

PROPOSAL 02/16/2001

**Breeding bird surveys at marshes of Northeast Creek and Bass Harbor, Acadia
National Park, ME**

Principal Investigators:

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Introduction

Knowledge of natural resources within national parks is essential to the National Park Service for its personnel to manage and protect parks (Fancy 1999). The National Park Service (NPS) initiated a program designed to implement natural resource inventory and monitoring (I&M) throughout the agency in fiscal year 1991 (Williams 1999). Later the NPS was directed by congress 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." under Title II of the National Parks Omnibus Management Act of 1998. Funding for field inventories for avian and herpetological species began in 1998 (Williams 1999).

Resource managers at Acadia National Park need information on the presence and abundance of breeding birds in two marshland habitats (Northeast Creek, Bass Harbor) to assist in either decision-making related to land acquisition or for management purposes (inventory and monitoring). In addition to determining the number of different avian species that breed at these two sites and at what densities, the survey method(s) must be suitable as a quantitative, long-term monitoring protocol that would be compatible to other nationwide breeding bird surveys. It is expected that we will associate the spatial distribution of breeding birds with specific habitat cover types that have been delineated on existing GIS maps for these sites. The focus of the surveys will be during the April through June breeding season, however, resource managers are also interested in information that may document the value of these two sites to migrating species during spring and fall. Special surveys may be required for raptors that initiate nesting in late winter. Because observers will be in the field during pre-dawn and post-dusk periods ancillary data on calling amphibians will be collected at appropriate sampling stations.

Inventory Objectives

Objectives of the survey are: (1) to determine, or reaffirm with previously collected data, the array of avian species breeding within the boundaries of the two study sites (Northeast Creek, Bass Harbor), (2) to determine the number of breeding pairs of each species at each study site, (3) to calculate densities of breeding pairs of each species by study site or habitat cover type as appropriate, (4) to document use of study sites by migratory birds in spring and fall, and (5) to determine relative numbers of each species of calling amphibian species by study site.

Field Procedures, Methods, Protocols

Although this study will be considered an **inventory**, sampling stations will be established so that they could be used in subsequent years as **monitoring** stations (Fancy and Sauer 2000). To meet objectives for determining avian breeding pairs we will use the following techniques: quiet observation (QO) from elevated platforms (Longcore and Ringelman 1980), "distance sampling" with variable circular-plots (VCP)(Buckland 1993, Fancy 1997, Fancy and Sauer 2000), broadcast calls (BC) for inconspicuous waterbirds (rails, bitterns) (Gibbs and Melvin 1993), and a late winter reconnaissance for raptors. All avian species as detected by the different methods will be entered into the NPSpecies database by the investigator, after receiving guidance from the park biologist (wildlife) and technician who manages data. Written permission from landowners will be obtained before trespass on private lands to access sampling points.

Survey Methods

Quiet Observation (QO): For each study site a variable number of fixed sampling stations (documented by GPS readings) will be established so that observers on elevated platforms (i.e., commercial tree stands) can survey each entire study site. We will align our sampling framework as feasible with any existing frameworks of Acadia NP and attempt to conform to standard sample selection procedures developed by NPS monitoring staff. We will observe study sites for 2-hr observations periods in the morning and evenings. Morning counts will begin one-half hour before sunrise and evening counts will extend one-half hour after sunset. A series of codes (Appendix A) will identify species and describe activity of the species while within the visual or aural range of the observer. Data will be recorded on standard forms (Appendix B). Because ≥ 10 hours of observation (i.e., 5, 2-hr visits) is required to document presence or absence of a marshland species (Gibbs et al. 1991) we will visit study sites repeatedly until we have expended at least 80 hours of observation for each study site. Numbers of 2-hr visits will be assigned proportionally on the basis of the area of the two sites. Counts would begin in early April (20 hr of observation) to document spring migrants, continue through June (40 hrs for breeding birds) and a fall survey (20 hrs) in late September (perhaps later if a late fall season) to document fall migrants. Experience may dictate that some visits will need to be done during the day. Associated with observations of breeding behavior (e.g., adults carrying food) nests of breeding birds will be searched for and documented with site descriptions and GPS readings to confirm status of a species as breeding. Detectability of marsh-dwelling birds inherently varies by species that have different degrees of secretiveness and that respond differently to broadcast calls. Although detectability is difficult to evaluate for species encountered during these surveys, we will collect data on distance to a seen or heard bird. Furthermore, two or more consecutive observers will be collecting data at the same sampling stations, for which data can be compared for detectability among observers.

Distance Sampling (variable circular-plot, VCP): Because our purpose is to gather data on distribution and abundance of breeding avian species for two study sites, variable circular-plots (VCP) will be established along the water courses that meander through the marsh area; we will ensure that stations used for VCP are separated by 250m (Reynolds et al. 1980). It may be necessary to establish a stratum to permit estimation of densities for habitats not adjacent to the streams. Samples within this stratum will ensure coverage at sites more distance from the stream, which will be traversed by canoe. The number of VCP stations to be established will depend on size and configuration of the two study sites to conform to the VCP protocol, but those stations used for VCP stations will be randomly selected. Markers will be set at 16, 32, and 48m (~50, 100, 150 feet) from plot center to identify the boundaries of the variable circular-plots. Upon arrival at the sampling station all species seen and heard will be recorded on standard forms (Appendix C) at 3-min and 5-min intervals to allow comparison with other surveys (Ralph et al. 1995). Wind velocity, temperature, cloud cover, and precipitation status will be recorded for each visit. These surveys will be completed at least 5 times at each study site between early May and late June.

Broadcast Calls (BC): For those more secretive, wetland-dependent species (e.g., rails, bitterns) calls will be broadcast during the breeding season for these species following the protocol of Gibbs and Melvin (1993). These data will augment data collected by QO and VCP techniques. Some of the following species can be detected without playback calls (e.g., American Bittern (*Botaurus lentiginosus*), Common Snipe (*Gallinago gallinago*), Marsh Wren (*Cistothorus palustris*), Great Blue Heron (*Ardea herodias*), but detection of other species less visible or vocal can be enhanced by use of broadcast calls (e.g., Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*), Least Bittern (*Ixobrychus exilis*), and Sedge Wren (*Cistothorus platensis*). Three visits to a wetland were adequate to determine the presence or absence of selected water birds with 90% certainty (Gibbs and Melvin 1993). To be consistent, however, with methods of previous investigators (T. Hodgman, DIF&W, unpubl. data) we will broadcast calls of Least Bittern, Virginia Rail, Sora, Green Heron (*Butorides striatus*), Pied-billed Grebe (*Podilymbus podiceps*), American Bittern, Common Moorhen (*Gallinula chloropus*), and American Coot (*Fulica Americana*), plus Yellow Rail (*Coturnicops noveboracensis*) and Sedge Wren. At each survey point of each study site, observers will record all species heard vocalizing during the 3-min and 5-min passive listening periods before broadcasting taped calls of the primary marsh birds into the marsh. Calls will be broadcast with a portable cassette recorder (e.g., Sony) with a power horn speaker. The cassette tape will include 30 seconds of the primary advertising calls of each of the species interspersed with 30 seconds of silence; that is, 5-15 seconds of continuous calling interspersed with 5 seconds of silence. Tapes will be obtained from the Cornell Laboratory Of Ornithology's Library of Natural Sounds. We will record when each individual vocalizes during all the taped calls broadcast and enter data on the field data form (Appendix D). Attempts will be made to estimate detectability of the response of the species to the broadcast call, wherein the distance (by 50-m intervals) to the responding call will be estimated and recorded. Although the focus is on marsh-dwelling species, all species encountered by sight or sound will be recoded.

Raptor Reconnaissance: In late winter before vegetation leafs out upland margins of study sites will be traversed to seek nesting activity of forest-dwelling raptors. If raptors are observed, surrounding areas will be searched for nest sites and revisited to document continuity of use and actual breeding by raptors. These transects will be treated as line transects, although it is unlikely that sufficient information will exist to allow for detectability to be evaluated.

Habitat Measurements: Existing GIS maps at Acadia NP will be used to plot locations of calling marsh birds so that use of major habitat types can be documented. All sampling locations will be recorded by GPS following ANP-NPS GIS standards.

Personnel and Training: Surveys will be conducted by biologists of the USGS, and as needed, experienced birders hired under contract. All survey personal will be required to listen to taped bird calls to learn them. Also, observers will practice estimating distances associated with the VCP sampling.

Equipment and Materials: Commercial hunting stands will be permanently erected for the survey season and UTM's of sites will be determined with a portable GPS unit and marked on field maps. Cassette tapes will be obtained from Cornell Lab of Ornithology and the quality of sound standardized with a sound level meter with 10 dB precision. A lightweight canoe will be used for traversing the marsh during the broadcast calls. Examples of field data forms are included in Appendices.

Data Collection, Analysis, Summary and Reporting

Field Data: Data from VCP and BC surveys will be entered in the field on a form that is compatible with the ACCESS database. For each survey we will record name of observer, name of data recorder (if applicable), name of wetland, X and Y UTM, date, survey station number, sunrise and sunset times, start time, end time, species of each individual detected, tape periods in which individual vocalized, distance to vocalizing bird. Field sheets will be duplicated weekly and sets of data will be stored at separate locations.

Data Entry and Management: Field forms will be compatible with ACCESS databases. Data will be entered into computer files weekly, printed, and verified with field forms. Computer files will be backed up on disks or zip drives after data entry.

Analyses of Data: Descriptive statistics will be obtained for observational data collected by the QO method. Numbers of breeding bird pairs (based on numbers of territorial calling males) will be summarized by study site and by habitat cover type when possible. Numbers of breeding birds seen will be standardized as numbers of individuals seen or heard per 100-hr effort. Lists of transient species that use marshes only during spring and fall migration will be prepared for each study site.

Data collected by the VCP method will be summarized by study site and species richness values calculated by the software program SPECRICH. Furthermore, version 4 of the DISTANCE program should be available to evaluate effects of different covariates on detection distances. Data collected by the BC method will be addressed following procedures of Gibbs and Melvin (1993).

Integration with other Monitoring Protocols: Establishment of sampling sites for VCP and BC surveys will be such that they could serve later as monitoring stations and are in conformity with accepted protocols. We have used quiet observation (QO) to document waterfowl (Anatidae) broods and we have documented wetland use by marsh birds (Gibbs et al. 1991). This study will allow us, at least for some species, to compare effectiveness of QO with the VCP and BC techniques at the same time.

Work Schedule and Budget

Because fieldwork can be disrupted by unforeseen events the work schedule will include a second field season. Work in the second year may be needed to confirm status of selected breeding birds, and may or may not include the full complement of survey techniques. Preliminary visits to study sites to determine sampling stations will be made before standardized observations begin in April, 2001. Fieldwork will continue into mid-July as necessary. Additional observations will be made on ~20 days during a ~60-day period (~15 August – 10 October) in fall to detect use of study sites by migrant birds.

Most (12) of the 20 observation days will be in September about every other day, but 4 observation days (every 4th day) will be each in August and in October.

Table 1. Estimated costs for avian surveys at Northeast Creek and Bass Harbor, Acadia NP, 2001-2002.

Item	FY2001	FY2002	Total
USGS Patuxent WRC staff salary/benefits	\$45,128	25,194	70,322
Acadia Funding from I&M Program			
Personnel			
Biological Tech. (contract hire) salary/benefits, etc	12,200	9,000	21,200
NPS Funding from I&M Program & Reg. Science			
USGS Patuxent WRC staff			
Housing	1,160	600	
Per Diem	4,350	2,175	
Equipment (tree stands, steps, rangefinder, sound	1,540		
Meter, taped calls, cassette recorder)			
Vehicles (fuel/maintenance) (1 ANP vehicle available)	3,000	1,500	
Collections (prepare & catalog archives;\$4x500 items)	1,400	600	
Statistical consultation and contingency	1,200	1,275	
Interagency Agreement Funding	\$12,650	6,150	18,800
NPS Subtotal	\$24,850	\$12,150	40,000
TOTAL COST	\$69,978	40,344	110,322

Products

Progress reports will be submitted annually via the NPS IAR reporting system in conjunction with annual meetings between park personnel and the investigator. A final report of findings will be prepared after fieldwork is completed. Maps depicting sampling stations will be prepared for both study sites and all GPS sampling locations (UTMs) will be included in the final report. Diskettes of field data will be provided for both study sites. Originals of all photo or slides (labeled), field notes, and written descriptions of field or laboratory techniques will accompany the final report. All equipment purchased with NPS funds will be returned to the park for final deposition. The investigator will make two (or more as needed) informal presentations, one to park staff and one to the public.

Literature Cited

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APPENDIX A. Data Codes for Bird Use and Broods

01-02	OBSERVER	Observer Initials: JL=Jerry Longcore, DM= Dan McAuley, DC= David Clugston
03-08	DATE	Date of Observation (MM-DD-YY)
09	ROADSIDE	Incidental Observation, not 2-hr sit (Y, N)
10	SIT	Was Sit On Stand Near Wetland (Y, N)
11-18	WETNAME	Wetland Name Acronym (8 letters)
19-25	XUTM	X Universal Transverse Mercator Grid System (UTM, easting)
26-32	YUTM	Y Universal Transverse Mercator Grid System (UTM, northing)
33	PRECIP	Precipitation (Y, N)
34-37	SRISE	Sunrise Time (24 hour clock)
38-41	SSET	Sunset Time (24 hour clock)
42-45	START	Time Observation Begin (24 hour clock)
46-49	END	Time Observation Ended (24 hour clock)
50-53	OBTIME	Time that Bird/Brood Initially Observed (24 hour clock)
54-56	AOU NO.	AOU Number of Species, or Code for No Broods Observed:
		000 Unknown Anatidae
		006 Pied-billed Grebe PBGR
		007 Common Loon COLO
		131 Hooded Merganser HOME
		132 Mallard MALL
		133 American Black Duck ABDU
		139 Green-winged Teal AGWT
		144 Wood Duck WODU
		190 American Bittern AMBI
		194 Great Blue Heron GTBH
		230 Common Snipe COSN
		364 Osprey OSPR
		390 Belted Kingfisher BEKI
		888 No Broods Observed
57	OBTYPE	Type of Observation: P=pair or bird use, B=brood use
58-59	TOTAL	Total Number of Birds Observed (e.g. female + 6 ducklings =7)
60	LMALE	Number of Lone Males
61	LFEMALE	Number of Lone Females
62	PAIR	Number of Pairs
63	UNKS	Number of Birds of Unknown Sex or Age
64	AGE	Age of Bird(s): A=Adult, I=Immature, Y=Young of Yr.

65	COUNTR	U=Unknown Reliability Total Count: A=Accurate, E=Estimate, P=Poor
66-67	BEHAV1	Predominate Behavior (See Codes below)
68-69	BEHAV2	Secondary Behavior 01=Flushed, Activity Unknown 02=Flying in 03=Flying over 04=Flying out 05=Standing, Perched 06=Swimming, Wading, Walking 07=Foraging 08=Feeding 09=Carrying Food 10=Vocalization (Courtship) 11=Courtship Flight 12=Copulation 13=Nest Building 14=Attending Nest (Incubating) 15=Comfort Movements (Preening, bathing) 16=Alert 17=Sleeping, Loafing 18=Territorial Aggression 19=Inter-specific Aggression 20=Brooding Young 21=Complex of Courtship Behaviors 22=Behavior Associated with Molting
70-72	CLSS	Age Class of Observed Brood (Ia, Ib, Ic, IIa, IIb, IIc, III)
73	CLSR	Reliability of Brood Age (A ccurate, E stimate, or P oor)
74-75	DCKLNGS	Number of Ducklings in Observed Brood
76	DCKLNGR	Reliability of Duckling Count (A, E, P)
77	HEN	Was Hen Present with Brood ? (Y, N)
8	BHEN	Is Only a Broody Hen Present with No Brood? (Y, N)
79	DISTRB	Was Brood Disturbed by Observer ? (Y, N)
80	INTRD	Was there Intrusion on Wetland (Fishermen, boaters) During Count ? (Y, N)

Appendix B. Form: Quiet Observation Marsh Bird Survey

Date: _____ Wetland: _____ Observer: _____

Temp. (C): ____ Windspeed: ____ Cloud Cover (%): ____ Precip.: ____
(Beaufort Scale) (<33, 34-66, >67) (None, Light, Heavy)

XUTM: _____ YUTM: _____ Sunrise: _____ Sunset: _____

Start time: _____ End time: _____.

[illegible]

Appendix D. Form: Broadcast Call survey Marsh Bird Survey

Date: _____ Wetland: _____ Observer: _____

Temp. (C): ____ Windspeed: ____ ____ Cloud Cover (%): ____ ____ Precip.: ____ ____
(Beaufort Scale) (<33, 34-66, >67) (None, L, Heavy)

XUTM: _____ YUTM: _____ Sunrise: _____ Sunset : _____

Start time: _____ End time: _____.

[illegible]

