- Costello, C.M., D.E. Jones, R.M. Inman, K.H. Inman, B.C. Thompson, and H.B. Quigley. 2003. Relationship of variable mast production to American black bear reproductive parameters in New Mexico. Ursus 14:1-16.
- Davis, D.E., II. 1982. Handbook of census methods for terrestrial vertebrates. CRC Press, Inc. Boca Raton, FL. 397 pp.
- Daw, S., S. Ambrose, M. Beer, and M.A. Powell. 2004. American Peregrine Falcon Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network. USDI National Park Service Inventory and Monitoring Program. Available online at <https://www.nps.gov/index.htm>.
- DeSante, D.F., K.M. Burton, P. Velez, and D. Froehlich. 2005. MAPS Manual. 2005 Protocol. Instructions for the Establishment and Operation of Constant-Effort Bird-Banding Stations as Part of the Monitoring Avian Productivity and Survivorship (MAPS) Program. The Institute for Bird Populations, Point Reyes Station, CA. Available online at <https://www.birdpop.org/pages/maps.php>.
- Dewey, S.A. and K.A. Andersen. 2004. Distinct Roles of Surveys, Inventories, and Monitoring in Adaptive Weed Management. Weed Technology 18:1449-1452.
- Diefenbach, D.R, D.W. Brauning, and J.A. Mattice. 2003. Variability in grassland bird counts related to observer differences and species detection rates. Auk 120:1168. Available online at <http://pacfwru.cas.psu.edu/scipubs/aukoct2003-detprob.pdf>.
- Dreitz, V.J., P.M. Lukacs, and F.L. Knopf. 2006. Monitoring Low Density Avian Populations: An Example Using Mountain Plovers. The Condor 108:700-706. Available online at <https://cnhp.colostate.edu/>.
- Dudley, J. and V. Saab. 2003. A field protocol to monitor cavity-nesting birds. Res. Pap. RMRS-RP-44. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 16 pp. Available online at [http://www.rmrs.nau.edu/publications/rmrs\\_rp044/rmrs\\_rp044.pdf](http://www.rmrs.nau.edu/publications/rmrs_rp044/rmrs_rp044.pdf).
- Duncan, N., T. Burke, S. Dowlan, and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan. Version 3.0 (2003). Available online at [https://www.blm.gov/or/plans/surveyandmanage/files/11-mollusks\\_v3\\_enclosed2.pdf](https://www.blm.gov/or/plans/surveyandmanage/files/11-mollusks_v3_enclosed2.pdf).
- Earnst, S.L., and J. Heltzel. 2005. Detection ratios of riparian songbirds. Pg. 781-786. In Ralph, C.J., Rich, T., Eds. Proceedings of the Third International Partners in Flight Conference: USDA Gen. Tech. Rep. PSW-GTR-191, Asilomar, CA, USDA Forest Service. Available online at <https://denix.osd.mil/dodpif/resources-and-information/articles/proceedings-of-the-third-international-partners-in-flight-conference/>.
- Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998. Measuring and Monitoring Plant Populations. Denver, Colorado, U.S. Department of the Interior, Bureau of Land Management. 477 pp. Available online at <https://www.ntc.blm.gov/krc/uploads/265/technical%20reference.pdf>.
- Elzinga, C.L.; Salzer, D.W.; Willoughby, J.W.; Gibbs, J.P. 2001. Monitoring plant and animal populations. Malden, MA: Blackwell Publishing. 368 p.
- Environmental Defense, Inc. and U.S. Fish and Wildlife Service. 2000. Minimum Procedures for Determining the Presence/Absence of Golden-cheeked Warblers and Black-capped Vireos. In Attachment 2, Survey and

Baseline Discussion for Golden-cheeked Warblers and Black-capped Vireos. Safe Harbor Agreement Between Environmental Defense, Inc. and The U.S. Fish And Wildlife Service to Provide Safe Harbor Assurances to Landowners in the Texas Hill Country Who Voluntarily Agree to Enhance Habitat for the Endangered Golden-Cheeked Warbler and Black-Capped Vireo (November 29, 2000). Available online at <https://www.edf.org/>.

- Erwin, R.M., C.J. Conway, S.W. Hadden, J.S. Hatfield, and S.M. Melvin. 2003. Waterbird Monitoring Protocol for Cape Cod National Seashore and other Coastal Parks, Refuges, and Protected Areas. A Protocol for the Long-term Coastal Ecosystem Monitoring Program at Cape Cod National Seashore. Long-term Coastal Ecosystem Monitoring Program, Cape Cod National Seashore, Wellfleet, MA. Available online at <http://www.nature.nps.gov/im/monitor/protocoldb.cfm>.
- Facka, A. N., P. L. Ford, and G. W. Roemer. 2008. A novel approach for assessing density and range-wide abundance of prairie dogs. *Journal of Mammalogy* 89:356-364.
- Farnsworth, G.L., K.H. Pollock, J.D. Nichols, T.R. Simons, J.E. Hines, and J.R. Sauer. 2002. A removal model for estimating detection probabilities from point-count surveys. *Auk* 119:414-425. Available online at <http://www.pwrc.usgs.gov/prodabs/ab04020902/5873%20Farnsworth.pdf>.
- Feldhamer, G.A., B.C. Thompson, and J.A. Chapman. 2003. *Wild Mammals of North America. Biology, Management, and Conservation*. Second Edition. Johns Hopkins Univ. Press, Baltimore, MD. 1213 pp.
- Fellers, G.M., and C.A. Drost. 1994. Sampling with artificial cover. Pages 146-150 In Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster. *Measuring and Monitoring Biodiversity: Standard Methods for Amphibians*. Smithsonian Institution Press, Washington, D.C. 364 pp.
- Finnamore, A.T., N.N. Winchester, and V.M. Behan-Pelletier. 1998. *Protocols for Measuring Biodiversity: Arthropod Monitoring in Terrestrial Ecosystems*. Environment Canada Ecological Monitoring and Assessment Network. Available online at <https://www.naturewatch.ca/fr/>.
- Flat-tailed Horned Lizard Interagency Coordinating Committee. 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 80 pp. plus appendices. Available online at [https://www.fws.gov/carlsbad/TEspecies/Documents/Flattailed\\_horned\\_lizard/PDFs/RMS%20-%20Final%202003.pdf](https://www.fws.gov/carlsbad/TEspecies/Documents/Flattailed_horned_lizard/PDFs/RMS%20-%20Final%202003.pdf).
- Forsman, E. D. 1983. Methods and materials for locating and studying spotted owls. Gen. Tech. Rep. PNW-162. Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, Portland, OR. Available online at [http://www.fs.fed.us/pnw/pubs/pnw\\_gtr162.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr162.pdf).
- Franklin, A.B., D.R. Anderson, E.D. Forsman, K.P. Burnham, and F.W. Wagner. 1996. Methods for collecting and analyzing demographic data on the Northern spotted owl. *Studies in Avian Biology* 17:12-20.
- Fuller, M., M.N. Kochert, and L. Ayers. 2001. Population Monitoring Plan for Golden Eagles in the Western United States. Unpublished report, Division of Migratory Bird Management, US Fish and Wildlife Service, Arlington, VA, 38 pp.
- Ganey, J.L. and M.A. Benoit. 2002. Using terrestrial ecosystem survey data to identify potential habitat for the Mexican spotted owl on National Forest System lands: a pilot study. Gen. Tech. Rep. RMRS-GTR-86. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 25 pp. Available online at [http://www.rmrs.nau.edu/publications/rmrs\\_gtr86/rmrs\\_gtr86.pdf](http://www.rmrs.nau.edu/publications/rmrs_gtr86/rmrs_gtr86.pdf).
- Ganey, J.L., G.C. White, D.C. Bowden, and A.B. Franklin. 2004. Evaluating methods for monitoring populations of Mexican spotted owls: a case study. Pg. 337-385. In W.L. Thompson (editor). *Sampling Rare and Elusive Species: Concepts, Designs, and Techniques for Estimating Population Parameters*. Island Press. Washington, DC. Available online at [http://www.rmrs.nau.edu/publications/ganey\\_2004b/ganey\\_2004b.pdf](http://www.rmrs.nau.edu/publications/ganey_2004b/ganey_2004b.pdf).
- Gibbs, J.P. 1998. Amphibian movements in response to forest edges, roads, and streambeds in southern New England. *Journal of Wildlife Management* 62:584-589.
- Gibbs, J.P., S. Droege, and P. Eagle. 1998. Monitoring populations of plants and animals. *BioScience* 48:935-940.
- Gibbs, J.P. 2000. Monitoring Populations. Chapter 7, Pg. 213-252. In L. Boitani and T.K. Fuller, Eds. *Research Techniques in Animal Ecology: Controversies and Consequences*. Methods and Cases in Conservation Science. Columbia Univ. Press, New York.

- Goldberg, C.S. and C.R. Schwalbe. 2004. Considerations for Monitoring a Rare Anuran (*Eleutherodactylus augusti*). The Southwestern Naturalist 49:442–448.
- Good, R.E., R.M. Nielson, H.H. Sawyer, and L.L. McDonald. 2004. Population Level Survey of Golden Eagles (*Aquila chrysaetos*) in the Western United States. Report prepared by Western EcoSystems Technology, Inc. for the U.S. Fish & Wildlife Service. Available online at [https://west-inc.com/reports/final\\_golden\\_eagle.pdf](https://west-inc.com/reports/final_golden_eagle.pdf).
- Gregory R.D., D.W. Gibbons, and P.F. Donald. 2004. Bird census and survey techniques. Pg. 17-56. In: Sutherland W.J., Newton I. and Green R. E. [Eds.]: Bird Ecology and Conservation; a Handbook of Techniques. - Oxford University Press, Oxford. Available online at <https://global.oup.com/ukhe/product/bird-ecology-and-conservation-9780198520863?cc=us&lang=en&>.
- Grossheusch, D.A. 2006. 2006 Western Great Lakes Region Owl Monitoring. 2006 Final Report. Produced for Minnesota Dept. of Natural Resources – Nongame Region 2, Wisconsin Dept. of Natural Resources – Wildlife Management, and Minnesota Ornithologists’ Union. Available online at <https://www.hawkridge.org/>.
- Guenzel, R.J. 1997. Estimating Pronghorn Abundance Using Aerial Line Transect Sampling. Wyoming Game and Fish Department, Cheyenne. 176 pp. Available online at <https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Handbook-BioTechniques/A02-LineTransect.pdf>.
- Guilfoyle, M.P., R.A. Fisher, D.N. Pashley, and C. Lott. 2004. Summary of interior least tern research and monitoring workshop. DOER Technical Notes Collection (TN-DOER-E17). U. S. Army Corp of Engineers Research and Development Center. Vicksburg, MS. Available online at [https://www.researchgate.net/publication/235209843\\_Summary\\_of\\_Interior\\_Least\\_Tern\\_Research\\_and\\_Monitoring\\_Workshop](https://www.researchgate.net/publication/235209843_Summary_of_Interior_Least_Tern_Research_and_Monitoring_Workshop).
- Gurnell, J., P. Lurz, and H. Pepper. 2001. Practical techniques for surveying and monitoring squirrels. Forestry Commission, Edinburgh. 12 pp. Available online at [https://treesforlife.org.uk/docs/079\\_360\\_practicaltechniquesforsurveyingandmonitoringsquirrels\\_1446049986.pdf](https://treesforlife.org.uk/docs/079_360_practicaltechniquesforsurveyingandmonitoringsquirrels_1446049986.pdf).
- Haber, E. 1997. Guide to Monitoring Exotic and Invasive Plants. Prepared for: Ecological Monitoring and Assessment Network, Environment Canada. Available online at <http://www.eman-rese.ca/>.
- Habich, E.F. 2001. Ecological site inventory, Technical reference 1734-7. Bureau of Land Management. Denver, Colorado. BLM/ST/ST-01/003+1734. 112 pp. Available online at <https://www.blm.gov/documents/national-office/blm-library/technical-reference/ecological-site-inventory>.
- Hamel, P.B., W.P. Smith, D.J. Twedt, J.R. Woehr, E. Morris, R.B. Hamilton, and R.J. Cooper. 1996. A Land Manager’s Guide to Point Counts of Birds in the Southeast. General Technical Report SO-1 20. USDA Forest Service Southern Research Station, New Orleans, LA. 39 pp. Available online at [http://www.srs.fs.fed.us/pubs/gtr/gtr\\_so120.pdf](http://www.srs.fs.fed.us/pubs/gtr/gtr_so120.pdf).
- Hartley, L. 2004. Designated sites and matrix strata important to aquatic birds in New Mexico. Prepared for the Coordinated Bird Monitoring project. Great Basin Bird Observatory, Reno, Nevada. In C.J. Ralph and T.D. Rich, Editors. Bird conservation implementation and integration in the Americas: Proceedings of the third international Partners in Flight conference. 2002 March 20-24; Asilomar, California; 2 volumes. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. Available online at [http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/Asilomar/](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/).
- Hathaway, S., R. Fisher, C. Rochester, C. Haas, M. Mendelsohn, G. Turschak, D. Stokes, M. Madden-Smith, E. Ervin, K. Pease, and C. Brown. 2004. Baseline biodiversity survey for the Santa Ysabel Ranch Open Space Preserve. USGS Technical Report. Prepared for The Nature Conservancy and San Diego County Department of Parks and Recreation. [https://www.sandiegocounty.gov/content/dam/sdc/parks/RMD/RMPs%20and%20Trails/Appendix\\_D.pdf](https://www.sandiegocounty.gov/content/dam/sdc/parks/RMD/RMPs%20and%20Trails/Appendix_D.pdf).
- Heilbrun, R.D., N.J. Silvy, M.J. Peterson, and M.E. Tewes. 2006. Estimating Bobcat Abundance Using Automatically Triggered Cameras. Wildlife Society Bulletin 34:69–73.
- Hendricks, P. and B.A. Maxell. 2005. Bat Surveys on USFS Northern Region Lands in Montana: 2005. Report to the USDA Forest Service, Northern Region. Montana Natural Heritage Program, Helena, MT. 12 pp. plus appendices. Available online at [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5130955.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5130955.pdf).
- Herrick, J.E., J.R. Brown, A.J. Tugel, P.L. Shaver, and K.M. Havstad. 2002. Application of Soil Quality to Monitoring and Management; Paradigms from Rangeland Ecology. Agronomy Journal 94:3-11.

- Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005. Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems. USDA-ARS Jornada Experimental Range, Las Cruces, NM. In two volumes. 236 pp. Volume I and Volume II available online at <https://jornada.nmsu.edu/monit-assess/manuals/monitoring>.
- Heyer, W.R., M. A. Donnelly, R. W. McDiarmid, L.-A. C. Hayek, and M. S. Foster (editors). 1994. Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Smithsonian Institution Press: Washington, DC. xix + 364 pp.
- Holycross, A.T. and C.W. Painter. 2000. Selected aspects of the autecology of the New Mexico ridgenose rattlesnake, *Crotalus willardi obscurus*. Unpublished Final Report to the New Mexico Dept. Game and Fish.
- Hopkins, H.L. and L.L. Kennedy. 2004. An assessment of indices of relative and absolute abundance for monitoring populations of small mammals. *Wildlife Society Bulletin* 32:1289-1296.
- Howe, M., J. Bart, S. Brown, C. Elphick, R. Gill, B. Harrington, C. Hickey, G. Morrison, S. Skagen, and N. Warnock, eds. 2000. A Comprehensive Monitoring Program for North American Shorebirds. Manomet Center for Conservation Sciences. Available online at <https://www.manomet.org/>.
- Hussell, D.J.T. and C.J. Ralph. 1995. Recommended methods for monitoring bird populations by counting and capture of migrants. N. Am. Migration Monitoring Council, Canadian Wildlife Service, Ottawa, Ontario, and US Geological Survey, Laurel, MD. Available online at <http://www.fs.fed.us/psw/topics/wildlife/birdmon/pif/migmon.shtml>.
- Jackman, R.E. and J.M. Jenkins. 2004. Protocol for Evaluating Bald Eagle Habitat and populations in California. US Fish and Wildlife Service, Endangered Species Division, Forest and Foothills Ecosystem Branch, Sacramento, CA. Available online at <https://www.wildlife.ca.gov/Conservation/Survey-Protocols>.
- Joyner, C.N. 2006. Bat Survey Needs Associated with Facility Disposal. Letter of June 16, 2006 to Forest Supervisors. Enclosure 1: Bat Species and Roosting Habits in Buildings; Enclosure 2: Surveying for Bats in Buildings. USDA Forest Service, Region 6, Portland, OR. Available online at [http://www.fs.fed.us/biology/resources/pubs/tes/Bat\\_Survey\\_Needs\\_Facility\\_Disposal\\_comments\\_2006.doc](http://www.fs.fed.us/biology/resources/pubs/tes/Bat_Survey_Needs_Facility_Disposal_comments_2006.doc).
- Keith, L.B., E.C. Meslow, and O.J. Rongstad. 1968. Techniques for snowshoe hare population studies. *Journal of Wildlife Management* 32:801-812.
- Lang, B.K. 2000. Status and Distribution of Terrestrial Snails of Southern New Mexico. Completion Report for Project E-36(1-5) submitted to US Fish and Wildlife Service, Division of Federal Aid, Albuquerque, NM. Endangered Species Program, Conservation Services Division, New Mexico Dept. Game and Fish, Santa Fe.
- Laymon, S.A. 1998. Draft yellow-billed cuckoo survey and monitoring protocol for California. Appendix B in Wiggins, D. (2005, March 25). Yellow-billed Cuckoo (*Coccyzus americanus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available online at <http://www.fs.fed.us/r2/projects/scp/assessments/yellowbilledcuckoo.pdf>.
- Lerich, S.P. 2006. Bibliography of literature pertaining to the scaled quail:1847-2006. Pg. 118-129. In J.W. Cain III and P.R. Krausman, Eds. *Managing Wildlife in the Southwest: New Challenges for the 21<sup>st</sup> Century*. Proc. Symposium, August 2005. Southwest Section of The Wildlife Society.
- Lewis, D.B., F. Gress, T. Ingram, G.L. Hunt, Jr., and D.W. Anderson. 1988. Seabird Monitoring Handbook. Channel Islands National Park, California. National Park Service, Channel Islands National Park, Dept. Wildlife and Fisheries Biology, Univ. Calif., Davis. Dept. Ecology and Evolutionary Biology, Univ. Calif., Irvine. 60 pp. plus 4 appendices. Available online at <https://www.nps.gov/index.htm>.
- Lewis, S.B., M.R. Fuller, and K. Titus. 2004. A comparison of 3 methods for assessing raptor diet during the breeding season. *Wildlife Society Bulletin* 32:373-385.
- Litvaitis, J.A. 2000. Investigating food habits of terrestrial vertebrates. Chapter 5, pp. 165-183. In L. Boitani and T.K. Fuller, Eds. *Research Techniques in Animal Ecology. Controversies and Consequences. Methods and Cases in Conservation Science*. Columbia Univ. Press, New York. Available online at [http://www.earthscope.org/r3/ES14780/05ch\(165-190\).pdf](http://www.earthscope.org/r3/ES14780/05ch(165-190).pdf).

- Magill, R.T. and M.D. Halterman. 1999. Natural History and Suggested Survey Methods for Western Yellow-billed cuckoos in Arizona. Draft unpublished manuscript. Arizona Game and Fish Department, Nongame Branch, Phoenix, AZ.
- Magle, S. B., B. McClintock, M. Antolin, D. Tripp, G. White, and K. R. Crooks. 2007. Mark-resight methodology for estimating population densities of prairie dogs. *Journal of Wildlife Management* 71:2067–2073.
- Manly, B.F.J., L.L. McDonald, and G.W. Garner. 1996. Maximum likelihood estimation for the double-count method with independent observers. *Journal of Agricultural Biological, and Environmental Statistics* 1:170-189.
- Martin, T.E., C.R. Paine, C.J. Conway, W.M. Hochachka, P. Allen, and W. Jenkins. 1997. BBIRD Field Protocol. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT, U.S.A. [https://www.fwspubs.org/doi/suppl/10.3996/102016-JFWM-079/suppl\\_file/10.3996102016-jfwm-079.s5.pdf](https://www.fwspubs.org/doi/suppl/10.3996/102016-JFWM-079/suppl_file/10.3996102016-jfwm-079.s5.pdf).
- Marsh, D.M. and M.A. Goicochea. 2003. Monitoring Terrestrial Salamanders: Biases Caused by Intense Sampling and Choice of Cover Objects. *Journal of Herpetology* 37:460–466.
- Massey, M. and B. Dunn. 2000. Survey for active lesser prairie-chicken leks: Spring 2000. Revised Report. New Mexico Department of Game and Fish, Santa Fe, New Mexico. 21 pp.
- Maxfield, B., T. Bonzo, C. McLaughlin, and K. Bunnell. 2005. Northern river otter management plan. Utah Division of Wildlife Resources, Salt Lake City. [https://wildlife.utah.gov/pdf/furbearer/otter\\_plan\\_2010-2020.pdf](https://wildlife.utah.gov/pdf/furbearer/otter_plan_2010-2020.pdf).
- McCallum, D.A. 2005. A Conceptual Guide to Detection Probability for Point Counts and Other Count-based Survey Methods. Pg. 754-761. In C.J. Ralph and T.D. Rich, Editors. *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*. 2002 March 20-24; Asilomar, California, Volume 1. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 651 pp. Available online at [http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/Asilomar/](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/).
- Miller, C.M. 2001. Jaguar track measurements: Investigation of a potential survey method. Gallon Jug, Belize. [http://eprints.uberibz.org/758/1/Jaguar\\_Track\\_Measurements\\_Investigation\\_of\\_a\\_Potential\\_Survey\\_Method.pdf](http://eprints.uberibz.org/758/1/Jaguar_Track_Measurements_Investigation_of_a_Potential_Survey_Method.pdf).
- Mills, L.S., P.C. Griffin, K.E. Hodges, K. McKelvey, L. Ruggiero, and T. Ulizio. 2005. Pellet count indices compared to mark-recapture estimates for evaluating snowshoe hare density. *Journal of Wildlife Management* 69:1053-1062.
- Moore, J.E., D.M. Scheiman, and R.K. Swihart. 2004. Field Comparison of Removal and Modified Double-Observer Modeling for Estimating Detectability and Abundance of Birds. *Auk* 121:865-876.
- Morrison, M. 2002. *Wildlife Restoration: Techniques for Habitat Analysis and Animal Monitoring*. Island Press, Washington D.C. 215 pp.
- Morrison, M.L., B.G. Marcot, and R.W. Mannan. 1992. *Wildlife Habitat Relationships: Concepts and Applications*. Univ. Wisconsin Press, Madison. 343 pp.
- Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. Available online at <https://www.natureserve.org/biodiversity-science/publications/invasive-species-assessment-protocol-evaluating-non-native-plants>.
- Moulton, C., R. Sallabanks, E. Ammon, and J. Bart. 2004. Idaho Bird Inventory and Survey (IBIS). A plan to implement Coordinated Bird Monitoring in Idaho. July 2004, Version 1.0. Prepared for the Idaho All-Bird Working Group.
- Murray, D.L., J.D. Roth, E. Ellsworth, A.J. Wirsing, and T.D. Steury. 2002. Estimating low-density snowshoe hare populations using fecal pellet counts. *Can. J. Zool.* 80:771–781.
- Natural Resources Conservation Service (NRCS). 1997. National pasture and range handbook, Rev. 1. Grazinglands Technical Institute, USDA Natural Resources Conservation Service. Available online at <http://www.glti.nrcs.usda.gov/technical/publications/nrph.html>.
- New Mexico Burrowing Owl Working Group. 2004. Recommended Burrowing Owl Survey and Monitoring Protocol. New Mexico Dept. Game and Fish.

- New Mexico Endemic Salamander Team. 2000. Cooperative Management Plan for the Jemez Mountains Salamander (*Plethodon neomexicanus*) on Lands Administered by the Forest Service. New Mexico Dept. Game and Fish, U.S. Fish and Wildlife Service, U.S. Geological Survey, and U.S.D.A. Forest Service.
- Nichols, J.D., J.E. Hines, J.R. Sauer, F.W. Fallon, J.E. Fallon, and P.J. Heglund. 2000. A double-observer approach for estimating detection probability and abundance from point counts. *Auk* 117:393-408.
- North American Amphibian Monitoring Program. 2005. Protocol. Patuxent Wildlife Research Center. Available online at <http://www.pwrc.usgs.gov/naamp>
- Norvell, R.E., F.P. Howe, and J.R. Parrish. 2003. A Seven-Year Comparison of Relative-Abundance and Distance-Sampling Methods. *Auk* 120:1013-1028.
- O'Brien, R.A. C.M. Johnson, A.M. Wilson, and V.C. Elsbernd. 2003. Indicators of rangeland health and functionality in the Intermountain West. Gen. Tech. Rep. RMRS-GTR-104. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 13 pp. Available online at [https://www.fs.fed.us/rm/pubs/rmrs\\_gtr104.pdf](https://www.fs.fed.us/rm/pubs/rmrs_gtr104.pdf).
- Ormsbee, P.C., A. Hart, L. Templeman, and J. Zinck. 2005. Guano collection techniques and analysis for conducting bridge surveys. Willamette N.F., USDA Forest Service, Eugene, OR and Portland State University, Portland, OR.
- Painter, C.W., New Mexico Dept. Game and Fish. 2006. Personal Communication to Randy Floyd, New Mexico Dept. Game and Fish, September 2006.
- Painter, C.W., L.A. Fitzgerald, H.L. Snell, D.S. Sias, and L.L. Pierce. 1999. Status of Sand Dune Lizards, *Sceloporus arenicolus* in Southeast New Mexico. US Fish and Wildlife Service, E-19/7. New Mexico Dept. Game and Fish Final Completion Report, 15 June 1999. Management Plan for the Sand Dune Lizard, *Sceloporus arenicolus* in New Mexico, plus appendices.
- Parmenter, R.R., T.L. Yates, D.R. Anderson, K.P. Burnham, J.L. Dunnum, A.B. Franklin, M.T. Friggens, B.C. Lubow, M. Miller, G.S. Olson, C.A. Parmenter, J. Pollard, E. Rexstad, T.M. Shenk, T.R. Stanley, and G.C. White. 2003. Small-Mammal Density Estimation: A Field Comparison of Grid-Based vs. Web-Based Density Estimators. *Ecological Monographs* 73:1-26.
- Pellant, M., P. Shaver, D. Pyke, and J. E. Herrick. 2000. Interpreting Indicators of Rangeland Health, Version 3.0. Interagency Technical Reference. U.S. Department of Interior, Bureau of Land Management, Denver, CO. Available online at <http://www.elkhornsloughctp.org/uploads/files/1125096771Rangeland%20health%20sm.pdf>.
- Pellant, M., P. Shaver, D. Pyke, and J. E. Herrick. 2005. Interpreting Indicators of Rangeland Health, Version 4.0. Interagency Technical Reference 1734-6. U.S. Department of Interior, Bureau of Land Management. National Science and Technology Center, Denver, CO. BLM/WO/ST-00/001+1734/REV05. 122 pp. Available online at [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1043944.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1043944.pdf).
- Persons, T.B. and E.M. Nowak. 2006. Inventory of amphibians and reptiles in southern Colorado Plateau national parks: U.S. Geological Survey, Southwest Biological Science Center, Colorado Plateau Research Station, Open File Report 2006-1132. 186 pp. Available online at [http://sbsc.wr.usgs.gov/files/pdfs/ofr\\_2006-1132.pdf](http://sbsc.wr.usgs.gov/files/pdfs/ofr_2006-1132.pdf).
- Petryszyn, Y. 1994. Bat Monitoring Protocol for the Ecological Monitoring Program in Organ Pipe Cactus National Monument, Arizona. Department of Ecology and Evolutionary Biology, Univ. Arizona, Tucson. Available online at <https://www.nps.gov/index.htm>.
- Pierce, L., New Mexico Dept. Game and Fish. 2006. Personal Communication to Randy Floyd, New Mexico Dept. Game and Fish, September 2006.
- Pierson, E.D. and W.E. Rainey. 1998. Distribution, Habitat Associations, Status, and Survey Methodologies for Three Molossid Bat Species (*Eumops perotis*, *Nyctinomops femorosaccus*, *Nyctinomops macrotis*) and the Vespertilionid (*Euderma maculatum*) Final Report. Prepared for California Department of Fish and Game, Wildlife Management Division, Bird and Mammal Conservation Program, Sacramento. Available online at <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2913>.



- Plumb, G.E., G.D. Willson, K. Kalin, K. Shinn, and W.M. Rizzo. 2001. Black-tailed Prairie Dog Monitoring Protocol for Seven Prairie Parks; Northern Prairie Wildlife Research Center Inventory and Monitoring Protocol. Available online at <https://www.nps.gov/index.htm>.
- Pollock, K.H., and W.L. Kendall. 1987. Visibility bias in aerial surveys: a review of estimation procedures. *Journal of Wildlife Management* 51:502-510.
- Pollock, K. H., Nichols, J. D., Brownie, C. Hines, J. E. (1990). Statistical inference for capture-recapture experiments. *Wildlife Monograph* 107:1-97.
- Pollock, K.H., J.D. Nichols, T.R. Simons, G.L. Farnsworth, L.L. Bailey, and J.R. Sauer. 2002. Large scale wildlife monitoring studies: statistical methods for design and analysis. *Environmetrics* 13:105-119. Available online at <http://www4.ncsu.edu:8030/~simons/Pollock%20et%20al.%20Environmetrics%202002.pdf>.
- Pruett, A. L., C. W. Boat, M. C. Wallace, H. A. Whitlaw, and J. D. Ray. 2009. Association of black-tailed prairie dogs (*Cynomys ludovicianus*) with playa lakes and a new approach to estimating size of populations. *Southwestern Naturalist* 54: 19-23.
- Pyke, D.A., J.E. Herrick, P. Shaver, and M. Pellant. 2002. Rangeland health attributes and indicators for qualitative assessment. *J. Range Manage.* 55:584-597. Available online at <http://fresc.usgs.gov/products/rangehealth/rangehealth.pdf>.
- Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of field methods for monitoring landbirds. U.S. Agric. For. Serv. PSW-GTR-144. Albany, CA. Available online at [https://www.birdpop.org/docs/pubs/Ralph et al 1993 Handbook of Field Methods for Monitoring Landbirds.pdf](https://www.birdpop.org/docs/pubs/Ralph%20et%20al%201993%20Handbook%20of%20Field%20Methods%20for%20Monitoring%20Landbirds.pdf).
- Ralph, C.J., S. Droege, and J.R. Sauer. 1995. Managing and monitoring birds using point counts: standards and applications. Pages 161-168 in C. J. Ralph, J. R. Sauer, and S. Droege, editors. *Monitoring Bird Populations by Point Counts*. USDA Forest Service General Technical Report PSW GTR 149. Pacific Southwest Research Station. Available online at <https://www.fs.usda.gov/treearch/pubs/31461>.
- Riddle, B.R., Ed. 1995. Inactive mines as bat habitat: guidelines for research, survey, monitoring and mine management in Nevada. Biological Resources Research Center, University of Nevada, Reno.
- Rivera-Milan, F.F. 1995. Spatial and temporal variation in the detectability and density of Columbids in Puerto Rico and on Vieques Island. *Ornitologia Neotropical* 6:1-17.
- Roberts-Pichette, P. and L. Gillespie. 1999. Terrestrial Vegetation Biodiversity Monitoring Protocols. Environment Canada, Ecological Monitoring and Assessment Network. Vegetation Monitoring Protocols Working Group of the Biodiversity Science Board of Canada. Available online at <https://www.nps.gov/index.htm>.
- Rosenberg, K.V. and P.J. Blancher. 2005. Setting Numerical Population Objectives for Priority Landbird Species. Pg. 57-67. In C.J. Ralph and T.D. Rich, Editors. *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*. 2002 March 20-24; Asilomar, California, Volume 1. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 651 pp. Available online at [http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/Asilomar/](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/).
- Rosenstock, S.S., D.R. Anderson, K.M. Giesen, T. Leukering, and M.F. Carter. 2002. Landbird Counting Techniques: Current Practices and an Alternative. *The Auk* 119:46-53.
- Row, J.R. and G. Blouin-Demers. 2006. An Effective and Durable Funnel Trap for Sampling Terrestrial Herpetofauna. *Herpetological Review* 37:183-185. [https://www.researchgate.net/publication/286700742\\_An\\_effective\\_and\\_durable\\_funnel\\_trap\\_for\\_sampling\\_terrestrial\\_herpetofauna](https://www.researchgate.net/publication/286700742_An_effective_and_durable_funnel_trap_for_sampling_terrestrial_herpetofauna).
- Royle, J.A. and J.D. Nichols. 2003. Estimating Abundance from Repeated Presence-Absence Data or Point Counts. *Ecology* 84:777-790.

- Russell, J.C. 2003. A Recent Survey of Methods for Closed Populations of Small Mammals. Unpubl. Diss. to STATS776 Animal Abundance Course (A), University of Auckland, Auckland. 38 pp. Available online at <https://www.auckland.ac.nz/en.html>.
- Ryan, T. J., T. Philippi, Y. A. Leiden, M. E. Dorcas, T. B. Wigley, and J. W. Gibbons. 2001. Monitoring herpetofauna in a managed forest landscape: effects of habitat types and census techniques. *Forest Ecology and Management* 167:83-90.
- Saunders, E.J. 2001. Population estimate and habitat associations of the long-billed curlew (*Numenius americanus*) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 25, Edmonton, AB. Available online at <https://open.alberta.ca/publications/0778518434>.
- Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, Eds. 2002. Field Book for Describing and Sampling Soils, Version 2.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. Available online at <https://water-research.net/course/FieldBookVer2.pdf>.
- Schultz, C. and R. Leivad. 2001. Black Swift survey protocol. Appendix B. In Wiggins, D. 2004. Black Swift (*Cypseloides niger*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available online at <http://www.fs.fed.us/r2/projects/scp/assessments/blackswift.pdf>.
- Seglund, A., J. Alston, A. Kozlowski, F.P. Howe, E. Ammon, and J. Bart. 2005. Coordinated Bird Monitoring in Utah. Utah Div. Wildlife Resources Great Basin Bird Observatory, and Snake River Field Station.
- Severson, K.E. and G.E. Plumb. 1998. Comparison of methods to estimate population densities of black-tailed prairie dogs. *Wildlife Society Bulletin* 26:859-866.
- Sibbald, S., P. Carter and S. Poulton. 2006. Proposal for a National Monitoring Scheme for Small Mammals in the United Kingdom and the Republic of Eire. The Mammal Society Research Report No. 6. 90 pp. Available online at <http://www.jncc.gov.uk/pdf/Small%20Mammal%20Monitoring%202006.pdf>.
- Silver, S. 2004. Assessing jaguar abundance using remotely triggered cameras. Jaguar Conservation Program, Wildlife Conservation Society. Available online at [https://www.academia.edu/5141653/Assessing\\_jaguar\\_abundance\\_using\\_remotely\\_triggered\\_cameras](https://www.academia.edu/5141653/Assessing_jaguar_abundance_using_remotely_triggered_cameras) Table of Contents.
- Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbitts. 1997. A southwestern willow flycatcher natural history summary and survey protocol. U.S. Dept. of the Interior, National Biological Service, Colorado Plateau Research Station. Technical Report NPS/NAUCPRS/NRTR-97/12. 37 pp. Available online at <https://pubs.usgs.gov/tm/tm2a10/pdf/tm2a10.pdf>.
- Sorrells, L.R. and S.M. Glenn. 1990. Annotated Bibliography of Techniques for Sampling Grassland Plant Communities. Unpublished Report, Oklahoma Biological Survey, Norman, OK.
- Spaeth, K.E. 2003. New proposed national resources inventory protocols nonfederal rangelands. *Journal of Soil and Water Conservation* January 2003.
- Stambaugh, C. and J. Schieck. 2006. Field Test of Terrestrial Arthropod (Springtails and Mites) Data Collection Methods and Protocols Proposed for the ABMP. Integrated Resource Management Alberta Research Council Vegreville, AB. 24 pp. Available online at [https://ftp-public.abmi.ca/home/publications/documents-org/315\\_Stambaugh\\_2006\\_TestingSoilArthropodFieldProcedures\\_ABMI.pdf](https://ftp-public.abmi.ca/home/publications/documents-org/315_Stambaugh_2006_TestingSoilArthropodFieldProcedures_ABMI.pdf).
- Steenhof, K., L. Bond, K.K. Bates, and L.L. Leppert. 2002. Trends in midwinter counts of bald eagles in the contiguous United States, 1986-2000. *Bird Populations* 6:21-32.
- Steinkamp, M., B. Peterjohn, V. Byrd, H. Carter, and R. Lowe. 2003. Breeding Season Survey Techniques for Seabirds and Colonial Waterbirds throughout North America. *Waterbird Conservation for the Americas Initiative*.
- Steinkamp, M., P. Frederick, K. Parsons, H. Carter, and M. Parker. 2005. The Challenges of Standardizing Colonial Waterbird Survey Protocols – What is Working? What is Not? Pg. 1006-1007. In C.J. Ralph and T.D. Rich, Editors. *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*. 2002 March 20-24; Asilomar, California, Volume 1. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of

- Agriculture. 651 pp. Available online at [http://www.fs.fed.us/psw/publications/documents/psw\\_gtr191/Asilomar/](http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/).
- Stevens, L.E., Stacey, P.B., Jones, A. L., Duff, D., Gourley, C., and J.C. Catlin. 2005. A protocol for rapid assessment of southwestern stream-riparian ecosystems. Pg. 397-420. In Charles van Riper III and David J. Mattsen, Eds. Proceedings of the Seventh Biennial Conference of Research on the Colorado Plateau titled The Colorado Plateau II, Biophysical, Socioeconomic, and Cultural Research. Tuscon, AZ: University of Arizona Press. Available online at <https://uapress.arizona.edu/book/the-colorado-plateau-ii>.
- Stohlgren, T.J., M.B. Falkner, and L.D. Schell. 1995. A modified Whittaker nested vegetation sampling method. Vegetation 117:113-121. In Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005. Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems. USDA-ARS Jornada Experimental Range, Las Cruces, NM. In two volumes. 236 pp. Volume I available online at <https://jornada.nmsu.edu/monit-assess/manuals/monitoring>.
- Stokes, D.C., C.S. Brehme, and R.N. Fisher. 2003. Bat Inventory of the Point Loma Peninsula Including the Cabrillo National Monument. San Diego Field Station, USGS Western Ecological Research Center. Final Report Prepared for Cabrillo National Monument, National Park Service. 35 pp. Available online at [http://www.werc.usgs.gov/sandiego/pdfs/cabr\\_bat\\_report\\_final\\_vRNf.pdf](http://www.werc.usgs.gov/sandiego/pdfs/cabr_bat_report_final_vRNf.pdf).
- Strindberg, S., S.T. Buckland, and L. Thomas. 2004. Design of distance sampling surveys and Geographic Information Systems. Pages 190-228. In S.T. Buckland, D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers, and L. Thomas, Editors. Advanced Distance Sampling. Oxford University Press, Oxford.
- Stuart, J.N. 2005. Bat Bibliography -- New Mexico. New Mexico Dept. Game and Fish, Santa Fe.
- Takats, D.L., C.M. Francis, G.L. Holroyd, J.R. Duncan, K.M. Mazur, R.J. Cannings, W. Harris, and D. Holt. 2001. Guidelines for Nocturnal Owl Monitoring in North America. Beaverhill Bird Observatory and Bird Studies Canada, Edmonton, Alberta. 32 pp. Available online at [https://www.researchgate.net/publication/270822838\\_Guidelines\\_for\\_Nocturnal\\_Owl\\_Monitoring\\_in\\_North\\_America](https://www.researchgate.net/publication/270822838_Guidelines_for_Nocturnal_Owl_Monitoring_in_North_America).
- Takats Priestley, L. 2004. Alberta Nocturnal Owl Survey. Instruction booklet. Beaverhill Bird Observatory. Environment Canada, Bird Studies Canada, and Alberta Sustainable Resource Development. Available online at <http://beaverhillbirds.com/media/1186/abnoctowlsurvey04manual.pdf>.
- Thomas, D.W. and S.D. West. 1989. Sampling methods for bats. Gen. Tech. Rep. PNW-GTR-243. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 pp. Available online at [http://www.fs.fed.us/pnw/pubs/pnw\\_gtr243.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr243.pdf).
- Thomas, L., S.T. Buckland, K.P. Burnham, D.R. Anderson, J.L. Laake, D.L. Borchers & S. Strindberg. 2002. Distance sampling. Pg. 544-552. In Encyclopedia of Environmetrics. A.H. El-Shaarawi & W. W. Piegorsch. John Wiley & Sons, Chichester. Available online at <https://onlinelibrary.wiley.com/doi/book/10.1002/9780470057339>.
- Thomas, L., G. Geupel, N. Nur, and G. Ballard. 2004. Optimizing the allocation of count days in a migration monitoring program. Pg. 97-111. In Ralph, C.J. and E.H. Dunn (Eds.), Monitoring Bird Populations Using Mist Nets. Studies in Avian Biology 29. Cooper Ornithological Society.
- Thompson, W.L. 2002. Towards reliable bird surveys: Accounting for individuals present but not detected. Auk 119:18-25.
- Thompson, W.L.; G.C. White, and C. Gowan. 1998. Monitoring vertebrate populations. San Diego, CA: Academic Press. 365 pp.
- Townsend, S.E. and T.A. Switalski. 2004. Guidelines for Wildlife Monitoring Following Road Decommissioning. Wildlands CPR. Available online at [https://www.researchgate.net/publication/228753448\\_Guidelines\\_for\\_wildlife\\_monitoring\\_following\\_road\\_decommissioning](https://www.researchgate.net/publication/228753448_Guidelines_for_wildlife_monitoring_following_road_decommissioning).
- Trites, A.W. and R. Joy. 2005. Dietary analysis from fecal samples: how many scats are enough? Journal of Mammalogy 86:704-712.
- Tuttle, M.D. 2004. North American Bat Conservation Partnership State Planning Guide for Bats. Unpublished report. 18 pp. Available online at <http://www.batcon.org>.

- U.S. Fish and Wildlife Service. (USFWS). 1980. Habitat Evaluation Procedures. ESM 102. Division of Ecological Services, U.S. Fish and Wildlife Service, Washington, D.C. Available online at <http://www.fws.gov/policy/ESMindex.html>.
- USFWS. 1989. Management guidelines and inventory protocols for the Mexican spotted owl in the southwestern region. Federal Register 54 FR 27416.
- USFWS. 1995. Recovery plan for the Mexican spotted owl. U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, NM. Available online at <https://www.fws.gov/southwest/es/arizona/Documents/RecoveryPlans/MexicanSpottedOwl.pdf>.
- USFWS, Otero County, the Village of Cloudcroft, and U.S. Forest Service. 2004. Conservation Plan for the Sacramento Mountains Checkerspot Butterfly (*Euphydryas anicia cloudcrofti*). Albuquerque, New Mexico. 80 pp. Exhibit "B": Guidance for conducting surveys to document the presence of the Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*). Available online at [https://www.fws.gov/southwest/es/NewMexico/documents/SMCB\\_Final\\_11\\_1\\_05.pdf](https://www.fws.gov/southwest/es/NewMexico/documents/SMCB_Final_11_1_05.pdf).
- USFWS. 2000. Southwestern Willow Flycatcher Protocol Revision. U.S. Fish and Wildlife Service, Region 2. <https://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/SWWFlycatcher.2000.protocol.pdf>.
- USFWS. 2002. Mountain Plover Survey Guidelines. U.S. Fish and Wildlife Service. Denver, CO. 7 pp. In BLM. 2005. Wildlife Survey Protocol for Coal Bed Natural Gas Development. Powder River Basin Wildlife Taskforce. Available online at: <http://www.oilandgasbmps.org/docs/WY036-PowderRiverBasinWildlifeSurveyProtocol.doc>.
- USFWS. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. US Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 pp. Available online at <https://www.fws.gov/endangered/esa-library/pdf/Peregrineplan2003.pdf>.
- USFWS. 2005. Long-billed curlew Implementation Guidelines 2005. U.S. Fish and Wildlife Service, Mountain-Prairie Region. Available online at [https://www.fws.gov/mountain-prairie/migbirds/species/birds/longbilled\\_curlew/](https://www.fws.gov/mountain-prairie/migbirds/species/birds/longbilled_curlew/).
- U.S. Forest Service (USFS). 1999. Conservation Assessment and Strategy, Wet Canyon talussnail *Sonorella macrophallus* (Gastropoda: Pulmonata: Helminthoglyptidae). Pinaleno Mountains, Graham County, Arizona. USDA Forest Service, Coronado National Forest, Safford Ranger District. Available online at [https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/WetCanyonTalussnail/WetCanyon\\_TS\\_CA&S1.pdf](https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/WetCanyonTalussnail/WetCanyon_TS_CA&S1.pdf).
- Vesely, D., B.C. McComb, C.D. Vojta, L.H. Suring, J. Halaj, R.S. Holthausen, B. Zuckerberg, and P.M. Manley. 2006. Development of Protocols to Inventory or Monitor Wildlife, Fish, or Rare Plants. Gen. Tech. Rep. WO-72. Washington, DC: USDA Forest Service. 100 pp. Available online at [https://www.fs.fed.us/rm/pubs\\_series/wo/wo\\_gtr072.pdf](https://www.fs.fed.us/rm/pubs_series/wo/wo_gtr072.pdf).
- Ward, J.P. Jr., A.B. Franklin, S.E. Rinkevich, and F. Clemente. 1995. Distribution and abundance of Mexican spotted owls. Chapter 1:1–14 In Recovery Plan for the Mexican spotted owl (*Strix occidentalis lucida*). Vol II—Technical supporting information. U.S. Department of Interior Fish and Wildlife Service, Albuquerque, NM. Available [https://www.researchgate.net/publication/264934392\\_Distribution\\_and\\_abundance\\_of\\_Mexican\\_spotted\\_owls](https://www.researchgate.net/publication/264934392_Distribution_and_abundance_of_Mexican_spotted_owls).
- Wauer, R.H., and J.M. Wunderle, Jr. 1992. The effect of Hurricane Hugo on bird populations on St. Croix, U. S. Virgin Islands. Wilson Bulletin 104:656-673.
- Weise, C.D. 2005. Roost counts and occurrence of bats of the Genus *Leptonycteris* in New Mexico. Final report for the New Mexico Department of Game and Fish, Grants for Endangered and Threatened Species.
- Western Association of Fish and Wildlife Agencies .2004. Greater Sage Grouse Lek Survey and Count Methodology. Developed by Western Association of Fish and Wildlife Agencies and locally adapted by the Wyoming Game and Fish Department. In BLM. 2005. Wildlife Survey Protocol for Coal Bed Natural Gas Development. Powder River Basin Wildlife Taskforce. Available online at [http://www.cbmclearinghouse.info/docs/BLM\\_Data/WildlifeSurveyProtocol.pdf](http://www.cbmclearinghouse.info/docs/BLM_Data/WildlifeSurveyProtocol.pdf).
- White, G. C. 1996. NOREMARK: population estimation from mark-resighting surveys. Wildlife Society Bulletin. 24:50-52.
- Williams, S.O., III. 1997. Suggested protocol for surveying Mountain Plovers in New Mexico. New Mexico Department of Game and Fish, Santa Fe, NM.

- Williams, B.K., J.D. Nichols, and M.J. Conroy. 2002. Analysis and management of animal populations. Academic Press, San Diego.
- Wintle, B.A., M.A. McCarthy, K.M. Parris, and M.A. Burgman. 2004. Precision and Bias of Methods for Estimating Point Survey Detection Probabilities. *Ecological Applications* 14:703–712.
- Wilson, D.E., F.R. Cole, J.D. Nichols, R. Rudram, and M.S. Poster (Eds.). 1996. Measuring and monitoring biological diversity. Standard methods for mammals. Washington, D.C. Smithsonian Institution Press. 409 pp. Includes bibliographical references (p. 355-390).
- Winter, K. and L. Hargrove. 2004. Gray Vireo (*Vireo vicinior*). In The Coastal Scrub and Chaparral Bird Conservation Plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California. Calif. Partners in Flight. Available online at <http://www.prbo.org/calpif/htmldocs/scrub.html>.
- Woodward, H.D., S.H. Stoleson, J. Kelly and D. Finch. 2003. Quantifying an enigma: evaluating the efficacy of survey methods for Yellow-billed Cuckoos. Proceedings of the One Hundred and Twentieth Stated Meeting of the American Ornithologist's Union, 24-28 September 2002. Hotel Intercontinental, New Orleans. Supplement to The Auk, Volume 120, No. 2, April 2003: The Proceedings – 2002 Meeting.
- Young, J., A. Noson, A. Cilimburg, R. Hutto, and D. Casey. 2005. A Plan for Coordinated All-Bird Monitoring in Montana. Version 3.0, March 25, 2005. Prepared for the Montana CBM Steering Committee. Available online at <http://fwp.mt.gov/fwpDoc.html?id=44560>.
- Young, K.E., B.C. Thompson, A. Lafón Terrazas, A.B. Montoya, and R. Valdez. 2004. Aplomado falcon abundance and distribution in the northern Chihuahuan Desert of Mexico. *Journal of Raptor Research* 38:107-117.
- Zielinski, W.J. and T.E. Kucera. 1995. American Marten, Fisher, Lynx, and Wolverine: Survey Methods for Their Detection. General Technical Report PSW GTR-157. USDA Forest Service, Pacific Southwest Research Station. Available online at [https://www.fs.fed.us/psw/publications/documents/psw\\_gtr157/psw\\_gtr157.pdf](https://www.fs.fed.us/psw/publications/documents/psw_gtr157/psw_gtr157.pdf).
- Zorn, P., V. Blazeski, and B. Craig. 2004. Joint EMAN/Parks Canada National Monitoring Protocol for Plethodontid Salamanders. Environment Canada, Ecological Monitoring and Assessment Network. Available online at [http://publications.gc.ca/collections/collection\\_2014/ec/En14-144-2004-eng.pdf](http://publications.gc.ca/collections/collection_2014/ec/En14-144-2004-eng.pdf).