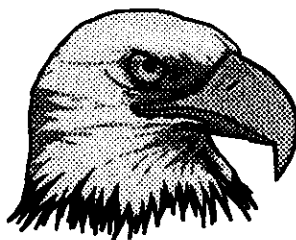


ORIGINAL

PROGRESS REPORT:

**Bald Eagle Nesting and Reproductive Success
Along the Pacific Coast of the Alaska Peninsula
Cape Kubugakli to Cape Kumlik
10 May-1 August 1995**



by

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Key Words: Alaska Maritime, Alaska Peninsula, Aniakchak, bald eagles, Becharof, Exxon Valdez, *Haliaeetus leucocephalus*, helicopter surveys, oil spill, Pacific Coast, productivity

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ABSTRACT

Bald eagle (*Haliaeetus leucocephalus*) nesting success was examined along the Pacific Coast of the Alaska Peninsula, from Cape Kubugakli (Becharof National Wildlife Refuge) to Cape Kumlik (Aniakchak National Monument & Preserve), during the summer of 1995. Aerial surveys were conducted by helicopter in mid-May (eggs) and late July (fledglings). Ninety-two active/occupied nests were recorded with a mean clutch size of 1.69 eggs and 10 nests containing 3 eggs. Pair productivity was 0.48 fledglings/eggs laid. Nesting success (56%) and nest productivity (0.90 fledglings/occupied and/or active nest) closely paralleled that recorded in 1989 and 1990. Habitat use also paralleled previous survey results with nearshore islands/islets used more frequently for nests than other available habitat types. Sixty-six percent of the 1995 nests were located on sites previously used in 1989 or 1990.

INTRODUCTION

Bald eagles (*Haliaeetus leucocephalus*) are abundant along the waters of the Pacific Ocean throughout Alaska (Murie 1959, King et al. 1972); however, baseline information on relative abundance, distribution and production is lacking for the Alaska Peninsula (Sowl 1982). Within the last decade, surveys have been conducted to determine distribution and abundance on the Peninsula (Bailey and Faust 1981, Sowl 1982, Payne 1987, Payne 1988) indicating highest densities along the Pacific coast.

In March 1989, the 11-million gallon Exxon Valdez Oil Spill impacted 1170 km (725 mi) of Pacific shoreline (Cape Kubugakli to American Bay) contained within the Alaska Peninsula/Becharof National Wildlife Refuges and 100+ nearshore islands and islets managed as the Alaska Peninsula Unit of the Alaska Maritime National Wildlife Refuge. Bald eagle surveys conducted as part of the Refuges' Wildlife Inventory Plan formed the basis for oil spill damage assessment studies. These pre-oil surveys included an aerial random plot survey of eagle density conducted in 1983 (Payne 1988) and a coastal nest survey conducted in 1987 (Payne 1987).

In May 1989, the Alaska Peninsula/Becharof Refuge Complex initiated a bald eagle (oil spill) damage assessment study along the Pacific Coast, from Cape Kubugakli to Cape Kunmik. In May 1990, this study was expanded 209 km (130 mi) south to American Bay to include data from Becharof, Alaska Peninsula, and Alaska Maritime National Wildlife Refuges, and Aniakchak National Monument and Preserve. In 1995, funding was provided to conduct the first follow-up surveys to monitor long term trends for the coastal nesting population of bald eagles. The objectives of these long term monitoring efforts are to:

- 1) map the locations of past and current bald eagle nests and document the habitat type used at each site;
- 2) monitor bald eagle reproductive success from egg to fledging; and
- 3) contribute bald eagle data from the Alaska Peninsula to the Alaska regional data base maintained by the U.S. Fish & Wildlife Service's (FWS) Raptor Management Office in Juneau, Alaska.

METHODS AND STUDY AREA

For the 1995 surveys, the study area covered from Cape Kubugakli south to Cape Kumlik, along the Pacific Coast of the Alaska Peninsula, including nearshore islands (Fig. 1). The area consists of 483 km (300 mi) of rugged shoreline formed by the junction of the Aleutian Mountain Range and the Pacific Ocean. Kodiak Island is located 48 km (30 mi) east from the peninsula and is separated by the Shelikof Strait. Study area boundaries were the Katmai National Park & Preserve to the north and the Chignik Unit of the Alaska Peninsula Refuge to the south.

Aerial nest surveys were flown using a chartered Bell 206 Jet-Ranger helicopter. The same primary observer (author) was maintained on all surveys, with alternating second observers. On the initial survey, active nest locations were marked on 1:63,360 series topographic maps. Active nests were classified as those possessing two or more of the following items: fresh nesting materials, 1-2 adult eagles actively defending nest, adult eagle in incubating posture, egg(s) present, or young present.

Survey data was recorded on a Lotus 1-2-3 spread sheet (Appendix I), with nest sites classified by habitat type (Sherrod et al. 1977, Dewhurst 1990). Nests located from Cape Kunmuk south to Cape Kumlik were surveyed only during the fledgling period. Nests from Cape Kubugakli south to Cape Kunmuk were surveyed twice; during incubation (May) and late fledgling stage (late July). During each nest visit, we recorded the number of adults/eggs/young present and age class of the eaglets (Carpenter 1990).

Upon trying to compare our eagle reproduction results with similar studies in Alaska, it became clear that the term productivity had multiple usage in bald eagle literature, depending on survey methodology. For purposes of clarity in this report, productivity was divided into two categories: pair productivity (# fledglings/egg laid) and nest productivity (# fledglings/nest).

RESULTS AND DISCUSSION

Nest Sites

Ninety-two active/occupied bald eagle nest sites were recorded during this year's survey, from Cape Kubugakli to Cape Kumlik. Nest distribution was not equal among the different land management units (Table 1). So, data gathered by land management unit should not be used to format trends for the entire Alaska Peninsula. Habitat use by nesting eagles in 1995 closely paralleled that of previous years (Dewhurst 1989, Dewhurst 1990) (Table 1), with sea stacks and islands being the highest used habitat types, likely due to mammalian predator avoidance.

Sixty-six percent (61) of the 1995 active nests were located on sites previously used in 1989 or 1990. Of those, 20 nest sites were used in all 3 survey years.

Productivity

Sixty-nine of the 92 active/occupied nests located in 1995 were initially checked for eggs or incubating adults. In only 3 cases, did incubating adults not permit observation of nest contents. Of the 66 nests where initial contents were observed, clutch size frequencies were: 0 eggs-12, 1 egg-7, 2 eggs-39, and 3 eggs-10, producing a mean clutch size of 1.69 eggs.

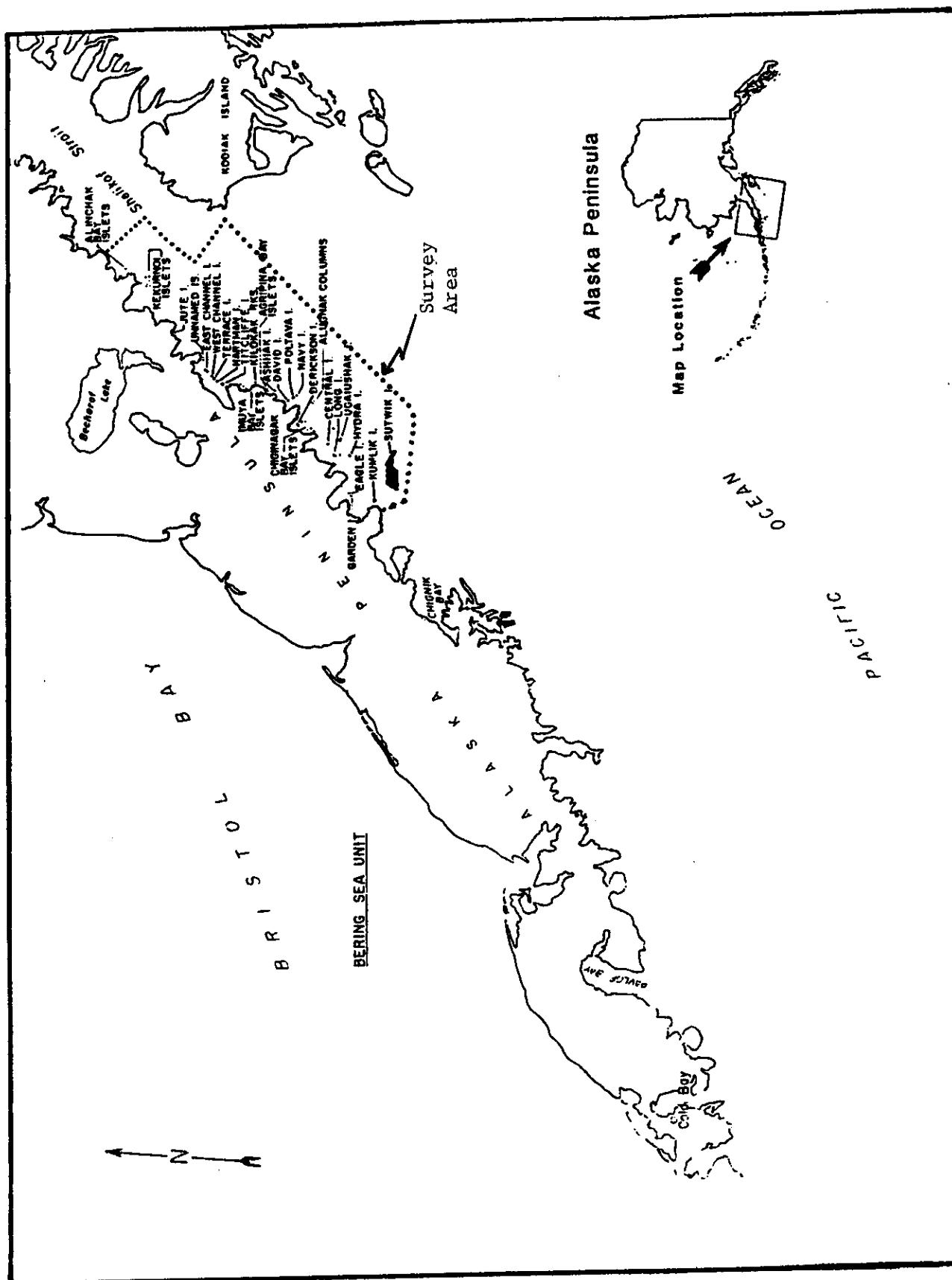


Figure 1. Aerial survey area used for the 1995 bald eagle nesting surveys, extending from Cape Kubugakli to Cape Kumlik, along the Pacific Coast of the Alaska Peninsula, Alaska, including all nearshore islands.

Table 1. Bald eagle nesting habitat use in survey area from Cape Kubugakli south to Cape Kumlik, May/July 1995. Nests are also subdivided by land management units.

Habitat Types ^a	# Active Nests				Totals
	Becharof Refuge	Ugashik Unit	Maritime Refuge	Aniakchak Monument	
I) Sea Stacks	6	10	0	1	17
II) Coastal Ridges	2	5	0		7
III) Connected Stacks	0	8	0	1	9
IV) Islets/Islands	1	3	45	0	49
-I Sea Stacks	0	0	23	0	0
-II Ridges	0	1	10	0	0
-III Conn. Stack	0	0	4	0	0
-IV Smaller Islet	0	0	2	0	0
-Va Hilltops	0	0	4	0	0
-Vb Hillsides	0	2	2	0	0
Va) Hilltops	0	3	0	2	5
Vb) Hillsides	0	4	0	1	5
Totals	9	33	45	5	92

^a Habitat types are defined in Appendix I

Tallying only nests with known initial contents yielded an estimate of pair productivity (#fledglings/eggs laid). At the 66 initial nest sites, 115 eggs yielded 56 fledglings (class 3). Pair productivity was 0.48 or roughly one fledgling per every 2 eggs laid.

Bald eagle nesting success and productivity in 1995 closely paralleled that of 1989 and 1990. Fifty-six percent of the nesting pairs successfully reared eaglets to fledging, averaging 0.88 fledglings/active nest (Table 2).

CONCLUSIONS

Replicating the oil spill-related monitoring of eagle nests along the Pacific Coast yielded good long term population trend information as well as consistency of habitat use. Nesting habitat selection as well as nesting success and productivity has remained remarkably consistent, 5 years after the oil spill. Given these successful results, this type of bald eagle survey method should be incorporated into a long term monitoring/inventory plan for the Pacific Coast of the Alaska Peninsula. To be practical, survey efforts need to be coordinated among the various land owners and managers, so that complete trends for the local nesting population can be monitored without "missing pieces" of the coast.

RECOMMENDATIONS

1) Revise the Alaska Peninsula/Becharof Refuges' Wildlife Inventory Procedure for bald eagles to include replication of nest surveys of the Pacific coast. To reduce expenses, surveys could be annually alternated between the Becharof Refuge/Ugashik Unit and the Chignik Unit. Preferably two series of flights would be conducted every 5 years, during the incubation stage and the fledgling stage.

2) All future coastal bald eagle nesting surveys should be conducted by helicopter only, to maintain survey accuracy and safety.

ACKNOWLEDGEMENTS

Wildlife Biologist Donna Dewhurst acted as the primary observer on all surveys from 1989 to 1995, with several people participating in 1995 surveys as the second or "back-seat" observers: Wildlife Biologist Heather Moore, Biological Technician Todd Eskelin and Biological Intern Ingrid Harrauld. Much credit is also due for the safe and efficient survey flying by the pilots of CalAlaska and Trans-Alaska Helicopters. Administrative support was provided by Refuge Manager Ronald E. Hood and the staff of the Alaska Peninsula/ Becharof Refuge Complex.

Table 2. A comparison of 1989, 1990 and 1995 bald eagle nest occupancy and productivity along the Pacific Coast of the Alaska Peninsula, from Cape Kubugakli to Cape Kunmik.

<u>Cape Kubugakli to Cape Kunmik^a</u>	<u>1989</u>	<u>1990</u>	<u>1995</u>
Total # Nests Surveyed ^b	72	106	125
# Occupied and/or Active Nests	72	78	66
# Successful Nests	40	41	38
% Nesting Success ^c	55%	53%	56%
# Fledglings	62	70	58
# Fledglings/ Occupied-Active Nest	0.86	0.90	0.88
# Fledglings/ Successful Nest	1.55	1.71	1.53
 <u>Total 1990 Productivity Survey Area</u> <u>(Cape Kunmik to Cape Kumlik)</u>			
		<u>1990</u>	<u>1995</u>
Total # Nests Surveyed		39	49
# Occupied and/or Active Nests		39	26
# Successful Nests		21	16
% Nesting Success		55%	62%
# Fledglings		25	25
# Fledglings/ Occupied-Active Nest		0.85	0.96
# Fledglings/ Successful Nest		1.65	1.56

^a Data from Cape Providence and Aiugnak Columns was only collected in 1990 and was not included in calculations. Cape Kunmik is defined at the Refuge/Aniakchak border.

^b Includes "empty" nests. Note empty nests were not recorded during the 1989 survey. Empty nests (on the initial surveys) were those occupied in previous years, but not the current year. Other abandoned nests (w/out fresh nesting material) were not documented due to problems with distinguishing bald eagle nests from those built by other area raptors.

^c Nests discovered during the July/August surveys were not included in this calculation.

LITERATURE CITED

- Bailey, E. P and N. H. Faust. 1981. Distribution and abundance of marine birds breeding between Amber and Kamishak Bays, Alaska, with notes on interactions with bears. *Western Birds*. 15:161-174.
- Bowman, T. 1990. Guidelines for standardization of bald eagle productivity surveys, 1990. U.S. Fish & Wildl. Serv., Admin. Memo., Cordova, Alas. (Unpubl). 8pp.
- Carpenter, G. P. 1990. An illustrated guide for identifying developmental stages of bald eagle nestlings in the field. San Francisco Zoo. Soc., San Francisco, Ca. ?pp.
- Dewhurst, D. A. 1989. Bald eagle nesting and reproductive success along the Pacific Coast of the Alaska Peninsula/Becharof National Wildlife Refuge, Cape Kubugakli to Cape Kunmik, 10 May-25 July, 1989. U.S. Fish & Wildl. Serv., Admin. Rep., King Salmon, Alas. (Unpubl). 15pp.
- . 1990. Bald eagle nesting and reproductive success along the Pacific Coast of the Alaska Peninsula/Becharof National Wildlife Refuge, Cape Kubugakli to American Bay, 9 May-28 July, 1989. U.S. Fish & Wildl. Serv., Admin. Rep., King Salmon, Alas. (Unpubl). 43pp.
- King, J. G., F. C. Robards, and C. J. Lensink. 1972. Census of bald eagle breeding population of southeast Alaska. *J. Wildl. Manage.* 48:61-69.
- Murie, O. J. 1959. Fauna of the Aleutian Islands and the Alaska Peninsula. U. S. Fish & Wildl. Serv., N. Amer. Fauna No. 61. U.S. Govt. Print. Office, Wash., D. C. 406pp.
- Payne, J. 1987. Initial bald eagle inventory along Pacific Coast. U.S. Fish & Wildl. Serv., Admin. Rep., King Salmon, Alas. (Unpubl). 4pp.
- . 1988. Bald eagle population survey and nesting inventory, Alaska Peninsula/Becharof Natl. Wildl. Refuge. U.S. Fish & Wildl. Serv., Admin. Rep., King Salmon, Alas. (Unpubl). 4pp.
- Sherrod, S. K., C. M. White, and F. S. L. Williamson. 1977. Biology of the bald eagle on Amchitka Island, Alaska. *Living Bird*. 15:143-182.
- Sowl, L. W. 1982. A reconnaissance of the breeding distribution of colonial nesting of seabirds on the south coast of the Alaska Peninsula, May 30-June 19, 1973. U.S. Fish & Wildl. Serv., Admin. Rep. (Unpubl). 46pp.

Appendix I. Bald eagle nesting data gathered during May & July 1995 from Cape Kubugakli to Aniakhchak Bay.

Map Quad	Nest #	Refuge Ref #	Location	Habitat Type	Nest Contents		Owner Unit
					5/10/95	7/31/95	
Karluk D-4	121-44-06	8901/90001/95001	Cape Kubugakli	I	A/2a2e	A2/1a2y(3c)	BNWR
Karluk D-4	121-44-11	/95002	Alinchak Bay	IV	A/2a2e	F/0a0y	BNWR
Karluk D-4	121-44-08	/90003/95003	Alinchak Bay	I	A/1a3e	A3/0a3y(3c)	BNWR
Karluk D-4	121-44-10	/90006/95004	Alinchak Bay	I	A/1a2e	A1/1a1y(3c)	BNWR
Karluk D-4	121-44-03	8904/90008/95005	Alinchak Bay	IV-II	A/2a2e	A1/2a1y(3c)	AMNWR
Karluk D-4	121-44-01	8906/90007/95006	Alinchak Bay	I	A/1a3e	A2/0a2y(3c)	BNWR
Karluk C4&5	121-34-01	8909/90010/95007	Kekurnoi Islets	IVb	A/2a2e	F/2a0y	AMNWR
Karluk D-5	121-45-01	8910/90011/95008	Puale Bay	II	A/1a1	F/0a0y	BNWR
Karluk C-6	121-36-04	/95009	Oil Creek	II	A/1a2e	A1/2a1y(3c)	BNWR
Karluk C-6	121-36-05	/95010	Island Bay	I	A/1a2e	A1/1a1y(3c)	BNWR
Ugashik B-1	120-21-23	/95011	Cape Igvak	I	A/2a2e	A1/2a1y(3c)	BNWR
Ugashik B-1	120-21-12	8917/90015/95012	Cape Igvak	I	A/1a1	F/0a0y	APNWR/U
Ugashik B-1	120-21-24	95013	Wide Bay	IV-II	O/1a0e	E/0a0y	APNWR/U
Ugashik B-1	120-21-10	8920/90017/95014	Wide Bay	IV-III	A/1a2e	F/0A0y	APNWR/U
Ugashik B-1	120-21-09	8921/90018/95015	Wide Bay	I	A/1a2e	A2/2a2y(3c)	APNWR/U
					5/10/95	7/29/95	
Ugashik B-1	120-21-17	90022/95016	West Channel Is	IV-II	A/1a2e	F/0a0y	AMNWR
Ugashik B-1	120-21-07	8922/90023/95017	West Channel Is	IV-III	A/1a1e	F/0a0y	AMNWR
Ugashik B-1	120-21-20	90027/95018	Wide Bay Islet	IV-I	A/1a2e	F/0a0y	AMNWR
Ugashik B-1	120-21-05	8924/ /95019	Hartman Island	IV-V	A/1a2e	A1/1a1y(3c)	AMNWR
Ugashik B-1	120-21-04	8925/ /95020	Wide Bay Islet	IV-I	A/1a1e	F/0a0y	AMNWR
Ugashik B-1	120-21-25	/95021	Wide Bay Islet	IV-I	A/1a2e	F/0a0y	AMNWR
Ugashik B-1	120-21-01	8928/90030/95022	Wide Bay Islet	IV-V	A/1a2e	A1/1a1y(3c)	AMNWR
Ugashik B-2	120-22-04	/95023	Cape Kayakliut	V	A/2a2e	A2/2a2y(3c)	APNWR/U
Ugashik B-2	120-22-01	8929/ /95024	Wide Bay	V	O/1a0e	E/1a0y	APNWR/U
					5/11/95	8/01/95	
Ugashik A-2	120-12-24	8931/90032/95025	Imuya Bay	IV-I	A/2a1e	F/2a0y	AMNWR
Ugashik A-2	120-12-22	8933/ /95026	Imuya Bay	II	A/2a1e	F/0a0y	APNWR/U
Ugashik A-2	120-12-38	/95027	Imuya Bay	III	O/2a0e	E/1a0y	APNWR/U
Ugashik A-2	120-12-21	8934/90034/95028	Cape Kilokak	IV-I	A/1a1	F/1a0y	APNWR
Ugashik A-2	120-12-20	8935/ /95029	Cape Kilokak	IV-I	A/1a2e	A2/1a2y(3c)	AMNWR
Ugashik A-2	120-12-19	8936/ /95030	Wreck Islet	IV-I	A/2a2e	A1/1a1y(3c)	AMNWR
Ugashik A-2	120-12-18	8937/90035/95031	Cape Kilokak	I	A/1a2e	A1/1a1y(3c)	APNWR/U
Ugashik A-2	120-12-17	8938/ /95032	Cape Kilokak	I	A/1a2e	F/0a0y	APNWR/U
Ugashik A-2	120-12-37	/95033	Agripina Bay	I	NE	A1/1a1y(3c)	APNWR/U
Ugashik A-2	120-12-11	8945/ /95034	Ashiik Island	IV-II	O/2a0e	F/0a0y	AMNWR
Ugashik A-2	120-12-10	8944/90045/95035	Agripina Bay	IV	A/1a2e	A3/1a3y(3c)	APNWR/U
Ugashik A-2	120-12-36	/95036	David Island	IV-I	A/1a2e	F/0a0y	AMNWR
Ugashik A-2	120-12-35	/95037	Port Wrangell	III	A/1a2e	A1/1a1y(3c)	APNWR/U
Ugashik A-2	120-12-34	/95038	Port Wrangell	III	A/1a3e	A3/1a3y(3c)	APNWR/U
Ugashik A-2	120-12-05	8950/ /95039	Port Wrangell	III	A/2a2e	A1/0a1y(3d)	APNWR/U
Ugashik A-2	120-12-02	8953/90048/95040	Port Wrangell	II	O/2a0e	E/0a0y	APNWR/U
					5/11/95	7/29/95	
Ugashik A-3	120-13-03	/95041	Chiginagak Bay	I	A/2a2e	A1/1a1y(3c)	AMNWR
Ugashik A-3	120-13-04	/95042	Chiginagak Bay	III	A/1a3e	A1/1a1y(3c)	APNWR/U
Ugashik A-3	120-13-02	90077/95043	Chiginagak Bay	IV-V	A/2a2e	A1/1a1y(3c)	AMNWR
Sutwik D-3	127-43-13	90051/95044	Chiginagak Bay	IV-V	A/1a2e	A1/1a1y(3c)	AMNWR
Sutwik D-3	127-43-12	8955/ /95045	Foul Islet	IV-II	A/1a1e	A1/1a1y(3c)	AMNWR
Sutwik D-3	127-43-23	/95046	Chiginagak Bay	III	A/1a2e	A1/1a1y(3c)	APNWR/U
Sutwik D-3	127-43-24	/95047	Chiginagak Bay	I	A/1a2e	A1/1a1y(3c)	APNWR/U
Sutwik D-3	127-43-09	8959/90054/95048	Chiginagak Bay	I	O/2a0e	E/0a0y	APNWR/U
Sutwik D-3	127-43-25	/95049	Cape Kuyuyukak	V	O/1a0e	E/0a0y	APNWR/U
Sutwik D-3	127-43-26	/95050	Cape Kuyuyukak	V	A/1a3e	A1/1a1y(3c)	APNWR/U
Sutwik D-3	127-43-06	8965/90058/95051	Nakalilok Bay	II	O/2a0e	E/0a0y	APNWR/U
Sutwik D-3	127-43-22	/90059/95052	Nakalilok Bay	V	A/2a2e	A2/1a2y(3c)	APNWR/U
Sutwik D-3	127-43-27	/95053	Nakalilok Bay	V	A/1a1e	F/2a0y	APNWR/U
Sutwik D-3	127-43-05	8966/ /95054	Nakol Pt	IV	A/2a2e	A2/1a2y(3c)	APNWR/U
Sutwik D-3	127-43-16	90061/95055	Yantarni Sound	I	A/1a2e	A2/1a2y(3c)	APNWR/U
Sutwik D-3	127-43-04	8969/90069/95056	Yantarni Sound	II	A/1a3e	A3/2a3y(3c)	APNWR/U

Appendix I. Continued

					5/11/95	8/01/95	
Sutwik D-3	127-43-20	/90066/95057	Long Island	IV-III	A/1a2e	A2/2a2y(3c)	AMNWR
Sutwik D-3	127-43-01	8964/90067/95058	Long Island	IV-I	A/1a2e	F/0a0y	AMNWR
Sutwik D-3	127-43-19	/90065/95059	Ugaiushak Island	IV-III	A/2a2e	A2/1a2y(3c)	AMNWR
Sutwik D-3	127-43-18	/90064/95060	Ugaiushak Island	IV-II	A/2a2e	A1/1a1y(3c)	AMNWR
Sutwik D-2	127-42-02	/90075/95061	Cape Providence	I	A/2a2e	A1/2a1y(3c)	APNWR/U
Sutwik D-2	127-42-03	/90076/95062	Un-named Island	IV-II	O/2a0e	E/0a0y	AMNWR
Sutwik D-2	127-42-04	/90077/95063	Un-named Island	IV-II	A/2a2e	A1/1a1y(3c)	AMNWR
Sutwik D-4	127-44-14	/95064	Yantarni Sound	V	A/1a1e	A1/1a1y(3c)	APNWR/U
Sutwik D-4	127-44-03	8970/90070/95065	Yantarni Bay	III	A/2a2e	F/0a0y	APNWR/U
Sutwik D-4	127-44-01	8972/ /95066	Cape Kunmik	IV	A/2a2e	F/0a0y	APNWR/U
Sutwik D-4	127-44-15	/95067	Cape Kunmik	I	NF	A2/2a1y(3c)	ANMP
Sutwik D-4	127-44-08	/90079/95068	Cape Kunmik	IV-I	A/1a2e	A2/2a2y(3b)	AMNWR
Sutwik D-4	127-44-16	/95069	Cape Kunmik	V	A/2a2e	A1/1a1y(3b)	ANMP
Sutwik D-4	127-44-09	/90080/95070	Cape Kunmik	III	NF	A1/1a1y(3c)	ANMP
Sutwik C-5	127-35-09	/90238/95071	Garden Island	IV-I	NS	E/1a0y	AMNWR
Sutwik C-5	127-35-10	/95072	Aniakchak Bay	V	NS	E/1a0y	ANMP
Sutwik C-5	127-35-11	/95073	Kumlik Island	IV-I	NS	E/1a0y	AMNWR
Sutwik C-5	127-35-01	/90084/95074	Aniakchak Bay	V	NS	A2/1a2y(3b)	ANMP
Sutwik C-4	127-35-01	/90068/95075	Hydra Island	IV-V	A/2a2e	F/2a0y	AMNWR
Sutwik C-4	127-35-17	/90239/95076	Sutwik Island	IV-I	NS	A1/1a1y(3c)	AMNWR
Sutwik C-4	127-35-21	/90243/95077	Sutwik Island	IV-I	NS	A2/1a2y(3c)	AMNWR
Sutwik C-4	127-35-22	/95078	Sutwik Island	IV-I	NS	A1/1a1y(3c)	AMNWR
Sutwik C-4	127-35-02	/90092/95079	Sutwik Island	IV-IV	NS	A2/1a2y(3c)	AMNWR
Sutwik C-4	127-35-23	/95080	Sutwik Island	IV-V	NS	A2/0a2y(3d)	AMNWR
Sutwik C-4	127-35-24	/95081	Sutwik Island	IV-II	NS	A1/1a1y(3c)	AMNWR
Sutwik C-4	127-35-16	/90106/95082	Sutwik Island	IV-III	NS	E/2a0y	AMNWR
Sutwik C-4	127-35-20	/90242/95083	Sutwik Island	IV-I	NS	E/0a0y	AMNWR
Sutwik C-4	127-35-25	/95084	Sutwik Island	IV-II	NS	E/1a0y	AMNWR
Sutwik C-4	127-35-19	/90241/95085	Sutwik Island	IV-I	NS	E/1a0y	AMNWR
Sutwik C-4	127-35-26	/95086	Sutwik Island	IV-I	NS	A2/2a2y(3c)	AMNWR
Sutwik C-4	127-35-13	/90103/95087	Sutwik Island	IV-I	NS	A2/1a2y(3c)	AMNWR
Sutwik C-4	127-35-27	/95088	Sutwik Island	IV-IV	NS	A1/1a1y(3c)	AMNWR
Sutwik C-4	127-35-28	/95089	Sutwik Island	IV-I	NS	A2/2a2y(3c)	AMNWR
Sutwik C-4	127-35-10	/90100/95090	Sutwik Island	IV-I	NS	E/2a0y	AMNWR
Sutwik C-4	127-35-09	/90099/95091	Sutwik Island	IV-I	NS	E/2a0y	AMNWR
Sutwik C-4	127-35-06	/90096/95092	Sutwik Island	IV-I	NS	A1/1a1y(3c)	AMNWR

Key to Appendix I Abbreviations and Symbols

- 1) Nest #: Example 127-35-06 means map series #127 (Sutwik), map quad #35 (C-4), nest number on the quad map.
- 2) Refuge Ref #: Example 8918/90025/95002 means the 18th nest documented in 1989, 25th nest in 1990 and the 2nd nest in 1995 - all at the same location.
- 3) Habitat Types: I = Sea Stacks (pinnacles sticking out of the sea), II = Ridges (small peninsula), III = Connected Sea Stacks (Ridges that have been partially worn away, leaving a stack joined to the mainland by a saddle).
IV = Islet/Islands (similar to sea stacks but with the width being greater than the height)
V = Mainland (Ridge tops or cliff face ledges)
Note: Islands have 2nd tier subdivisions of the same habitat types (Dewhurst 1990)

4) Nest Contents Symbols:

Pre- / symbols (Example: A/2a2e) Source: Bowman (1990)

E = Empty, NS = Not Surveyed, NF = Not Found, A = Active nest w/ eggs, chicks or incubating adults
O = Occupied (fresh nesting material or 2 defending adults), a = adult eagles, ai = incubating adult, e = eggs

Post- / symbols (Example: A2/2a2y-3c) Source: Dewhurst (1989), Carpenter (1990)

1 = Number indicate, A2 = Active nest w/ 2 eaglets, a = adult eagles, y = eaglets
(3b) = eaglet w/ late contour growth (first feather patches), (3c) = eaglet - standing & mostly feathered
(3d) = fledgling eaglet w/ complete contour/ poss. flight capable