

PROJECT: Bald Eagle Inventory and Monitoring Plan for Wrangell-St. Elias National Park and Preserve

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INTRODUCTION:

Bald eagles are common breeders in Wrangell-St Elias National Park and Preserve (WRST) where most nests are concentrated along the Copper River and its major tributaries. Potential threats to nesting eagles include habitat loss, human disturbance, and exposure to environmental contaminants that may affect reproduction or survival. Specific threats in this area include highway construction from Chitina to Cordova, the possibility of hydroelectric development in Wood Canyon below Chitina, potential use of the coal-fired power plant near Gulkana, development or timber harvest on private lands along rivers or lakes, potential increases in fishing pressure along the Copper River and its tributaries, camping or other recreational or subsistence access/use activities (including use of ATVs and jet boats) in sensitive breeding areas, and environmental contamination from local and global sources. Pollution is of special concern in the wake of the oil spill that occurred near Valdez in March of 1989. Eagles from WRST may be affected directly if they winter in areas damaged by the spill or indirectly by eating contaminated prey migrating in from affected areas. The close proximity of the oil pipeline to the Copper River and its tributaries and the presence of trucks that transport oil along the Richardson Highway adjacent to the Copper River are also cause for concern because of the increased potential for accidental spills. These are all important reasons to document long-term trends on population density and reproductive rates for bald eagles.

The USFWS surveyed sections of the Copper River in 1987 and 1988 to document raptor nest locations (Amaral 1988). Information on the productivity of some individual nests was obtained but overall population productivity cannot be calculated from single surveys because the number of pairs that attempted to nest but failed is unknown. WRST initiated annual bald eagle productivity surveys in 1989 along the Copper River and its tributaries (Faber 1989, Route 1990). This information provides insights into reproductive trends of bald eagles in the Copper River basin and will be continued in the future.

OBJECTIVES:

- 1) To establish baseline data on bald eagle population size and trends in WRST.
- 2) Monitor reproductive success of bald eagles nesting in WRST.
- 3) Document diets, identify foraging areas, and measure habitat characteristics.
- 4) Identify occupied and potential bald eagle breeding habitat

within WRST.

- 5) Monitor contaminant levels in bald eagles to gain secondary information on water quality.

STUDY AREA:

There are 2 study areas, one interior and one coastal. The interior study area extends from Copper and Tanada Lakes south along the Copper River to Miles Lake, east along the Bremner River to its confluence with the Little Bremner River and west along the Tasnuna River to the Woodworth Glacier (Fig. 1). The coastal study area includes the shoreline of the Malaspina Forelands from Disenchantment Bay to Icy Bay (Fig 2). The Copper River requires 2 days or 12 hours of flight time for each survey (occupancy and productivity). The survey along the Malaspina Forelands requires 1 day or 5 hours of flight time for each survey.

METHODS:

Objective 1: To establish baseline data on bald eagle population size and trends in WRST.

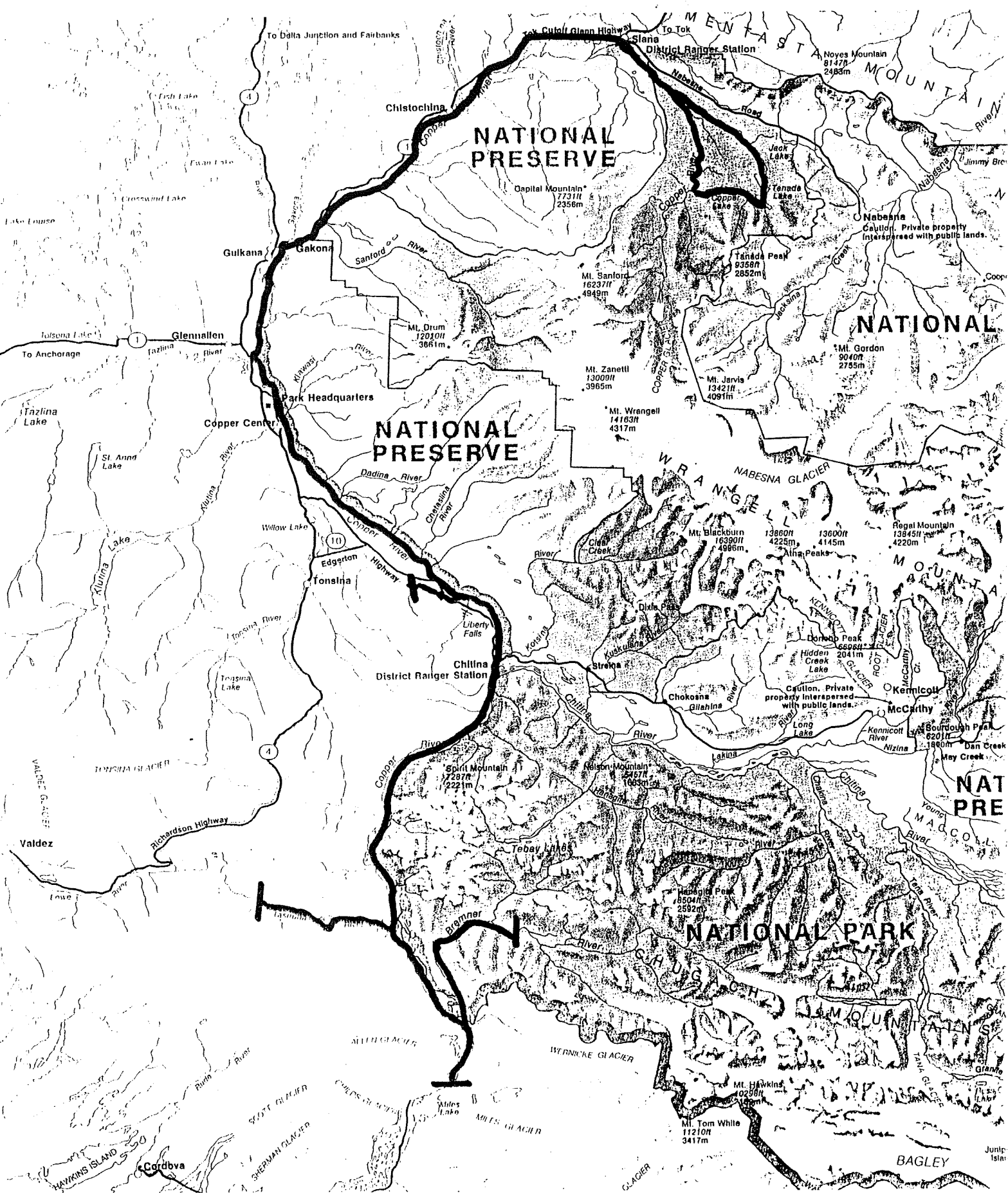
Information on the number of breeding bald eagles will be gathered during the annual bald eagle breeding survey (see objective 2). Individual breeding territories will be identified over a period of years. This is often not possible with short-term data because one pair may have multiple nests, making it difficult, especially along rivers, to identify where one territory ends and another begins. However, with multiple years of data, a breeding pair's use of a territory becomes clearer. Individual nesting territories can be identified by 1) delineating logical breaks between nests or groups of nests, 2) examining occupancy of nests within territories (e.g. no more than 1 nest per territory is occupied in a single year. Therefore, 2 occupied nests in what was thought to be 1 territory indicate 2 separate breeding territories.), 3) examine locations of perched adults recorded during surveys and identify potential feeding areas (e.g. outwash plains of streams entering into the Copper River) to help delineate possible territory boundaries. Identification of individual nesting territories will provide insight into carrying capacity and population potential for the survey area. The number of occupied territories may change with variations in food supply or habitat alteration. Any non-breeding eagles, e.g. those not associated with a nest territory (this includes adults > 1/2 mile from a known nest and immatures) should also be counted and mapped during breeding surveys. Adults seen consistently near an area away from known nests may indicate a new nest or one which has not yet been found.

Objective 2: Monitor reproductive success of bald eagles nesting in WRST.

Productivity Survey Technique:

The survey requires 1 biologist/observer and 1 pilot. The observer

Figure 1. Interior study area for bald eagle inventory and monitoring, Wrangell-St. Elias National Park and Preserve.



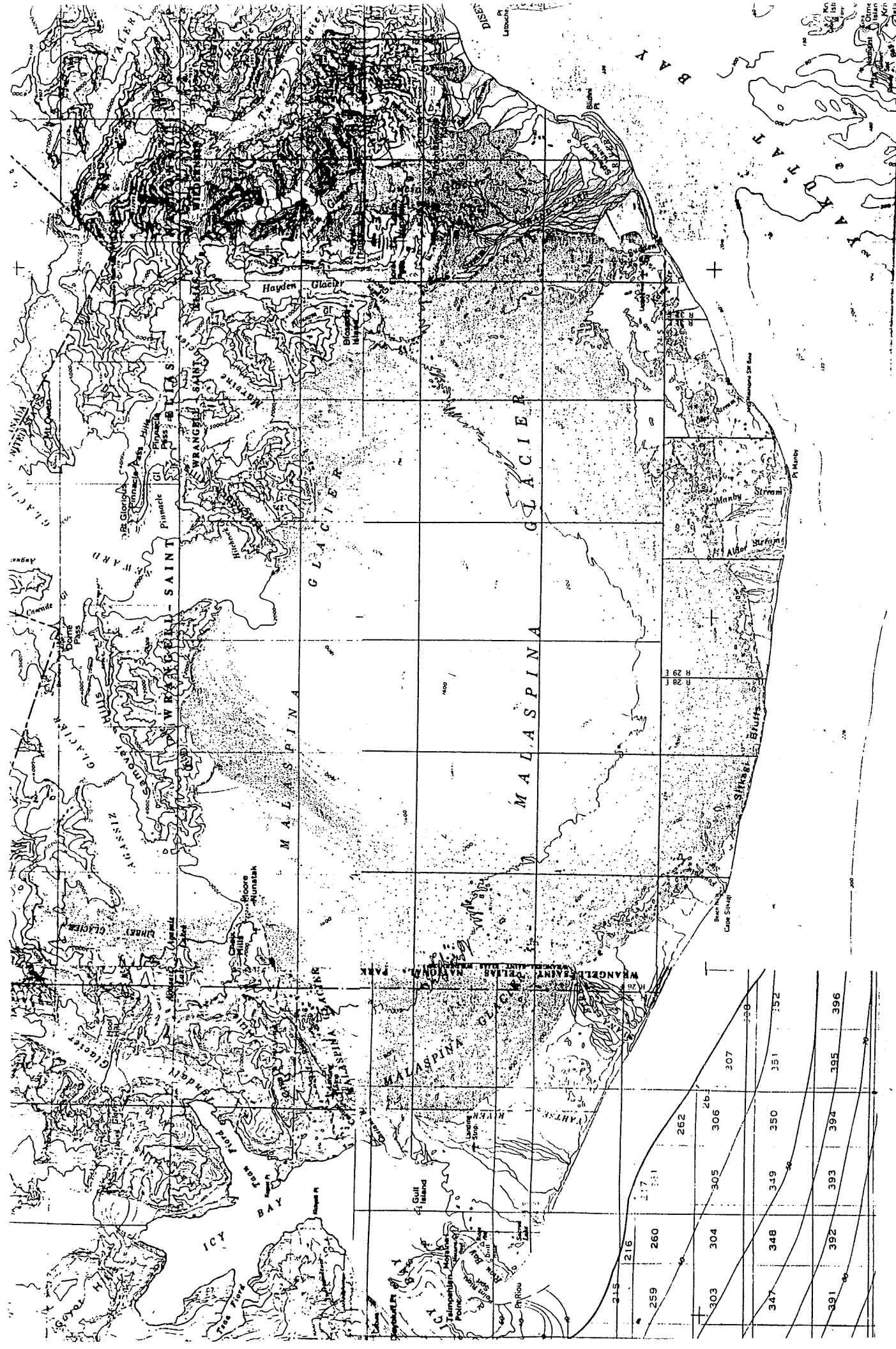


Figure 2. Coastal study area for bald eagle inventory and monitoring, Wrangell-St. Elias National Park and Preserve.

should be experienced in low level observations from a fixed wing aircraft and able to withstand intense circling. The pilot and plane should be OAS certified for low level flights. Ideally the same observer and pilot will be used every year to ensure consistency in data collection. At a minimum, the same observer should fly both surveys within 1 breeding season. J Lee (Lee's Air Taxi) has piloted the bald eagle surveys since 1991 and should continue to be used in the future. The survey consists of 2 flights, the first to locate occupied nests (occupancy survey) and the second to document reproductive success (productivity survey). Surveys should be flown at 200 to 300 feet above ground level (AGL) at as slow a speed as practical. A piper supercub is recommended for bald eagle surveys because of the double-sided view provided to the observer, its high maneuverability and slow flight speed. The aircraft should be equipped with full communications capabilities between pilot and observer and a Global Positioning System (GPS). For best coverage, surveys should be flown up one side of the river and down the other; the entire shoreline of large lakes should be circled. Flight routes are mapped on 1:63,360 topographic maps which are stored in the Resource Management Office. The occupancy survey should be flown prior to leaf-out to improve visibility. Nests and areas of thick vegetation should be circled as needed to identify presence and activity status of each nest. The summary sheet at the end of this document can be used for planning.

EQUIPMENT:

- 1:63,360 topographic working maps of the survey route showing all known nest locations (Table 1).
- Pencils/pens

Occupancy Survey

The first or **occupancy survey** to locate occupied nests is flown in mid-May (5/11-5/15), after eggs have been laid, but prior to most nest failures (Bernatowicz et al 1992). The lower Copper River (below Chitina) can be difficult to survey due to the frequency of high winds in that area. Care should be taken to choose calm days and early morning flights. Nesting chronology is also later there than along the rest of the Copper River due to glacial influences which delay spring break up. Survey flights along the lower Copper River should be flown last, as close as possible to May 15. Even then, some occupied nests will be missed. Aging young by USFWS personnel in 1990 resulted in the estimation of the start of incubation at 2 nests along the LCR on May 27. Territories with 1 or 2 adults, or with a repaired nest during the occupancy survey should be re-checked during the productivity survey. The coastal study area also experiences glacial influences and should be surveyed on about May 15.

All known nests are mapped on 1:63,360 topographic maps which are stored in the Resource Management Office. Working copies of these maps should be used to locate nests during the surveys. All known nests should be checked each year, even those that were "gone" in

Table 1. **Survey Route Maps.** U.S. Geological Survey
1:63,360 series topographic quadrangles required for Wrangell-
St. Elias National Park and Preserve's bald eagle survey.

Upper Copper River:

1. Nabesna B-6
 2. Nabesna B-5
 3. Nabesna C-5
 4. Nabesna C-6
 5. Gulkana C-1
-

Middle Copper River:

- | | |
|----------------|---------------|
| 1. Gulkana C-2 | 6. Valdez D-4 |
| 2. Gulkana B-2 | 7. Valdez D-3 |
| 3. Gulkana B-2 | 8. Valdez C-3 |
| 4. Gulkana B-3 | 9. Valdez C-2 |
| 5. Gulkana A-3 | |
-

Lower Copper River:

- | | |
|---------------|----------------|
| 1. Valdez B-2 | 5. Valdez A-2 |
| 2. Valdez B-3 | 6. Cordova D-3 |
| 3. Valdez A-3 | 7. Cordova D-2 |
| 4. Valdez A-4 | 8. Cordova C-2 |
-

Yakutat:

- | | |
|----------------|----------------------|
| 1. Yakutat D-5 | 5. Yakutat C-8 |
| 2. Yakutat D-6 | 6. Yakutat D-8 |
| 3. Yakutat C-6 | 7. Icy Bay D-1 |
| 4. Yakutat C-7 | 8. Icy Bay D-2 & D-3 |
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previous years. Bald eagles tend to re-build nests in the same tree (or same area) even after long absences. Latitude and longitude of each nest is entered into a GPS via computer disk prior to each survey flight. Territory number and nest number is used to identify individual nests. Latitude and longitude of each nest can then be used as a waypoint to locate nests which are difficult to find, especially along the upper Copper River (between the Gulkana River and Copper Lake). The following data should be recorded directly on the topographic maps during the productivity survey: 1) the number of adults (1 or 2 **A**), and eggs (1-3 **eggs** but eggs are rarely observed) at the nest, 2) presence of an incubating adult (**I**), 3) an empty nest (**E**), 4) whether the nest is repaired (**egg cup visible, fresh greens, etc...**), 5) what condition the nest is in (**good, poor, remnant**), 6) whether the nest is not found (**NF**), gone (**NG**), or not checked (**NC**), and 7) new nest locations (include latitude/longitude and tree species). It is helpful to record nests which were "gone" or "not found" during the previous survey year on current working maps to minimize search time for individual nests (e.g. less time is spent searching for a nest that was gone or not found the previous year than a nest that was in good condition). Information that helps describe nest locations is also helpful (e.g. nest on top of bluff or on north side of ravine) to record on working maps. Data collected during the occupancy survey should be recorded in black pencil and data collected during the productivity survey in colored pencil. This makes it easier to separate what was seen during each survey. GPS readings (latitude/longitude) should be taken at all new nests so they can be mapped accurately and easily relocated. Tree species and any notes that might aid in future nest relocation should also be recorded for new nests.

The following standard reproductive terminology (Postupalsky 1983, Steenhof 1987) should be used in interpreting data:

- O = OCCUPIED.** All of the following conditions constitute an occupied nest; 1) evidence of eggs or young, 2) an incubating adult, 3) 2 adults (or 1 adult and 1 sub-adult) near an empty nest or within a known breeding territory (this includes known territories where the nest is gone), 4) a recently repaired nest (e.g. egg cup, fresh lining material, green twigs, sticks with fresh breaks on top), or a new nest (one known not to have been present the preceding year). A recently repaired nest with 0 or 1 adult present is still considered occupied because nest building behavior is elicited by the presence of a mate. One adult perched at or near an empty unrepaired nest does not constitute an occupied territory.
- E = EMPTY.** This includes empty, unrepaired nests with 0 or 1 adult near the nest.
- NF = NOT FOUND.** Previously known nest not found in survey.
- NC = NOT CHECKED.** Self-explanatory.
- NG = NEST GONE.** Previously known nest which no longer exists.

The term "active" nest has often been used to describe solid evidence of breeding such as an incubating adult or presence of eggs. However, it has been used inconsistently to designate a variety of situations (occupied, breeding, successful) by different biologists, making its meaning difficult to interpret (Steenhof and Kochert 1982, Postupalsky 1983). Productivity figures are calculated from "occupied" nests because one survey cannot determine all nesting activity, e.g. some nests may have already failed by the time they are surveyed. For this reason, only the term "occupied" should be used to report productivity data (Steenhof 1987). However, it is important to record exactly what was seen at a nest as rationale for calling it occupied or empty during the occupancy survey and in case these data are needed for later, more detailed, analysis. For example, territories that have only one adult obviously attending an empty nest (e.g. perched in the nest tree or within a few hundred feet) may also represent an occupied territory because surveys that consist of only brief aerial checks may easily miss a second adult which is foraging away from the nest (S. Ambrose, USFWS, pers commun, Fraser 1978, Fraser et al. 1983, Steenhof 1987). These may be failed nests, nests with only one adult, or nests at which breeding did not occur in that year. However, because breeding status cannot be definitely determined from 1 brief aerial check, these data are not included in annual productivity calculations.

Productivity Survey

The second or **productivity survey** to document reproductive success should be conducted in late July, after adults have completed brooding, young are large and dark enough to be seen easily from an aircraft, and most nestling deaths and nest failures have already occurred. It is important that the productivity survey is completed by about August 1, before young start fledging. The productivity survey consists of re-visiting nests that were occupied (see terminology) during the occupancy survey or had at least 1 adult present (not incubating). Because second adults are often missed during brief aerial checks (Fraser et al 1983), 2 adults seen during either survey constitute an occupied territory (S Postupalsky, Madison, WI, pers commun). For the purposes of productivity calculations, however, (because all nests are not re-checked during the second survey), when 2 adults are seen during the productivity survey, they are only included in data analysis if they had at least 1 adult present during the occupancy survey. This implies that nests with at least 1 adult (not incubating) during the occupancy survey will be re-checked during the productivity survey. Occasionally, a few additional new nests with young that were missed during the occupancy survey are also found at this time. These should not be included in annual productivity calculations, with the exception of young/successful nest. Important information recorded during the productivity survey include nest success and the number of young produced. Again, this can be recorded directly on maps (in pen): 1) the number of adults (1 or 2 A), 2) the number of young (Y1, 2, or 3), 3) empty nest (E), and 4) whether the nest is not found (NF), gone (NG), or not

checked (NC).

The following standard reproductive terminology (Postupalsky 1983, Steenhof 1987) should be used in interpreting the data:

- Y1,2,3 = Successful nest with 1, 2, or 3 **YOUNG**.
- F = **FAILED** or unsuccessful breeding attempt. Nests that were known occupied earlier in the year, but are currently empty (e.g. no eggs were laid, eggs did not hatch, or eaglets died).
- U = Outcome **UNKNOWN**. This occurs at nests which were not found (NF) or not checked (NC) during the second survey or nests at which the presence of young could not be determined (due to canopy cover).

The age of young in weeks should also be recorded during the second survey to establish nesting chronology and appropriate survey dates. The age of nestlings can be estimated from descriptions in Carpenter (1990) and Bortolotti (1984).

Data Management:

Data Input:

As soon as possible after returning from each survey, all data should be recorded on Alaska Raptor Observation and Nest Record Cards designed by the USFWS (Fig. 3) if these have not been used during surveys or entered directly into the corresponding dBase files D:NESTOBBE.DBF and D:NESTREC.DBF. New nest locations should be transferred from working maps to base maps in the Resource Management office. Nest numbers will follow the USFWS protocol. Nests are identified by 1) map name and quadrangle number, 2) territory number, 3) the individual nest number for that quadrangle, and 4) latitude and longitude. All nests within each quadrangle have been numbered consecutively (numbers correspond to USFWS data and should not be altered). A number should describe each individual nest; numbers should not be re-used even after that nest no longer exists. This limits confusion over historic nest records and eagles often rebuild nests in the same tree even after long absences. New nests found in subsequent surveys are assigned the next number for that individual 1:63,360 map. Territory numbers are sequential and are not repeated on different maps so each territory has a unique number.

Data Interpretation/Report writing:

Bald eagle productivity is measured by percent nest success (total number of successful nests/total number of occupied nests), the average number of young/occupied nest (total number of young/total number of occupied nests), and the average number of young/successful nests. At least 50% of nesting pairs must be successful and produce a minimum of 0.7 young/occupied nest to maintain a stable population (Sprunt et al. 1973). However, 1.0

Figure 3. Raptor observation and nest record card.

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young/occupied nest is more indicative of a healthy population (Wiemeyer et al. 1984). Productivity in individual years will be discussed in annual reports.

Trends in nest success are more important than productivity in individual years. A comprehensive report summarizing trends in population size, reproductive success, and other available information, e.g. habitat characteristics and food habits, will be written every 5 years.

Copies of annual/comprehensive reports and new nest locations should be sent to US Fish & Wildlife Service raptor biologist in Juneau where a bald eagle data base is maintained and to the Ahtna Native Corporation in Glennallen who has also expressed an interest in nest locations on their lands along the Copper River. Copies of annual reports should be sent to wildlife biologists at the Bureau of Land Management in Glennallen and the US Forest Service in Cordova. The Bureau of Land Management currently surveys nests along the Gulkana River. The Chugach National Forest hopes to initiate surveys along the lower Copper River if funding becomes available in the future. Sharing productivity information between agencies promotes a better understanding of the entire Copper River watershed. It is important to examine the Copper River on a watershed basis to determine localized versus large-scale effects and to promote cooperative management and solutions of large-scale problems.

Objective 3: Document diet, identify foraging areas and measure habitat characteristics.

Identification of prey remains and habitat characteristics will be accomplished through ground visits in mid-August just after young have fledged. Permission to access nests on private lands should be obtained well in advance. Prey remains found below nest and perch trees will be collected from successful nests. Collections can begin along the Copper River, with pairs nesting near the confluence of the Chistochina and Copper Rivers south to Copper Center in the first year. Pairs nesting near Copper Center south to Chitina and those in Yakutat Bay would be surveyed in subsequent years. Unknown food items should be collected and identified by comparison with museum specimens; the minimum number of individuals of each species is determined by the greatest number of bones or feathers per taxon (Mollhagen et al. 1970). Any foraging activity observed should be recorded and mapped.

Habitat characteristics described on the Alaska Raptor Observation and Nest Record Card will be collected concurrent with diet documentation. Tree and nest height will be measured with a clinometer; DBH can be measured with a diameter tape. As much information as possible should be gathered from maps, personnel familiar with the area, and observations during aerial surveys to reduce time spent at nests. Nests should not be visited before nestlings are at least 5 weeks old, when nestlings are near fledging (9-12 weeks old) (see Carpenter 1990 and Bortolotti 1984

for aging criteria), or during periods of inclement weather.

Objective 4: Identify occupied and potential bald eagle breeding habitat within WRST.

This will be an ongoing project using GIS and incidental observations in areas not currently surveyed during the annual bald eagle breeding survey. Special survey priority will be given to areas which may potentially be developed or are vulnerable to changes which may affect eagles (e.g. pollution, habitat loss, increased fish harvest, increased recreation, timber harvest or mineral resource extraction on federal, state, or private lands).

Objective 5: Monitor contaminant levels in bald eagles to gain secondary information on water quality.

As terminal predators associated with an aquatic environment, bald eagles are good indicators of water quality for those contaminants which biomagnify up the food chain. Embryos are often more vulnerable to the effects of contaminants than adults, resulting in productivity being a sensitive indicator of environmental contamination. Bald eagles will be monitored for decreases in population size or reproductive success with the annual surveys described above. Potential correlations with environmental contamination and/or other factors will be examined if decreases are noted. Fresh carcasses of dead eagles (especially nestlings which reflect local contamination) or unhatched eggs found in WRST should be analyzed for contaminants to document current contaminant levels. Brain, breast and blood samples are appropriate for most organic contaminants. Liver, kidney, blood, and body (breast) feathers are used to document metal contamination. Carcasses should be frozen as soon as possible after recovery. Eggs, however, should **not** be frozen but should be wrapped in aluminum foil and refrigerated until they can be shipped for contaminant analysis or properly archived. The USFWS, e.g. the Regional Environmental Contaminants Specialist in the Anchorage office and the Raptor Specialist in the Juneau or Fairbanks office should be contacted if carcasses or unhatched eggs are recovered. Funding may be available through the USFWS for contaminant analysis since eagles are good bioindicators of environmental contamination and results are of interest to several different agencies.

If cause of death is unknown, carcasses may be submitted frozen to US Fish and Wildlife Service, National Wildlife Health Lab, 6006 Schroeder Road, Madison, Wisconsin 53711-6223 for necropsy. Instructions to save the carcass for contaminant analysis and return address must accompany the bird. Carcasses must be reasonably fresh to be mailed to the Health Lab. The necessary state and federal permits for WRST personnel to collect and hold eagle carcasses, eggs, or feathers will be maintained in the bald eagle file and must be renewed annually by the Resource Management Specialist.

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