APPENDIX IV. Trumpeter and Tundra Swan Survey Protocol – 2007.

TRUMPETER AND TUNDRA SWAN SURVEY PROTOCOL – 2007

Introduction

In the 1960's, the Alaska Region of the U.S. Fish and Wildlife Service (USFWS) developed a protocol for Trumpeter and Tundra Swan surveys in Alaska that has since been used by several government agencies and private entities to gather swan data. This standardized survey technique has allowed data collected by these diverse organizations to be stored together in a common digital archival system called the Alaska Swan Data Base, which is maintained by the USFWS Waterfowl Management office in Juneau, Alaska. The data base continues to increase in value as additional data are added each year. Several useful products can be derived from the data base, such as summary tables of demographic attributes and various types of distribution maps. The raw data can also be incorporated into a geographic information system, where more in-depth spatial analyses can be performed. Summary products, as well as the raw data, are available to agencies and the public upon request.

We encourage all collectors of swan data to follow this protocol and contribute to the Alaska Swan Data Base. Data and inquiries should be submitted to:

U.S. Fish and Wildlife Service
Waterfowl Management
3000 Vintage Blvd., Suite 240
Juneau, Alaska 99801-7100
debbie_groves@fws.gov
(907) 780-1174

From 1968-1999, the survey flight track, swan attribute data, and observation locations were recorded directly onto U.S. Geological Survey (USGS) paper maps by the survey observer and afterwards transcribed into a computer and digitized. Since 2000, however, an increasing number of surveys have been conducted using an onboard computer and a global positioning system unit (GPS) to collect and record the data and flight path. Digital data collection represents a signficant step forward in many respects, including lessening the burden on the survey pilot and observer and eliminating the need to transcribe and digitize the data. However, because different surveyors use different data-collection software, it has become necessary to allow for some deviation from the exact protocol, at least as it pertains to the recorded data format. Therefore, this revised version of the swan survey protocol includes both detailed instructions for the original paper data-collection method, as well as more general guidelines for collecting data digitally. Please note that the basic methodology must be adhered to without deviation if data are to be accepted. Following these guidelines as closely as possible will help facilitate an efficient operation and will reduce the potential for introducing errors into the data set.

Basic Methodology

1. Survey Timing

The bulk of swan surveys conducted in Alaska are of two types: Spring nesting surveys and late-summer productivity surveys. Spring nesting surveys should be timed to occur after the onset of incubation and before hatch. Generally, this is early to late May in the southern part of the state and late May to mid-June in the north. Productivity surveys should be conducted when cygnets are at least 4 to 6 weeks old, when they are large enough to be easily seen and counted and less likely to hide in dense vegetation. On the other hand, the survey should not be done so late that pre-migratory movements have begun. The best time period is generally mid- to late August but could be started in early August or extended into early September if necessary.

2. Sample Unit

A sample unit consists of one entire USGS 1:63,360 scale topographic map, or a complete one-quarter block of the map. Quarter blocks consist of NW, NE, SE, and SW quadrants of a map. Whole maps are strongly preferred, but in some cases logistical constraints or very densely-populated habitat (e.g. Tundra Swan habitat in parts of western Alaska) may require the use of ¼ maps. The sample unit serves as a subsample of available habitat with known and easily-delineated boundaries that can be replicated over time.

3. Survey Method

The pilot and/or observer is responsible for ensuring that all potential swan habitat within each sample unit is covered. The flight path can be determined either beforehand or enroute, but keep in mind that the distance required between flight lines will ultimately depend on the lighting conditions at the time of the survey as well as observer ability and experience. The optimal flight pattern will depend on the distribution and amount of potential swan habitat within the map unit. For example, if the entire unit area consists of wetlands, a set of parallel lines across the map, spaced to ensure complete coverage, would likely be the best option. However, if the only potential habitat is a few scattered lakes among otherwise upland terrain, then a route meandering from lake to lake would be adequate and more efficient. Because it is up to the surveyors to determine what constitutes "complete coverage," it is essential that the surveyors have some way of tracking their progress while enroute. This means having the ability to view the flight path while the survey is being conducted, either by having the observer record it on paper maps or by viewing it on a computer screen via some type of moving map software.

The optimal survey altitude is about 150 m (500 ft) above ground level. When a brood is encountered, it will often be necessary to descend to a lower altitude to count the number of cygnets, and it may require circling around the brood one or more times until an accurate brood count is obtained. This may also be necessary to obtain egg counts (optional) during spring nesting surveys.

4. Data Collection

For each survey, record the following:

- Names of the pilot(s) and observer(s)
- Date(s) survey was conducted (i.e., the specific date *each* map was surveyed)
- Projection and datum of observations/flight track if collected electronically

For each observation, record the following:

Observation number (if needed to tie the location coordinates to the attribute data)
The precise location
Number of adults (white swans)
Presence or absence of nest (spring survey)
Number of eggs in nest (spring survey)(optional, rarely recorded)
Number of cygnets (if present)

See below for more detailed explanations of observation attributes and examples.

5. Survey Flight Track

Record the flight track during the survey to ensure complete coverage of the map. Submit this along with your swan attribute data. See below for more information.

Recording Data on Paper Maps

Mark each observation on the map with a *small* dot to indicate the precise location. Remember that at 1:63,360 scale, the size of a sloppily-drawn pencil dot or a circle can represent a fairly large area on the earth. Therefore make the dot as small as possible to ensure accuracy when digitizing. Do not circle observation numbers as this tends to obscure both numbers and observation points. Number all observations in a sample unit sequentially, starting with the number 1 for each sample unit. Record the appropriate attributes neatly along the map margin. Recording data on separate sheets is not recommended.

Use the following set of abbreviations to record attributes on map margins (examples at right):

S = Single (do not use "1")
Pr = Pair (do not use "P" or "2")
Flk = Flock (do not use "F" or "Fl")
+ = and
N = Nest
( ) = Eggs

1. S (single)
2. S + 5 (single + 5 cygnets)
3. Pr (pair)
4. Pr + 6 (pair + 6 cygnets)
5. Flk 7 (flock of 7)
6. 0 + 4 (no adults, 4 cygnets)
7. Pr + N (pair + nest)
8. S + N (single + nest)
9. Pr + N(5) (pair + nest with 5 eggs)

Record the survey flight line during the survey on the map. Write the date (month/day/year) each time a flight line enters the sample unit. Draw occasional directional arrows on the flight lines to help the person digitizing determine the flight direction (see example below).

Recording Data Digitally

Biologists conducting swan surveys in Alaska have developed a variety of ways to take advantage of digital technology to collect the data. As a result, in recent years data have been

recorded in various formats that differ from the format described above for paper maps. The attribute abbreviations protocol for digital data can be somewhat less restrictive because digital data are easier to read and interpret than hastily-written handwriting on paper map margins. For example, the paper map protocol requires the observer to write "Flk" for flock, because handwriting could mistakenly turn a simple "F" for flock into a "P," or pair. This is not an issue with digital data entry, although errors are still possible with any data-entry system. Therefore, it is important that data be entered carefully and reviewed soon after the survey to correct any mistakes while observers retain some recall of events.

Several methods, using various combinations of hardware and software, have been used to capture the geographic coordinates of swan observations. One method is to use a touch-screen, portable computer with moving map software that displays the USGS 1:63,360 topo maps. Another method is to fly the airplane over each observation location and record the GPS waypoint when the airplane is directly overhead. Whatever method is used, it is essential that location coordinates are as accurate as possible. The geographic information stored in the Alaska Swan Data Base is an important component of the data base, and it is assumed to have sufficient accuracy for use in fairly detailed spatial analyses. Therefore, if you choose the latter recording method, make sure that you are *directly* over the bird(s) when you record an observation waypoint.

We can accept data stored as Excel spreadsheets or as text files (preferably comma-delimited). The exact format is not important, as long as the basic survey methodology described above has been followed and all the required information is present and accurate. The flight track, often originally an output file from the survey's GPS unit, can also be sent as an Excel or text file. Indicate what projection and datum your swan and flight track data were stored in, because we need to know whether or not it must be converted to the coordinate system of the Alaska Swan Database. (All data in the Alaska Swan Database are stored as geographic coordinates [latitude and longitude], North American 1927 datum.) An example of the final data format of the Alaska Swan Data Base, to which your data will be conformed, is provided below.

General Tips

The following suggestions are offered to help avoid some typical problems we have encountered both during swan surveys and during the paper map digitizing:

1. Only include observations that are located within the map boundaries. Any observations outside map boundaries should be transferred to the appropriate map (if included in the survey).

2. Include only swan attribute data in the sequential list of observations (i.e., do not include incidental species such as geese, moose, etc.).

3. Before submitting maps and data, review them for data-entry errors, ambiguous handwriting, missing attributes or point locations, etc. For paper maps, make sure all numbered attribute data in the margins have corresponding numbered observation points

on the map, and vice versa. This "map review" is best done soon after the survey (preferably the same day) so that the observer is more likely to recall any omitted data.

4. When submitting maps for digitizing, include only one original or copy of each map. If data for a given 1:63,360 map unit were recorded on two separate maps, transcribe them onto one map with one sequential numbering system.

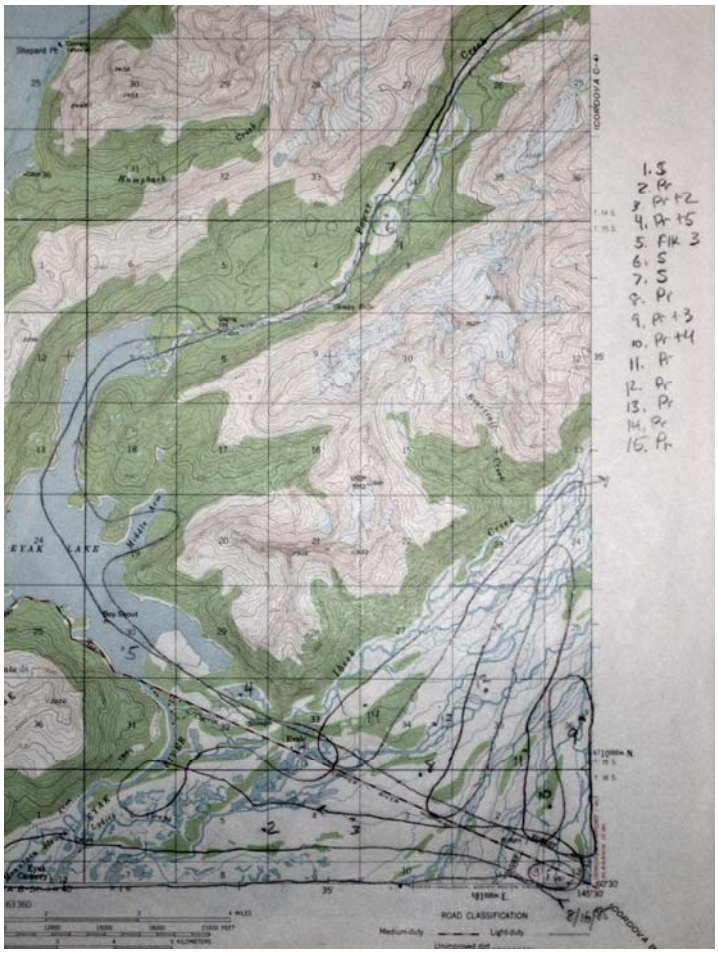
5. Try not to fold maps, because the creases can cause digitizing to be less accurate. Send rolled up maps in a map tube.

6. Send maps via certified mail or via an express mail service, or keep copies of the maps in case maps are lost during transit.

Reference

A useful reference for conducting swan surveys using this protocol is *King, J.G. 1973. The use of small airplanes to gather swan data in Alaska. Wildfowl 24:15-20.*

Paper Map Example



Alaska Swan Data Base Archival Format

Swan data are stored in a comma-delimited text format containing 16 fields as shown in the following example:

Unit	Map	Quad	QtrQuad	Month	Day	Year	Contrib	ObsNo	Lat	Lon	Adults	Young	Nest	Egg	Leg_Sym
1	96	A1	AL	5	24	1999	103	1	60.0333	-144.2067	2	0	0	NoData	P
1	96	A1	AL	5	24	1999	103	2	60.0717	-144.0022	2	0	1	NoData	PNest
1	96	A1	AL	5	24	1999	103	3	60.1022	-144.0378	3	0	0	NoData	F
1	96	A1	AL	5	24	1999	103	4	60.1117	-144.0931	2	0	0	NoData	P
1	96	A1	AL	5	24	1999	103	5	60.1417	-144.0989	2	0	0	NoData	P
1	96	A1	AL	5	24	1999	103	6	60.1394	-144.1689	2	0	0	NoData	P
1	96	A1	AL	5	24	1999	103	7	60.1536	-144.1939	2	0	1	NoData	PNest
1	96	A1	AL	5	24	1999	103	8	60.1558	-144.2125	1	0	1	NoData	SNest
1	96	A2	AL	5	24	1999	103	1	60.1631	-144.2069	2	0	0	NoData	P
1	96	A2	AL	5	24	1999	103	2	60.1639	-144.1803	2	0	0	NoData	P
1	96	A2	AL	5	24	1999	103	3	60.1831	-144.1522	2	0	1	NoData	PNest
1	96	A2	AL	5	24	1999	103	4	60.1794	-144.1972	1	0	0	NoData	S
1	96	A2	AL	5	24	1999	103	5	60.1894	-144.1897	2	0	0	NoData	P
1	96	A2	AL	5	24	1999	103	6	60.1747	-144.2031	2	0	0	NoData	P
1	96	A2	AL	5	24	1999	103	7	60.1625	-144.2389	2	0	1	5	PNest
1	96	A3	AL	5	25	1999	103	1	60.1803	-144.2103	3	0	0	NoData	F
1	96	A3	AL	5	25	1999	103	2	60.1942	-144.1936	2	0	0	NoData	P
1	96	A3	AL	5	25	1999	103	3	60.1981	-144.1819	2	0	0	NoData	P
1	96	A3	AL	5	25	1999	103	4	60.1944	-144.1822	1	0	0	NoData	S

Unit:

Trumpeter Swans:

1 = Gulf Coast
2 = Copper Canyon
3 = Gulkana
4 = Kenai
5 = Cook Inlet
6 = Lower Tanana
7 = Kuskokwim
8 = Koyukuk
9 = Yukon Flats
10 = Southeast Mainland
11 = Upper Tanana
12 = Canada

Tundra Swans:

1 = Kodiak
2 = Izembek
3 = Bristol Bay
4 = Yukon Delta
5 = Seward Peninsula
6 = Kotzebue Sound
7 = North Slope

Map: Map Number (USGS 1:250,000 scale quadrangle)

Quad: USGS 1:63,360 scale quad map letter and number

QtrQuad: Quarter Quad (1/4 of USGS 1:63,360 scale quad)

AL = All quarters surveyed
NE = Northeast 1/4 surveyed
NW = Northwest 1/4
SE = Southeast 1/4
SW = Southwest 1/4

Contrib: Contributor Code (Agency/office that collected and contributed data).
A separate file exists that lists the name and address for each code.

ObsNo: Observations recorded on paper maps are sequentially numbered; all observations recorded directly into computer have value of 0.

Lat/Lon: Swan location coordinates are stored in a geographic coordinate system (decimal degrees), North American 1927 datum.

Nest: 0 = Absent, 1 = Present

Egg: No. of eggs entered if eggs were counted; otherwise "NoData".

Leg_Sym: A field used by MBM-Juneau for displaying data in ArcGIS:

S = Single swan
P = Pair without nest or brood
SNest = Single with nest
PNest = Pair with nest
SBr = Single with brood
PBr = Pair with brood
0Br = Lone brood (no parent present)
F = Flock

APPENDIX V. List of participants in the 2005 Alaska Trumpeter Swan Census.

U.S. Fish and Wildlife Service:
Bruce Conant (pilot)
Jack Hodges (pilot)
Deb Groves
Jim King
Bill Larned (pilot)
Ed Mallek (pilot)
Paul Anderson (pilot)
Russ Oates
Chris Dau
Julian Fischer
Heather Wilson
Bill Eldridge
Rod King (pilot)
Karen Bollinger (pilot)
Liz Jozwiak
Tamara Mills
Robin Corcoran
Alan Brackney
Roger Kaye (pilot)
Jim Akaran
Colette Buchholtz
Gail Collins
Jim Ellis (pilot)
Susy Grimes
Hank Timm
Mike Spindler
Chris Harwood
Mark Bertram
Mike Vivion
Jenny Bryant
Brad Scotton (pilot)
Joee Huhndorf
Melanie Hans

National Park Service:
Nikki Guldager
Mason Reid
Tom Betts
Miranda Terwilliger

U.S. Forest Service:
Susan Oehlers
Nate Catterson

Others:
Josh Schmidt
James Wynbrandt
John Liston (pilot)
Eileen Henniger