Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 1

Before the Field Season

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) describes pre-season procedures for monitoring landbirds in the Northern Colorado Plateau Network (NCPN). Landbird monitoring in the NCPN is conducted by Rocky Mountain Bird Observatory (RMBO), and is part of the Monitoring Colorado's Birds program. Before conducting surveys, observers should review the entire NCPN protocol narrative, including SOPs, as well as the detailed RMBO protocol and supplements (see Appendices B-D in the NCPN Land Bird Monitoring Protocol Narrative). This SOP describes general pre-season preparation, scheduling considerations, and supplies and equipment needs.

I. General Preparation and Review

Procedures:

Prior knowledge of species likely to be encountered in the NCPN park units selected for monitoring will be key in preparing for the birding season. Observers should review the list of bird species by NCPN park unit in Attachment A. Copies of species lists can be used in the field for reference.

Waypoints for each point-count station on a transect or for a riparian transect must be loaded into the GPS unit prior to the start of the field season. Waypoints are the X and Y coordinates for each point-count station, and are used to navigate to their location. SOP #4 contains a list of point locations for all transects in NCPN park units with their associated UTM coordinates. Way points for transects also will be stored as part of the project metadata (see SOP #7).

The following reference manuals should be reviewed for background information on conducting bird surveys and habitat measures:

- Elmore, F.H. 1976. Shrubs and Trees of the Southwest Uplands. Southwest Parks and Monuments Association. Globe, Arizona.
- National Geographic. 1987. Field Guide to Birds of North America, 3rd Edition. National Geographic, Washington, D.C. 480 pages.
- Robbins, C.S., B. Bruun, and H.S. Zim. 1983. Golden: A Guide to Field Identification of North American Birds. Western Publishing Company, Inc., Racine, WI. 360 pages.
- Stokes, D. W. and L. Q. Stokes. 1995. Stokes Field Guide to Birds: Western Region. Little, Brown and Company, New York, NY. 519 pages.
- Welsh, S.L., N.D. Atwood, S. Goodwich, L.C. Higgins. 1993. A Utah Flora. Brigham Young University, Second Edition, Provo, Utah. 986 pp.
- Williams, D. 2000. A Naturalist's Guide to Canyon Country. A Falcon Guide. The Globe Pequot Press. Guilford, Connecticut.

All observers must attend the five-day training workshop conducted by The Rocky Mountain Bird Observatory in early May each year (see SOP #2).

II. Scheduling Field Work

Procedures:

1. Breeding bird surveys will be conducted during the period that coincides with the peak-breeding activity of most birds (May, June, and into July for higher elevation habitats). Specific survey dates may vary slightly because of weather, but will be within a 3-week period established for each transect. The sampling window will be determined by RMBO, and documented herein. Sampling dates should be scheduled, and logistics organized prior to the start of each field season.

2. Three observers are required to sample 15 transects in each of three habitat types each year. Each observer is to complete up to two 15-point transects each field day. This includes collecting habitat data at each point (where applicable) before beginning the bird count. To ensure completion of surveys, it is imperative to schedule survey times prior to the field season. When two transects must be completed on the same day, transects separated by the least amount of distance should be selected.

III. Organizing Supplies and Equipment

Procedures:

1. Equipment (Table 1-1) should be organized and made ready several weeks before the field season.

Table 1-1. Field equipment list, based on the *Monitoring Colorado's Birds* program (see Appendix C of the NCPN Land Bird Monitoring Protocol Narrative).

Number Req.	Description
	Bird surveys
1	Timepiece with countdown timer and a chime
1	Binocular
1	Rangefinder and extra batteries
1	Declination-adjustable compass with sighting capability (i.e. a mirror)
1	Fahrenheit thermometer
1	GPS unit for navigating to bird plots
1	Master list of four-letter bird codes for all species likely to be encountered, specifically noting the low-density target species
1	Master list of weather and habitat codes, taped to the clipboard
1	Random numbers table, if establishing a new transect
as needed	Data forms (copied onto write-in-rain paper)
2 - 3	At least two writing utensils – in case you lose one (pencil or indelible ink pen)
1	Clip boards for recording data and carrying data sheet
1	Cruising vest for carrying equipment (backpack and hip packs may be substituted)
as needed	Reference books for bird and plant identification
1	Insect repellent
1	Sunscreen
1	First Aid kit

Attachment A

Bird Species determined to be migrants and breeders in NCPN park units. Information source is the current version (2.2) of the NPSpecies XP Inventory and Monitoring Database. Species lists were developed using data that has not been through the QA/QC process of Certification. Park unit acronyms are defined in Attachment B.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Pipilo aberti	ABTO	179307	Abert's Towhee																X
Recurvirostra americana	AMAV	176721	American Avocet			X	X				X	X				X			
Botaurus lentiginosus	AMBI	174856	American Bittern													X			
Fulica americana	AMCO	176292	American Coot	X			X	X			X	X	X		X				
Corvus brachyrhynchos	AMCR	179731	American Crow	X	X		X			X	X	X	X		X	X		X	
Cinclus mexicanus	AMDI	178536	American Dipper	X	X		X	X	X		X	X				X		X	X
Spinus tristis	AMGO	179249	American Goldfinch	X	X		X	X	X	X	X	X			X	X		X	X
Falco sparverius	AMKE	175622	American Kestrel	X	X		X	X		X	X	X	X	X	X	X		X	X
Anthus rubescens	AMPI	554127	American Pipit	X			X	X			X					X			X
Setophaga ruticilla	AMRE	178979	American Redstart	X			X				X	X			X	X			
Turdus migratorius	AMRO	179759	American Robin	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Anas americana	AMWI	175094	American Wigeon	X	X	X	X	X			X	X				X			
Myiarchus cinerascens	ATFL	178316	Ash-throated Flycatcher	X	X		X	X		X	X	X		X	X	X	X	X	X
Spizella arborea	ATSP	179432	American Tree Sparrow	X				X	X	X	X	X						X	

Attachment A. cont.

Latin name	**BBL 4-letter code**	**TSN #**	**Common name**	**ARCH**	**BLCA**	**BRCA**	**CANY**	**CARE**	**CEBR**	**COLM**	**CURE**	**DINO**	**FOBU**	**GOSP**	**HOVE**	**NABR**	**PISP**	**TICA**	**ZION**
Dendroica auduboni memorabilis	AUWA	- 501489	Audubon's Warbler												X	X			X
Pelecanus erythrorhynchos	AWPE	174684	American White Pelican			X	X	X		X	X	X				X			X
Haliaeetus leucocephalus	BAEA	175420	Bald Eagle	X	X	X	X	X		X	X	X			X	X		X	X
Bucephala islandica	BAGO	175144	Barrow's Goldeneye		X		X				X	X							
Riparia riparia	BANS	178436	Bank Swallow	X			X	X		X	X	X			X			X	
Hirundo rustica erythrogaster	BARS	178449	Barn Swallow	X	X		X	X		X	X	X	X	X	X	X		X	X
Calidris bairdii	BASA	176655	Baird's Sandpiper								X					X			
Pica pica	BBMA	179720	Black-billed Magpie	X	X		X	X		X	X	X	X	X	X			X	X
Pluvialis squatarola	BBPL	176567	Black-bellied Plover			X					X								
Parus atricapillus	BCCH	178699	Black-capped Chickadee	X	X		X	X	X	X	X	X	X		X	X		X	X
Archilochus alexandri	BCHU	178033	Black-chinned Hummingbird	X	X		X	X	X	X	X	X		X	X	X		X	
Nycticorax nycticorax	BCNH	174832	Black-crowned Night-Heron	X			X				X	X				X			
Leucosticte australis	BCRF	179223	Brown-capped Rosy-Finch								X	X			X				
Spizella atrogularis	BCSP	179448	Black-chinned Sparrow																X
Vireo atricapillus	BCVI	554455	Black-capped Vireo															X	
Ceryle alcyon	BEKI	178119	Belted Kingfisher	X	X		X	X		X		X						X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Toxostoma bendirei	BETH	178636	Bendire's Thrasher	X			X								X				
Vireo bellii	BEVI	179003	Bell's Vireo																X
Thryomanes bewickii	BEWR	178562	Bewick's Wren	X	X		X	X		X	X	X			X	X	X	X	X
Polioptila caerulea	BGGN	179853	Blue-gray Gnatcatcher	X	X		X	X		X	X	X			X	X		X	X
Dendragapus obscurus	BGSE	175860	Blue Grouse		X			X		X	X	X	X			X		X	X
Molothrus ater	BHCO	179112	Brown-headed Cowbird	X	X		X	X		X	X	X	X	X	X	X	X	X	X
Pheucticus melanocephalus	BHGR	179140	Black-headed Grosbeak	X	X		X	X		X	X	X	X		X	X		X	X
Guiraca caerulea	BLGR	179145	Blue Grosbeak	X			X	X		X	X	X			X	X		X	X
Sayornis nigricans	BLPH	178330	Black Phoebe				X	X								X			X
Leucosticte atrata	BLRF	179222	Black Rosy-Finch		X						X	X							
Cypseloides niger	BLSW	177997	Black Swift		X						X								X
Chlidonias niger	BLTE	176959	Black Tern								X								
Tyto alba pratincola	BNOW	177852	Barn Owl		X						X								X
Himantopus mexicanus	BNST	176726	Black-necked Stilt			X	X	X			X	X				X			X
Larus philadelphia	BOGU	176839	Bonaparte's Gull								X					X			
Bombycilla garrulus	BOWA	178529	Bohemian Waxwing					X		X	X	X						X	
Euphagus cyanocephalus	BRBL	179094	Brewer's Blackbird	X	X		X	X		X	X	X	X	X	X	X		X	X
Certhia americana	BRCR	178803	Brown Creeper	X	X		X	X	X	X	X	X	X					X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Spizella breweri	BRSP	179440	Brewer's Sparrow	X	X		X	X		X	X	X	X	X	X	X		X	X
Toxostoma rufum	BRTH	178627	Brown Thrasher	X			X	X			X	X							
Polioptila melanura	BTGN	179857	Black-tailed Gnatcatcher				X												
Quiscalus major	BTGR	179108	Boat-tailed Grackle													X			
Selasphorus platycercus	BTLH	178038	Broad-tailed Hummingbird	X	X		X	X	X	X	X	X				X		X	
Columba fasciata	BTPI	177065	Band-tailed Pigeon	X	X			X											X
Amphispiza bilineata	BTSP	179395	Black-throated Sparrow	X	X		X	X		X		X			X	X	X	X	X
Dendroica nigrescens	BTYW	178896	Black-throated Gray Warbler	X	X		X	X	X	X	X	X				X		X	X
Bucephala albeola	BUFF	175145	Bufflehead				X	X			X	X				X			
Icterus bullockii	BUOR	554267	Bullock's Oriole		X					X	X	X		X	X		X	X	X
Athene cunicularia	BUOW	177946	Burrowing Owl	X			X	X			X	X	X	X					
Psaltriparus minimus	BUSH	178764	Bushtit	X	X		X	X		X	X	X			X	X	X	X	X
Anas discors	BWTE	175086	Blue-winged Teal	X		X	X	X			X	X				X			X
Bubulcus ibis	CAEG	174803	Cattle Egret	X			X									X			X
Carpodacus cassinii	CAFI	179190	Cassin's Finch	X	X		X	X	X	X	X	X	X		X	X		X	X
Branta canadensis	CAGO	174999	Canada Goose	X	X	X	X	X			X	X		X		X		X	X
Larus californicus	CAGU	176829	California Gull			X	X				X		X	X		X		X	

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Stellula calliope	CAHU	178048	Calliope Hummingbird									X						X	
Tyrannus vociferans	CAKI	178288	Cassin's Kingbird	X			X	X							X				X
Gymnogyps californianus	CALC	175274	California Condor	X		X													
Pipilo fuscus mesoleucus	CANT	179302	Canyon Towhee																X
Aythya valisineria	CANV	175129	Canvasback								X	X				X		X	
Catherpes mexicanus conspersus	CANW	178612	Canyon Wren	X	X		X	X		X	X	X		X	X	X	X	X	X
Callipepla californica	CAQU	175876	California Quail									X		X				X	
Sterna caspia	CATE	176924	Caspian Tern								X								
Vireo cassinii	CAVI	554456	Cassin's Vireo								X								
Calcarius ornatus	CCLO	179530	Chestnut-collared Longspur								X								
Spizella pallida	CCSP	179439	Clay-colored Sparrow												X	X			
Bombycilla cedrorum	CEDW	178532	Cedar Waxwing	X			X	X		X	X	X	X			X		X	X
Spizella passerina	CHSP	179435	Chipping Sparrow	X	X		X	X	X	X	X	X	X		X	X		X	X
Alectoris chukar	CHUK	175908	Chukar	X	X		X	X		X		X	X	X	X	X		X	
Anas cyanoptera	CITE	175089	Cinnamon Teal	X		X	X	X			X	X				X			
Aechmophorus clarkii	CLGR	554027	Clark's Grebe								X								
Nucifraga columbiana	CLNU	179750	Clark's Nutcracker	X	X		X	X	X	X	X	X	X		X	X		X	X
Petrochelidon pyrrhonota	CLSW	178455	Cliff Swallow	X	X		X	X	X	X	X	X	X	X	X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Dendroica tigrina	CMWA	178887	Cape May Warbler									X							
Empidonax occidentalis	COFL	554255	Cordilleran Flycatcher	X	X		X	X	X	X	X		X		X	X		X	X
Bucephala clangula	COGO	175141	Common Goldeneye	X	X		X	X			X	X						X	X
Quiscalus quiscula	COGR	179104	Common Grackle					X			X	X				X			
Accipiter cooperii	COHA	175309	Cooper's Hawk	X	X		X	X		X	X	X	X		X	X		X	X
Calypte costae	COHU	178035	Costa's Hummingbird																X
Gavia immer	COLO	174469	Common Loon	X			X	X			X	X				X			
Mergus merganser	COME	175185	Common Merganser	X	X	X	X	X			X	X						X	X
Chordeiles minor	CONI	177979	Common Nighthawk	X	X		X	X		X	X	X	X	X	X	X		X	X
Phalaenoptilus nuttallii	COPW	555544	Common Poorwill	X			X	X		X	X	X	X	X	X	X		X	X
Corvus corax	CORA	179725	Common Raven	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Carduelis flammea	CORE	179230	Common Redpoll	X														X	
Capella gallinago	COSN	176586	Common Snipe	X		X		X			X	X	X	X		X		X	
Geothlypis trichas	COYE	178944	Common Yellowthroat	X			X	X			X	X				X		X	X
Phalacrocorax auritus	DCCO	174717	Double-crested Cormorant								X	X			X	X			
Picoides pubescens	DOWO	178259	Downy Woodpecker	X	X		X	X		X	X	X	X			X		X	X
Empidonax oberholseri	DUFL	178346	Dusky Flycatcher	X	X		X		X	X	X	X	X			X		X	X

Attachment A. cont.

Latin name	**BBL 4-letter code**	**TSN #**	**Common name**	**ARCH**	**BLCA**	**BRCA**	**CANY**	**CARE**	**CEBR**	**COLM**	**CURE**	**DINO**	**FOBU**	**GOSP**	**HOVE**	**NABR**	**PISP**	**TICA**	**ZION**
Calidris alpina	DUNL	176661	Dunlin								X								
Podiceps nigricollis	EAGR	174485	Eared Grebe	X		X	X	X			X	X				X			X
Tyrannus tyrannus	EAKI	178279	Eastern Kingbird	X						X	X	X		X				X	
Sturnus vulgaris	EUST	179637	European Starling	X	X		X	X		X	X	X	X	X	X	X	X	X	X
Hesperiphona vespertina	EVGR	179175	Evening Grosbeak		X			X	X	X	X	X	X		X	X		X	X
Buteo regalis	FEHA	175377	Ferruginous Hawk	X		X	X	X				X	X		X	X		X	X
Otus flammeolus	FLOW	177878	Flammulated Owl		X		X	X				X						X	X
Passerella iliaca	FOSP	179464	Fox Sparrow								X		X					X	X
Sterna forsteri	FOTE	176887	Forster's Tern			X	X				X	X							
Larus pipixcan	FRGU	176838	Franklin's Gull			X	X				X	X	X			X			
Anas strepera	GADW	175073	Gadwall	X		X	X	X			X	X				X			X
Lophortyx gambelii	GAQU	175887	Gambel's Quail				X	X		X					X		X		X
Ardea herodias	GBHE	174773	Great Blue Heron	X	X		X	X		X	X	X		X		X			X
Regulus satrapa	GCKI	179865	Golden-crowned Kinglet	X			X	X		X	X	X	X					X	X
Leucosticte tephrocotis	GCRF	179215	Gray-crowned Rosy-Finch		X						X	X							
Zonotrichia atricapilla	GCSP	179461	Golden-crowned Sparrow	X							X								X
Junco hyemalis	GHJU	179410	Gray-headed Junco	X	X		X	X	X	X			X		X	X		X	X
Bubo virginianus	GHOW	177884	Great Horned Owl	X	X		X	X	X	X	X	X	X	X	X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Aquila chrysaetos canadensis	GOEA	175408	Golden Eagle	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Perisoreus canadensis	GRAJ	179667	Gray Jay				X			X	X					X		X	
Dumetella carolinensis	GRCA	178625	Gray Catbird		X	X	X			X	X	X						X	
Ardea alba	GREG	554135	Great Egret								X								
Empidonax wrightii	GRFL	178347	Gray Flycatcher	X	X		X	X		X	X	X	X		X	X		X	X
Butorides virescens	GRHE	174793	Green Heron								X								
Perdix perdix	GRPA	175915	Gray Partridge											X					
Geococcyx californianus	GRRO	177836	Greater Roadrunner																X
Ammodramus savannarum	GRSP	179333	Grasshopper Sparrow									X							
Vireo vicinior	GRVI	179008	Gray Vireo	X	X		X	X		X					X	X		X	X
Dendroica graciae	GRWA	178909	Grace's Warbler				X	X								X			X
Tringa melanoleuca	GRYE	176619	Greater Yellowlegs			X	X				X	X							
Quiscalus mexicanus	GTGR	179109	Great-tailed Grackle													X			X
Pipilo chlorurus	GTTO	179310	Green-tailed Towhee	X	X		X	X		X	X	X	X		X	X		X	X
Centrocercus minimus	GUSG	-503934	Gunnison Sage-Grouse		X						X								
Empidonax hammondii	HAFL	554254	Hammond's Flycatcher		X	X	X	X	X	X	X	X	X			X		X	X
Zonotrichia querula	HASP	179454	Harris's Sparrow	X				X			X	X							
Picoides villosus	HAWO	178262	Hairy Woodpecker	X	X		X	X	X	X	X	X	X		X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Larus argentatus	HERG	176824	Herring Gull								X								
Catharus guttatus	HETH	179779	Hermit Thrush	X	X		X	X	X	X	X	X	X		X	X		X	X
Carpodacus mexicanus frontalis	HOFI	179192	House Finch	X	X		X	X		X	X	X	X	X	X	X	X	X	X
Podiceps auritus	HOGR	174482	Horned Grebe				X				X					X			
Eremophila alpestris	HOLA	554256	Horned Lark		X		X	X		X	X	X	X	X	X	X		X	X
Lophodytes cucullatus	HOME	175183	Hooded Merganser		X						X								X
Icterus cucullatus	HOOR	179070	Hooded Oriole																X
Passer domesticus	HOSP	179628	House Sparrow	X	X			X		X	X	X		X	X		X	X	X
Wilsonia citrina	HOWA	178972	Hooded Warbler										X						
Troglodytes aedon	HOWR	178541	House Wren	X	X		X	X	X	X	X	X	X		X	X		X	X
Passerina cyanea	INBU	179150	Indigo Bunting	X	X		X	X		X	X	X			X	X			X
Baeolophus ridgwayi	JUTI	- 501459	Juniper Titmouse	X	X		X			X	X	X			X	X		X	X
Charadrius vociferus	KILL	176520	Killdeer	X	X		X	X		X	X	X	X	X	X	X		X	X
Calcarius lapponicus	LALO	179526	Lapland Longspur								X								
Calamospiza melanocorys	LARB	179312	Lark Bunting	X						X		X							
Chondestes grammacus	LASP	179371	Lark Sparrow	X	X		X	X		X	X	X		X	X	X		X	X
Passerina amoena	LAZB	179151	Lazuli Bunting	X	X		X	X		X	X	X	X		X	X		X	X

Attachment A. cont.

Latin name	**BBL 4-letter code**	**TSN #**	**Common name**	**ARCH**	**BLCA**	**BRCA**	**CANY**	**CARE**	**CEBR**	**COLM**	**CURE**	**DINO**	**FOBU**	**GOSP**	**HOVE**	**NABR**	**PISP**	**TICA**	**ZION**
Numenius americanus	LBCU	176593	Long-billed Curlew	X				X			X	X		X				X	
Limnodromus scolopaceus	LBDO	176679	Long-billed Dowitcher	X		X	X				X								
Egretta caerulea	LBHE	174827	Little Blue Heron								X								
Picoides scalaris	LBWO	178260	Ladder-backed Woodpecker				X												X
Spinus psaltria	LEGO	179254	Lesser Goldfinch		X		X	X		X	X	X			X	X		X	X
Chordeiles acutipennis	LENI	177988	Lesser Nighthawk				X												X
Asio otus	LEOW	177932	Long-eared Owl	X	X		X	X		X	X	X	X	X	X			X	
Calidris minutilla	LESA	176656	Least Sandpiper	X		X					X								
Aythya affinis	LESC	175134	Lesser Scaup			X	X	X			X	X							X
Melanerpes lewis	LEWO	178196	Lewis's Woodpecker	X	X		X	X		X		X	X			X		X	X
Tringa flavipes	LEYE	176620	Lesser Yellowlegs			X					X	X			X	X			
Melospiza lincolnii	LISP	179484	Lincoln's Sparrow	X			X	X	X		X		X			X			X
Lanius ludovicianus	LOSH	178515	Loggerhead Shrike	X	X		X	X		X	X	X	X	X	X	X		X	X
Vermivora luciae	LUWA	178866	Lucy's Warbler	X			X									X			X
Limosa fedoa	MAGO	176686	Marbled Godwit								X								
Eugenes fulgens	MAHU	178050	Magnificent Hummingbird								X								
Anas platyrhynchos	MALL	175063	Mallard	X	X		X	X		X	X	X	X	X	X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Cistothorus palustris	MAWR	178608	Marsh Wren	X			X	X											X
Falco columbarius	MERL	175613	Merlin	X	X	X	X				X	X							X
Oporornis tolmiei	MGWA	178940	MacGillivray's Warbler	X	X		X	X	X	X	X	X	X		X	X		X	X
Sialia currucoides	MOBL	179811	Mountain Bluebird	X	X		X	X	X	X	X	X	X		X	X		X	X
Parus gambeli	MOCH	178718	Mountain Chickadee	X	X		X	X	X	X	X	X	X		X	X		X	X
Zenaida macroura	MODO	177125	Mourning Dove	X	X		X	X		X	X	X	X	X	X	X	X	X	X
Vermivora ruficapilla	NAWA	178861	Nashville Warbler	X		X	X	X	X							X		X	X
Accipiter gentilis atricapillus	NOGO	175301	Northern Goshawk	X	X		X	X		X	X	X			X	X		X	X
Circus cyaneus	NOHA	175430	Northern Harrier	X	X	X	X	X		X	X	X	X	X	X	X		X	X
Mimus polyglottos	NOMO	178620	Northern Mockingbird	X			X	X		X	X	X		X	X	X		X	X
Anas acuta	NOPI	175074	Northern Pintail	X		X	X	X			X	X				X			X
Glaucidium gnoma	NOPO	177902	Northern Pygmy-Owl		X		X	X	X	X	X	X			X	X		X	X
Seiurus noveboracensis	NOWA	178931	Northern Waterthrush				X				X								X
Stelgidopteryx serripennis	NRWS	178443	Northern Rough-winged Swallow	X			X	X	X	X	X	X	X	X	X	X		X	X
Anas clypeata	NSHO	175096	Northern Shoveler			X	X	X			X	X				X			X
Lanius excubitor	NSHR	178511	Northern Shrike	X			X	X		X	X	X	X		X			X	

Attachment A. cont.

Latin name	**BBL 4-letter code**	**TSN #**	**Common name**	**ARCH**	**BLCA**	**BRCA**	**CANY**	**CARE**	**CEBR**	**COLM**	**CURE**	**DINO**	**FOBU**	**GOSP**	**HOVE**	**NABR**	**PISP**	**TICA**	**ZION**
Aegolius acadicus	NSWO	177942	Northern Saw-whet Owl	X	X		X	X		X	X	X			X			X	
Vermivora celata	OCWA	178856	Orange-crowned Warbler	X	X	X	X	X		X	X	X	X	X	X	X		X	X
Junco hyemalis	ORJU	179410	Oregon Junco	X			X								X	X			
Nuttallornis borealis	OSFL	178369	Olive-sided Flycatcher	X	X		X	X	X	X	X	X						X	X
Pandion haliaetus	OSPR	175590	Osprey	X	X		X				X	X							X
Myioborus pictus	PARE	178986	Painted Redstart																X
Podilymbus podiceps	PBGR	174505	Pied-billed Grebe				X	X			X	X				X			
Falco peregrinus anatum	PEFA	175605	Peregrine Falcon	X	X		X	X	X	X	X	X			X	X		X	X
Calidris melanotos	PESA	176653	Pectoral Sandpiper								X								
Phainopepla nitens	PHAI	179877	Phainopepla				X												X
Pinicola enucleator	PIGR	179205	Pine Grosbeak					X		X	X	X						X	
Gymnorhinus cyanocephalus	PIJA	179748	Pinyon Jay	X	X		X	X	X	X	X	X			X	X		X	X
Spinus pinus pinus	PISI	179247	Pine Siskin	X	X		X	X	X	X	X	X	X		X	X		X	X
Vireo solitarius plumbeus	PLVI	179013	Plumbeous Vireo	X	X		X				X	X			X	X		X	X
Falco mexicanus	PRFA	175603	Prairie Falcon	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Empidonax difficilis	PSFL	178348	Pacific-slope Flycatcher									X							
Carpodacus purpureus	PUFI	179186	Purple Finch	X			X												

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Progne subis	PUMA	178464	Purple Martin					X										X	
Sitta pygmaea	PYNU	178788	Pygmy Nuthatch		X				X	X	X	X	X			X		X	X
Pheucticus ludovicianus	RBGR	179139	Rose-breasted Grosbeak	X				X		X									X
Larus delawarensis	RBGU	176830	Ring-billed Gull			X	X				X		X			X		X	
Mergus serrator	RBME	175187	Red-breasted Merganser								X								
Sitta canadensis	RBNU	178784	Red-breasted Nuthatch	X	X		X	X	X	X	X	X	X			X		X	X
Sphyrapicus ruber	RBSA	178212	Red-breasted Sapsucker													X			
Regulus calendula	RCKI	179870	Ruby-crowned Kinglet	X	X		X	X	X	X	X	X	X			X		X	X
Aimophila ruficeps	RCSP	179377	Rufous-crowned Sparrow												X				X
Loxia curvirostra	RECR	179259	Red Crossbill		X				X		X	X	X			X		X	X
Aythya americana	REDH	175125	Redhead			X		X			X	X				X			
Vireo olivaceus	REVI	179021	Red-eyed Vireo															X	
Melanerpes erythrocephalus	RHWO	178186	Red-headed Woodpecker															X	
Buteo lagopus	RLHA	175373	Rough-legged Hawk			X	X	X			X	X	X	X		X		X	X
Aythya collaris	RNDU	175128	Ring-necked Duck			X	X	X			X	X				X			
Phalaropus lobatus	RNPH	176735	Red-necked Phalarope			X					X			X		X			

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Sphyrapicus varius nuchalis	RNSA	178205	Red-naped Sapsucker	X	X		X	X		X	X	X	X			X		X	X
Columba livia	RODO	177071	Rock Dove	X	X		X	X		X	X	X	X			X			
Salpinctes obsoletus	ROWR	178614	Rock Wren	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Phasianus colchicus	RPHE	175905	Ring-necked Pheasant	X			X	X		X		X		X					X
Colaptes cafer	RSFL	- 501479	Red-shafted Flicker																X
Buteo jamaicensis	RTHA	175350	Red-tailed Hawk	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Oxyura jamaicensis	RUDU	175175	Ruddy Duck					X			X	X				X			
Bonasa umbellus	RUGR	175790	Ruffed Grouse										X					X	
Selasphorus rufus	RUHU	178040	Rufous Hummingbird	X	X					X	X	X						X	X
Agelaius phoeniceus	RWBL	179045	Red-winged Blackbird	X	X		X	X		X	X	X	X		X	X		X	X
Grus canadensis	SACR	176177	Sandhill Crane		X		X			X	X	X	X	X					
Amphispiza belli	SAGS	179402	Sage Sparrow	X			X	X		X	X	X	X		X	X		X	X
Calidris alba	SAND	176669	Sanderling								X								
Sayornis saya	SAPH	178333	Say's Phoebe	X	X		X	X		X	X	X	X	X	X	X		X	X
Oreoscoptes montanus	SATH	178654	Sage Thrasher	X	X		X	X		X	X	X	X	X	X	X		X	X
Passerculus sandwichensis	SAVS	179314	Savannah Sparrow	X			X	X		X	X	X	X			X			X
Junco hyemalis	SCJU	179410	Slate-colored Junco	X			X									X			
Icterus parisorum	SCOR	179082	Scott's Oriole	X			X	X		X					X	X		X	X
Callipepla squamata	SCQU	175872	Scaled Quail												X				

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Asio flammeus	SEOW	177935	Short-eared Owl	X				X		X	X	X	X	X	X			X	
Charadrius semipalmatus	SEPL	176506	Semipalmated Plover								X								
Calidris pusilla	SESA	176667	Semipalmated Sandpiper								X								
Plectrophenax nivalis	SNBU	179532	Snow Bunting								X							X	
Egretta thula	SNEG	174813	Snowy Egret	X		X	X	X			X	X		X	X	X			X
Porzana carolina	SORA	176242	Sora	X		X	X	X			X								
Tringa solitaria	SOSA	176615	Solitary Sandpiper	X			X				X				X	X			
Melospiza melodia	SOSP	179492	Song Sparrow	X	X		X	X		X	X	X	X		X	X		X	X
Vireo solitarius	SOVI	179010	Solitary Vireo					X		X									X
Strix occidentalis	SPOW	177925	Spotted Owl				X					X							X
Actitis macularia	SPSA	176612	Spotted Sandpiper	X	X	X	X	X	X		X	X	X		X	X			X
Pipilo maculatus	SPTO	554380	Spotted Towhee	X	X		X		X	X	X	X	X	X	X	X		X	X
Accipiter striatus velox	SSHA	175305	Sharp-shinned Hawk	X	X		X	X		X	X	X	X		X	X		X	X
Pedioecetes phasianellus	STGR	175840	Sharp-tailed Grouse							X									
Cyanocitta stelleri	STJA	179685	Steller's Jay		X		X	X	X	X	X	X	X		X	X		X	X
Calidris himantopus	STSA	554145	Stilt Sandpiper								X								
Piranga rubra	SUTA	179888	Summer Tanager																X
Buteo swainsoni	SWHA	175367	Swainson's Hawk	X	X	X	X	X			X	X	X	X	X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Melospiza georgiana	SWSP	179488	Swamp Sparrow	X															
Catharus ustulatus	SWTH	179788	Swainson's Thrush	X		X		X				X	X			X		X	X
Vermivora peregrina	TEWA	178855	Tennessee Warbler			X		X											
Myadestes townsendi	TOSO	179824	Townsend's Solitaire	X	X		X	X	X	X	X	X	X		X	X		X	X
Dendroica townsendi	TOWA	178897	Townsend's Warbler	X	X	X	X	X			X	X				X			
Tachycineta bicolor	TRES	178431	Tree Swallow	X	X		X	X		X	X	X	X			X		X	X
Picoides tridactylus	TTWO	178251	Three-toed Woodpecker						X			X				X		X	
Cathartes aura teter	TUVU	175268	Turkey Vulture	X	X		X	X		X	X	X	X		X	X		X	X
Catharus fuscescens	VEER	179796	Veery							X								X	
Pooecetes gramineus	VESP	179366	Vesper Sparrow	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Tachycineta thalassina	VGSW	178427	Violet-green Swallow	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Rallus limicola	VIRA	176221	Virginia Rail	X			X												X
Vermivora virginiae	VIWA	178864	Virginia's Warbler	X	X		X	X		X	X	X			X	X		X	X
Vireo gilvus swainsoni	WAVI	179025	Warbling Vireo	X	X		X	X	X	X	X	X	X		X	X		X	X
Sitta carolinensis	WBNU	178775	White-breasted Nuthatch	X	X		X	X	X	X	X	X	X		X	X		X	X
Zonotrichia leucophrys	WCSP	179455	White-crowned Sparrow	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Sialia mexicana occidentalis	WEBL	179808	Western Bluebird	X	X		X	X	X	X	X	X			X	X		X	X

Attachment A. cont.

Latin name	BBL 4-letter code	TSN #	Common name	ARCH	BLCA	BRCA	CANY	CARE	CEBR	COLM	CURE	DINO	FOBU	GOSP	HOVE	NABR	PISP	TICA	ZION
Aechmophorus occidentalis	WEGR	174503	Western Grebe	X			X				X	X				X			
Tyrannus verticalis	WEKI	178287	Western Kingbird	X	X		X	X		X	X	X	X	X	X	X		X	X
Sturnella neglecta	WEME	179039	Western Meadowlark	X	X		X	X		X	X	X	X	X	X	X		X	X
Calidris mauri	WESA	176668	Western Sandpiper			X					X					X			X
Aphelocoma ultramarina	WESJ	179707	Western Scrub-Jay		X						X	X	X					X	X
Otus kennicottii	WESO	555388	Western Screech-Owl	X			X	X		X		X			X			X	X
Piranga ludoviciana	WETA	179882	Western Tanager	X	X		X	X	X	X	X	X	X			X		X	X
Contopus sordidulus	WEWP	178360	Western Wood-Pewee	X	X		X	X	X	X	X	X	X		X	X	X	X	X
Plegadis chihi	WFIB	174926	White-faced Ibis	X		X	X	X			X	X				X			
Empidonax traillii	WIFL	178341	Willow Flycatcher	X			X	X		X	X	X						X	X
Catoptrophorus semipalmatus	WILL	176638	Willet				X	X			X	X		X	X	X			X
Phalaropus tricolor	WIPH	176736	Wilson's Phalarope			X		X			X	X			X	X			
Sphyrapicus thyroideus	WISA	178208	Williamson's Sapsucker		X		X	X								X		X	X
Meleagris gallopavo	WITU	176136	Wild Turkey		X					X		X							X
Wilsonia pusilla	WIWA	178973	Wilson's Warbler	X	X		X	X		X	X	X	X		X	X		X	X
Troglodytes troglodytes	WIWR	178547	Winter Wren					X											X
Aix sponsa	WODU	175122	Wood Duck								X								X
Calidris fuscicollis	WRSA	176654	White-rumped Sandpiper								X								

Attachment A. cont.

Latin name	**BBL 4-letter code**	**TSN #**	**Common name**	**ARCH**	**BLCA**	**BRCA**	**CANY**	**CARE**	**CEBR**	**COLM**	**CURE**	**DINO**	**FOBU**	**GOSP**	**HOVE**	**NABR**	**PISP**	**TICA**	**ZION**
Zonotrichia albicollis	WTSP	179462	White-throated Sparrow	X				X			X								X
Aeronautes saxatalis	WTSW	178014	White-throated Swift	X	X		X	X	X	X	X	X	X		X	X		X	X
Icteria virens	YBCH	178964	Yellow-breasted Chat	X	X		X	X			X	X			X	X		X	X
Coccyzus americanus	YBCU	177831	Yellow-billed Cuckoo					X				X							X
Sphyrapicus varius	YBSA	178202	Yellow-bellied Sapsucker							X					X	X		X	X
Xanthocephalus xanthocephalus	YHBL	179043	Yellow-headed Blackbird	X			X	X		X	X	X			X	X			X
Dendroica petechia	YWAR	178878	Yellow Warbler	X	X		X	X	X	X	X	X	X			X		X	X

Attachment B. Acronyms of NCPN park units.

Park unit	Acronym	State
Arches National Park	ARCH	UT
Black Canyon of the Gunnison National Park	BLCA	CO
Bryce Canyon National Park	BRCA	UT
Canyonlands National Park	CANY	UT
Capitol Reef National Park	CARE	UT
Cedar Breaks National Monument	CEBR	UT
Colorado National Monument	COLM	CO
Curecanti National Recreation Area	CURE	CO
Dinosaur National Monument	DINO	CO/UT
Fossil Butte National Monument	FOBU	WY
Golden Spike National Historic Site	GOSP	UT
Hovenweep National Monument	HOVE	CO/UT
Natural Bridges National Monument	NABR	UT
Pipe Spring National Monument	PISP	AZ
Timpanogos Cave National Monument	TICA	UT
Zion National Park	ZION	UT

Land Bird Monitoring Protocol for the Northern Colorado Plateau Network National Parks and Monuments

Standard Operating Procedure (SOP) # 2

Training Observers

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) summarizes the training workshop conducted by the Rocky Mountain Bird Observatory for all participants in their *Monitoring Colorado's Birds* program. Observers surveying Northern Colorado Plateau Network (NCPN) park units must participate in the RMBO training. Additionally, supplemental information of value to observers working in the NCPN park units is provided.

Procedures:

1. In early May of each year, the Rocky Mountain Bird Observatory conducts a five-day training workshop for all observers participating in their *Monitoring Colorado's Birds* program. Training includes the following topics:

    - Identification of birds by sight and vocalizations
    - Estimating distances to birds seen or heard
    - Collecting habitat data
    - Using a GPS unit
    - Detailed explanation of the protocol

2. Supplemental reference manuals for bird surveys and habitat-collection procedures are listed below, and should be reviewed by observers working in NCPN park units:

    - Elmore, F.H. 1976. Shrubs and Trees of the Southwest Uplands. Southwest Parks and Monuments Association. Globe, Arizona.
    - National Geographic. 1987. Field Guide to Birds of North America, 3rd Edition. National Geographic, Washington, D.C. 480 pages.

- Robbins, C.S., B. Bruun, and H.S. Zim. 1983. Golden: A Guide to Field Identification of North American Birds. Western Publishing Company, Inc., Racine, WI. 360 pages.
- Stokes, D. W. and L. Q. Stokes. 1995. Stokes Field Guide to Birds: Western Region. Little, Brown and Company, New York, NY. 519 pages.
- Welsh, S.L., N.D. Atwood, S. Goodwich, L.C. Higgins. 1993. A Utah Flora. Brigham Young University, Second Edition, Provo, Utah. 986 pp.
- Williams, D. 2000. A Naturalist's Guide to Canyon Country. A Falcon Guide. The Globe Pequot Press. Guilford, Connecticut.

3. The NCPN may provide a recreational GPS unit to observers working in park units. Instructions on using a recreational GPS unit are provided in SOP #3.

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 3

Using Global Positioning System (GPS) Units

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) explains the procedures and considerations that all observers should follow when collecting geospatial data or navigating to locations. This SOP is written for use with recreational-grade GPS units such as those manufactured by Garmin or Magellan. These units are far less expensive than mapping-grade units (e.g., Trimble GeoExplorer), yet they are effective for obtaining point information at a level of spatial accuracy that is required for this project. Recreational-grade GPS units do not have the capability of a data dictionary for storing attribute information with point locations.

This SOP assumes that each observer is familiar with the operation and function of the GPS unit to be used for this project. This SOP is intended to complement, not replace, the operations manual accompanying the GPS unit. Each observer should be familiar with the use of their particular GPS unit before entering the field to collect data or navigate to points.

This SOP does not require the use of a specific type or brand of GPS unit; however, the unit is required to meet the minimum standards listed below. The Northern Colorado Plateau Network (NCPN) has used primarily Garmin units, specifically, the eTrex, III Plus, and 76 models. Detailed instructions relating to the Garmin 76 model and this protocol are included in Attachment A. Functions other than those associated with this protocol are not explained in this document.

Procedures:

1. The minimum GPS receiver standards for navigating and mapping are:

- Capable of storing date, time, and coordinates of features collected.

- Capable of exporting features collected to a format that can be used by a GIS
- Capable of maintaining an EHE (Estimate of Horizontal Error) of less than or equal to 12 meters. Maintaining an EHE (or EPE – Estimate of Positional Error) of 12 meters or less meets the National Map Accuracy Standard.
- Capable of tracking a minimum of 4 satellites
- Capable of collecting real-time differentially-corrected positions (DGPS)

2. Required equipment

- GPS unit
- One set of extra batteries
- Operation manual
- Compass
- Rangefinder
- USGS 1:24,000-scale topographic map
- Personal computer for downloading data from the GPS unit. DNR Garmin (freeware, available at http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions.html) should be installed on the computer to facilitate the data download.

3. GPS Unit Setup before leaving the office (see Attachment A)

- set GPS unit standards

Minimum GPS Receiver Settings Standards

Name	Standard
Projection (displayed coordinates)	UTM
Datum	NAD 27 CONUS
WAAS	Enabled (on)

- upload background data (MapSource)
- upload existing waypoints to the GPS unit (if necessary)

4. Navigation to an existing location

When the observer needs to revisit the points that make up the transects, the observer can relocate those points using the GPS unit. Navigation to the point is best accomplished by using background maps that have been loaded onto the GPS unit, in addition to using hard-copy USGS 1:24,000-scale topographic maps.

- Select the waypoint you wish to navigate towards and follow the pointer displayed on the unit.
- In order to navigate, the GPS unit must be moving

5. Collecting new location data

Once the observer has navigated to the beginning of a transect, a series of 15 waypoints will be taken to represent each transect.

- Take (or mark) a waypoint, and identify it with a unique ID that matches the location identifier recorded on the field sheet: Transect number (2 letter habitat code and 2 digit transect number) and 2 digit point number. Ex. MS0112 Montane Shrub, 01 Transect, Point # 12. Space permitting, the NCPN recommends adding a GPS unit ID letter to the end of the waypoint ID (MS0112C would indicate GPS unit "C" was used).
- Record waypoint UTM coordinates that are displayed on the GPS unit on field sheet

Collection of Access Points can be accomplished in the same manner. A suggested waypoint ID for access points is the letter "A", a 2 digit number, and 2 letter habitat code. Ex. A01MS would indicate this point is Access Point #1 for a Montane Shrub transect. These access waypoint IDs should be included in the notes under "Directions to Access Point" on the UTM Data Sheet.

6. Downloading Data from GPS unit (see Attachment A)

The data from the GPS unit are downloaded to a personal computer daily, or after each field stint. Frequent, regular downloads will safeguard against any loss of data.

NCPN recommends the use of the DNR Garmin extension. This tool facilitates the communication between ArcView and Garmin Brand GPS units by allowing users to download and upload waypoints (and tracks) as text files, shapefiles and/or graphics. DNR Garmin is freeware, and is available at http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions.html)

- Connect the GPS unit to the personal computer using a USB or serial cable.
- Download GPS data (.txt files) into appropriate folders (Figure 3-1). Fields required from a unit download are: ident (waypoint), lat, long, y_proj, x_proj, comment, altitude, and model.
- Review the downloaded data for accuracy and completeness.

Text files are required as part of the download. GIS shapefiles can be created at the same time. See Attachment A for additional information on shapefile creation. NCPN recommends that during the field season downloads be limited to text files, with a single set of GIS shapefiles created at the conclusion of the field season.

Downloaded GPS text files will be appended to the Land Bird database at the time of data entry (see SOP # 7). At this time, all GIS data will be converted to the NPS standard projection of UTM NAD83. Both NAD27 and NAD83 coordinates will be preserved in the database. Spatial files will be maintained in NAD83.

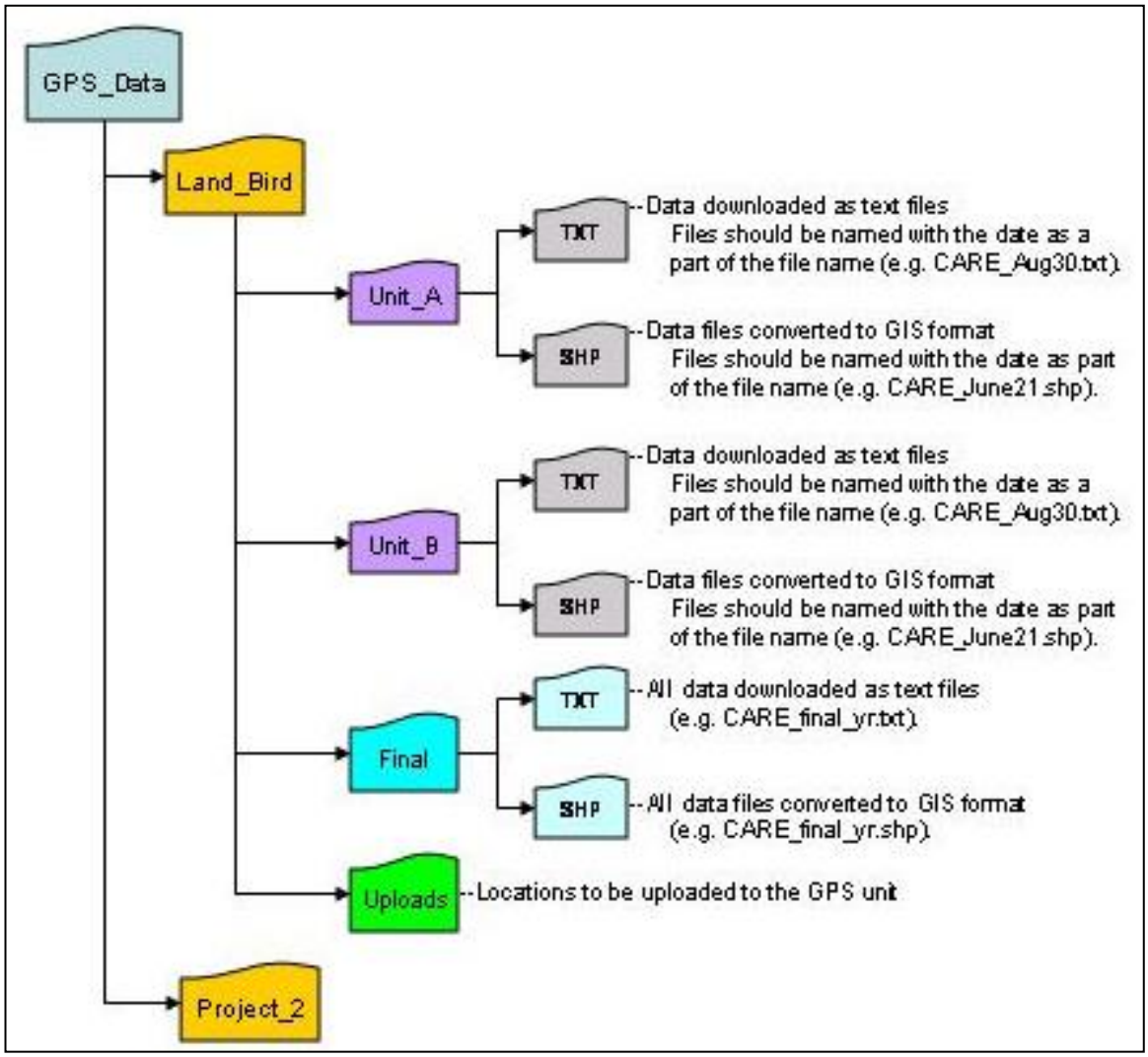


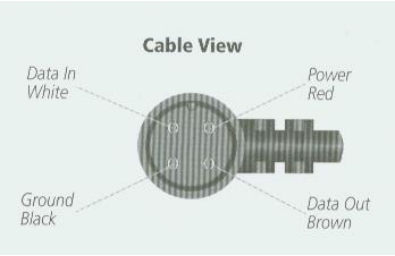
Figure 3-1. Recommended directory structure for data downloaded from GPS unit.

Attachment A

This graphic demonstrates the keys of a Garmin 76 GPS unit, and their functions. These keys are referred to in the following instructions.

1. To Connect GPS to Computer

- Either a serial or USB port cable will accompany the GPS unit. This is the cable that connects the GPS receiver to your workstation computer, allowing the uploading and downloading of waypoints.
- The serial or USB end of the cable attaches to your workstation computer. The other cable end (below) inserts into the Garmin GPS unit (lift bottom of black flap on the back of the GPS unit)



2. To change the displayed map projection:

- Turn on the unit by depressing the POWER key
- Set Projection
    1. Access the Main Menu (press the MENU key twice)
    2. Using the rocker key, scroll down to Setup and press the ENTER key
    3. There are several tabs listed (General, Time, Units, Location, Alarms & Interface) – using the rocker key, scroll over to the Location tab. Scroll down with the rocker key to Location Format and press the ENTER key.
    4. Scroll down the list of formats to UTM UPS, make sure this choice is highlighted, and press the ENTER key.
    5. Scroll down to Map Datum, press the ENTER key. Scroll down through the Map Datum choices, press the ENTER key when NAD 27 CONUS is highlighted.
    6. Press the PAGE key to get back to the "GPS Information" screen. (If the GPS Information screen is not showing, press the PAGE key; it will cycle through the screens). The bottom of the screen should now be displaying coordinates as UTM.

3. Set GPS to log differentially correct data

- If not already on, power up the GPS
- Enable WAAS
    1. Access the Main Menu (press the MENU key twice)
    2. Using the key, scroll down to Setup and press the ENTER key
    3. There are several tabs listed (General, Time, Units, Location, Alarms & Interface) – using the rocker key, scroll over to the Location tab. Scroll down with the rocker key to General and press the ENTER key.
    4. Scroll down to WAAS, press ENTER, highlight Enabled, and press ENTER
    5. Press the PAGE key to exit Setup

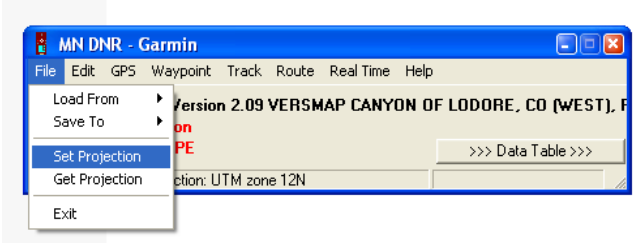
4. In the Field

- Collect (or mark) a waypoint
    1. When at the observation location, check the GPS Information page for number of satellites (4 or more needed) and accuracy (12 meters or less)
    2. Press and hold the ENTER/MARK key until the Mark Waypoint Page is displayed.
    3. Using the Rocker key, change the waypoint ID to Transect, point #, optional GPS letter
    4. Using the Rocker key, highlight "OK" and press ENTER
- Navigation
    1. Press the NAV key
    2. Select 'Go To Point' then press the ENTER key
    3. Select 'Waypoints' then press the ENTER key
    4. Select 'your point' then press the ENTER key

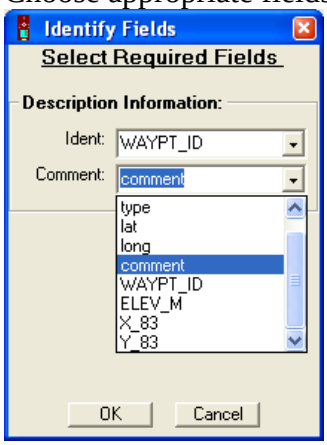
5. Highlight the 'GoTo' button, press ENTER
6. As you start walking, the Pointer will point to your destination

5. Upload Background Data

- Upload background maps from MapSource (proprietary software) if needed
- Upload waypoints using DNR Garmin
    1. Connect GPS to the computer
    2. Turn GPS on, then open DNR Garmin, it will connect to the computer
    3. When the MN DNR – Garmin window opens, make sure that the projection is set to NAD27, UTM, zone 12N (unless at CURE or BLCA, which are zone 13N). Go to File, then Set Projection to change projection.

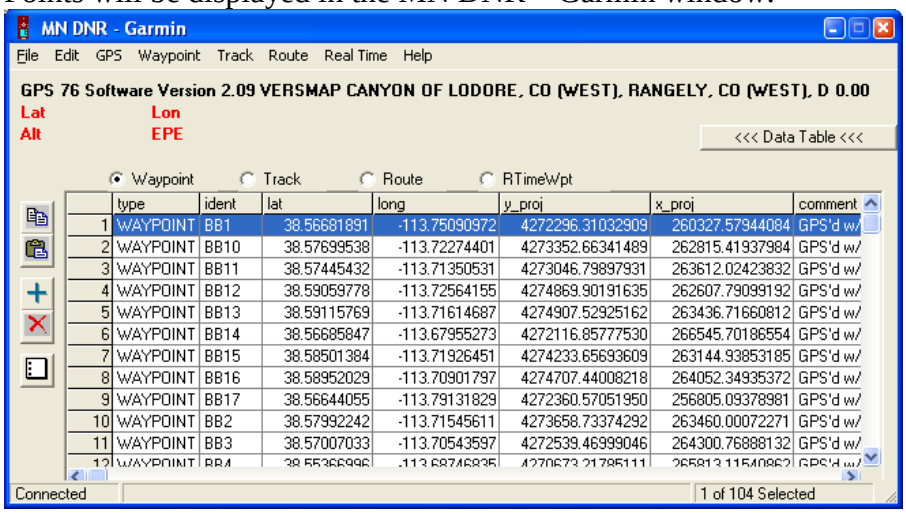


    4. Click on File, then Load From. You can upload a .txt file, .dbf file or a shapefile. Navigate to the file you wish to upload and click Open.
    5. A window will open prompting you select description information. Choose appropriate fields for Ident (ID) and Comment and click OK.



    6. A window will open stating "File was loaded successfully from….", click OK

7. Points will be displayed in the MN DNR – Garmin window.

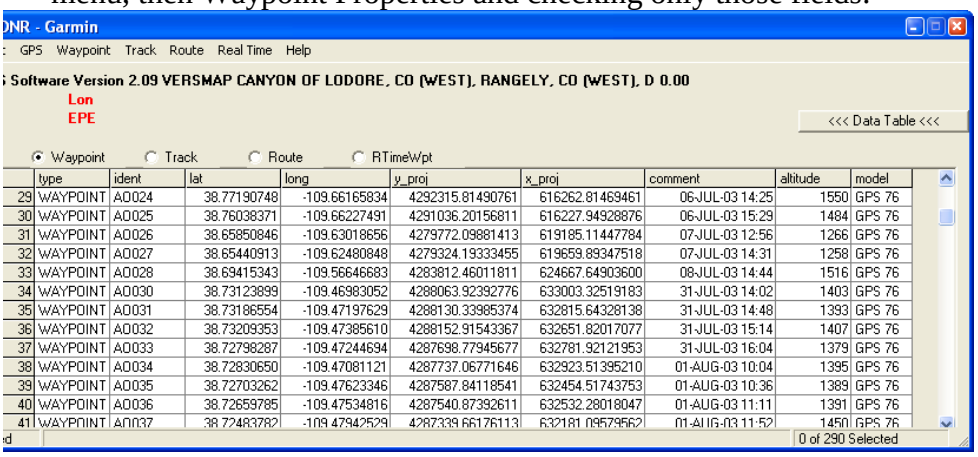


	type	ident	lat	long	y_proj	x_proj	comment
1	WAYPOINT	BB1	38.56681891	-113.75090972	4272296.31032909	260327.57944084	GPS'd w/
2	WAYPOINT	BB10	38.57699538	-113.72274401	4273352.66341489	262815.41937984	GPS'd w/
3	WAYPOINT	BB11	38.57445432	-113.71350531	4273046.79897931	263612.02423832	GPS'd w/
4	WAYPOINT	BB12	38.59059778	-113.72564155	4274869.90191635	262607.79099192	GPS'd w/
5	WAYPOINT	BB13	38.59115769	-113.71614687	4274907.52925162	263436.71660812	GPS'd w/
6	WAYPOINT	BB14	38.56685847	-113.67955273	4272116.85777530	266545.70186554	GPS'd w/
7	WAYPOINT	BB15	38.58501384	-113.71926451	4274233.65693609	263144.93853185	GPS'd w/
8	WAYPOINT	BB16	38.58952029	-113.70901797	4274707.44008218	264052.34935372	GPS'd w/
9	WAYPOINT	BB17	38.56644055	-113.79131829	4272360.57051950	256805.09378981	GPS'd w/
10	WAYPOINT	BB2	38.57992242	-113.71545611	4273658.73374292	263460.00072271	GPS'd w/
11	WAYPOINT	BB3	38.57007033	-113.70543597	4272539.46999046	264300.76888132	GPS'd w/
12	WAYPOINT	BB4	38.55366996	-113.68746835	4270673.21785111	265813.11540862	GPS'd w/

8. If the points are correct, click on WAYPOINT, then Upload
9. A window will pop up stating "Transfer Complete. _#_ points uploaded"

6. Downloading Waypoints

- Download waypoints using MN DNR Garmin freeware
  1. Connect the GPS to the computer and turn on the GPS unit, then open the program DNR Garmin on the computer
  2. From the DNR Garmin main menu, click on Waypoint, then Download. Your data will appear in the MN DNR Garmin window (see below). Elements to be included in the downloading process are: type, ident, lat, long, y_proj, x_proj, comment, altitude & model. These fields can be chosen by choosing Waypoint from the main menu, then Waypoint Properties and checking only those fields.

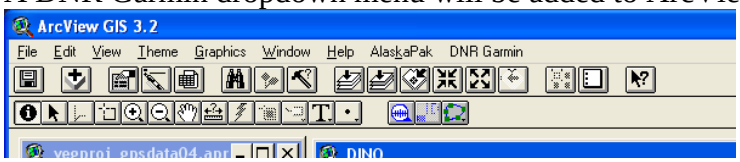


	type	ident	lat	long	y_proj	x_proj	comment	altitude	model
29	WAYPOINT	A0024	38.77190748	-109.66165834	4292315.81490761	616262.81469461	06-JUL-03 14:25	1550	GPS 76
30	WAYPOINT	A0025	38.76038371	-109.66227491	4291036.20156811	616227.94928876	06-JUL-03 15:29	1484	GPS 76
31	WAYPOINT	A0026	38.65850846	-109.63018656	4279772.09881413	619185.11447784	07-JUL-03 12:56	1266	GPS 76
32	WAYPOINT	A0027	38.65440913	-109.62480848	4279324.19333455	619659.89347518	07-JUL-03 14:31	1258	GPS 76
33	WAYPOINT	A0028	38.69415343	-109.56646683	4283812.46011811	624667.64903600	08-JUL-03 14:44	1516	GPS 76
34	WAYPOINT	A0030	38.73123899	-109.46983052	4288063.92392776	633003.32519183	31-JUL-03 14:02	1403	GPS 76
35	WAYPOINT	A0031	38.73186554	-109.47197629	4288130.33985374	632815.64328138	31-JUL-03 14:48	1393	GPS 76
36	WAYPOINT	A0032	38.73209353	-109.47385610	4288152.91543367	632651.82017077	31-JUL-03 15:14	1407	GPS 76
37	WAYPOINT	A0033	38.72798287	-109.47244694	4287698.77945677	632781.92121953	31-JUL-03 16:04	1379	GPS 76
38	WAYPOINT	A0034	38.72830650	-109.47081121	4287737.06771646	632923.51395210	01-AUG-03 10:04	1395	GPS 76
39	WAYPOINT	A0035	38.72703262	-109.47623346	4287587.84118541	632454.51743753	01-AUG-03 10:36	1389	GPS 76
40	WAYPOINT	A0036	38.72659785	-109.47534816	4287540.87392611	632532.28018047	01-AUG-03 11:11	1391	GPS 76
41	WAYPOINT	A0037	38.72483782	-109.47942529	4287339.66176113	632181.09579562	01-AUG-03 11:52	1450	GPS 76

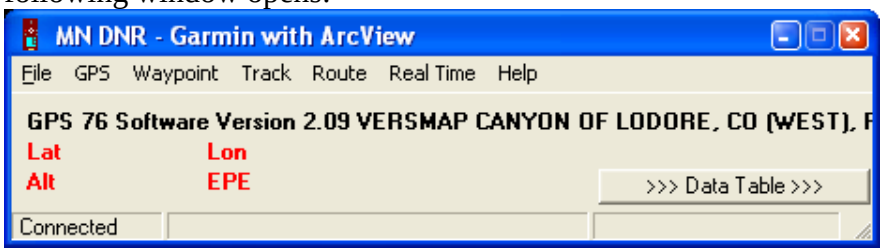
3. Click on File, then Save To. Navigate to the proper folder on the computer (see possible directory structure, Figure 3-1)
   There are several file types which you can save the file as. The NCPN recommends saving the data as a Text File (Comma delimited)(*.txt) file. This is the default choice.

4. Name the file with the date of download in the file name (example: Peregrine_June10_05.txt) and click the Save button. A window will display "File successfully written to …"

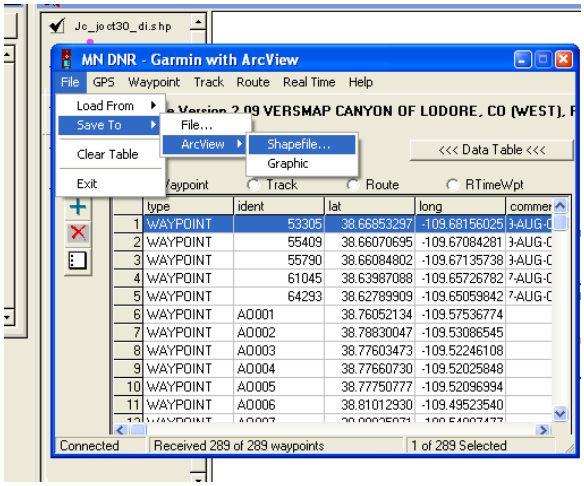
- Download waypoints using MN DNR Garmin and ArcView 3.x
  1. Connect GPS unit to workstation
  2. Open and activate the DNR Garmin-ArcView extension in ArcView. A DNR Garmin dropdown menu will be added to ArcView.



  3. From the DNR Garmin menu, choose "Set Projection". Choose UTM NAD27, and the appropriate zone (12 for all NCPN parks except CURE and BLCA which are 13)
  4. From the DNR Garmin menu, choose "Open Garmin GPS". The following window opens:



  5. From this window, click on Waypoint, then Properties. Choose (check) the following fields: type, ident, lat, long, y_proj, x_proj, comment, altitude & model. Click OK to dismiss the Properties window
  6. Click on Waypoint, then Download. All points collected will be downloaded.
  7. Click on File, then Save To, then ArcView, then Shapefile.



8. Navigate to the appropriate folder, and click Save. The newly created shapefile will appear in the active ArcView view window. Notice that X & Y coordinates have been added to the shapefile.

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 4

Establishing and Marking Sampling Plots

Version 1.01 (May 10, 2007)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.00	10 May 2007	S. L. Garman – NCPN Ecologist	Updated site selection procedures.	To document 'final' site selection procedures.	1.01

Landbird monitoring in the Northern Colorado Plateau Network (NCPN) is conducted by Rocky Mountain Bird Observatory (RMBO), and is part of the Monitoring Colorado's Birds (MCB) program. This Standard Operating Procedure (SOP) describes the procedures used to select monitored habitat patches in NCPN park units, followed by a summary of the MCB procedures to select and mark bird-survey transects. The RMBO-MCB protocol is included as Appendix C in the NCPN Land Bird Monitoring Protocol narrative. Section IV and Appendix A in the RMBO-MCB protocol describes establishing and marking sampling plots.

I. Selecting Habitat Patches to Monitor

Sagebrush, pinyon-juniper, and riparian habitats were selected for monitoring in NCPN park units on the basis of region-wide concerns and issues related to habitat degredation and bird populations. Funding constraints limited the number of transects per habitat type to 15. Park units included in landbird monitoring were determined by the availability of target habitat. A combination of random selection and index sites were employed to identify areas for monitoring. All transects were established in the first year of monitoring (2005). Coordinates of each transect, and general directions to transects are recorded in Appendices F and G, respectively, of the protocol narrative.

Procedures:

The selection of monitoring locations for the two upland habitat types (Pinyon-Juniper [PJ] and sagebrush) involves a 7-step process, which is outlined below.

1) An accessibility assessment for each park unit is first performed. This involves using a GIS to mask-out areas accessible only by traversing a ≥50% slope, and areas corresponding to ≥50% slope. The output from this procedure is a map indicating the areas within a park unit that are accessible.

2) Land cover or vegetation maps are used to determine suitable habitat patches. For this version of the protocol, Southwest REGAP landcover maps were the basis for habitat types, with the exception of ZION and CARE National Parks for which interim versions of vegetation-association maps were available. For both map sources, all Pinyon-Juniper types are combined into an aggregate PJ type. The modified landcover or association map (hereafter both are referred to as a habitat map) is overlaid on the accessiblility map, and inaccessible areas of the habitat map masked-out. The result from this overlay is a habitat map for only accessible areas.

3) A point sampling frame is used to determine the origin of monitoring transects. A 500-m inter-point spacing is employed to minimize the potential for selecting overlapping transects.

4) The point-based sampling frame is overlaid on the resulting map from step #2. Habitat patches and the associated frame points are extracted, and patches evaluated for suitable size and shape. If a patch is too small to accommodate a 3.5-km transect (15 monitoring stations with a 250-m inter-station distance), the patch and all associated frame points are discarded. Otherwise, the points are extracted and stored according to habitat type (e.g., PJ or sagebrush).

5) Procedure 1-4 is performed for all park units with PJ or sagebrush habitat.

6) For each of the upland habitat types, corresponding points from all park units are combined, and 30 points are randomly selected and ordered according to selection sequence. This ordering provides a sequential list for evaluating the suitability of points as monitoring transects.

7) Points are mapped onto topographic and habitat maps to double-check accessibility, patch size, and to determine if a transect originating from the point overlaps a transect of a previously selected point. Transects originating from previously selected points are estimated using ArcMap drawing and distance tools. If the three criteria are not met, the point is discarded and the next sequential point is evaluated. This is performed until 15 suitable transects are identified per habitat type.

Riparian habitats in the NCPN were limited to wadeable streams, which excluded the Green, Colorado, Gunnison, and Virgin rivers. Given the limited number of streams, riparian systems for monitoring were hand picked. With exceptions noted below, the beginning location of a riparian transect is subjectively determined such that the resulting location would provide a suitable 3.5-km transect. The Southeast Utah Group (SEUG) has monitored landbirds along three streams in Arches and in Canyonlands National Park, and two streams in Natural Bridges National Monument for up to 14 years. The monitoring of these streams was turned over to RMBO, who used the existing 10-station design, but added five more stations by extending the existing transects.

The final number of transects by habitat type is shown in Table 1.

Table 1. Number of landbird monitoring transects, by NCPN park unit and habitat.

Park Unit	Habitat		
	PJ	Sagebrush	Riparian
Arches NP	1	-	3
Black Canyon of the Gunnison NP	1	1	-
Bryce Canyon NP	1	2	-
Canyonlands NP	2	-	3
Captiol Reef NP	2	-	2
Colorado NM	2	-	-
Curecanti NRA	-	5	-
Dinosaur NM	4	5	3
Fossil Butte NM	-	2	-
Natural Bridges NM	1	-	2
Zion NP	1	-	2

II. Establishing Sampling Plots

Park-based maps were generated showing the selected habitat patches. Maps included transportation networks to aid in navigating to possible access points. Aided by these maps, the following RMBO-MCB procedures were used to locate and document bird-monitoring transects.

Procedures:

1. Determine an access point adjacent to or within the habitat patch to be surveyed that is easily recognizable, requires the least amount of driving to get to, and offers a safe parking place off of the road. For linear habitats, the access point is strategically placed near the end of the habitat to accommodate the entire length of a 15-point (requires approximately 4 km). Directions to the access point should be clear, detailed, and the UTM coordinates of its location should be recorded using a GPS unit. This information is recorded on the Rocky Mountain Bird Observatory – UTM Data Sheet (Attachment A). Instructions for recording this information are provided in Attachment B (SITE DATA).

2. The procedure for locating the first point-count station from the access point will vary depending on how close the access point is to the target habitat. For access points in or adjacent to the target habitat, a random number table is used for both the distance and the bearing for heading into the stand to get to the start of a transect. For access points far from the target habitat, walk the most direct bearing to the target habitat, and upon reaching it, establish the first point-count station.

3. Transect orientation follows the initial randomly selected bearing from the access point to the habitat patch. An exception is when monitoring linear habitats, such as riparian areas. In such cases, the transect is located in the middle of the habitat and follows the orientation of the habitat. When the transect runs into another habitat or a barrier (e.g., cliff, private property), specific instructions are detailed in the RMBO-MCB protocol for how to proceed (see Section IV., part A of the RMBO-MCB protocol in Appendix C of the NCPN Land Bird Monitoring Protocol Narrative). The 15 point-count stations should be spaced 250-m apart, using the "way-points" feature on the GPS unit to ensure the correct straight-line distance. Use of straight-line distance will result in actual walking distances through meandering linear habitats to be >250 m. Pacing will give a reasonable estimate of distance while hiking between points, but should not replace the use of a GPS unit to establish the exact point location. The UTM coordinates of each point-count station should be recorded in the GPS (see SOP #3 for GPS instructions) and on the UTM Data Sheet (Attachment A) following the instructions listed in Attachment B (TRANSECT DATA – UTM data.).

III. Marking Sampling Plots

The MCB protocol does not call for permanent marking of transects. Observers rely on a GPS unit to re-locate UTM coordinates for the survey points, as well as between-point narrative accounts describing topography, habitat, landmarks, or other notable features of the landscape to help identify the point.

Attachment A
Rocky Mountain Bird Observatory – UTM Data Sheet

Directions to Access Point — Used existing directions? (check if Y)

	Zone	Easting	Northing
Access point UTM	1	0	

Transect description _____ m @ _____ ° to point 1;

Date,	Date		Sky:	Start	End
Time,	Time	Start 0	Wind:	Start	End
Weather		End	Temp:	Start °F	End °F

Transect notes

UTM data

Point #	Zone	Easting	Northing	Point #	Zone	Easting	Northing
01	1	0		08	1	0	
02	1	0		09	1	0	
03	1	0		10	1	0	
04	1	0		11	1	0	
05	1	0		12	1	0	
06	1	0		13	1	0	
07	1	0		14	1	0	
				15	1	0	

Habitat data

Point #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Within 100m of road (Y/N)?															
On private land (Y/N)?															
Bearing to point															
Best habitat classification															
Best habitat seral stage															
Next best habitat classification															
Next best habitat seral stage															
Primary understory class.															
Primary understory %															
Secondary understory class.															
Secondary understory %															

Rocky Mountain Bird Observatory, 14500 Lark Bunting Ln., Brighton, CO 80603 303-659-4348

Transect # ____ **Sheet 1 of** ____

Attachment B

Explanation of Field Form and Data Codes

(Appendix A, Point Transect Protocol for Monitoring Colorado's Birds - RMBO)

(These instructions apply to the Rocky Mountain Bird Observatory – UTM Data Sheet)

SITE DATA (at top of page 1)

***Transect #*:** Enter the **four-character** transect number using the ***correct* habitat codes** as described below (e.g., MS01, for Montane Shrubland #01, **not** MS1);

Observer: Enter your first two initials *and your full last name*

Map coord.: Enter the map coordinates for the transect Access Point, using either or both the *DeLorme* or *Roads of Colorado* atlases

Directions to access point (VERY IMPORTANT!)*: *Provide explicit directions to the access point from some nearby town, major intersection, or geographical feature readily found on a *DeLorme* or *Roads of Colorado* atlas. Provide mileages from intersections or other landmarks using your odometer. **If the observer last year did not provide adequate directions to your site, *please provide better directions this year*.** For new sites (*or for those lacking Access Point UTM coordinates*), take GPS readings and record **UTM coordinates** (and stored GPS waypoint#) for each access point. Also, **be explicit in your description about the *exact location* of the access point** (e.g., "the right post of the green metal gate" or "the NE corner of the bridge").

Example: MS02: From jct. of Highway 61, head East on Happy Canyon Rd for 8.4 miles to jct. with 420 Rd. Head South on 420 Rd through narrow canyon for 2.1 miles, cross over wooden bridge and park in 1st pullout on right. Access point is the tall wooden post at the SW corner of the bridge.

Transect description*:** Provide the **distance** and **bearing** *from the access point **to** the first point* (do not provide bearing from first point back to the access point). Then, provide *between-point accounts*, describing the topography, habitat, landmarks and/or other features that you pass prior to arriving at the next count station, with sufficient detail so that future observers can follow the same route that you are establishing. ***It is especially important that you record any turns, changes in bearings, or other deviations that you make from the original transect bearing. Also, provide a brief description of the area surrounding the count station, or any noticeable features of the landscape at each point, again so future observers will know when they have reached the area of the point-count station. *As this is a long-term monitoring program, the importance of providing detailed directions/descriptions for each transect cannot be overstated!* GPS locations alone are not sufficiently reliable as the accuracy of GPS locations can be changed significantly by the U.S. Government (as happened after Sept. 11). Please provide the transect description information in the general format and detail as described in the following example.

Example: Pt#6: From pt 5, turn to 356 ^{o} and head down steep drainage. Stay on bearing, passing ~45 m to the right of drainage bottom, where drainage meets larger valley. Continue through small stand of aspen; cross dirt 2-track at ~175 m; cross small creek at ~225 m. After creek, head up small hill with tall spruce trees on top. Point is on top of this hill, ~3 m south of largest-diameter spruce.

TRANSECT DATA (middle of page 1)

Date: Enter the date in the format: MM-DD-YY

Time: Enter start and stop times for entire transect (not individual points) using 24-hour clock

Sky (start and end)**:** Enter one-digit codes at beginning and end of transect (not at points)

0=0-15% cloud cover	*1=16-50% cloud cover*	*2=51-75% cloud cover*
3=76-100% cloud cover	*4=fog*	*6=drizzle*

You shouldn't conduct counts in any other conditions!

Wind (start and end)**:** Enter one-digit codes at beginning and end of transect

0=Less than 1 mph; smoke rises vertically
1=1-3 mph; smoke drift shows wind direction
2=4-7 mph; leaves rustle, wind is felt on face
3=8-12 mph; leaves, small twigs in constant motion; light flag extended
4=13-18 mph; raises dust, leaves, loose paper; small branches in motion
YOU SHOULDN'T CONDUCT COUNTS IN ANY OTHER CONDITIONS!

Temperature (start and end)**:** Use ^{o}F (no thermometer?, estimate to nearest 5°).

Transect notes: Enter information relevant to the site, good camp sites, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting.

UTM data: *Enter the UTM coordinates* (**using the NAD27 CONUS datum** in navigation setup) *for each point-count station associated with a **new** site* (*for established sites, only take a GPS reading if you are moving the count station; in these cases, provide new directions to the count station as well*). Be sure that the GPS reading is essentially stable before recording the UTM location. **Record all *new* UTM coordinates in the appropriate spaces provided on the field form and save all *new* UTM coordinates in the GPS units using the "Mark Waypoint" feature**. *Record the stored waypoint number, as indicated on the GPS unit, under "WP#", next to each UTM coordinate, respectively*. The stored UTM coordinates can then be uploaded to a PC, and thus you won't have to enter UTM coordinates as part of your data entry duties. However, each unit can only store 500 waypoints, so you will need to delete some of the established sites from the GPS unit (*after* completing the transect!) before you input additional locations. Whatever the situation, *make sure that **all** new UTMs get recorded on the field forms as well as in the GPS units!*

HABITAT DATA (bottom of page 1)

Within 100m of road (Y/N): Enter "Y" for yes and "N" for no for **EACH** point based on your best knowledge of the site. For our purposes, a "road" must be substantial enough so that it either causes a significant disruption of the understory vegetation OR a break in the canopy. For example, a grassy 2-track running through an open meadow should not be considered a road, whereas a gravel or dirt road that forms a 3 to 4-m wide break in the grass cover would be considered a road. Similarly, an old, pine needle-covered logging track in an open forest situation should not be considered a road, whereas a logging road that causes a clear and wide break in the woody understory vegetation, or in the forest canopy, should be considered a road. This topic will be covered more thoroughly during the training session.

On private land (Y/N): Enter "Y" for yes and "N" for no for **EACH** point. Be sure that you have permission to conduct counts that are on private land!

Bearing to point: Enter the true bearing (do not use magnetic bearings) you followed from the last point (or access point) to arrive at the current point.

Best habitat classification: Enter the two-letter code of the habitat that BEST describes the habitat surrounding the point count station. Consider the entire landscape around the count station from which you are picking up birds and select *the dominant habitat type that occupies the greatest amount of this area*.

Habitat classification codes:

AS = Aspen	LR = Low-elevation Riparian	RA = Rural/Agriculature
AT = Alpine Tundra	MR = Mid-elevation Riparian	SA = Sage Shrubland
CR = Cliff/Rock	MC = Mixed Conifer	SE = Semi-desert Shrubland
GR = Grassland	MS = Montane Shrubland	SB = Shore/Bank
HR = High-elevation Riparian	PJ = Piñon-Juniper	SF = Spruce-Fir
LP = Lodgepole Pine	PP = Ponderosa Pine	WE = Wetland

Best habitat seral stage and canopy closure: Enter one-digit code of seral stage (see Appendix D for habitat-specific seral stage accounts) of habitat used in best habitat classification, followed by a one-letter code for canopy closure:

1=grass-forb stage 2=shrub-seedling stage 3=sapling-pole stage

4=mature stage 5=old growth stage

a=<40% canopy closure b=40-70% canopy closure c=>70% canopy closure

Next-best habitat classification: Enter two-letter code of habitat that NEXT best describes the habitat surrounding the point. Consider the entire landscape from which you are picking up birds and select the next-most dominant habitat type occupying the

greatest amount of this area ***OR*** *select the habitat that is contributing the most birds to the point count* (if different than the Best Habitat).

Next-best habitat seral stage and canopy closure: Enter one-digit code of seral stage and one-letter code for canopy closure of habitat used in next-best habitat classification.

Primary understory classification: Enter two-letter code for primary understory vegetation type that best describes the understory within a 50-m radius of the point:

BG=bare ground	*GO=Gambel's oak*	*GF=grass/forb*
MM=mountain mahogany	*NS=not sage or willow*	*SA=sage*
SV=serviceberry	*SN=snowberry*	*WI=willow*

Primary understory percentage: Estimate the percent coverage of the primary understory type within a 50-m radius of point and enter the 1-digit code:

1=1-20% 2=21-40% 3=41-60% 4=61-80% 5=81-100%

Secondary understory classification: Enter two-letter code for secondary understory type that NEXT BEST describes the understory within a 50-m radius of the point, as described above.

Secondary understory percentage: Estimate the percent coverage of the secondary understory type within a 50-m radius of point and enter the 1-digit code, as described above.

(These instructions apply to the bird count data page of the Rocky Mountain Bird Observatory Point-Transect Form)

POINT-COUNT DATA

Point #: Enter number of point (01-15) on the transect; **NOTE:** for entries of target species *between points* enter "99" (see text on Transect counts).

Species: Enter **CORRECT** four-letter code for birds (see Appendix C); PLEASE, PLEASE use correct codes, as it makes data entry and analysis easier. Species that cause particular problems for observers include: **Northern Shoveler** (NSHO, not NOSH), Ring-necked Pheasant (RINP, not RNPH), **Western Wood-Pewee** (WEWP, not WWPE), **Gray Jay** (GRAJ, not GRJA), **Tree Swallow** (TRES, not TRSW), **Bank Swallow** (BANS, not BASW), **Barn Swallow** (BARS, not BASW), **MacGillivray's Warbler** (MGWA, not MAWA), **Yellow Warbler** (YWAR, not YEWA), **Yellow-rumped Warbler** (AUWA - for Audubon's Warbler, MYWA for Myrtle's Warbler, not YRWA), **Lark Bunting** (LARB, not LABU), **Sage Sparrow** (SAGS, not SASP), **Savannah Sparrow** (SAVS, not SASP), **Lazuli Bunting** (LAZB, not LABU) and **Red-winged Blackbird** (RWBL, not RWBB).

Radial distance: Measure radial distance (estimate only when necessary) to *each* bird (that is, direct distance from point to bird), using a binocular rangefinder, in one-meter units (when estimating, **DO NOT** round off to five- or ten-meter units) -- if beyond a kilometer (1000 meters), fit number in the three spaces provided as best you can.

Bearing: *When recording low-density target species on point counts and in between points, use your declination-adjusted compass to site in the direction of the bird and record the true bearing (as opposed to magnetic) to the bird.*

How: Enter code for how each individual was **detected**: C=calling, S=singing, D=drumming, O=other aural cue; V=visual; F=flyover; K=flock

Sex: Enter code for sex: M=male, F=female, U=unknown

VERY IMPORTANT: Skip a line between entries for individual points and/or individual legs of the transect. That is, all individual birds on a particular point (or transect leg) should be bunched together on the form; then you should leave a blank line before starting entries for the next transect leg (or point).

OTHER IMPORTANT REMINDERS:

Before leaving your transect sites, don't forget to:

- ***enter transect and page #'s at the bottom of EACH page!***
- ***record the end of transect data (time, temp, sky, wind, transect notes) IMMEDIATELY UPON COMPLETING THE TRANSECT!***
- ***go through your data sheets carefully to make sure that you have not forgotten to record any data. Your work is not done until you've reviewed your data from the morning!***
- ***provide clear and explicit directions to the access point, if you have not already done so!***

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) #5

Conducting the Survey

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) summarizes the procedures for conducting landbird monitoring using the Rocky Mountain Bird Observatory (RMBO) *Monitoring Colorado's Birds* (MCB) protocol. Landbird monitoring in the Northern Colorado Plateau Network (NCPN) park units will be conducted by RMBO. Observers should read the RMBO Protocol (Appendix C of the NCPN Land Bird Monitoring Protocol Narrative) for a complete, detailed description of survey methods. This SOP summarizes procedures for: 1) collecting bird-observation data; 2) filling in the Rocky Mountain Bird Observatory – UTM Data Sheet; and 3) filling in the front and back of the Rocky Mountain Bird Observatory Point-Transect Form.

I. General Survey Considerations

Procedures:

1. Seasonal Timing. Surveys must be conducted within a three-week window after all migratory species have returned to an area. Appropriate survey times for each transect in the NCPN will be determined and provided by RMBO.

2. Monitoring Methods. Monitoring employs a combination of point-count and transect distance sampling. Observations for the more common species are collected at 15 point-count stations (i.e., variable circular plots) distributed along a transect. Observations are made during a 5-minute period. Observations of low-density target species are continuously collected along the line transect while walking between point-count stations. Distance measures are recorded for all observed individuals. A list of low-density target species by habitat will be provided by RMBO (also see Appendix C of the NCPN Land Bird Monitoring Protocol Narrative), and will be updated to reflect the habitats monitored in the NCPN.

3. Permissible Weather Conditions. Surveys should only be conducted in weather conditions that allow for birds to be adequately heard and seen. Counts should be stopped if winds exceed 13-18 mph (raising dust, leaves, loose paper; small branches in motion) and if precipitation is exceeds a drizzle.

4. Time of Day: Surveys begin approximately one half hour before sunrise and end no later than 10:00 am.

5. Transect Documentation: For each established transect, directions to the access point, distance and bearing to the start of a transect, and waypoint coordinates (if appropriate) must be recorded on the Rocky Mountain Bird Observatory – UTM Data Sheet (Attachment A) prior to entering the field. This information is supplied by RMBO; the NCPN also stores this information (see SOP #7). For new transects, areas selected for monitoring (i.e., habitat patches or riparian corridors) are provided, and during the first visit, an access point, and the distance and bearing to the start of a transect must be determined and recorded (see SOP #4).

II. 5-Minute Point Counts

Procedures:

1. If a new transect, the habitat patch or riparian corridor to monitor is provided along with park maps showing roads and trails, and suggested access points. You must determine the most appropriate access point, record directions to this point, and record the bearing and distance from the access point to the start of the transect. This information is recorded on the Rocky Mountain Bird Observatory – UTM Data Sheet form (Attachment A). Instructions for recording this information are provided in Attachment C - SITE DATA). UTM coordinates for all point-count stations also must be determined and recorded on this form (see Attachment C – TRANSECT DATA). Detailed instructions for locating and documenting a new transect are provided in SOP #4.

2. If an established transect, navigate to the access point, then to the start of the transect following the recorded directions. Always verify the directions and correct as necessary. Also, verify the recorded UTM coordinates of each point-count station.

3. At each point-count station, record habitat data before recording bird observations. Instructions and data forms are provided in SOP #6.

4. After recording habitat data (where applicable), start the timepiece and begin recording the following information for all birds detected during a 5-minute count:
    - radial distance from you to the bird
    - how the bird was detected
    - sex of the bird (if known)
    - the bearing from you to the bird, if a low-density target species

Observations are recorded on the Rocky Mountain Bird Observatory Point-transect Form (Attachment B) following the instructions provided in Attachment C (POINT-COUNT DATA).

III. Line Transect Component of the 5-Minute Point Counts

Conduct a continuous transect count between the first and last points of the transect, recording all detections of low-density target species. It is important to note that low-density target species also are recorded at point-count stations.

Procedures:

For each low-density target species detected, record:

- radial distance from you to the bird
- bearing from you to the bird
- how the bird was detected
- sex of the bird (if known)

Observations are recorded on the Rocky Mountain Bird Observatory Point-Transect Form (Attachment B) following the instructions provided in Attachment C (POINT-COUNT DATA).

IV. Potential Problems

Observers should pay specific attention to the following topics when reviewing the RMBO protocol (see Appendix C of the NCPN Land Bird Monitoring Protocol Narrative):

- how to distinguish flyovers
- how to determine the correct distance measure for birds which move during the survey
- how to estimate radial distances, especially for birds heard but not seen
- why not to round distance estimates
- how to adjust bearings for proper declination
- the need to avoid recording birds seen or heard previously
- sources of observer error (see Section VII in Appendix C)

Attachment A
Rocky Mountain Bird Observatory – UTM Data Sheet

Directions to Access Point — Used existing directions? (check if Y)

Transect description _____ m @ _____ ° to point 1;

	Zone	Easting	Northing
Access point UTM	1	0	

Date, Date

Time, Time Start 0 End

Weather

Sky: Start End

Wind: Start End

Temp: Start °F End °F

Transect notes

UTM data

Point #	Zone	Easting	Northing	Point #	Zone	Easting	Northing
01	1	0		08	1	0	
02	1	0		09	1	0	
03	1	0		10	1	0	
04	1	0		11	1	0	
05	1	0		12	1	0	
06	1	0		13	1	0	
07	1	0		14	1	0	
				15	1	0	

Habitat data

Point #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Within 100m of road (Y/N)?															
On private land (Y/N)?															
Bearing to point															
Best habitat classification															
Best habitat seral stage															
Next best habitat classification															
Next best habitat seral stage															
Primary understory class.															
Primary understory %															
Secondary understory class.															
Secondary understory %															

Rocky Mountain Bird Observatory, 14500 Lark Bunting Ln., Brighton, CO 80603 303-659-4348

Transect # **Sheet 1 of**

Attachment B

Rocky Mountain Bird Observatory Point-Transect Form

(Observer initials - all three) (Year) (prog - BH,CO,NM,WY) -- (Transect #, e.g., AS04)

Transect description and notes:

How: V=visual; S=singing; C=calling; D=drumming; O=other aural detection. Sex: M=male; F=female; U=unknown.

Between points, point # = 99.

Point #	Species	Radial Distance	HOW	SEX	Code Bearing	Cluster Size	Point #	Species	Radial Distance	HOW	SEX	Code Bearing	Cluster Size

Attachment C

Explanation of Field Form and Data Codes

(Appendix A, Point Transect Protocol for Monitoring Colorado's Birds - RMBO)

(These instructions apply to the Rocky Mountain Bird Observatory – UTM Data Sheet)

SITE DATA (at top of page 1)

Transect #*:** Enter the **four-character** transect number using the ***correct **habitat codes** as described below (e.g., MS01, for Montane Shrubland #01, **not** MS1);

Observer: Enter your first two initials *and your full last name*

Map coord.: Enter the map coordinates for the transect Access Point, using either or both the *DeLorme* or *Roads of Colorado* atlases

Directions to access point (VERY IMPORTANT!)*: *Provide explicit directions to the access point from some nearby town, major intersection, or geographical feature readily found on a *DeLorme* or *Roads of Colorado* atlas. Provide mileages from intersections or other landmarks using your odometer. **If the observer last year did not provide adequate directions to your site, *please provide better directions this year*.** For new sites (*or for those lacking Access Point UTM coordinates*), take GPS readings and record **UTM coordinates** (and stored GPS waypoint#) for each access point. Also, **be explicit in your description about the *exact location* of the access point** (e.g., "the right post of the green metal gate" or "the NE corner of the bridge").

Example: MS02: From jct. of Highway 61, head East on Happy Canyon Rd for 8.4 miles to jct. with 420 Rd. Head South on 420 Rd through narrow canyon for 2.1 miles, cross over wooden bridge and park in 1st pullout on right. Access point is the tall wooden post at the SW corner of the bridge.

Transect description*:** Provide the **distance** and **bearing** *from the access point* ***to *the first point* (do not provide bearing from first point back to the access point). Then, provide *between-point accounts*, describing the topography, habitat, landmarks and/or other features that you pass prior to arriving at the next count station, with sufficient detail so that future observers can follow the same route that you are establishing. ***It is especially important that you record any turns, changes in bearings, or other deviations that you make from the original transect bearing.*** Also, provide a brief description of the area surrounding the count station, or any noticeable features of the landscape at each point, again so future observers will know when they have reached the area of the point-count station. *As this is a long-term monitoring program, the importance of providing detailed directions/descriptions for each transect cannot be overstated!* GPS locations alone are not sufficiently reliable as the accuracy of GPS locations can be changed significantly by the U.S. Government (as happened after Sept. 11). Please provide the transect description information in the general format and detail as described in the following example.

Example: Pt#6: From pt 5, turn to 356° and head down steep drainage. Stay on bearing, passing ~45 m to the right of drainage bottom, where drainage meets larger valley. Continue through small stand of aspen; cross dirt 2-track at ~175 m; cross small creek at ~225 m. After creek, head up small hill with tall spruce trees on top. Point is on top of this hill, ~3 m south of largest-diameter spruce.

TRANSECT DATA (middle of page 1)

Date: Enter the date in the format: MM-DD-YY

Time: Enter start and stop times for entire transect (not individual points) using 24-hour clock

Sky (start and end)**:** Enter one-digit codes at beginning and end of transect (not at points)

0=0-15% cloud cover	*1=16-50% cloud cover*	*2=51-75% cloud cover*
3=76-100% cloud cover	*4=fog*	*6=drizzle*

You shouldn't conduct counts in any other conditions!

Wind (start and end)**:** Enter one-digit codes at beginning and end of transect

0=Less than 1 mph; smoke rises vertically
1=1-3 mph; smoke drift shows wind direction
2=4-7 mph; leaves rustle, wind is felt on face
3=8-12 mph; leaves, small twigs in constant motion; light flag extended
4=13-18 mph; raises dust, leaves, loose paper; small branches in motion
YOU SHOULDN'T CONDUCT COUNTS IN ANY OTHER CONDITIONS!

Temperature (start and end)**:** Use ^{o}F (no thermometer?, estimate to nearest 5°).

Transect notes: Enter information relevant to the site, good camp sites, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting.

UTM data: *Enter the UTM coordinates* (**using the NAD27 CONUS datum** in navigation setup) *for each point-count station associated with a **new** site* (*for established sites, only take a GPS reading if you are moving the count station; in these cases, provide new directions to the count station as well*). Be sure that the GPS reading is essentially stable before recording the UTM location. **Record all *new* UTM coordinates in the appropriate spaces provided on the field form and save all *new* UTM coordinates in the GPS units using the "Mark Waypoint" feature**. *Record the stored waypoint number, as indicated on the GPS unit, under "WP#", next to each UTM coordinate, respectively*. The stored UTM coordinates can then be uploaded to a PC, and thus you won't have to enter UTM coordinates as part of your data entry duties. However, each unit can only store 500 waypoints, so you will need to delete some of the established sites from the GPS unit (*after* completing the transect!) before you input additional locations. Whatever the situation, *make sure that **all** new UTMs get recorded on the field forms as well as in the GPS units!*

HABITAT DATA (bottom of page 1)

Within 100m of road (Y/N): Enter "Y" for yes and "N" for no for **EACH** point based on your best knowledge of the site. For our purposes, a "road" must be substantial enough so that it either causes a significant disruption of the understory vegetation OR a break in the canopy. For example, a grassy 2-track running through an open meadow should not be considered a road, whereas a gravel or dirt road that forms a 3 to 4-m wide break in the grass cover would be considered a road. Similarly, an old, pine needle-covered logging track in an open forest situation should not be considered a road, whereas a logging road that causes a clear and wide break in the woody understory vegetation, or in the forest canopy, should be considered a road. This topic will be covered more thoroughly during the training session.

On private land (Y/N): Enter "Y" for yes and "N" for no for **EACH** point. Be sure that you have permission to conduct counts that are on private land!

Bearing to point: Enter the true bearing (do not use magnetic bearings) you followed from the last point (or access point) to arrive at the current point.

Best habitat classification: Enter the two-letter code of the habitat that BEST describes the habitat surrounding the point count station. Consider the entire landscape around the count station from which you are picking up birds and select *the dominant habitat type that occupies the greatest amount of this area*.

Habitat classification codes:

AS = Aspen	LR = Low-elevation Riparian	RA = Rural/Agriculature
AT = Alpine Tundra	MR = Mid-elevation Riparian	SA = Sage Shrubland
CR = Cliff/Rock	MC = Mixed Conifer	SE = Semi-desert Shrubland
GR = Grassland	MS = Montane Shrubland	SB = Shore/Bank
HR = High-elevation Riparian	PJ = Piñon-Juniper	SF = Spruce-Fir
LP = Lodgepole Pine	PP = Ponderosa Pine	WE = Wetland

Best habitat seral stage and canopy closure: Enter one-digit code of seral stage (see Appendix D for habitat-specific seral stage accounts) of habitat used in best habitat classification, followed by a one-letter code for canopy closure:

1=grass-forb stage 2=shrub-seedling stage 3=sapling-pole stage

4=mature stage 5=old growth stage

a=<40% canopy closure b=40-70% canopy closure c=>70% canopy closure

Next-best habitat classification: Enter two-letter code of habitat that NEXT best describes the habitat surrounding the point. Consider the entire landscape from which you are picking up birds and select the next-most dominant habitat type occupying the

greatest amount of this area ***OR*** *select the habitat that is contributing the most birds to the point count* (if different than the Best Habitat).

Next-best habitat seral stage and canopy closure: Enter one-digit code of seral stage and one-letter code for canopy closure of habitat used in next-best habitat classification.

Primary understory classification: Enter two-letter code for primary understory vegetation type that best describes the understory within a 50-m radius of the point:

BG=bare ground	*GO=Gambel's oak*	*GF=grass/forb*
MM=mountain mahogany	*NS=not sage or willow*	*SA=sage*
SV=serviceberry	*SN=snowberry*	*WI=willow*

Primary understory percentage: Estimate the percent coverage of the primary understory type within a 50-m radius of point and enter the 1-digit code:

1=1-20% 2=21-40% 3=41-60% 4=61-80% 5=81-100%

Secondary understory classification: Enter two-letter code for secondary understory type that NEXT BEST describes the understory within a 50-m radius of the point, as described above.

Secondary understory percentage: Estimate the percent coverage of the secondary understory type within a 50-m radius of point and enter the 1-digit code, as described above.

(These instructions apply to the bird count data page of the Rocky Mountain Bird Observatory Point-Transect Form)

POINT-COUNT DATA

Point #: Enter number of point (01-15) on the transect; **NOTE:** for entries of target species *between points* enter "99" (see text on Transect counts).

Species: Enter **CORRECT** four-letter code for birds (see Appendix C); PLEASE, PLEASE use correct codes, as it makes data entry and analysis easier. Species that cause particular problems for observers include: **Northern Shoveler** (NSHO, not NOSH), Ring-necked Pheasant (RINP, not RNPH), **Western Wood-Pewee** (WEWP, not WWPE), **Gray Jay** (GRAJ, not GRJA), **Tree Swallow** (TRES, not TRSW), **Bank Swallow** (BANS, not BASW), **Barn Swallow** (BARS, not BASW), **MacGillivray's Warbler** (MGWA, not MAWA), **Yellow Warbler** (YWAR, not YEWA), **Yellow-rumped Warbler** (AUWA - for Audubon's Warbler, MYWA for Myrtle's Warbler, not YRWA), **Lark Bunting** (LARB, not LABU), **Sage Sparrow** (SAGS, not SASP), **Savannah Sparrow** (SAVS, not SASP), **Lazuli Bunting** (LAZB, not LABU) and **Red-winged Blackbird** (RWBL, not RWBB).

Radial distance: Measure radial distance (estimate only when necessary) to *each* bird (that is, direct distance from point to bird), using a binocular rangefinder, in one-meter units (when estimating, **DO NOT** round off to five- or ten-meter units) -- if beyond a kilometer (1000 meters), fit number in the three spaces provided as best you can.

Bearing: *When recording low-density target species on point counts and in between points, use your declination-adjusted compass to site in the direction of the bird and record the true bearing (as opposed to magnetic) to the bird.*

How: Enter code for how each individual was **detected**: C=calling, S=singing, D=drumming, O=other aural cue; V=visual; F=flyover; K=flock

Sex: Enter code for sex: M=male, F=female, U=unknown

VERY IMPORTANT: Skip a line between entries for individual points and/or individual legs of the transect. That is, all individual birds on a particular point (or transect leg) should be bunched together on the form; then you should leave a blank line before starting entries for the next transect leg (or point).

OTHER IMPORTANT REMINDERS:

Before leaving your transect sites, don't forget to:

- ***enter transect and page #'s at the bottom of EACH page!***
- ***record the end of transect data (time, temp, sky, wind, transect notes) IMMEDIATELY UPON COMPLETING THE TRANSECT!***
- ***go through your data sheets carefully to make sure that you have not forgotten to record any data. Your work is not done until you've reviewed your data from the morning!***
- ***provide clear and explicit directions to the access point, if you have not already done so!***

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 6

Documenting Habitat Variables

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

Landbird monitoring in the Northern Colorado Plateau Network (NCPN) is conducted by Rocky Mountain Bird Observatory (RMBO), and is part of the Monitoring Colorado's Birds (MCB) program. This Standard Operating Procedure (SOP) summarizes habitat-data collection procedures of the MCB protocol. Habitat data are collected only at point-count stations on upland transects. Data are collected upon reaching a point-count station prior to bird counts. Habitat data are collected annually. Two sets of habitat data are collected according to protocols developed in 2000 and in 2004. Data forms and detailed instructions are included in this SOP as attachments.

Procedures:

1. The 2000 protocol requires collecting habitat data at both the landscape scale and within a 50-m radius circular plot centered on a point-count survey point. Specific instructions are provided in Appendix A, part 3, and Appendix E of the RMBO *Point Transect Protocol for Monitoring Colorado's Birds* (see Appendix C of the NCPN Land Bird Monitoring Protocol Narrative). The habitat data section of the Rocky Mountain Bird Observatory UTM Data Sheet (Attachment A) records landscape and 50-m radius habitat information. Following RMBO instructions for the data sheet (Attachment B – HABITAT DATA) and the guidelines for classifying habitat (Attachment C), record the following attributes:

    - Landscape Attributes
        - Dominant habitat: type, seral stage, canopy closure
        - Next-most dominant habitat: type, seral stage, canopy closure
    - 50-m Radius Plot Attributes
        - Primary understory: classification, percent cover
        - Secondary understory: classification, percent cover

2. The 2004 protocol requires collecting seral-stage and canopy-cover data within a 50-m radius circular plot centered on a bird-survey point. This information is recorded in the habitat page of the Rocky Mountain Bird Observatory Point-Transect Form (Attachment D). Specific instructions are provided in Attachment E of this SOP. Following RMBO instructions, record the following habitat attributes at each bird-survey point:

   - Overstory
     - seral (structural) stage
     - canopy closure
     - canopy tree height
     - dominant tree species (up to 5)
     - relative percent of overstory occupied by each dominant species
     - additional habitats present

   - Sub-canopy/ mid-story
     - foliage mass (volume) of middle vertical third of the forest
     - distinct sub-canopy tree species

   - Shrub layer
     - foliage mass (volume) of all woody shrubs and seedling trees
     - mean height of the shrub layer
     - shrub and tree seedling species (up to 5)
     - relative percent of total shrub layer occupied by each species

   - Ground cover
     - absolute percent of ground cover in each of 4 categories: woody, herbaceous, grass, bare ground.

Attachment A - Rocky Mountain Bird Observatory – UTM Data Sheet

Directions to Access Point | Used existing directions? (check if Y)

Transect description _____ m @ _____ ° to point 1;

	Zone	Easting	Northing
Access point UTM	1	0	

Date, Date

Time, Time Start 0 End

Weather

Sky: Start End

Wind: Start End

Temp: Start °F End °F

Transect notes

UTM data

Point #	Zone	Easting	Northing	Point #	Zone	Easting	Northing
01	1	0		08	1	0	
02	1	0		09	1	0	
03	1	0		10	1	0	
04	1	0		11	1	0	
05	1	0		12	1	0	
06	1	0		13	1	0	
07	1	0		14	1	0	
				15	1	0	

Habitat data

Point #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Within 100m of road (Y/N)?															
On private land (Y/N)?															
Bearing to point															
Best habitat classification															
Best habitat seral stage															
Next best habitat classification															
Next best habitat seral stage															
Primary understory class.															
Primary understory %															
Secondary understory class.															
Secondary understory %															

Rocky Mountain Bird Observatory, 14500 Lark Bunting Ln., Brighton, CO 80603 303-659-4348

Transect # **Sheet 1 of**

Attachment B

Explanation of Field Form and Data Codes

(Appendix A, Point Transect Protocol for Monitoring Colorado's Birds - RMBO)

(These instructions apply to the Rocky Mountain Bird Observatory – UTM Data Sheet)

SITE DATA (at top of page 1)

Transect #*:** Enter the **four-character** transect number using the ***correct **habitat codes** as described below (e.g., MS01, for Montane Shrubland #01, **not** MS1);

Observer: Enter your first two initials *and your full last name*

Map coord.: Enter the map coordinates for the transect Access Point, using either or both the *DeLorme* or *Roads of Colorado* atlases

Directions to access point (VERY IMPORTANT!)*: *Provide explicit directions to the access point from some nearby town, major intersection, or geographical feature readily found on a *DeLorme* or *Roads of Colorado* atlas. Provide mileages from intersections or other landmarks using your odometer. **If the observer last year did not provide adequate directions to your site, *please provide better directions this year*.** For new sites (*or for those lacking Access Point UTM coordinates*), take GPS readings and record **UTM coordinates** (and stored GPS waypoint#) for each access point. Also, **be explicit in your description about the *exact location* of the access point** (e.g., "the right post of the green metal gate" or "the NE corner of the bridge").

Example: MS02: From jct. of Highway 61, head East on Happy Canyon Rd for 8.4 miles to jct. with 420 Rd. Head South on 420 Rd through narrow canyon for 2.1 miles, cross over wooden bridge and park in 1st pullout on right. Access point is the tall wooden post at the SW corner of the bridge.

Transect description*:** Provide the **distance** and **bearing** *from the access point* ***to *the first point* (do not provide bearing from first point back to the access point). Then, provide *between-point accounts*, describing the topography, habitat, landmarks and/or other features that you pass prior to arriving at the next count station, with sufficient detail so that future observers can follow the same route that you are establishing. ***It is especially important that you record any turns, changes in bearings, or other deviations that you make from the original transect bearing.*** Also, provide a brief description of the area surrounding the count station, or any noticeable features of the landscape at each point, again so future observers will know when they have reached the area of the point-count station. *As this is a long-term monitoring program, the importance of providing detailed directions/descriptions for each transect cannot be overstated!* GPS locations alone are not sufficiently reliable as the accuracy of GPS locations can be changed significantly by the U.S. Government (as happened after Sept. 11). Please provide the transect description information in the general format and detail as described in the following example.

Example: Pt#6: From pt 5, turn to 356° and head down steep drainage. Stay on bearing, passing ~45 m to the right of drainage bottom, where drainage meets larger valley. Continue through small stand of aspen; cross dirt 2-track at ~175 m; cross small creek at ~225 m. After creek, head up small hill with tall spruce trees on top. Point is on top of this hill, ~3 m south of largest-diameter spruce.

<u>TRANSECT DATA</u> (middle of page 1)

Date: Enter the date in the format: MM-DD-YY

Time: Enter start and stop times for entire transect (not individual points) using 24-hour clock

Sky (start and end)**:** Enter one-digit codes at beginning and end of transect (not at points)

0=0-15% cloud cover	*1=16-50% cloud cover*	*2=51-75% cloud cover*
3=76-100% cloud cover	*4=fog*	*6=drizzle*

You shouldn't conduct counts in any other conditions!

Wind (start and end)**:** Enter one-digit codes at beginning and end of transect

0=Less than 1 mph; smoke rises vertically
1=1-3 mph; smoke drift shows wind direction
2=4-7 mph; leaves rustle, wind is felt on face
3=8-12 mph; leaves, small twigs in constant motion; light flag extended
4=13-18 mph; raises dust, leaves, loose paper; small branches in motion
YOU SHOULDN'T CONDUCT COUNTS IN ANY OTHER CONDITIONS!

Temperature (start and end)**:** Use ^{o}F (no thermometer?, estimate to nearest 5°)

Transect notes: Enter information relevant to the site, good camp sites, cool scenery, or other tidbits that either don't really fit in other places or that future surveyors might find interesting.

UTM data: *Enter the UTM coordinates* (**<u>using the NAD27 CONUS datum</u>** in navigation setup) *for each point-count station associated with a **new** site* (*for established sites, only take a GPS reading if you are moving the count station; in these cases, provide new directions to the count station as well*). Be sure that the GPS reading is essentially stable before recording the UTM location. **Record all *new* UTM coordinates in the appropriate spaces provided on the field form <u>and</u> save all *new* UTM coordinates in the GPS units using the "Mark Waypoint" feature**. *Record the stored waypoint number, as indicated on the GPS unit, under "WP#", next to each UTM coordinate, respectively*. The stored UTM coordinates can then be uploaded to a PC, and thus you won't have to enter UTM coordinates as part of your data entry duties. However, each unit can only store 500 waypoints, so you will need to delete some of the established sites from the GPS unit (*after* completing the transect!) before you input additional locations. Whatever the situation, *make sure that **all** new UTMs get recorded on the field forms as well as in the GPS units!*

HABITAT DATA (bottom of page 1)

Within 100m of road (Y/N): Enter "Y" for yes and "N" for no for **EACH** point based on your best knowledge of the site. For our purposes, a "road" must be substantial enough so that it either causes a significant disruption of the understory vegetation OR a break in the canopy. For example, a grassy 2-track running through an open meadow should not be considered a road, whereas a gravel or dirt road that forms a 3 to 4-m wide break in the grass cover would be considered a road. Similarly, an old, pine needle-covered logging track in an open forest situation should not be considered a road, whereas a logging road that causes a clear and wide break in the woody understory vegetation, or in the forest canopy, should be considered a road. This topic will be covered more thoroughly during the training session.

On private land (Y/N): Enter "Y" for yes and "N" for no for **EACH** point. Be sure that you have permission to conduct counts that are on private land!

Bearing to point: Enter the true bearing (do not use magnetic bearings) you followed from the last point (or access point) to arrive at the current point.

Best habitat classification: Enter the two-letter code of the habitat that BEST describes the habitat surrounding the point count station. Consider the entire landscape around the count station from which you are picking up birds and select *the dominant habitat type that occupies the greatest amount of this area*.

Habitat classification codes:

AS = Aspen	LR = Low-elevation Riparian	RA = Rural/Agriculature
AT = Alpine Tundra	MR = Mid-elevation Riparian	SA = Sage Shrubland
CR = Cliff/Rock	MC = Mixed Conifer	SE = Semi-desert Shrubland
GR = Grassland	MS = Montane Shrubland	SB = Shore/Bank
HR = High-elevation Riparian	PJ = Piñon-Juniper	SF = Spruce-Fir
LP = Lodgepole Pine	PP = Ponderosa Pine	WE = Wetland

Best habitat seral stage and canopy closure: Enter one-digit code of seral stage (see Appendix D for habitat-specific seral stage accounts) of habitat used in best habitat classification, followed by a one-letter code for canopy closure:

1=grass-forb stage 2=shrub-seedling stage 3=sapling-pole stage

4=mature stage 5=old growth stage

a=<40% canopy closure b=40-70% canopy closure c=>70% canopy closure

Next-best habitat classification: Enter two-letter code of habitat that NEXT best describes the habitat surrounding the point. Consider the entire landscape from which you are picking up birds and select the next-most dominant habitat type occupying the

greatest amount of this area ***OR*** *select the habitat that is contributing the most birds to the point count* (if different than the Best Habitat).

Next-best habitat seral stage and canopy closure: Enter one-digit code of seral stage and one-letter code for canopy closure of habitat used in next-best habitat classification.

Primary understory classification: Enter two-letter code for primary understory vegetation type that best describes the understory within a 50-m radius of the point:

BG=bare ground	*GO=Gambel's oak*	*GF=grass/forb*
MM=mountain mahogany	*NS=not sage or willow*	*SA=sage*
SV=serviceberry	*SN=snowberry*	*WI=willow*

Primary understory percentage: Estimate the percent coverage of the primary understory type within a 50-m radius of point and enter the 1-digit code:

1=1-20% 2=21-40% 3=41-60% 4=61-80% 5=81-100%

Secondary understory classification: Enter two-letter code for secondary understory type that NEXT BEST describes the understory within a 50-m radius of the point, as described above.

Secondary understory percentage: Estimate the percent coverage of the secondary understory type within a 50-m radius of point and enter the 1-digit code, as described above.

(These instructions apply to the bird count data page of the Rocky Mountain Bird Observatory Point-Transect Form)

POINT-COUNT DATA

Point #: Enter number of point (01-15) on the transect; **NOTE:** for entries of target species *between points* enter "99" (see text on Transect counts).

Species: Enter **CORRECT** four-letter code for birds (see Appendix C); PLEASE, PLEASE use correct codes, as it makes data entry and analysis easier. Species that cause particular problems for observers include: **Northern Shoveler** (NSHO, not NOSH), Ring-necked Pheasant (RINP, not RNPH), **Western Wood-Pewee** (WEWP, not WWPE), **Gray Jay** (GRAJ, not GRJA), **Tree Swallow** (TRES, not TRSW), **Bank Swallow** (BANS, not BASW), **Barn Swallow** (BARS, not BASW), **MacGillivray's Warbler** (MGWA, not MAWA), **Yellow Warbler** (YWAR, not YEWA), **Yellow-rumped Warbler** (AUWA - for Audubon's Warbler, MYWA for Myrtle's Warbler, not YRWA), **Lark Bunting** (LARB, not LABU), **Sage Sparrow** (SAGS, not SASP), **Savannah Sparrow** (SAVS, not SASP), **Lazuli Bunting** (LAZB, not LABU) and **Red-winged Blackbird** (RWBL, not RWBB).

Radial distance: Measure radial distance (estimate only when necessary) to *each* bird (that is, direct distance from point to bird), using a binocular rangefinder, in one-meter units (when estimating, **DO NOT** round off to five- or ten-meter units) -- if beyond a kilometer (1000 meters), fit number in the three spaces provided as best you can.

Bearing: *When recording low-density target species on point counts and in between points, use your declination-adjusted compass to site in the direction of the bird and record the true bearing (as opposed to magnetic) to the bird.*

How: Enter code for how each individual was **detected**: C=calling, S=singing, D=drumming, O=other aural cue; V=visual; F=flyover; K=flock

Sex: Enter code for sex: M=male, F=female, U=unknown

VERY IMPORTANT: Skip a line between entries for individual points and/or individual legs of the transect. That is, all individual birds on a particular point (or transect leg) should be bunched together on the form; then you should leave a blank line before starting entries for the next transect leg (or point).

OTHER IMPORTANT REMINDERS:

Before leaving your transect sites, don't forget to:

- ***enter transect and page #'s at the bottom of EACH page!***
- ***record the end of transect data (time, temp, sky, wind, transect notes) IMMEDIATELY UPON COMPLETING THE TRANSECT!***
- ***go through your data sheets carefully to make sure that you have not forgotten to record any data. Your work is not done until you've reviewed your data from the morning!***
- ***provide clear and explicit directions to the access point, if you have not already done so!***

Attachment C

Guidelines for Classifying Habitat, Seral Stage, and Canopy Closure
(Appendix E, Point Transect Protocol for Monitoring Colorado's Birds - RMBO)

The following characteristics can generally define the various seral stages of the habitats listed below. However, they are intended to be used as a guide, not gospel. Variability among sites is to be expected depending on geographic location, elevation, aspect, slope, soil quality and other site characteristics. Therefore, you must still use your head when judging seral stage. All data regarding habitat should be recorded on page 1 of the field form *prior to beginning each point count*.

Estimating Canopy Closure

For all habitats (other than MG) in seral stages 2-5, canopy closure should also be assessed **at each point count station** using the following codes:

a = canopy closure < 40% b = canopy closure 40-70% c = canopy closure > 70%

Canopy closure should be assessed based on the openness of the canopy for both the primary and secondary habitats selected at each point. Ex. = a mature stand of ponderosa pine with greater than 70% of sky obscured by canopy vegetation should be classified as '4c'.

Assessing Habitat and Seral Stage in Selected Habitats

Aspen (AS)

AS Habitat Description:
AS habitat consists of small or large forested stands dominated by quaking aspen. AS stands are generally not monotypic; other tree species that frequently occur within or adjacent to AS include, from lower to higher elevations, Ponderosa Pine, White Fir, Blue Spruce, Douglas-fir, Lodgepole Pine, Englemann Spruce, and Subalpine Fir. Some AS stands have a woody understory of a variety of species, depending upon location, elevation, and other factors. These understory species can include Common Juniper, Mountain Mahogany, Big Sage, Snowberry, Serviceberry, among others. Other stands have only herbaceous under-stories.

AS Seral Stage Assessment:

1 = Grass-Forb stage: Grasses and forbs dominate; aspen suckers/saplings are absent.
2 = Shrub-Seedling stage: Suckers/saplings are present, up to 2 inches dbh and 4 m in height. Stem density can vary from 5,000 to 40,000 stems per acre.
3 = Sapling-Pole stage: Saplings between 2 and 8 inches dbh and up to 6-13 m in height on good sites; on poorer sites trees may never reach 8 inches dbh and may be shorter than 6 m, with crooked and twisted boles.

4 = Mature stage: Trees > 8 inches dbh; on better sites, trees between 16-24 inches dbh and 28-33 m in height. Typically, there is a high density of grass, forbs
and shrubs in the understory. Snags are also generally common in this stage.
5 = Old-Growth stage: Large diameter trees and many snags are present, as are diseased trees and downed material. Snags may occur in large groups in this stage.

Ponderosa Pine (PP)

PP Habitat Description:
PP habitat is forest dominated by, amazingly, Ponderosa Pine, often in pure stands, but there are often admixtures of Aspen, White Fir, Douglas-fir, and/or Blue Spruce and the habitat can intergrade at its upper elevational level with Lodgepole Pine. The habitat occurs primarily between 5500' and about 8500', though it can occur at slightly higher elevations in some places. In some places, particularly in South Park, Ponderosa Pine and Limber Pine co-occur. However, habitats designated PP should consist primarily of Ponderosa Pine; habitats with any significant admixture (>20%) of some other conifer should be called Mixed Conifer (MC). The habitat often has a well-developed woody under-story, though historic burn frequencies kept most stands fairly open with large, widely-spaced trees. In areas where fire has been excluded, a significant Gambel Oak understory often develops and these areas can host large numbers of shrub-dependent species, e.g., Green-tailed and Spotted towhees and Dusky Flycatcher.

PP Seral Stage Assessment:
1 = Grass-Forb stage: Grasses and forbs dominate; pine seedlings and shrubs scarce or absent. This stage usually results from fire and/or logging.
2 = Shrub-Seedling stage: Small pine saplings, <=1 inch dbh, and a variety of woody shrubs small deciduous trees are present, as well as herbs. Litter and downed material may exist.
3 = Sapling-Pole stage: Trees 1-8 inches dbh, 3-17 m in height; age of stand 6-50 yrs old. Stands in this stage can be quite dense, normally exceeding 70% canopy closure, and are typically even aged. Some small diameter snags may be present.
4 = Mature stage: Avg. dbh of trees >8 inches. Stand may be multi-layered, and snags suitable in size for most cavity-nesting birds should be present. Oak layer, if present, is usually well developed.
5 = Old-Growth stage: Avg. dbh of dominant trees >8 inches, with some trees between 30 to 60 inches; stand typically of uneven age, woody understory is extensive and well-developed; canopy and stand structure generally open; numerous large snags, dying trees, and downfall present.

Spruce-Fir (SF)

SF Habitat Description:
SF habitat refers to areas dominated by Englemann Spruce and Subalpine Fir. This habitat typically occurs at elevations above 8000'. This habitat often mixes with

Lodgepole Pine (LP), so be careful about the particular tree species present. These stands can be monotypic, but usually have admixtures of Aspen (AS).

SF Seral Stage Assessment:

1 = Grass-Forb stage: Primarily herbaceous plants; no trees or saplings; near complete absence of downed litter or snags.
2 = Shrub-Seedling stage: Spruce saplings up to 1 inch dbh are present.
3 = Sapling-Pole stage: Stems 1-7 inches dbh, and; snags and downfall present.
4 = Mature stage: Avg. dbh of trees >8 inches. Stand may be multi-layered, and snags suitable in size for most cavity-nesting birds should be present.
5 = Old-Growth stage: Avg dbh of dominant trees > 22 inches; forest is typically multi-layered, with trees of varying age/size, significant amounts of accumulated downfall and numerous, randomly distributed snags. Grasses and forbs are relatively scarce, but epiphytic vegetation (mosses & lichens) is prevalent.

Attachment D

Rocky Mountain Bird Observatory Point-Transect Form

Point	GPS info: Unit #	GPS info: Point #	Point info: <100m to road?	Point info: Private property?	Point info: Bearing point to
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Point	Overstory: Struct stage(1-5)	Canopy (a-c)	Mean height	Species #1	Sp 1 abun (0-9)	Species #2	Sp 2 abun (0-9)	Species #3	Sp 3 abun (0-9)	Species #4	Sp 4 abun (0-9)	Species #5	Sp 5 abun (0-9)	Additional habitats present within 50 meters: If so, list up to 3 by habitat code
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

Point	Sub-canopy: Volume (1-5)	List any species forming a distinct sub-canopy: Species #1	Species #2	Species #3
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Point	Shrub layer: Volume (0-9)	Mean height	Species #1	Sp 1 abun (0-9)	Species #2	Sp 2 abun (0-9)	Species #3	Sp 3 abun (0-9)	Species #4	Sp 4 abun (0-9)	Species #5	Sp 5 abun (0-9)	Ground cover: Woody	Herbaceous	Grass	Bare (incl. litter)
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

Rocky Mountain Bird Observatory, 14500 Lark Bunting Lane, Brighton, CO 80603

Date 0 | | 2 | 0 | 0 | 4

Observer (FI, MI, Last name)

Time: Start / End

Sky: Start / End — Wind: Start / End

Temperature: Start F° / End F°

"Roads of" at (page) (horiz-vert; e.g., A-5,5) DeLorme

Transect # (prog: BH,CO,NM, or WY) C O (e.g., AS04)

Attachment E

Changes to the RMBO Monitoring Program Vegetation and Bird Count Protocols 2004 -RMBO

Weather data

Please see clipboard sheet for explanations of the various weather data requested: sky code, wind speed, and temperature.

Atlas page and location

Enter the page number on which the Access Point of the current transect is located – putting this value in the correct set of boxes (either the De Lorme atlas or the "Roads of" atlas). Then enter the horizontal and vertical grid reference of the Access Point of the current transect. ALWAYS list the letter first, regardless of whether letters make up the X axis or the Y axis of the maps. You may use "half-grids" to indicate points approximately halfway between either two numbers OR two letters, e.g., A.5-2 or C-3.5; use a hyphen to separate the two components of the value. If you are using only whole grid references, e.g., B1 or D7, then do NOT use a hyphen to separate the components.

GPS info

Unit # - Write the last four digits of the GPS unit number (from the silver sticker affixed to the unit) in the appropriate space.

Point # - Enter the saved waypoint number referable to the point at which you are standing (from the GPS unit) in the appropriate space.

Point info

<100m to road? - Enter 'Y' here if the point at which you are standing is within 100 meters of a road; otherwise, enter 'N'.

Private property? - (Not for Wyoming program) Enter 'Y' if the point at which you are standing is on private property; otherwise, enter 'N'.

Distance to edge - (For Wyoming program ONLY) Enter estimate or measured distance to nearest habitat edge.

Bearing to point – Enter the bearing (either from the Access Point or from the previous point) that you took to get TO the point at which you are standing.

Overstory

Seral (i.e., structural) stage - At each point-count station, identify and record the *average* structural stage of the overstory trees within a 50-m radius of the point-count station. Please use the following scale:

1 grass-forb (i.e., no or very few overstory trees present)
2 shrub-seedling (i.e., generally trees below head height)
3 sapling-pole
4 mature
5 old-growth

Canopy Closure - Estimate the percent closure of the canopy trees within a 50-m radius of the point-count station and select the best choice from the following categories:

A <40%
B 40-70%
C >70%

Height - At each point-count station, estimate the average height of the canopy trees (in meters) within a 50-m radius circle to the nearest meter. Use a range finder to help gauge estimates.

Species Composition - Identify the dominant tree species in the overstory and record the *relative* percent of the total overstory occupied by each species within a 50-m radius of each point-count station; as many as five species may be listed. Note that if only one tree species is present in the overstory, the relative percent should be 100% (9), regardless of how much of the circle is occupied by the tree species. Tree species should be recorded on the data forms using the correct 2-letter vegetation code provided in the list. Please use the following scale for recording relative abundance of each overstory tree species:

0 01-09%
1 10-19%
2 20-29%
3 30-39%
4 40-49%
5 50-59%
6 60-61%
7 70-71%
8 80-81%
9 90-100%

Additional Habitats

In some cases, additional distinct habitats may be present within the 50-m radius circle around the point-count station that do not get adequately characterized in any of the assessments of specific habitat components (e.g. overstory, shrub layer). For example, a

meadow or riparian area may occur within the circle, along with the dominant forest or other habitat, but may contribute little to either the shrub layer, mid story or overstory. Nonetheless, these minor habitats may by significant for the birds present within the 50-m circle. In these situations, list up to three additional habitats in the appropriate space, using the 2-letter habitat codes provided.

Sub-canopy/mid-story

In forest, this category is intended to assess the foliage mass roughly in the middle vertical third, particularly if there is a distinct sub-canopy of a different species mix than that present in the overstory.

Volume – Estimate the foliage mass in the middle vertical third of the forest in 20% increments: 1 = 1-20%, 2 = 21-40%; 3 = 41-60%; 4 = 61-80%; and 5 = 81-100%. Note that it would be quite rare for this category to score greater than 3 and that many (most?) probably score less than 3.

Species – If, and only if, there is a distinct sub-canopy comprised of tree species different from that making up the overstory, enter as many as three species' 2-letter codes in the spaces provided. If there is no distinct sub-canopy, enter "N" in the Species #1 space.

Shrub Layer

This category is intended to estimate the amount and species makeup of any woody shrub (*including* seedling trees) layer present. Generally, shrubs are >0.5 meter high and <5.0 meters high. Anything taller than 5.0 meters should be considered part of the sub-canopy (e.g., very tall oaks or aspens that are of greater height); anything shorter than 0.5 meter should be considered in the ground cover category.

Volume – Estimate the foliage mass of all woody shrub species AND seedling trees present (see definition above) scored on a 10-point scale, for which, see **Overstory** Species compostion.

Mean height – Estimate the average height (to the nearest meter) of the shrub layer within a 50-m radius of the count station.

Species composition - Identify the shrub species (including seedling trees) present and record the *relative* percent of the total shrub layer occupied by each species within a 50-m radius of each point-count station; as many as five species may be listed. Note that if only one shrub species is present, the relative percent should be 100% (9), regardless of how much of the circle is occupied by the species. Shrub species should be recorded on the data forms using the correct 2-letter vegetation code provided in the list. Please use the same 10-point scale as above, for recording relative abundance of each species.

Ground Cover

Ground cover is classified into four categories:

1) woody vegetation below 0.5 m (roughly knee height),
2) broad-leaved herbaceous plants (forbs),
3) grass, and
4) bare ground and/or leaf litter.

At each point-count station, estimate (to the nearest 10 percent) the total percent of ground cover within the 50-m radius circle around the point-count station that qualifies for each category. Please use the same 10-point scale as presented above, but note that for ground cover, this is an absolute scale, rather than a relative scale.

At each point count that is conducted, please put an "N" in the box for any category that is absent from the 50-m circle, rather than leaving it blank. It will be assumed that blank boxes represent point counts where the ground cover was not assessed, either because the count was not conducted or because you forgot to record it.

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 7

Data Management

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) describes how data collected as part of the Rocky Mountain Bird Observatory - Monitoring Colorado's Birds (MCB) program in Northern Colorado Plateau Network (NCPN) park units are managed. The Rocky Mountain Bird Observatory manages the database and conducts all entry, verification, and validation of data in this protocol. Therefore, primary responsibilities for data management lie with the Rocky Mountain Bird Observatory. However, a copy of all data collected within NCPN park units will be stored and archived with the NCPN Inventory and Monitoring Program. Therefore, this SOP focuses on metadata and archiving procedures, with some background information about database design and data entry.

All data collected in the field are sent to RMBO:

Jason Beason
14500 Lark Bunting Lane
Brighton, CO 80603

I. Database Design and Data Entry

The Rocky Mountain Bird Observatory has designed and maintains a Microsoft Access database for entering and managing data collected during surveys. Data from field forms are entered into a local copy of the database by the person conducting the surveys. After a series of quality control checks, these database records are then uploaded into the central MCB database located at the RMBO offices in Ft. Collins. In December, 2004, the database was undergoing an upgrade and redesign in order to improve functions and normalization. The Rocky Mountain Bird Observatory also is designing an Internet-based application of the database so that data entry can also be completed on-line. Both developments are expected to be completed in 2005.

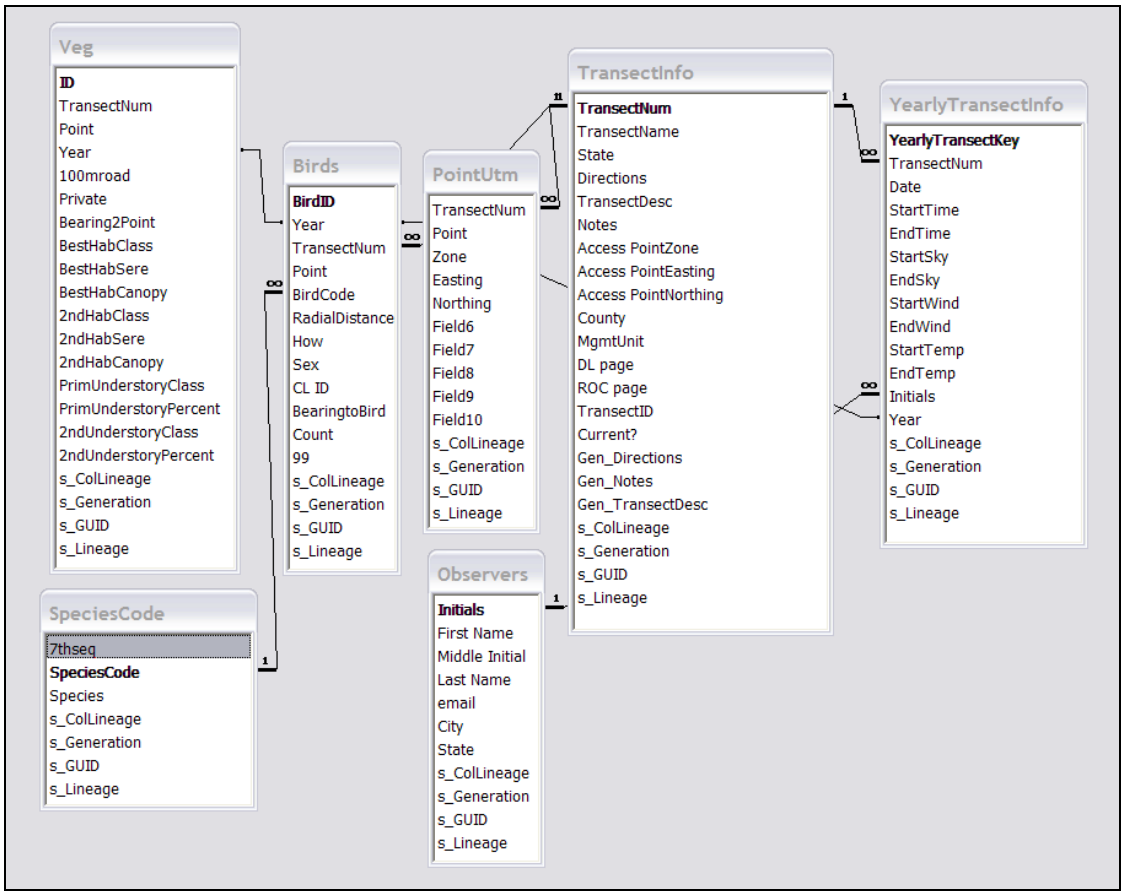


Figure 7-1. Data model for 2004 MCB database maintained by the Rocky Mountain Bird Observatory.

The data model for the MCB database (Fig. 7-1) consists of a primary transect table that is linked to records corresponding to each point on a transect. Data on habitat, birds observed, observers, and observation conditions are stored in separate linked tables.

Data from field forms are entered into a local copy of the database by the person conducting the surveys. After a series of quality control checks performed by the person entering the data, the project manager, and the data manager, these database records are then uploaded into the central MCB database located at the RMBO offices in Ft. Collins.

At the conclusion of a field season, after data have been entered, verified, and validated by RMBO, a subset of the database in Access format will be provided to NCPN. This subset will comprise all records entered to date for survey locations within NCPN park units.

II. Data Archiving

Archived versions of the database are created and stored by RMBO. Original field forms are stored at the RMBO office in Ft. Collins, with a set of copies stored off-site in a different RMBO office.

All annual NCPN park unit data sets that are received from RMBO will be archived by NCPN in their native Access database format. These data sets will be stored on the NCPN server:

X:\ Archive\Monitoring_Archive\Land_Birds\Data\Annual_Data\[year]

File names will consist of the database name, the date it was created, and the word Archive. Example:

MCB_10Nov2005_archive.mdb

In addition to the copy of the database in Access format, all database tables in the annual data sets will be archived in a comma-delimited ASCII format by using the Access_to_ASCII.mdb utility developed by the NCPN. These ASCII files will reside in the same subdirectory as the Access database file. File names will consist of the table name and the date it was created, and a .txt extension. Example:

tbl_transect_10Nov2005.txt
tbl_observer_10Nov2005.txt

All archived files will be designated as read-only.

III. Metadata Procedures

Documentation of all database tables and fields will be maintained by RMBO, and will be completed and available with the revised version of the database. The NCPN will complete and maintain an I&M Dataset Catalog record for the project and the Access database, and will update the record contents annually. Any spatial datasets created by the NCPN that are used for data analysis or distribution will have associated FGDC-compliant metadata records completed using ArcCatalog.

The complete protocol for this project (Protocol Narrative and SOP #s 1-9) is an integral component of the project metadata. All narrative and SOP version changes are noted in the Master Version Table (MVT), which is maintained in SOP #9. Any time narrative or SOP versions change, a new Version Key number (VK#) must be created and recorded in the MVT, along with the date of the change and the versions of the narrative and SOPs in effect. The Version Key number is essential for project information to be properly interpreted and analyzed. *The protocol narrative, SOPs, and data should not be distributed independently of this table*.

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) # 8

After the Field Season

Version 1.00 (December 15, 2004)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This Standard Operating Procedure (SOP) provides a brief summary of post-season procedures for landbird monitoring in the Northern Colorado Plateau Network (NCPN) park units. Observers should be familiar with and follow these procedures after the field season is completed.

Procedures:

1. Equipment must be cleaned, repaired, and returned to their proper storage areas in the NCPN park unit or to the Rocky Mountain Bird Observatory. All references manuals, materials, and extra data sheets should be filed or re-shelved in their appropriate storage location. Clean the insides and outsides of all vehicles used in the field.

2. Field data sheets should be organized and checked to be sure that they have been filled out completely. Checking for completeness should generally be done before leaving the field.

3. All data collected in the field are sent to:

   Jason Beason
   Rocky Mountain Bird Observatory:
   14500 Lark Bunting Lane
   Brighton, CO 80603

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network

Standard Operating Procedure (SOP) #9

Revising the Protocol Narrative and SOPs

Version 1.01 (May 10, 2007)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.00	10 May 2007	S. L. Garman – NCPN Ecologist	Update MVT	Update MVT	1.01

This Standard Operating Procedure (SOP) explains how to make and track changes to the Land Bird Protocol Narrative and associated SOPs for the park units of the Northern Colorado Plateau Network (NCPN). The Land Bird Monitoring Protocol Narrative and SOPs are based on the Rocky Mountain Bird Observatory (RMBO) - Monitoring Colorado's Birds Protocol. Over time, the protocol narrative and SOPs may require modifications as directed by RMBO. The following procedures must be followed when making changes to ensure that previous data collection and processing procedures are clearly understood when using and interpreting historical data sets. Similarly, clearly articulating new methods is key to credible interpretation of data acquired since the implementation of changes. Personnel making changes must be familiar with this SOP to ensure that proper reviews are conducted, and that documentation standards are followed.

Procedures:

1. Modifications must be reviewed for clarity and technical soundness. Small changes or additions to existing methods will be reviewed in-house by RMBO or NCPN Inventory and Monitoring staff. An outside review will be encouraged by NCPN for whole-scale changes in methods. Regional and national staff of the National Park Service and experts outside of the Park Service with familiarity in bird monitoring and data analysis would be used to review major changes.

2. All changes must be documented, and updated protocol versions must be recorded in the Revision History Log that accompanies the Protocol Narrative and each SOP. Changes are recorded only in the Protocol Narrative or the SOP being modified. Version numbers increase incrementally by hundredths (e.g. version 1.01, version 1.02, etc.) for minor changes. Major revisions will be designated with the next whole

number (e.g., version 2.0, 3.0, 4.0 …). Record the previous version number, date of revision, author of the revision, identify paragraphs and pages where changes are made, and the reason for the changes along with the new version number.

3. Narrative and SOP updates may occur independently. That is, a change in one SOP will not necessarily invoke changes in other SOPs: a narrative update may not require SOP modifications. All narrative and SOP version changes must be noted in the Master Version Table (MVT), which is maintained in this SOP. Any time a narrative or an SOP version change occurs, a new Version Key number (VK#) must be created and recorded in the MVT, along with the date of the change and the versions of the narrative and SOPs in effect. The VK number increments by whole integers (e.g., 1,2,3,4,5). Updates to the MVT also must be provided to the NCPN Data Manager for inclusion in the master version table database. The Version Key number is essential for project information to be properly interpreted and analyzed. *The protocol narrative, SOPs, and data should not be distributed independently of this table.*

4. New versions of the Protocol Narrative and SOPs must be posted on the NCPN web page. Previous versions of the Protocol Narrative and SOPs must be archived in the NCPN Land Bird Protocol Library (X:\Archive\Monitoring_Archive\Landbird\Protocol_Library\).

Land Bird Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network
Master Version Table

Version Key #	Date of Change	Narrative	SOP #1	SOP #2	SOP #3	SOP #4	SOP #5	SOP #6	SOP #7	SOP #8	SOP #9
VK1	12-15-2004	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
VK2	03-10-2007	1.01	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.01