

Bird Monitoring in Rocky Mountain National Park

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Background

Rocky Mountain National Park (RMNP) initiated a raptor and owl monitoring program in 1988 and a songbird monitoring program in 1993. Before 1988 there was no long-term monitoring program other than work on white-tailed ptarmigan (see information below). However, there were a number of research projects related to birds (reports, thesis and dissertations are in the park library). The protocols for songbird monitoring were modified in 1994, and the modified design was used to survey breeding bird through 2000. In 1998, RMNP became a funding partner for Monitoring Colorado Birds (MCB). Other funding partners include Rocky Mountain Bird Observatory, Colorado Division of Wildlife, U.S.D.S. Forest Service, and the Bureau of Land Management. The MCB program is intended to continue for the foreseeable future. Four of RMNP's point count transects are part of the statewide MCB program (see description of point count transects).

In 2000, Rocky Mountain National Park (RMNP) staff requested that the U.S. Geological Survey undertake an external scientific review of the existing monitoring program design and protocols (Kotliar 2000, park files). This review coincided with a new initiative in the National Park Service to develop a standardized national monitoring program at national parks across the U.S. The parallel efforts to evaluate current monitoring programs provided an opportunity to assess the RMNP avian monitoring program in the context of the broader monitoring initiative. In turn, the review of RMNP avian monitoring program (AMP) can provide guidance to national efforts on: 1) procedures for evaluating monitoring programs, 2) identification of potential deficiencies that may be common to existing programs, and 3) recommendations for improvements.

The goal of the National Park Service's (NPS) monitoring initiative is to improve inventory and monitoring activities to provide scientifically credible information on the status and trends of NPS resources (Fancy 2000). Indeed, recent legislation calls for the NPS to "*...undertake a program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources. The monitoring program shall be developed in cooperation with other Federal monitoring and information collection efforts to ensure a cost-effective approach*" (National Parks Omnibus Management Act of 1998). The monitoring initiative is based on the recognition that an understanding of the condition of natural resources is fundamental to protection and management of National Parks (Fancy 2000). Long-term ecosystem monitoring is necessary for making informed management decisions and providing early warnings of abnormal conditions. Thus, an important goal of NPS monitoring is to develop ecological "vital signs" to assess present and future health of, and establish normal limits in, resource variation (Fancy 2000). This provides baseline data for assessing long-term trends and detecting significant unnatural changes both, within and among National Parks. In addition, NPS monitoring can provide information on relatively pristine conditions for comparison with monitoring programs outside National Parks.

A critical component of any monitoring program is periodic review by experts (Fancy 2000). This will help ensure that the data are scientifically sound and will withstand scientific and public scrutiny. For example, credible data are necessary for demonstrating that environmental changes are real and not artifacts of sampling design, or justifying controversial management actions (Noon 1999, Fancy 2000). Another key component of credible monitoring programs is quality assurance and control. Both of these essential components are often neglected, resulting in unreliable data sets (Fancy 2000).

Specific objectives of RMNP's bird monitoring program are to:

- 1) Ensure that the current avian monitoring program is achieving the park's inventory and monitoring objectives.
- 2) Quantify the levels of population change that can be detected with the existing protocols.
- 3) Identify techniques and design considerations that can help to improve the power and efficiency of the monitoring program.
- 4) Provide recommendations on database management, including opportunities to integrate RMNP's database into newly developed state and national monitoring database networks.
- 5) Continue to be an active partner in the Monitoring Colorado Birds (MCB) program and Colorado Partners-in-Flight.
- 6) Facilitate the integration of the avian monitoring program with other monitoring programs at RMNP to provide greater opportunities to detect and understand ecosystem dynamics.
- 7) Keep common birds common!

Current RMNP Avian Monitoring Program

Table 1 is a timeline for all bird monitoring that is ongoing as of January 1, 2003.

Table 1. Start and Ending Dates for Different Types of Monitoring

	March	April	May	June	July	August	Sept.
Type of Monitoring							
Birds of Prey – breeding owls, eagles, hawks, falcons, osprey	Start ~ March 24	Continue	Continue	Continue	End of the month		
Aspen Cavity Nesting Survey			Start May 15	Continue	Stop July 31		
N. Goshawk Survey				Start June 1	Stop July 31		
Point Count Transects				Start June 1	End July 15		
White-tailed Ptarmigan Survey			May 15	To June 15	Start July 15	End Sept 30	
Black Swift Survey						Start August 15	End Sept. 20
Constant Effort Mist Netting						Start August 15	End Sept. 30
Monthly one day count on Cow Creek Trail (Year round)							
Water fowl survey			May 15	Continue	End July 15		
Sandhill Crane, Sora and				Starts	Ends		

	March	April	May	June	July	August	Sept.
Virginia Rail Survey				June 1	July 31		
Christmas Bird Count (only occurs in December)							

Following are established protocols for each segment of the bird-monitoring program. It is important to note that as new monitoring techniques become available based on peer reviewed research, adjustments to the program may occur. For example, in 2000, distance estimates were changed for point counts. Circular plots are presently used at point count stations and distance from the observer to the bird is noted.

Raptor Productivity Monitoring – Monitoring starts on or about the third week of March depending on the behavior of raptors. Monitoring begins in the Lumpy Ridge for raptors that nest on cliffs also used by rock climbers. Initial raptor closures for the following rock formations in the Lumpy ridge area are established by the third week in March and stay in effect until April 30: Twin Owls, Rock One, Thunder Buttress, Checkerboard Rock, Lightning Rock, Batman Rock, Batman Pinnacle, and Sheep Mountain. Once raptors begin full time incubation, cliffs unoccupied that were initially closed, will be reopen. Cliffs with active nests will have an extended closure from April 30 to at least July 15. Closures stay in effect until two-weeks after young-of-the-year fledge. For example in 2003, Twin Owls and Rock One rock formations will remain closed until mid-July, while Checkerboard, Lightning Rock, Batman Rock and Batman Pinnacle were reopened. Sheep Mountain closure is usually closed for raptors, but also closed for bighorn sheep that lamb on the upper cliffs.

The Resource Management and Research Division is responsible to determine exact nesting locations during March and April, refine closures and monitor nests until young of the year fledge. Monitoring of active nests continue for two weeks after fledging and then the remaining climbing closures are lifted.

The Visitor Protection Division enforces the closures. The raptor database and previous year's field notes (presently located in the Roll Building should be consulted for known nest locations. Red-tail hawk nests usually become active the later part of April and into May. All known red-tailed hawk nests are surveyed initially for activity. Once the active nests are determined and hawks are well into incubation the inactive nests are no longer checked. Hatching usually takes place the latter part of May and early June with fledging usually by mid-July.

When hatching dates are being reached for raptors, the nests are checked once a week. After hatching, nests are checked once every other week. Once close to fledging, nests are checked once a week until fledging is confirmed. It may be necessary to check nests more than once a week. Osprey nests are checked in June through July. For other raptors or owls, nests are observed when active nests are found. Previously known nests are checked every year. For example, the witches broom used by great-horned owls near Cascade Cottages. Nest sites are GPSed and entered into the raptor database. Specific information such as type of tree the nest is located in, height of nest in the tree and height of tree are also noted. Dates are noted for beginning incubation, hatching, and fledging.

Northern Goshawk Survey – Survey work usually starts the first week of June. Areas of the park where goshawks are known to occur are surveyed by using taped calls of the goshawk played in the cassette tape and megaphone. The cassette player and megaphone is in the equipment locker. Areas known-to-be-occupied by breeding goshawks are surveyed with known nests checked every year. If active nests are not found, the breeding area of each pair of goshawks are surveyed by walking transects through the area 100 meters apart. Observer stops every 100 meters and plays the tape for five minutes. If time permits other potential habitat where goshawks have not been noted but suspected to occur are surveyed. When a goshawk responds to the taped call, a more intensive survey is conducted in concentric circles from around the initial response until a nest is located. An active nest is then checked as described in raptor nest section above.

Aspen Cavity Nest Survey – Monitoring in aspen groves on the elk winter range started in 1997. Monitoring usually starts the middle of May and continues through at least mid-July. Aspen trees with known tree cavities from previous surveys have been GPSed and some are marked with a small tag at the base of the tree, usually on the north side. Known trees will be relocated and cavities checked for activity. If a cavity is active, the cavity is rechecked to determine hatching and fledging success. Some birds such as sapsuckers and mountain bluebirds are caught and color banded to monitor individual species. Locations of aspen trees not previously documented are documented by GPS and entered into the cavity nesting database. Work is usually completed by the Rocky Mountain Bird Observatory through a task agreement.

Point Counts – In 1993, a general avian monitoring program was initiated by establishing individual point counts in major cover types of RMNP. In 1994, the design of the monitoring program was modified; transects were established from a randomly located starting point. Points were added on either side of the starting point (spaced 250 m apart) such that transects started within one mile of a trailhead or road. All points within a transect were located within a single cover type. Thus, transects varied in length (i.e., number of points) depending on the size of the patch sample. Additional points were added in 1996 and 1999. The UTM coordinates of all points have been recorded using a GPS unit.

The survey period is between June 1 and July 15. Transects are surveyed between 0530 and 0900. From 1993 to 1999, points were surveyed for 5 minutes (broken into 0-3 min, and >3-5 min segments). From 1993-1999, distances were recorded as either < 50 m, or > 50 m from the point center. However, in small patches, the larger distance category was constrained by the size of the patch (only birds observed in the vegetation cover type surveyed were recorded). Thus, the larger distance category varied with patch size.

In 1998 two of the point count transects became part of the Monitoring Colorado Bird program, one in aspen and one in spruce/fir. In 2002 two more were added, another in spruce fir and one in alpine tundra. Each MCB transect is 3500 meters long (2.33 miles) and composed of 15 points. The transects are designed to allow partners to obtain large samples of the fairly common and widespread breeding species of the state. The rest of RMNP's transects follow the same protocols of the MCB program.

In 2000, following meetings with USGS and NPS scientists, new distance categories were recorded (0-10 m, >10-25 m, >25-50 m, >50-75m, >75-100 m, >100m). All birds within seeing and hearing distance of the point count station are documented regardless of the habitat type. Distances are either visually estimated based on the observers confidence, or documented with a Bushnell Laser Yardage Pro 500 Range Finder. If the bird is not visible but heard, distance to the bird with the range finder is calculated by distance from the observer to the tree where the bird is thought to be perched. If distance is visually estimated without a range finder, observers are required to calibrate their ocular estimates each year with a range finder. The distance categories enable correction for detection differences among cover types and observers. In addition, this eliminates the bias in sampling radius among different size patches. In 2000, transects when possible were adjusted to include 15 point count stations to meet Monitoring Colorado Bird protocols.

There are currently 41 transects being monitored one time during the breeding bird season. Transects vary in length from six to 24 point count stations with most transects being 15. With each transect, point count stations are 250 meters apart. All birds seen or heard are documented by the distance categories and during 7.5 minutes. Birds are noted by time intervals that are split from 0 to 3 minutes, > 3 to 5 minutes and > 5 to 7.5 minutes. A copy of the bird monitoring form is in park files. All birds that fly over or through the point are also documented during the 7.5 minute count.

The following data is collected by point count station: time of start of the point count, species of bird, number of a species observed, how birds were detected (call, song, observed, drumming etc.), and sex (male, female, juvenile, pair). Weather and wind conditions are also noted. If wind speed is strong enough to move trunks of trees, the count is postponed. If it is raining, the count is postponed.

Table 2. List of point count transects currently being monitored.

TRANSECT #	HABITAT TYPE	TRANSECT NAME
1500	Alpine Willow	Gore Range Overlook
5800	Alpine Willow	Chapin Pass
2500	Lodgepole Pine	Timbercreek
5500	Lodgepole Pine	Onahu Trail
2700 (MCB transect)	Spruce/Fir	Specimen Mtn.
5600	Spruce/Fir	Onahu Trail
6300	Spruce/Fir	Forest Canyon Pass
2600	Alpine Tundra	Mount Ida Trail
5700	Alpine Tundra	Crater area
3400	Riparian Meadow	Kawuneeche Valley
6100	Riparian Meadow	Big Meadows
6200	Riparian Meadow	Long Meadow
800 (MCB transect)	Aspen	Bierstadt Moraine
1700	Lodgepole Pine	Lawn Lake Trail
5300	Lodgepole Pine	Longs Peak Trail

TRANSECT #	HABITAT TYPE	TRANSECT NAME
5400	Lodgepole Pine	SandBeach Trail
300	Ponderosa/Shrub	Fall River Entrance
1000	Ponderosa/Shrub	Boneyard to Museum
5000	Shrub/Ponderosa	MacGregor Ranch
1600	Spruce/Fir	Bear Lk to Odessa
4000 (MCB Transect)	Spruce/Fir	Above TRR Hidden Valley
100	Montane Willow	Moraine Park
1300	Montane Willow	Endovalley
4200	Ponderosa Savanna	Cow Creek
4300	Ponderosa/ Lodgepole Pine	Cow Creek
1800	Alpine Willow	Milner Pass Poudre
5900	Alpine Willow	Below Lava Cliff
400	Aspen	Mills Creek Basin
4900	Aspen	Upper Beaver Meadows
1100	Lodgepole Pine	Bierstadt Trail
200	Ponderosa Pine	North Lateral Moraine
500	Ponderosa Pine	Beaver Meadows
5100	Ponderosa Pine	Deer Mountain
5200	Ponderosa Pine	South Beaver
6400	Spruce/Fir	Ypsilon
700	Alpine Tundra	Ute Trail
6000 (MCB Transect)	Alpine Tundra	Sundance Mtn.
2000	Riparian and upland Meadow	South Moraine Pk
2100	Riparian and upland Meadow	North Moraine Pk.
600	Montane Willow	Lower Horseshoe
900	Montane Willow	Hollowell Pk.

White-tailed Ptarmigan Survey – Monitoring ptarmigan on Trail Ridge has been ongoing for over 30 years by the Colorado Division of Wildlife (reports are in the park's library). Birds have been color banded and productivity studied. Several master students have written thesis on the research. Copies are in the park's library. General survey work covering a wider area than Trail Ridge will occur in 2003. Survey work should start mid-May to document post-breeding movements by both males and females and the survey should carry through mid-June to determine density estimates. Starting July 1,

survey work would determine hatching success. From mid-July into late summer, surveys would provide information on productivity (hen success, brood size). For consistency and repeatability (among areas and years), it is recommended to use a taped chick call to locate hens with chicks, especially for observers not having extensive experience with ptarmigan. Depending upon the area, (habitat quality), it should be possible to survey 1-2 square miles per day. All locations (males, females, broods) should be plotted by GPS or on a topo map. Ptarmigan distribution in summer is clumped and observations may identify critical brood rearing and summer habitat.

Black Swift Survey – The black swift is a long-distance neotropical bird that breeds in west North America located in close association with mountain waterfalls or sea-side cliffs. Known breeding populations are disjunct and are associated with highly specialized habitat characteristics. RMNP has some of the best-known black swift colonies in Colorado. Survey work has been ongoing since 1998, but Black swifts were first noted breeding in RMNP in 1961 (Knorr 1961). Known colonies will be in the park's GIS database. Partners-in-Flight ranks the Black swift as a species of high priority for conservation concern. Colorado is estimated to host between 10% and 20% of the world's breeding population.

The most appropriate sampling parameter for Black swifts is a simple count of the maximum number of individuals seen simultaneously flying about or roosting on the nesting cliffs. Survey work should start two weeks after hatching to avoid potentially biasing samples with the inclusion of late migrants or nonresident floating individuals. Prior to hatch and for about two-weeks after hatching, one of the adults stays on the nest. Therefore, it is best to wait until both adults are in sight over the colony at the same time and thus a better chance of obtaining a full colony count. Surveys should be conducted in the late afternoon until dark when adults return after spending most of the day away from the colony feeding on aerial insects, such as swarming ants. For Colorado, survey work would start on August 15 and carry through September 20. For optimum counts, it is best to make three colony visits. Other waterfalls that are not known to have Black swift colonies should be evaluated for potential Black swift occupancy based on criteria developed by Chris Schultz of the San Juan National Forest. Copies of the waterfall evaluation form, swift survey form, and observer safety information is available in park files.

Constant Effort Mist Netting – Late summer to early fall mist netting is recommended to catch and band migrating songbirds. Mist netting would start August 15 and continue until September 30. An array of eleven mist nets are placed at two sites, Endovalley in tall willow habitat and Upper Beaver Meadows in aspen, willow, ponderosa pine savanna habitat. Net locations are GPSed and in the park's GIS files. Each bird captured is banded with a USGS BRD leg bands. Some target species such as sapsuckers, woodpeckers and mountain bluebirds are banded with unique combinations of the regular metal band and three colored plastic bands. This is done to assist in determining survivability and finding nests the next breeding season by being able to follow known individuals.

Starting in 2004, Monitoring Avian Productivity and Survivorship (MAPS) may start in the same locations as the late summer/early fall constant effort mist netting. The

MAPS methodology will follow national protocols. A copy of the MAPS Manual is in park files and is available at www.birdpop.org.

Monthly Bird Count in Cow Creek – A one day monthly bird count occurs along the Cow Creek Trail from McGraw Ranch to Bridal Veil Falls. The monthly count started in 1998 is presently done by volunteers Susan and John Ward. All birds heard and seen from the trail are noted. Distance estimates are not noted. Bird data is summarized in park files and in hard copy format.

Water Fowl Survey – Beaver Ponds and lower elevation lakes are surveyed for breeding waterfowl. Surveys are conducted to document number of breeding pair earlier in the breeding season and pairs with ducklings mid-season.

Christmas Bird Count – A one day count is conducted following national protocols. The center of the count area is Estes Park and includes portions of Lumpy Ridge, Fall River Entrance, Upper Beaver Meadows and along Trail Ridge Road into the Alpine Tundra above Rainbow Curve.

Sandhill Crane, Sora and Virginia Rail Count – Each year the Kawuneeche Valley is surveyed for one pair of nesting Sandhill cranes. Nest and young-of-the-year is noted. The wetland on the south side of Lily Lake is surveyed for Sora and Virginia rails.

Literature Cited

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