

FY 1990 RESEARCH REVIEW
BRIEFING BOOK

ALASKA
FISH AND WILDLIFE
RESEARCH CENTER

U.S. Department of the Interior
Fish and Wildlife Service
Region 8

1011 E. Tudor Road
Anchorage, Alaska

March, 1990

On Reserve

FWLB
1355

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Sea Otters - EXXON VALDEZ Oil Spill (6310)
Immediate Impact of the EXXON VALDEZ Oil Spill on Marine Birds
US/USSR Cooperative Pacific Black Brant Research -
Opportunities for the Future

LISTING OF AVAILABLE SUPPLEMENTAL MATERIAL 102

PROGRAM REVIEW
ALASKA FISH AND WILDLIFE RESEARCH CENTER
ANCHORAGE, ALASKA
MARCH 21-23, 1990

WEDNESDAY, MARCH 21, 1990

8:00 AM	<u>Opening Remarks</u> Welcome and Introduction Review Objectives and Procedures	A. Palmisano J. Buffington
8:15	<u>1987 Review</u>	R. Stevens
8:30	<u>Center Profile</u> Mission and Objectives Organization and Management Function and Philosophy	A. Palmisano
9:00	<u>Center Administration</u> Proposed Organization Changes Administration Handbook Administration Budget Financial Tracking System	A. Palmisano (and appropriate staff)
9:45	<u>Break</u>	
10:00	<u>Research Overview (Migratory Birds)</u> Arctic Nesting Geese Northern Pintail Seabirds Bristle-thighed Curlew Aircraft Disturbances to Waterfowl (Izembek, Teshekpuk, ANWR) DNA Studies	D. Derksen C. Ely/M. Anthony B. Grand S. Hatch C. Handel/R. Gill D. Ward/B. Stehn M. Cronin
12:00	<u>Lunch</u>	
1:00 PM	<u>Research Overview (Mammals)</u> Polar Bear Studies Pacific Walrus Sea Otter Brown Bear ANWR--1002 Studies High Technology	L. Pank S. Amstrup S. Hills A. DeGange L. Pank T. McCabe D. Douglas
3:20	<u>Research overview (Fisheries)</u> Yukon River Tustumena Lake	R. Wilmot R. Wilmot C. Burger
4:00	<u>Research Overview (Special Topics)</u> Oil Spill Assessment--Sea Otters Oil Spill Assessment--Birds US/USSR Cooperative Brant Study	A. DeGange J. Piatt D. Derksen

THURSDAY, MARCH 22, 1990

8:00 AM	<u>EEO Program</u>	E. Trujillo
9:00	<u>One-on-One Interviews</u> (30 minutes each; schedule to be arranged at Review)	Review Team
10:45	<u>Break</u>	
11:00	<u>Special Issues</u> Funding and FTE Strategies Quantity/Quality of Publications; Scientific Professionalism Internal Center Management Future Research Directions U.S./U.S.S.R. Cooperative Research Role of AFWR in Region 8 Initiatives -Waterfowl Research -Advanced Technology -Oil Spill Research -Global Climate Change -Biodiversity -Wetlands Sea Otter Research -Permit Process -Public Scrutiny/Criticism Facilities -Adequacy of Facilities -Need for/Use of Maintenance Funds Region 7 Support Services Private-Sector Support of Research Safety in Field Research	
12:00	<u>LUNCH</u>	
1:00	<u>Special Issues</u> (continued)	
3:00	<u>Relationships</u> Region 8 -Regional Office -Other Centers, including CURC and Alaska Units Regions 1-7 Universities	
3:45	<u>Report on Quality Assurance and Animal Welfare Review</u>	R. Stevens R. Hall
4:15	<u>Other Issues</u>	
6:00	<u>Social Gathering and Dinner (Sourdough Mining Company)</u>	All Staff

FRIDAY MARCH 23, 1990

8:00 AM Executive Session

9:15 Closeout Session with Center Director

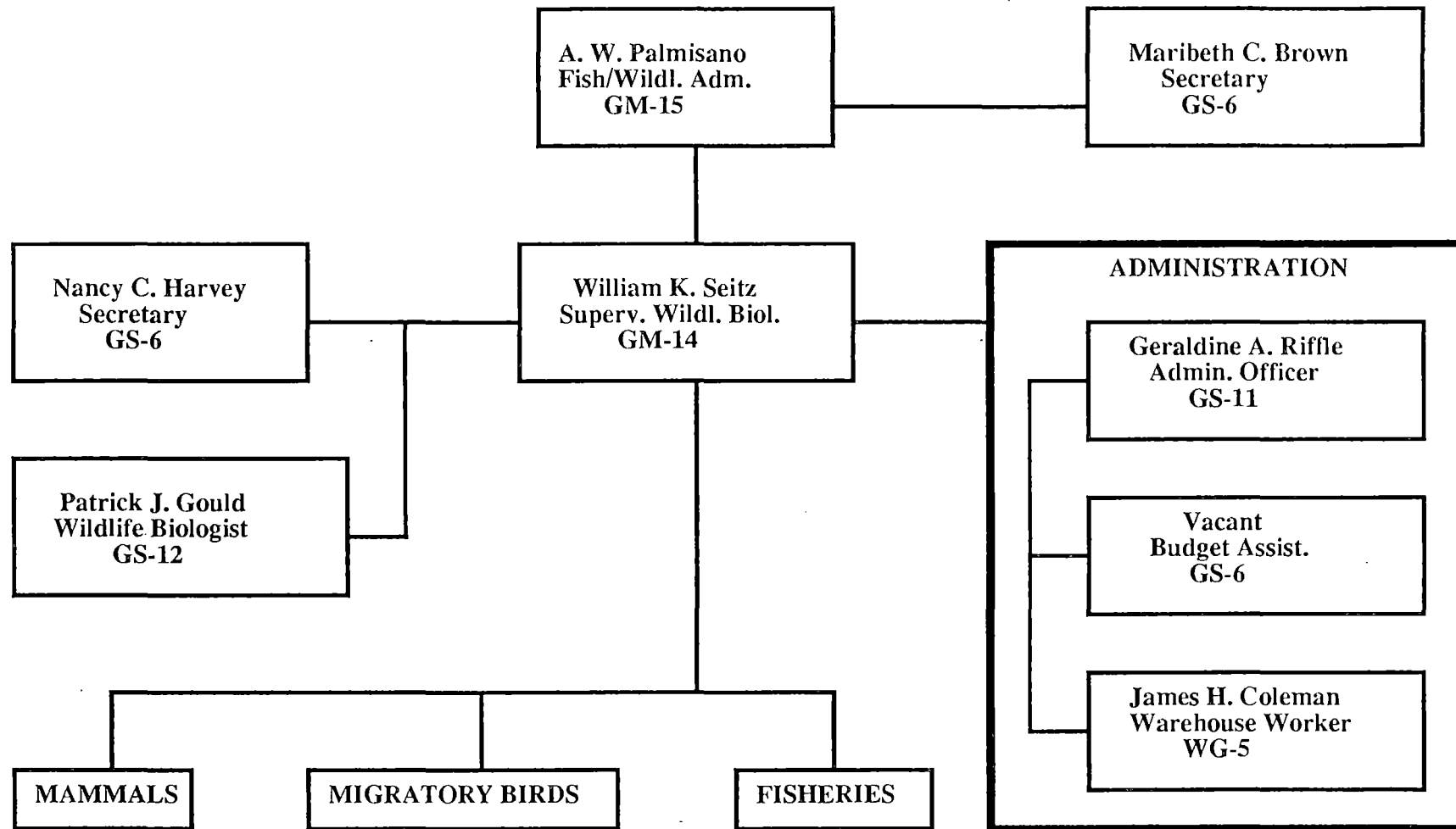
9:45 Closeout Session with Center Staff J. Buffington

1:00 PM Research on the Pintail Decline

An informal discussion of the results of the March 13-15 meeting
at Northern Prairie Wildlife Research Center for Center Directors
and other interested individuals

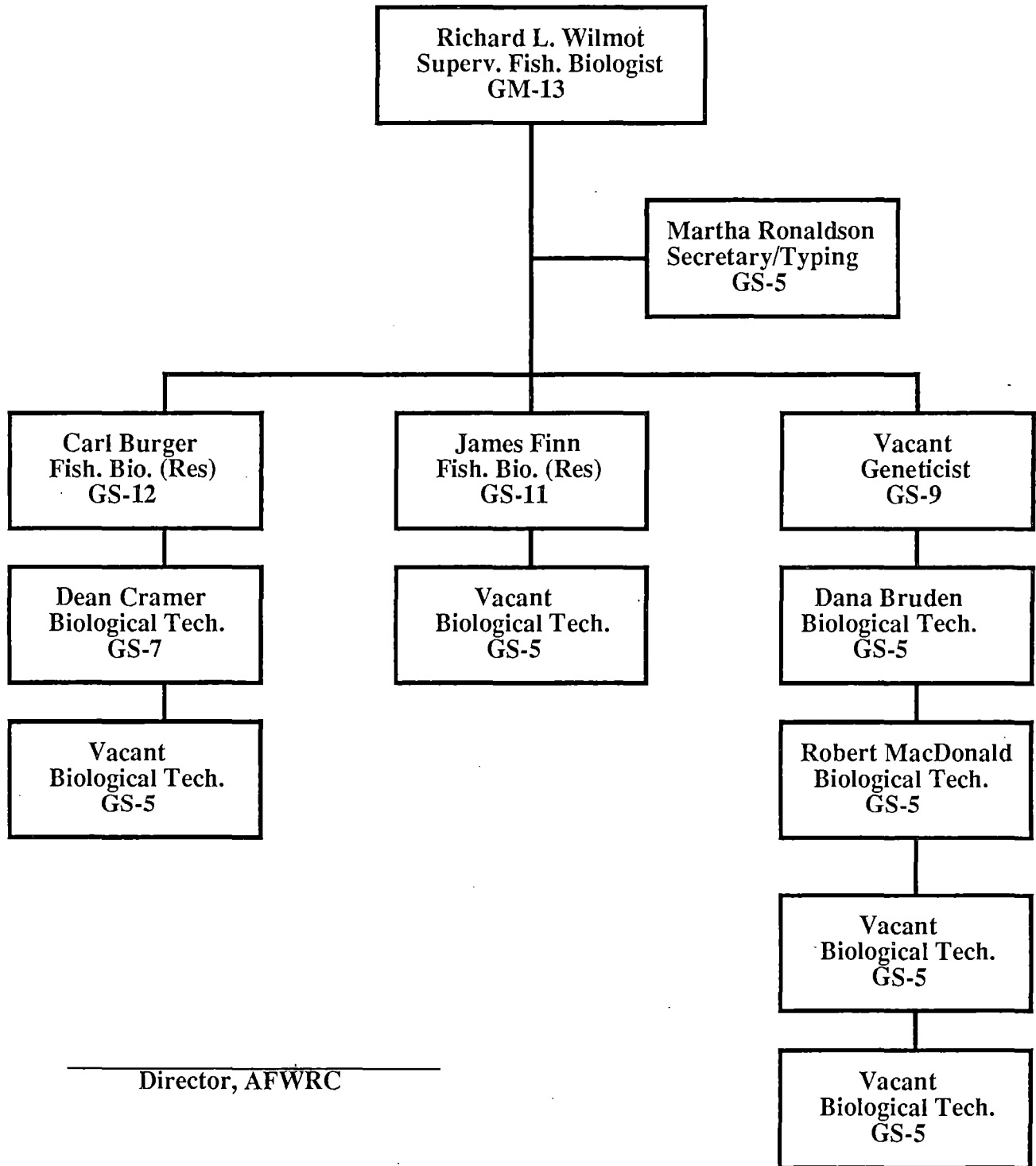
2:30 GIS Demonstration

ALASKA FISH AND WILDLIFE RESEARCH CENTER



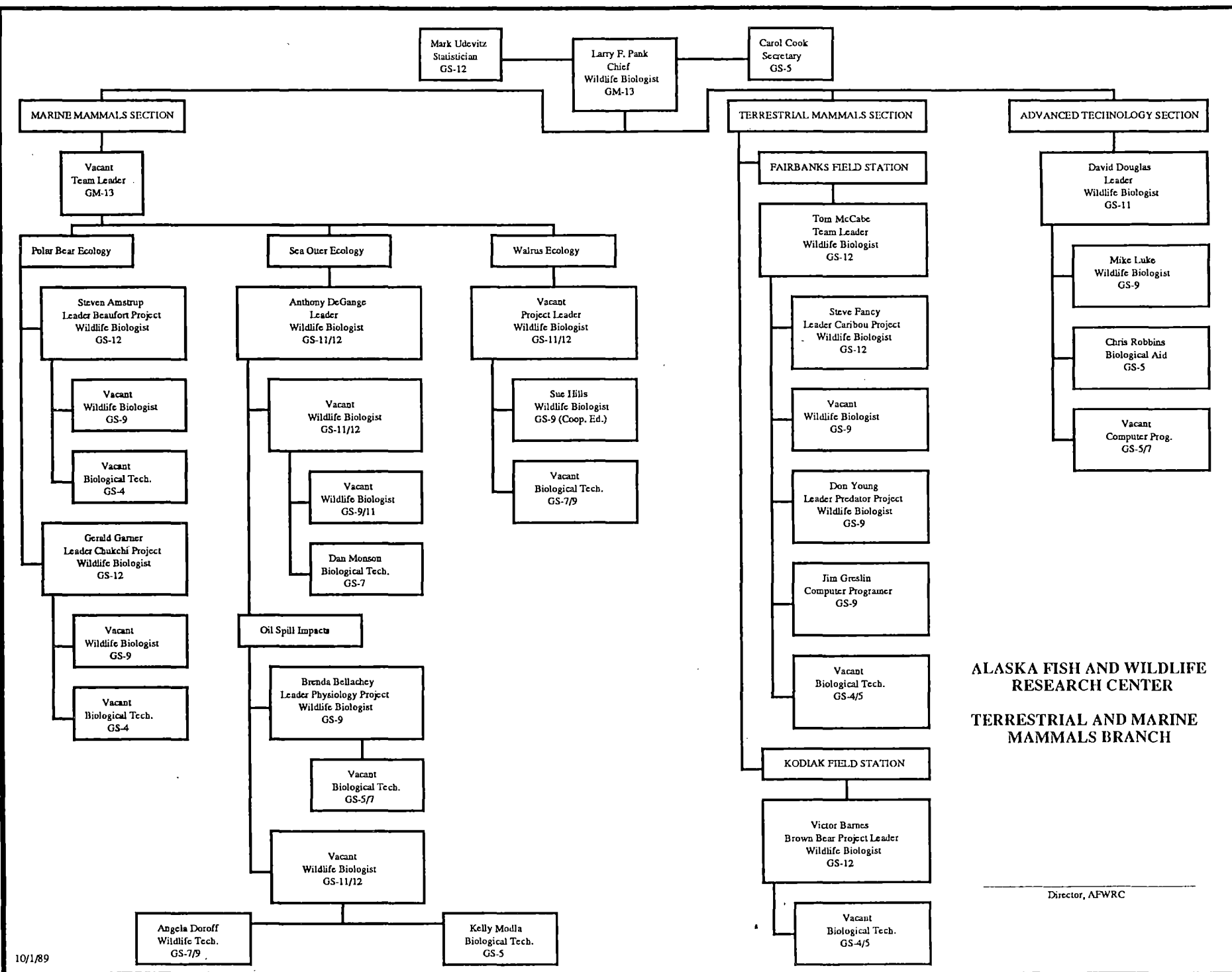
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Alaska Fish and Wildlife Research Center
Fisheries Branch

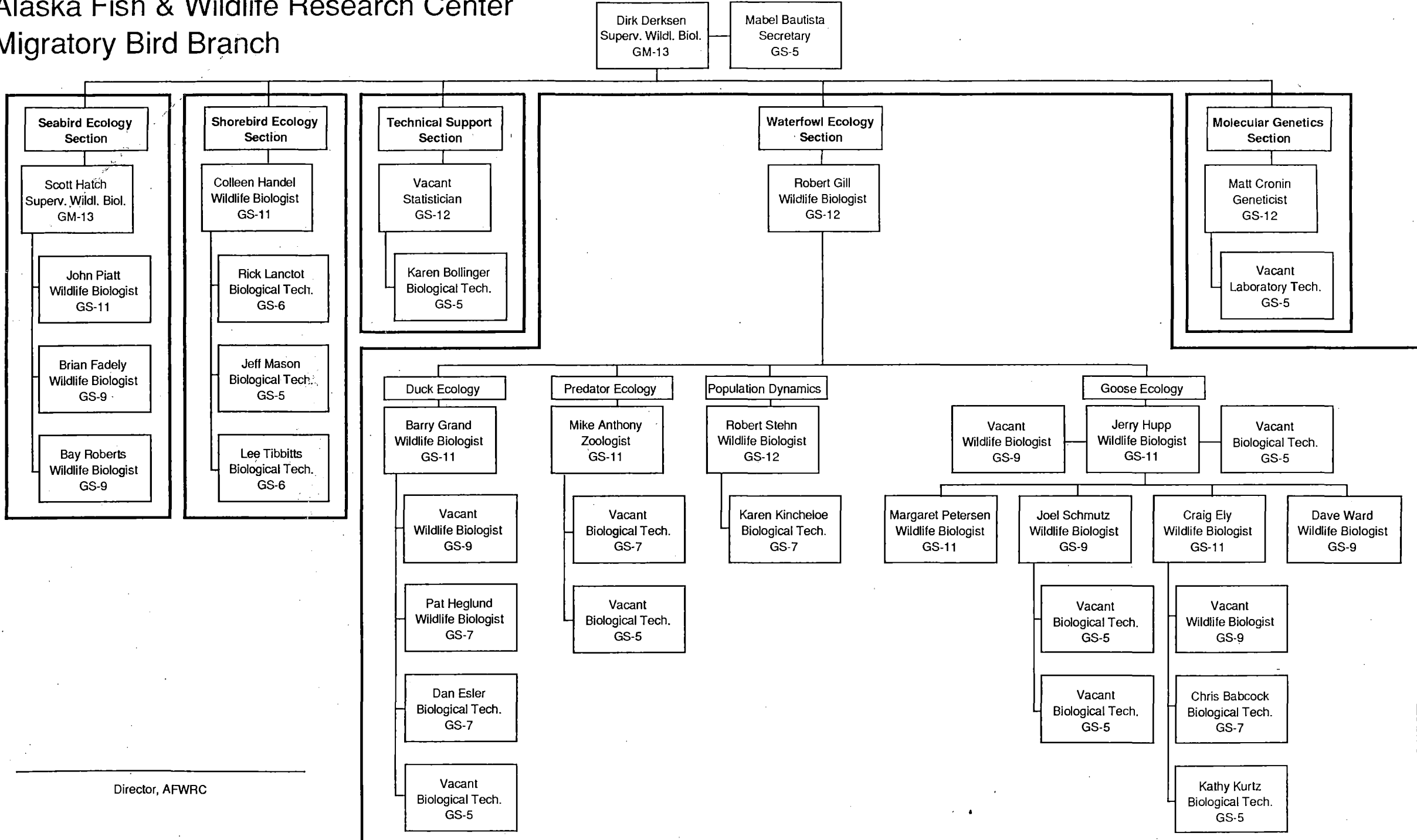


Director, AFWRC

2/12/90



Alaska Fish & Wildlife Research Center
Migratory Bird Branch



ALASKA FISH AND WILDLIFE RESEARCH CENTER

RECAP - PERSONNEL LISTING

AS OF: 03-01-90

	<u>Permanent</u>	<u>TERM</u>	<u>Temporary</u>	<u>Total</u>
Administration	8	0	0	8
Fisheries	4	1	2	7
Mammals	11	8	3	22
Birds	<u>10</u>	<u>10</u>	<u>8</u>	<u>28</u>
Totals:	33	19	13	65

Approved FTE's for the Center in FY 90: 61

(1 FTE = 2,080 hrs)

ALASKA FISH AND WILDLIFE RESEARCH CENTER

Personnel Listing as of 03-01-90

OFFICE OF THE DIRECTOR

A.W. Palmisano	GM-480-15
Fish & Wildlife Administrator	FTP
William K. Seitz	GM-480-14
Fish & Wildlife Administrator	FTP
Maribeth C. Brown	GS-318-6
Secretary (Typing)	FTP
Patrick J. Gould	GS-486-12
Wildlife Biologist	FTP

ADMINISTRATION

Geraldine A. Riffle	GS-341-11
Administrative Officer	FTP
V A C A N T	GS-561-6/7
Budget Assistant	FTP
Nancy C. Harvey	GS-318-6
Secretary (Typing)	FTP
James H. Coleman, Jr.	WG-6907-5
Warehouseman	FTP

FISHERIES BRANCH

Richard L. Wilmot	GM-482-13
Supv. Fishery Biologist (Research)	FTP
Carl V. Burger	GS-482-12
Fishery Biologist (Research)	FTP
James E. Finn	GS-482-11
Fishery Biologist (Research)	FTP
Martha L. Ronaldson	GS-318-5
Secretary (Typing)	FTP
Dean W. Cramer	GS-404-7
Biological Technician (Fisheries)	TERM NTE 01-13-94
Robert D. MacDonald	GS-404-5
Biological Technician (Wildlife)	FTT NTE 04-02-90
Dana L. Bruden	GS-404-5
Biological Technician (Fisheries)	FTT NTE 06-11-90

MAMMALS BRANCH

Larry F. Pank Supv. Wildlife Biologist (Research)	GM-486-13 FTP
Gerald W. Garner Wildlife Biologist (Research)	GS-486-12 FTP
Steven C. Amstrup Wildlife Biologist (Research)	GS-486-12 FTP
Mark S. Udevitz Statistician (Biology)	GS-1530-12 FTP
Anthony R. DeGange Wildlife Biologist (Research)	GS-486-11 FTP
David C. Douglas Wildlife Biologist (Research)	GS-486-11 FTP
Carol S. Cook Secretary (Typing)	GS-318-5 FTP
George E. Menkens Wildlife Biologist (Research)	GS-486-9 TERM NTE 05-19-94
John S. Bevins Wildlife Biologist (Research)	GS-486-9 TERM NTE 02-24-94
Brenda E. Ballachey General Biologist (Research)	GS-486-9 TERM NTE 11-12-91 (Oil Spill)
Gregory M. Luke General Biologist (Research)	GS-486-9 TERM NTE 03-26-93
Daniel H. Monson Biological Technician (Wildlife)	GS-404-7 TERM NTE 06-18-91
Angela M. Doroff Biological Technician (Wildlife)	GS-404-7 TERM NTE 07-30-91 (Oil Spill)
Kelly A. Modla Biological Technician (Wildlife)	GS-404-5 FTT NTE 10-01-90 (Oil Spill)
Christopher M. Robbins Biological Aid (Wildlife)	GS-404-4 FTT NTE 04-22-90

Fairbanks Field Station

Thomas R. McCabe Wildlife Biologist (Research)	GS-486-12 FTP
Steven G. Fancy Wildlife Biologist (Research)	GS-486-12 FTP
Gary E. Muehlenhardt Secretary (Typing)	GS-318-5 FTP
Donald D. Young Wildlife Biologist (Research)	GS-486-9 TERM NTE 01-02-93
James C. Greslin Computer Programmer	GS-334-9 TERM NTE 08-27-92
Susan Hills Student Trainee (Biology)	GS-499-9 FTT (Cooperative Education)

Kodiak Field Station

Victor G. Barnes, Jr. Wildlife Biologist (Research)	GS-486-12 FTP
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MIGRATORY BIRD BRANCH

Dirk V. Derksen Supv. Wildlife Biologist	GM-486-13 FTP
Scott A. Hatch Supv. Wildlife Biologist (Research)	GM-486-13 FTP
Robert E. Gill, Jr. Wildlife Biologist (Research)	GS-486-12 FTP
Robert A. Stehn Wildlife Biologist (Research)	GS-486-12 FTP
Richard M. Anthony Zoologist	GS-410-11 FTP
Colleen M. Handel Wildlife Biologist (Research)	GS-486-11 PTP
Margaret R. Petersen Wildlife Biologist (Research)	GS-486-11 FTP
Patricia J. Heglund Wildlife Biologist (Research)	GS-486-7 FTP
Karen S. Bollinger Biological Technician (Wildlife)	GS-404-5 FTP
Mabel Bautista Secretary (Typing)	GS-318-5 FTP

Matthew A. Cronin Geneticist (Research)	GS-440-12 TERM NTE 09-24-93
Craig R. Ely Wildlife Biologist (Research)	GS-486-11 TERM NTE 02-15-92
James B. Grand Wildlife Biologist (Research)	GS-486-11 TERM NTE 04-09-93
Jerry W. Hupp Wildlife Biologist (Research)	GS-486-11 TERM NTE 06-18-92
John F. Piatt Wildlife Biologist (Research)	GS-486-11 TERM NTE 04-05-90
Brian S. Fadely Wildlife Biologist (Research)	GS-486-9 TERM NTE 06-26-92
Bay d. Roberts Wildlife Biologist (Research)	GS-486-9 TERM NTE 06-04-92
Joel A. Schmutz Wildlife Biologist (Research)	GS-486-9 TERM NTE 04-23-91
David H. Ward Wildlife Biologist (Research)	GS-486-9 TERM NTE 04-11-90
Karen L. Kincheloe Biological Technician (Plants)	GS-404-7 TERM NTE 01-30-91
Daniel Esler Biological Technician (Wildlife)	GS-404-7 FTT NTE 04-08-90
Richard B. Lanctot Biological Technician (Wildlife)	GS-404-6 FTT NTE 04-22-90
Theresa L. Tibbitts Biological Technician (Wildlife)	GS-404-6 FTT NTE 04-22-90
Sarah E. Griffin Biological Technician (Wildlife)	GS-404-5 Intermittent NTE 05-06-90
Jeffrey D. Mason Biological Technician (Wildlife)	GS-404-5 FTT NTE 05-07-90
Jeffrey T. Ramsey Biological Technician (Wildlife)	GS-404-5 Intermittent NTE 05-21-90
David J. Sausville, Jr. Biological Technician (Wildlife)	GS-404-5 Intermittent NTE 05-20-90
Kelly O. Smith Biological Technician (Wildlife)	GS-404-5 Intermittent NTE 11-06-90

Alaska Fish and Wildlife Research Center
Annual Work Plan Summaries

Administration Section
Jeri Riffle, Administrative Officer

Title: ADMINISTRATIVE COSTS

AFWR Work Unit No. 1

Project Duration: Oct. 1989 - Sept. 1990

Principal Investigator: William Seitz

Objective: Administration of the Alaska Fish and Wildlife Research Center

Budget:	1261	Add	\$77.8
	1411	Base	\$351.8
	1411	Add	\$145.6
	1412	Base	\$46.2
	1412	Add	\$42.1

Title: MAINTENANCE

AFWR Work Unit No. 44

Project Duration: Oct. 1989 - Sept. 1990

Principal Investigator: William Seitz

Objective: To bring the Alaska Center's ADP work processing system up to
Fish and Wildlife Service standards

Budget:	1415	Base	\$40.0
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Mammals Branch
Larry Pank, Branch Chief

Title: POLAR BEAR DENNING IN ALASKA

AFWR Work Unit No. 18

Project Duration: Oct. 1981 - Sept. 1992

Principal Investigator: Steven Amstrup

Objective: To determine the distribution, timing, and importance of polar bear denning in Alaska

Budget: 1261 Add \$27.6K
1411 Base \$10.1K
Support from Arctic NWR

Title: POPULATION BIOLOGY OF POLAR BEARS IN THE BEAUFORT SEA

AFWR Work Unit No. 19

Project Duration: Mar. 1982 - Sept. 1992

Principal Investigator: Steven Amstrup

Objective: To assess critical population parameters of polar bears in the Beaufort Sea

Budget: 1411 Base \$116.2K
1411 Add \$148.1K

Title: POLAR BEARS, SEA ICE MOVEMENT AND CONDITION, AND PAGOPHILIC SEALS

AFWR Work Unit No. 20

Project Duration: Mar. 1987 - Oct. 1992

Principal Investigator: Steven Amstrup

Objective: To determine the relationship between polar bears, sea ice movement and condition, and pagophilic seals

Budget: 1411 Base \$39.0K

Title: POPULATION BIOLOGY OF POLAR BEARS IN NORTHWESTERN AND NORTHERN ALASKA

AFWR Work Unit No. 21

Project Duration: Oct. 1987 - Sept. 1992

Principal Investigator: Gerald Garner

Objective: Assess the critical population parameters of polar bears in northwestern Alaska and determine the impact of the subsistence harvest on that population.

Budget: 1411 Base \$137.2K
1411 Add \$148.1K

Title: SEA ICE HABITATS AND POLAR BEAR DISTRIBUTIONS IN THE BERING AND CHUKCHI SEAS IN NORTHWESTERN ALASKA

AFWR Work Unit No. 22

Project Duration: Mar. 1986 - Sept. 1992

Principal Investigator: Gerald Garner

Objective: To determine the interrelationships between sea ice habitats and polar bear distributions in the Bering and Chukchi seas

Budget: 1411 Base \$27.4K

Title: ZONAL MANAGEMENT PROGRAM FOR SEA OTTERS IN ALASKA

AFWR Work Unit No. 23

Project Duration: Oct. 1979 - Sept. 1991

Principal Investigator: Anthony DeGange

Objective: To provide the biological information necessary to establish a zonal management program for sea otters in Alaska

Budget: 1411 Base \$25.2K
1411 Add \$148.0K
Support from Kodiak NWR

Title: INTERACTIONS BETWEEN SEA OTTERS AND FISHERIES IN ALASKA

AFWR Work Unit No. 24

Project Duration: Oct. 1979 - Sept. 1991

Principal Investigator: Anthony DeGange

Objective: To examine existing and potential conflicts between increasing sea otter populations and commercial, sport and subsistence uses of shellfish resources in Alaska

Budget: 1411 Base \$30.1K

Title: SUSTAINED YIELD, POPULATION REGULATION, AND DISPERSAL RELATIVE TO MANAGEMENT OF SEA OTTERS

AFWR Work Unit No. 25

Project Duration: Sept. 1986 - Sept. 1995

Principal Investigator: Anthony DeGange

Objective: To devise a means to regulate population size and dispersal of sea otters in southeastern Alaska

Budget: 1411 Base \$0.0K

Title: MONITORING MOVEMENTS FOR POPULATION ASSESSMENT OF PACIFIC WALRUS

AFWR Work Unit No. 26

Project Duration: Oct. 1986 - Sept. 1995

Principal Investigators: James Gilbert and Susan Hills

Objective: To develop techniques to monitor movements for population assessment, haulout patterns, determine age/sex composition and behavior, and refine estimates of walrus populations

Budget: 1411 Add \$159.4K (RWO #7)

Title: INTEGRATION OF TELEMETRY, REMOTE COMMUNICATION, REMOTE SENSING, AND GEOGRAPHIC INFORMATION SYSTEMS

AFWR Work Unit No. 27

Project Duration: June 1986 - Sept. 1994

Principal Investigators: David Douglas and Larry Pank

Objective: To develop and apply high technology in wildlife and fisheries research

Budget: 1411 Base \$86.6K
1977 Add \$12.2K

Title: KEY WILDLIFE HABITAT ON THE ARCTIC COASTAL PLAIN

AFWR Work Unit No. 28

Project Duration: Jan. 1988 - Sept. 1994

Principal Investigators: Thomas McCable, Janet Christiansen, David Douglas

Objective: To determine the distribution and seasonal quality of habitat available for key wildlife species on the Arctic coastal plains

Budget: 1411 Base \$213.2K (RWO #32)
Support from Arctic NWR

Title: STATUS AND ECOLOGY OF KODIAK BEARS

AFWR Work Unit No. 29

Project Duration: Mar. 1982 - Sept. 1992

Principal Investigator: Victor Barnes

Objective: To evaluate the status and ecology of the brown bears of Kodiak Island, Alaska

Budget: 1261 Add \$74.0K
Support from Kodiak NWR

Title: IMPACTS OF PETROLEUM EXPLORATION AND DEVELOPMENT ON CARIBOU ON THE ARCTIC COASTAL PLAIN

AFWR Work Unit No. 30

Project Duration: June 1988 - Sept. 1994

Principal Investigators: Steven Fancy, Thomas McCabe, and Kenneth Whitten

Objective: To determine the potential impacts of petroleum exploration and development on caribou of the Arctic coastal plain

Budget: 1261 Add \$52.3K
1411 Base \$287.1K (RWO #27 \$12.0K)
Support from Arctic NWR

Title: POTENTIAL IMPACTS OF OIL DEVELOPMENT ON CARIBOU HABITAT

AFWR Work Unit No. 31

Project Duration: June 1988 - Sept. 1994

Principal Investigators: Raymond Cameron, Steven Fancy, and Thomas McCabe

Objective: To determine the impacts of oil development on caribou and their habitat

Budget: 1261 Add \$40.0K
1411 Base \$78.4K (RWO #30 \$40.0K)
Support from Alaska Dept. Game and Fish, Arctic NWR

Title: POTENTIAL IMPACTS OF PETROLEUM EXPLORATION AND DEVELOPMENT ON MUSKOXEN

AFWR Work Unit No. 32

Project Duration: June 1988 - Sept. 1994

Principal Investigators: Patricia Reynolds and Thomas McCabe

Objective: To determine the potential effects of petroleum exploration and development on muskoxen using the 1002 area of the Arctic National Wildlife Refuge

Budget: 1411 Base \$58.9K (RWO #29 \$15.0K)
Support from Arctic NWR

Title: ASSESS THE FATE OF SEA OTTERS OILED AND REHABILITATED AS A RESULT OF THE "EXXON VALDEZ" OIL SPILL

AFWR Work Unit No. 41

Project Duration: Apr. 1989 - Apr. 1991

Principal Investigator: Anthony DeGange

Objective: To evaluate cleaning and rehabilitation efforts as effective tools for placing oiled sea otters back into their environment as functioning members of the population

Budget: 6310 Add \$65.0K (additional funds will be added in the next "spill" year)

Title: IMPACTS OF THE "EXXON VALDEZ" OIL SPILL ON SEA OTTER POPULATIONS

AFWR Work Unit No. 42

Project Duration: Apr. 1989 - Mar. 1993

Principal Investigator: Anthony DeGange

Objective: To determine pathway and assess injury to sea otters from the "Exxon Valdez" oil spill

Budget: 6310 Add \$515.0K (additional funds will be added in the next "spill" year)

Migratory Bird Branch
Dirk Derksen, Branch Chief

Title: STATUS, POPULATION DYNAMICS AND ECOLOGY OF ALASKAN GEESE

AFWR Work Unit No. 2

Project Duration: Oct. 1981 - Oct. 1991

Principal Investigators: Margaret Petersen and Robert Stehn

Objective: To determine current status and trends of populations of geese nesting on the Yukon-Kuskokwim Delta, Alaska

Budget: 1411 Base \$191.4K
1261 Add \$16.0K
Support from Yukon Delta NWR

Title: ECOLOGY OF GEESE STAGING AT UPPER COOK INLET AND ALASKA PENINSULA ESTUARIES

AFWR Work Unit No. 3

Project Duration: Oct. 1981 - Jan. 1994

Principal Investigators: David Ward, Robert Stehn, Robert Gill, and Margaret Petersen

Objective: To document the importance of spring and fall staging areas to brant, cackling Canada, Taverner's Canada, and emperor geese

Budget: 1261 Add \$37.2K
1411 Base \$178.8K
Support from Alaska Peninsula/Becharof NWR

Title: POPULATIONS AND PRODUCTION OF WATERFOWL ON NATIONAL WILDLIFE REFUGES IN ALASKA

AFWR Work Unit No. 4

Project Duration: Oct. 1986 - Sept. 1991

Principal Investigator: Leigh Fredrickson

Objective: To assess duck production and habitat on national wildlife refuge lands in Alaska and their importance to national populations during drought conditions in prairie nesting areas

Budget: 1411 Base \$0.0K (RWO #8)
Support from Yukon Flats NWR

Title: ECOLOGY AND BEHAVIOR OF FOXES IN GOOSE NESTING AREAS

AFWR Work Unit No. 5

Project Duration: Mar. 1985 - Dec. 1991

Principal Investigator: Michael Anthony

Objective: To determine the feasibility of improving nesting success of brant and cackling Canada geese on the Yukon-Kuskokwim Delta by localized control of Arctic foxes

Budget: 1261 Add \$159.0K
Support from Yukon Delta NWR

Title: IMPACTS OF HUMAN ACTIVITIES ON THE PACIFIC BLACK BRANT AND OTHER GEESE NEAR TESHEKPUK LAKE, ALASKA

AFWR Work Unit No. 6

Project Duration: May 1987 - Sept. 1991

Principal Investigators: Dirk Derksen and Milton Weller

Objective: To investigate to effects of disturbance on Pacific black brant behavior, distribution and habitat use in the Teshekpuk Lake Special Area.

Budget: 1411 Base \$20.0K
1977 Add \$70.0K (MMS)
1977 Add \$70.0K (BLM)

Title: IMPACTS OF PETROLEUM EXPLORATION AND DEVELOPMENT ON SNOW GEESE STAGING ON THE ARCTIC COASTAL PLAIN

AFWR Work Unit No. 7

Project Duration: Apr. 1988 - Sept. 1992

Principal Investigator: Jerry Hupp

Objective: To determine fall staging requirements and the effect of aircraft overflights on lesser snow goose behavior, distribution and habitat use

Budget: 1411 Base \$189.0K
Support from Arctic NWR

Title: NESTING ECOLOGY AND HABITAT REQUIREMENTS OF GEESE ON THE
YUKON-KUSKOKWIM DELTA

AFWR Work Unit No. 8

Project Duration: Oct. 1983 - Sept. 1992

Principal Investigators: James Sedinger, Craig Ely, Margaret Petersen, Mike
Anthony

Objective: To determine the nesting and postbreeding populations, ecology,
and habitats of Arctic nesting geese on the Yukon-Kuskokwim Delta

Budget: 1261 Add \$210.0K
1411 Base \$10.0K (RWO #26)
Support from Yukon Delta NWR

Title: SEABIRDS AND THEIR PREY IN ALASKA WATERS

AFWR Work Unit No. 9

Project Duration: Oct. 1988 - April 1990

Principal Investigator: John Piatt

Objective: To determine seabird-prey associations and interactions

Budget: 1411 Base \$50.0K
Support from Alaska Maritime NWR

Title: INTERACTIONS BETWEEN SEABIRDS AND COMMERCIAL FISHERIES IN THE GULF
OF ALASKA AND BERING SEA

AFWR Work Unit No. 10

Project Duration: Oct. 1986 - Sept. 1990

Principal Investigators: Scott Hatch and Gerald Sanger

Objective: To determine the interrelationships between seabirds and
commercial fisheries in Alaska

Budget: 1411 Base \$57.7K

Title: BLACK-LEGGED KITTIWAKE BREEDING BIOLOGY ON MIDDLETON ISLAND, ALASKA

AFWR Work Unit No. 11

Project Duration: May 1986 - Dec. 1992

Principal Investigators: Scott Hatch, Brian Fadely, and Bay Roberts

Objective: To determine adult survival and energetics of black-legged
kittiwakes on Middleton Island, Alaska

Budget: 1411 Base \$93.0K

Title: MONITORING SEABIRDS POPULATIONS IN ALASKA: A MANUAL OF METHODS

AFWR Work Unit No. 12

Project Duration: Oct. 1986 - Dec. 1993

Principal Investigator: Scott Hatch

Objective: To publish a manual of techniques to monitor seabirds in Alaska

Budget: 1411 Base \$5.0K

Title: POPULATION STATUS AND ECOLOGY OF SHOREBIRDS IN ALASKA

AFWR Work Unit No. 14

Project Duration: Oct. 1979 - Sept. 1990

Principal Investigator: Robert Gill

Objective: To determine the nesting ecology, habitat use and migration
patterns of shorebirds occurring along the coast of Alaska

Budget: 1411 Base \$38.0K
Support from Yukon Delta NWR

Title: STATUS AND DEMOGRAPHY OF THE BRISTLE-THIGHED CURLEW

AFWR Work Unit No. 17

Project Duration: Jan. 1988 - Aug. 1993

Principal Investigator: Joe Ball and Bob Gill

Objective: To determine the status of the bristle-thighed curlew

Budget: 1411 Add \$139.OK (RWO #31)
Support from Yukon Delta NWR

Title: POPULATIONS AND PRODUCTION OF NORTHERN PINTAIL IN ALASKA

AFWR Work Unit No. 40

Project Duration: Oct. 1988 - Sept. 1990

Principal Investigator: Barry Grand

Objective: To determine factors limiting production and influencing
mortality of northern pintails in Alaska

Budget: 1411 Add \$194.OK
Support from Yukon Flats NWR

Title: USE OF DNA TO INVESTIGATE RELATIONSHIPS BETWEEN POPULATIONS OF
ALASKA WILDLIFE

AFWR Work Unit No. 43

Project Duration: May 1989 - Sept. 1994

Principal Investigator: Matt Cronin

Objective: To apply DNA sequence analytical technology to avian, mammalian,
and fisheries population management problems in Alaska

Budget: 1411 Base \$74.8K
1412 Base \$18.7K

Fisheries Branch
Richard Wilmot, Branch Chief

Title: STOCK RELATIONSHIPS AND ESCAPEMENT REQUIREMENTS FOR KARLUK LAKE
SOCKEYE SALMON

AFWR Work Unit No. 33

Project Duration: Oct. 1984 - Mar. 1990

Principal Investigator: Richard Wilmot

Objective: To determine stock relationships and escapement requirements for
Karluk Lake sockeye salmon

Budget: 1412 Base \$1.0K
Support from Kodiak NWR

Title: THERMAL ADAPTATIONS IN THE LIFE HISTORY REQUIREMENTS OF KENAI RIVER
CHINOOK SALMON

AFWR Work Unit No. 34

Project Duration: Oct. 1986 - Mar. 1990

Principal Investigator: Carl Burger

Objective: To determine the variation in run and spawning times of stocks
of chinook salmon in the Kenai River

Budget: 1412 Base \$1.0K
Support from Kenai NWR

Title: SPAWNING DISTRIBUTION AND MIGRATION PATTERNS OF CHUM AND CHINOOK
SALMON IN THE YUKON RIVER, ALASKA

AFWR Work Unit No. 35

Project Duration: Oct. 1987 - Sept. 1992

Principal Investigator: Richard Wilmot

Objective: To determine the origin, spawning distribution and migration
patterns of U.S. and Canadian stocks of chum and chinook salmon
in the Yukon River, Alaska

Budget: 1412 Base \$67.7K
1412 Add \$126.0K

Title: SOCKEYE AND CHINOOK SALMON STUDIES IN THE TUSTUMENA LAKE DRAINAGE

AFWR Work Unit No. 37

Project Duration: Oct. 1988 - Sept. 1994

Principal Investigator: Carl Burger

Objective: To determine migration patterns of sockeye and chinook salmon in the Tustumena Lake drainage

Budget: 1412 Base \$191.3K
Support from Kenai NWR

Title: COHO SALMON ESCAPEMENT EVALUATION ON KODIAK NWR

AFWR Work Unit No. 38

Project Duration: Oct. 1988 - Sept. 1994

Principal Investigator: Richard Wilmot

Objective: To develop methods to assess production potential of coho salmon escapements on the Kodiak NWR

Budget: 1412 Base \$0.0K
Support from Kodiak NWR

Title: EVALUATION OF HABITAT SUITABILITY MODELS FOR LAKE TROUT AND CHINOOK SALMON

AFWR Work Unit No. 45

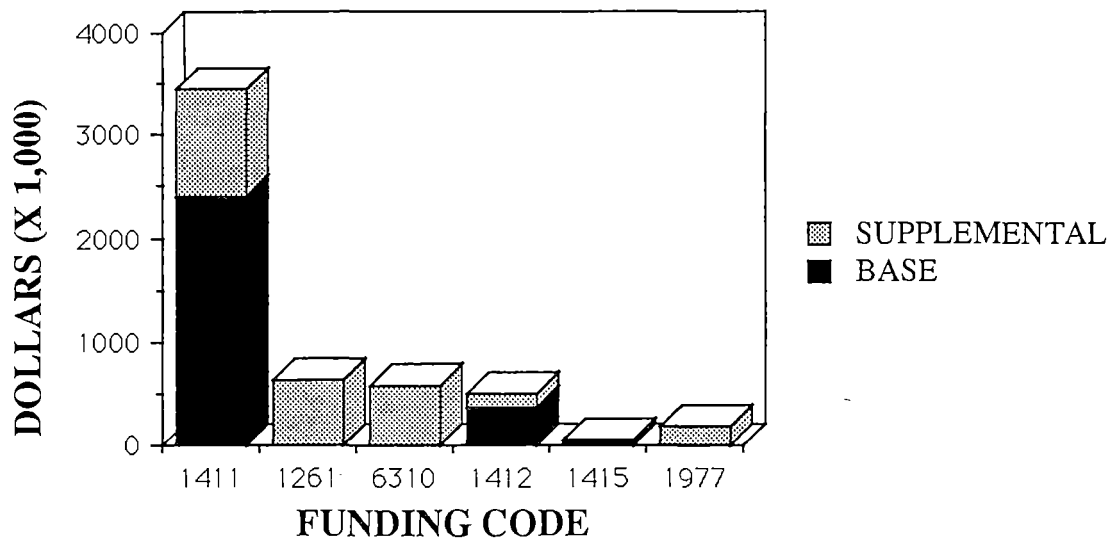
Project Duration: Oct. 1989 - Sept. 1991

Principal Investigators: Carl Burger, Dick Wilmot, James Finn, James Reynolds

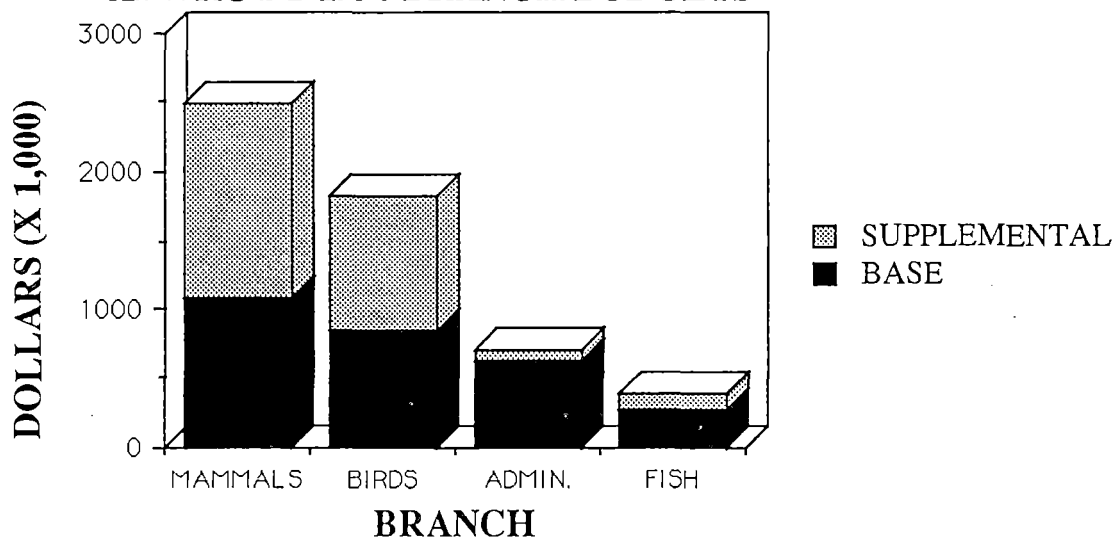
Objective: To evaluate the performance of existing habitat suitability models for lake trout and chinook salmon in Alaska

Budget: 1415 Base 2.0K
Support from the Alaska Cooperative Fishery Research Unit

AFWRC FY 1990 CENTER BUDGET



AFWRC FY 1990 BRANCH BUDGETS



Alaska Fish and Wildlife Research Center budget for fiscal year 1990. Funds are separated into: **BASE** = multi-year division funding and **SUPPLEMENTAL** = one time funds such as congressional add-on's and reimbursables. Funding codes: 1411 = wildlife research, 1261 = region 7 support, 6310 = oil spill contingency, 1415 = maintenance, and 1977 = reimbursables.

REV. 2/90

ALASKA FISH AND WILDLIFE RESEARCH CENTER
FY 1990 Cost Codes for the Center

87200-1411 (RESEARCH-WILDLIFE)

GS	Status of Geese	Derksen
TL	Teshekpuk Lake	Derksen
SG	Snow Goose/ANWR	Hupp
SB	Seabirds	Hatch
SX	Shorebirds	Handel
BC	Bristle-thigh Curlews	Handel
DNA	Genetics	Cronin
IZ	Brant/Izembek	Ward
UG	Cacklers/Ugashik	Gill
WC	White-fronts/Cacklers	Ely
EG	Emperor Geese	Schmutz
AN	ANWR 1002	McCabe
PBB	Polar Bear-Beaufort	Amstrup
PBC	Polar Bear-Chukchi	Garner
SO	Sea Otters	DeGange
HT	High Technology	Douglas
WS	Walrus	Pank
AD	Administration	Riffle

87200-1412 (RESEARCH-FISHERIES)

FR	Fishery Research	Wilmot
YR	Yukon River Work	Burger
DNA	Genetics	Cronin
AD	Administration	Riffle

87200-1415 (RESEARCH-MAINTENANCE)

AD	Administration	Riffle
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72104-1261 (REFUGE PLAN.-OPRS.)

GS	Status of Geese	Derksen
NG	Nesting Geese	Stehn
WC	Whitefront/Cackler	Ely
EG	Emperor Geese	Schmutz
FX	Fox Ecology	Anthony

72104-1411 (REGION 7 RESEARCH)

PT	Pintail Ducks	Grand	PC	Porcupine Caribou	McCabe
PTS	Pintail Support	Derksen	PB	Polar Bear	Amstrup
			BB	Brown Bear	Barnes
			AD	Administration	Riffle

87200-6310-XXXX (RESEARCH-OIL SPILL SUPPLEMENTAL-PROJECT CODE)

009S Sea Otter Chronic Long-term Effects
 009T Sea Otter Rehabilitation Assessment
 009Y Administrative Overhead

REIMBURSABLES:

87200-1977-0018 - High Technology (NASA) - Mammals (Pank)
 87200-1977-0032 - Teshekpuk Lake/Brant (MMS) - Birds (Derksen)
 87200-1977-0033 - Teshekpuk Lake/Brant (BLM) - Birds (Derksen)

PROJECT	BUDGET	SALARIES	TRAVEL	MISC	PROJ SAL	PENDING	NET BAL
1261AD	77,800	24,815	0	0	80,424	0	(27,439)
1411AD	497,400	77,641	4,318	45,194	165,574	14,580	190,094
1412AD	88,300	0	0	1,982	43,526	0	42,792
1415AD	40,000	0	0	18,121	0	1,512	20,367
1412FR	4,000	0	0	703	0	0	3,297
1412TS	191,300	21,497	68	13,296	95,022	14,822	46,595
1412YR	193,700	30,009	3,315	27,621	84,553	4,935	43,268
1411DNA	74,800	12,984	0	13,249	30,404	1,538	16,625
1412DNA	18,700	0	0	1,258	11,404	248	5,790
1261EG	37,200	23,948	2,480	8,882	6,404	0	(4,516)
1261FX	159,000	17,743	717	10,536	36,959	2,047	90,998
1261GS	16,000	0	112	35	0	184	15,669
1261NG	90,000	23,919	0	500	74,236	0	(8,655)
1261WC	120,000	18,669	1,095	8,463	42,501	1,516	47,756
SUBTOT	422,200	84,280	4,404	28,416	160,101	3,748	141,252
1411BC	139,000	26,380	1,078	19,621	56,809	1,480	33,631
1411EG	112,800	5,269	2,216	1,792	59,970	422	43,130
1411GS	138,600	30,463	3,057	31,580	94,731	25,448	(46,679)
1411IZ	17,000	0	0	414	0	0	16,586
1411PT	194,000	24,035	0	4,880	61,702	192	103,191
1411PTS	52,800	0	0	0	0	0	52,800
1411SB	205,700	42,572	470	3,662	111,032	411	47,553
1411SG	189,000	20,950	112	1,760	36,840	28	129,311
1411SX	38,000	8,230	2,558	285	25,888	136	903
1411TL	20,000	5,876	0	33	7,493	1,026	5,572
1411UG	49,000	0	0	500	0	0	48,500
1411WC	10,000	0	0	1,906	0	0	8,094
SUBTOT	1,165,900	163,776	9,491	66,433	454,465	29,143	442,593
1977NSB	70,000	0	0	2,038	0	0	67,962
1977NSM	70,000	9,962	0	0	11,880	534	47,624
1261BB	74,000	14,868	711	1,180	46,210	0	11,031
1261PB	27,600	9,216	0	0	768	0	17,616
1261PC	92,300	16,690	0	0	78,607	0	(2,997)
SUBTOT	193,900	40,775	711	1,180	125,585	0	25,649
1411AN	637,600	50,132	7,758	225,930	132,200	28,328	193,251
1411HT	86,600	15,315	4,660	8,026	40,092	1,239	17,267
1411PBB	313,011	21,760	8,113	150,275	80,746	3,952	48,165
1411PBC	313,011	33,172	3,317	90,577	87,639	758	97,547
1411SO	202,715	13,296	3,315	35,812	40,569	2,600	107,123
1411WS	160,063	9,683	2,139	6,577	30,094	0	111,571
SUBTOT	1,713,000	143,359	29,303	517,197	411,341	36,877	574,924
1977HT	11,313	0	0	0	0	0	11,313
6310SO	645,000	18,200	21,816	500,876	84,192	19,006	911
1261	693,900	149,870	5,115	29,596	366,110	3,748	139,462
1411	3,451,100	397,760	43,111	642,072	1,061,783	82,138	1,224,236
1412	496,000	51,506	3,384	44,859	234,505	20,005	141,742
1415	40,000	0	0	18,121	0	1,512	20,367
1977	151,313	9,962	0	2,038	11,880	534	126,900
6310	645,000	18,200	21,816	500,876	84,192	19,006	911
GRDTOT	5,477,313	627,297	73,426	***, ***	1,758,470	126,942	1,653,617

ALASKA FISH AND WILDLIFE RESEARCH CENTER
BUDGET STATUS REPORT
FISCAL YEAR 1990
02/24/90

* PROJECTED SALARIES INCLUDE ESTIMATE FOR 3.6% PAY INCREASE *

PROJECT 1411AD

BUDGET		\$497,400
SALARIES	77,641	
TRAVEL	4,318	
MISC	<u>45,194</u>	
TOTAL		<u>127,152</u>
AVAILABLE		370,248
PROJ SAL		165,574
PENDING		<u>14,580</u>
NET BAL		\$190,094

ALASKA FISH & WILDLIFE RESEARCH CENTER

02/24/90

Transactions Listing for FY 1990

<u>DATE</u>	<u>TID</u>	<u>VENDOR</u>	<u>AMOUNT</u>	<u>PROJECT</u>	<u>UNIT</u>	<u>GRP</u>	<u>TYP</u>	<u>QTR</u>
01/13	70181-00483	Airborne	9.45	1411AD	..	M	TNS	no
12/16	70181-00434	Airborne Exp	13.01	1411AD	..	M	TNS	no
12/16	70181-00467	Airborne Exp	236.20	1411AD	..	M	TNS	no
12/16	70181-00473	Airborne Exp	30.89	1411AD	..	M	TNS	no
11/25	70181-00222	AK Computer	299.00	1411AD	..	M	MTN	no
11/25	70181-00223	AK Computer	237.60	1411AD	..	M	MTN	no
01/13	87200-00059	Alascom	33.30	1411AD	..	M	TEL	no
10/11	87200-00004	Alyeska Resort	1296.00	1411AD	..	M	SVS	no
12/16	70181-00449	Arctic Office	145.79	1411AD	..	M	SUP	no
12/30	70181-09506	ATU	760.00	1411AD	..	M	SVS	no
01/29	87200-00067	Bhree Cycle	110.00	1411AD	..	M	SUP	no
01/18	70181-04137	Bohdan	805.00	1411AD	..	M	ADP	no
02/15	87200-00072	Brown, M.	150.00	1411AD	..	T	TVL	no
10/18	70181-00102	Data General	2016.00	1411AD	..	M	ADP	no
11/25	70181-00126	Data General	2160.00	1411AD	..	M	MTN	no
11/25	70181-00130	Data General	3255.00	1411AD	..	M	MTN	no
10/18	70181-00122	ESRI	400.00	1411AD	..	M	ADP	no
02/23	87200-00090	Far North Compu	75.65	1411AD	..	M	SUP	no
01/31	87200-00069	Fine Line Grap	125.00	1411AD	..	M	SUP	no
12/16	86670-00098	GPO	750.00	1411AD	..	M	PTG	no
01/30	70181-04155	GTSI	3638.00	1411AD	..	M	ADP	no
11/25	70181-02033	Gvt Print Ofc	125.00	1411AD	..	M	PTG	no
02/15	87200-00061	Harvey, N.	704.00	1411AD	..	T	TVL	no
02/15	87200-00062	Harvey, N.	300.00	1411AD	..	T	TVL	no
01/03	70181-09610	Imprest	40.00	1411AD	..	M	SUP	no
12/16	87200-00038	Imprest	35.00	1411AD	..	M	SUP	no
01/13	87200-00046	Imprest	65.65	1411AD	..	M	SUP	no
01/22	87200-00063	Imprest	42.62	1411AD	..	M	SUP	no
10/20	87200-00010	Imprest 10/20	196.98	1411AD	..	M	SUP	no
11/25	87200-00021	Imprest 10/31	314.32	1411AD	..	M	SUP	no
11/25	70181-09600	Imprest 11/06	40.20	1411AD	..	M	SUP	no
12/30	70181-00026	Kellers	34.00	1411AD	..	M	FTO	no
12/20	70181-00004	Keller's	90.00	1411AD	..	M	FTO	no
12/16	86670-00116	Kevin Cook	125.00	1411AD	..	M	SVS	no
12/16	70181-00002	Kodalux	1404.16	1411AD	..	M	FTO	no
11/25	70181-00423	Kodalux Proc	2130.16	1411AD	..	M	FTO	no
12/30	87200-00047	Palmisano, A	980.22	1411AD	..	T	TVL	no
11/25	87200-03000	Palmisano, A	215.71	1411AD	..	T	TVL	no
02/05	70181-02257	Polaroid	2482.85	1411AD	..	M	EQP	no
01/23	87200-00068	Reprographics	1017.43	1411AD	..	M	SUP	no
12/16	87200-09003	Seitz, W	184.00	1411AD	..	T	TVL	no
10/18	70181-00111	Tektronix	1955.52	1411AD	..	M	ADP	no
01/13	70181-09855	Tvl Ctr	1020.00	1411AD	..	T	GTR	no
11/25	70181-09800	Tvl Ctr 10/30	618.00	1411AD	..	T	GTR	no
11/25	70181-09801	Tvl Ctr 11/12	146.00	1411AD	..	T	GTR	no
10/18	70181-00124	Wang	780.00	1411AD	..	M	ADP	no
10/18	70181-00125	Wang	7032.00	1411AD	..	M	ADP	no
12/16	70181-02123	Westvaco Env	96.24	1411AD	..	M	SUP	no
01/22	70181-00244	XEROX	1624.80	1411AD	..	M	SUP	no
01/26	70181-02305	XEROX	561.10	1411AD	..	M	SUP	no
01/13	70181-02235	Xerox Corp	8604.65	1411AD	..	M	EQP	no

ALASKA FISH AND WILDLIFE RESEARCH CENTER
BUDGET STATUS REPORT
FISCAL YEAR 1990
02/24/90

* PROJECTED SALARIES INCLUDE ESTIMATE FOR 3.6% PAY INCREASE *

PROJECT 1412AD

BUDGET		\$88,300
SALARIES	0	
TRAVEL	0	
MISC	<u>1,982</u>	
TOTAL		<u>1,982</u>
AVAILABLE		86,318
PROJ SAL		43,526
PENDING		<u>0</u>
NET BAL		\$42,792

ALASKA FISH & WILDLIFE RESEARCH CENTER

02/24/90

Transactions Listing for FY 1990

<u>DATE</u>	<u>TID</u>	<u>VENDOR</u>	<u>AMOUNT</u>	<u>PROJECT</u>	<u>UNIT</u>	<u>GRP</u>	<u>TYP</u>	<u>OTR</u>
11/25	87200-00034	Alascom	2.30	1412AD	..	M	TEL	no
12/16	87200-00044	Alascom	31.82	1412AD	..	M	TEL	no
01/13	87200-00059	Alascom	46.57	1412AD	..	M	TEL	no
12/16	70181-01162	Arctic Office	27.48	1412AD	..	M	SUP	no
12/16	70181-09505	ATU	1260.00	1412AD	..	M	TEL	no
11/25	70181-09001	GSA	361.75	1412AD	..	M	SUP	no
01/13	87200-00046	Imprest	107.75	1412AD	..	M	SUP	no
01/22	87200-00063	Imprest	4.38	1412AD	..	M	SUP	no
01/31	70181-04145	INMAC	140.13	1412AD	..	M	SUP	no

ALASKA FISH AND WILDLIFE RESEARCH CENTER
BUDGET STATUS REPORT
FISCAL YEAR 1990
02/24/90

* PROJECTED SALARIES INCLUDE ESTIMATE FOR 3.6% PAY INCREASE *

PROJECT 1415AD

BUDGET \$40,000

SALARIES	0
TRAVEL	0
MISC	<u>18,121</u>

TOTAL	<u>18,121</u>
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AVAILABLE 21,879

PROJ SAL	0
PENDING	<u>1,512</u>

NET BAL \$20,367

ALASKA FISH & WILDLIFE RESEARCH CENTER

02/24/90

Transactions Listing for FY 1990

<u>DATE</u>	<u>TID</u>	<u>VENDOR</u>	<u>AMOUNT</u>	<u>PROJECT</u>	<u>UNIT</u>	<u>GRP</u>	<u>TYP</u>	<u>OTR</u>
11/25	70181-04008	Advance Telem	300.00	1415AD	..	M	REP	no
12/30	70181-09506	ATU	500.00	1415AD	..	M	SVS	no
01/13	87200-00054	Beckman Inst	1012.00	1415AD	..	M	SUP	no
11/25	70181-04029	Corinth Telecom	108.96	1415AD	..	M	SUP	no
12/16	87200-00038	Imprest	15.00	1415AD	..	M	SUP	no
01/22	87200-00063	Imprest	5.00	1415AD	..	M	SUP	no
12/16	70181-02120	North Star	800.00	1415AD	..	M	EQP	no
01/17	70181-02293	Security Safe	1055.00	1415AD	..	M	SUP	no
02/15	70181-03903	Tom Gittens	14000.00	1415AD	..	M	REP	no
12/16	70181-03902	Western Ent	325.00	1415AD	..	M	SVS	no

ALASKA FISH AND WILDLIFE RESEARCH CENTER
BUDGET STATUS REPORT
FISCAL YEAR 1990
02/24/90

* PROJECTED SALARIES INCLUDE ESTIMATE FOR 3.6% PAY INCREASE *

PROJECT 1261AD

BUDGET \$77,800

SALARIES 24,815

TRAVEL 0

MISC 0

TOTAL 24,815

AVAILABLE 52,984

PROJ SAL 80,424

PENDING 0

NET BAL (\$27,439)

LIST OF PENDING NON-LABOR TRANSACTIONS

02/24/90

1

<u>I.D.</u>	<u>DESCRIPTION</u>	<u>AMOUNT</u>	<u>PROJECT</u>
TVL	Limited Open T.A.'s	0.00	1411AD
GSA	supplies	27.86	1411SG
GSA	supplies	89.08	1411AN
GSA	supplies	163.35	1411DNA
GSA	supplies	17.54	1411BC
GSA	supplies	316.95	1412TS
GSA	supplies	22.73	1411PT
GSA	supplies	1169.62	1411AD
GSA	supplies	269.97	1411GS
GSA	supplies	120.86	1411HTS
GSA	vehicles - 12 months	8400.00	1411AD
R-6	PC SAS license	1590.00	1411AD
WR-0148	fuel for Tiglax	9075.00	6310SQ
IR-7002	MV 8000 SAS license renewa	2600.00	1411AD
IR-7048	PC network system	1000.00	6310SQ
RS-3031	rent house	14400.00	1412TS
RS-3063	electrical wiring	250.00	1411AD
RS-3095	install outboard motor	300.00	6310SQ
RS-3096	gas	141.32	1411SB
RS-3097	gas	769.20	1261WC
RS-3097	gas	445.53	1411GS
RS-3097	gas	1462.75	1411BC
RS-3097	gas	830.13	1261FX
RS-3098	gas	6100.00	1411AN
RS-3098	gas	1326.80	1411PBB
RS-3109	outboard motor	4505.25	6310SQ
RS-3110	lodging for Soviet	1118.00	1411HT
RS-3111	paper	490.00	1411PBB
RS-3131	rent vehicle		6310SQ
RS-3143	lab supplies	899.40	1411DNA
RS-3170	print report	450.00	1411AD
RS-3184	computer supplies	119.50	6310SQ
RS-3202	computers	24367.00	1411GS
RS-3215	photo reproduction	100.00	1411SB
RS-3216	photo reproduction	75.00	1411SB
RS-3219	lab supplies	247.80	1412DNA
RS-3228	install centrifuge	1012.00	1415AD
RS-3229	wiring	500.00	1415AD
RS-3239	repair datapod	105.00	1412TS
RS-3240	photo prints	60.00	1411SB
RS-3248	freight	200.00	6310SQ
RS-3249	lab supplies	135.00	1411PBB
	lab supplies	139.35	1411DNA
RS-3258	rent cabin	2600.00	1411SO
RS-3261	lab supplies	923.40	1412YR
RS-3264	freight	150.00	6310SQ
RS-3265	photo processing	95.50	1411GS
RS-3266	computer diskettes	64.50	1411AD
RS-3269	repair radios	218.04	1411GS
RS-3269	repair radios	34.50	1411SB
RS-3269	repair radios	184.23	1261GS
RS-3269	repair radios	124.89	1261FX
RS-3269	repair radios	136.27	1411SX
RS-3269	repair radios	347.07	1261WC
RS-3269	repair radios	533.72	1977NSM

LIST OF PENDING NON-LABOR TRANSACTIONS

02/24/90

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<u>I.D.</u>	<u>DESCRIPTION</u>	<u>AMOUNT</u>	<u>PROJECT</u>
RS-3269	repair radios	422.28	1411EG
RS-3270	publication	21.50	1411AD
RS-3271	laboratory analysis	2000.00	1411PBB
RS-3274	chemicals	817.25	1412YR
RS-3275	freight	150.00	6310SO
RS-3277	charger	169.00	1411PT
RS-3278	computer equipment	22100.00	1411AN
RS-3281	storage	2496.00	6310SO
RS-3282	photo prints	100.00	1411DNA
RS-3283	bird bands	876.00	1411TL
RS-3284	chemicals	851.15	1412YR
RS-3285	publication	34.20	1411AD
RS-3286	freight	190.00	6310SO
RS-3287	freight	760.00	6310SO
RS-3288	lab supplies	188.95	1411DNA
RS-3289	cold weather gear	758.30	1411PBC
RS-3290	film	500.00	1412YR
RS-3291	chemicals	919.76	1412YR
RS-3293	chemical	47.00	1411DNA
RS-3297	shipping	60.00	6310SO
RS-3300	Fisheries supplies	923.54	1412YR
RS-3303	SAS User guide	38.95	1411AN
RS-3304	Electrical work	150.00	1411TL
RS-3305	Refurbish transmitters	1092.00	1261FX
RS-3306	Tower blind	400.00	1261WC
RS-3307	Reprint publication	51.75	1411GS

PROJECTED SALARIES

02/24/90

PAGE 1

<u>NAME</u>	<u>SALARY</u>	<u>HOURS</u>	<u>PP</u>	<u>SAL EST</u>	<u>HRS EST</u>	<u>PROJECT</u>	<u>COMMENTS</u>
Amstrup	2014.30	80	19.5	40693	1560	1411PBB	from 12/03
Anthony	1829.49	80	19.5	36959	1560	1261FX	from 12/03
Babcock	1004.14	80	7.0	7282	560	1261WC	thru 4/6
Ballachey	1444.00	80	19.5	29172	1560	631OSO	from 12/03
Barnes	2287.41	80	19.5	46210	1560	1261BB	from 12/03
Bautista	923.92	80	19.5	18665	1560	1411GS	from 12/03
Bollinger	1156.01	80	19.5	23354	1560	1411GS	from 12/03
Brown	1323.19	80	19.5	26731	1560	1261AD	from 12/03
Burger	2118.74	80	19.5	42803	1560	1412TS	from 12/03
Coleman	1832.52	80	19.5	37021	1560	1411AD	from 12/03
Cook	890.27	80	19.5	17985	1560	1411ANS	from 12/03
Cramer	1239.12	80	13.0	16688	1040	1412YR	thru 7/1
Cronin	2000.00	80	14.5	30404	1160	1411DNA	from 12/03
Cronin	2000.00	80	5.0	11404	400	1412DNA	from 12/03
DeGange	2008.17	80	19.5	40569	1560	1411SO	from 12/03
Derkson	2609.28	80	19.5	52713	1560	1411GS	from 12/03
Doroff	1102.26	80	19.5	22268	1560	631OSO	from 12/03
Douglas	1687.30	80	19.5	34087	1560	1411HT	from 12/03
Ely	1743.33	80	19.5	35219	1560	1261WC	from 12/03
Esler	1004.14	80	7.0	7282	560	1411PT	thru 4/8
Fadely	1445.91	80	19.5	29210	1560	1411SB	from 12/03
Fancy	2053.76	80	19.5	41490	1560	1411AN	from 12/03
Budget Ast	1202.40	80	15.5	19481	1240	1261AD	
Finkbiner	1202.40	80	2.5	3850	200	1261AD	
Finn	1795.00	80	16.5	30684	1320	1412TS	from 2/11
Gardner	1536.05	80	0.5	768	40	1261PB	thru 1/5
Garner	2355.51	80	19.5	47586	1560	1411PBC	from 12/03
Gill	2227.54	80	19.5	45001	1560	1411BC	from 12/03
Gould	2351.29	80	5.0	13407	400	1411AD	thru Mar 10
Grand	1737.22	80	19.5	35095	1560	1411PT	from 12/03
Greslin	1448.41	80	19.5	29261	1560	1261PC	from 12/03
Handel	1281.48	60	19.5	25888	1170	1411SX	from 12/03
Harvey	1292.16	80	19.5	26104	1560	1261AD	from 12/03
Hatch	1955.29	80	19.5	39501	1560	1411SB	from 12/03
Heglund	956.56	80	19.5	19324	1560	1411PT	from 12/03
Hills	1489.66	80	19.5	30094	1560	1411WS	from 12/03
Hupp	1742.91	80	19.5	35210	1560	1411SG	from 12/03
Kinchloe	1189.82	80	19.5	24037	1560	1261NG	from 12/03
Lanctot	904.05	80	8.0	7493	640	1411BC	thru 4/22
Luke	1443.93	80	19.5	29170	1560	1411ANS	from 12/03
MacDonald	810.62	80	19.5	15997	1560	1412YR	from 12/31
Mason	810.62	80	4.0	3505	320	1411EG	thru 2/23
Mason	810.62	80	5.0	4316	400	1411BC	thru 5/7
McCabe	2155.93	80	19.5	43554	1560	1411AN	from 12/03
Modla	810.62	80	19.5	16376	1560	631OSO	from 12/03
Monson	810.62	80	19.5	16376	1560	631OSO	from 12/03
Muehlenhard	1005.31	80	19.5	20309	1560	1261PC	from 12/03
Palmisano	3413.14	80	19.5	68952	1560	1411AD	from 12/03
Pank	2430.38	80	19.5	49099	1560	1411PBS	from 12/03
Petersen	1730.01	80	3.0	6404	240	1261EG	from 12/03
Petersen	1730.01	80	16.5	29760	1320	1411EG	from 12/03
Piatt	1794.59	80	7.0	13014	560	1411SB	thru 4/5
Riffle	1661.35	80	19.5	33563	1560	1411AD	from 12/03
Robbins	724.61	80	8.0	6006	640	1411HT	thru 4/22

PROJECTED SALARIES

02/24/90

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<u>NAME</u>	<u>SALARY</u>	<u>HOURS</u>	<u>PP</u>	<u>SAL</u> <u>EST</u>	<u>HRS</u> <u>EST</u>	<u>PROJECT</u>	<u>COMMENTS</u>
Roberts	1450.67	80	19.5	29306	1560	1411SB	from 12/03
Ronalds	1066.01	80	19.5	21536	1560	1412TS	from 12/03
Schmutz	1355.44	80	0.5	1629	40	1411SG	thru 1/7
Schmutz	1355.44	80	19.0	26705	1520	1411EG	from 1/8
Seitz	2686.44	80	4.0	12632	320	1411AD	from 12/03
Seitz	2686.44	80	15.5	43526	1240	1412AD	from 12/03
Stehn	2484.86	80	19.5	50199	1560	1261NG	from 12/03
Tibbetts	904.05	80	8.0	7493	640	1411TL	thru 4/22
Udevitz	2000.00	80	15.0	31008	1200	1411PBS	from 1/17
Ward	1532.57	80	7.5	11880	600	1977NSM	thru 4/11
Wilmot	2567.46	80	19.5	51868	1560	1412YR	from 12/03
Wilson	1150.00	80	3.0	4257	240	1261AD	
Young	1437.33	80	19.5	29037	1560	1261PC	from 12/03

ACTUAL AND ESTIMATED FTE'S

PROJECT	ACTUAL HOURS	ESTIMATED HOURS	ACT FTE'S	EST FTE'S
	32309.00	81970.00		
1261EG	1640.00	240.00	0.79	0.11
1261FX	1040.00	1560.00	0.50	0.75
1261NG	1040.00	3120.00	0.50	1.49
1261WC	1120.00	2120.00	0.54	1.02
1261GS	0.00	0.00	0.00	0.00
1411BC	1520.00	2600.00	0.73	1.25
1411EG	520.00	3160.00	0.25	1.51
1411GS	1560.00	4680.00	0.75	2.24
1411IZ	0.00	0.00	0.00	0.00
1411PT	1560.00	3680.00	0.75	1.76
1411PTS	0.00	0.00	0.00	0.00
1411SB	2080.00	5240.00	1.00	2.51
1411SG	1120.00	1600.00	0.54	0.77
1411SX	385.00	1170.00	0.18	0.56
1411TL	520.00	640.00	0.25	0.31
1411UG	0.00	0.00	0.00	0.00
1411WC	0.00	0.00	0.00	0.00
1411DNA	520.00	1160.00	0.25	0.56
1412DNA	0.00	400.00	0.00	0.19
1977NSB	0.00	0.00	0.00	0.00
1977NSM	520.00	600.00	0.25	0.29
1261PC	1080.00	4680.00	0.52	2.24
1261BB	520.00	1560.00	0.25	0.75
1261PB	480.00	40.00	0.23	0.02
1411PBB	560.00	1560.00	0.27	0.75
1411PBC	1040.00	1560.00	0.50	0.75
1411AN	1480.00	3120.00	0.71	1.49
1411SD	520.00	1560.00	0.25	0.75
1411WS	520.00	1560.00	0.25	0.75
1411HT	1000.00	2200.00	0.48	1.05
1411PBS	520.00	2760.00	0.25	1.32
1411ANS	1040.00	3120.00	0.50	1.49
1411SOS	0.00	0.00	0.00	0.00
1411WSS	0.00	0.00	0.00	0.00
1411HTS	0.00	0.00	0.00	0.00
1977HT	0.00	0.00	0.00	0.00
6310SO	1600.00	6240.00	0.77	2.99
1412FR	0.00	0.00	0.00	0.00
1412TS	1084.00	4440.00	0.52	2.13
1412YR	1560.00	4160.00	0.75	1.99
1261AD	1560.00	4800.00	0.75	2.30
1411AD	2600.00	5400.00	1.25	2.59
1412AD	0.00	1240.00	0.00	0.59
1415AD	0.00	0.00	0.00	0.00
END	0.00	0.00	-----	-----
TOTAL			15.48	39.28

ALASKA FISH AND WILDLIFE RESEARCH CENTER

Budget Tracking Transaction Codes

ADP	Computer hardware, software, non-supplies
EQP	Equipment (property), non-ADP
INT	Interest - late payment fees
FTO	Photoprocessing
GAS	Gasoline
GTR	Government Transportation Request
MIS	Miscellaneous
MTN	Maintenance contracts; e.g., typewriter, computer, copier, etc.
REP	Repairs
SAL	Salaries
SUP	Supplies
SVS	Services, contractual; e.g., RWO's, Coop. Agrmts, OAS, ADP license renewals, Raven Electric, ATU, etc.
TEL	Telephone service (telephone bills, not services)
ING	Training
INS	Transportation of things
TVL	Travel, vouchers, etc.

RESEARCH WORK ORDERS

<u>RWO #</u>	<u>UNIT CO-OP AGRMT #</u>	<u>PROJECT DESCRIPTION</u>	<u>NTE AMOUNT</u>
7	14-16-0009-1557 U. of Maine Eff: 05-01-89	Evaluation of Population Characteristics of Alaskan Marine Mammals. Comp: 12-31-90	<u>\$280,075</u>
8	14-16-0009-1556 U. of Missouri Eff: 09-01-86	Relationship among fire, wetland habitat & waterfowl communities on interior Alaskan National Wildlife Refuges. Comp: 09-30-91	<u>\$335,054</u>
15	14-16-0009-1557 U. of Maine Eff. 05-24-89	Evaluation of Alternate Survey Designs for Estimating Walrus Populations. Comp: 12-31-91	<u>\$300,000</u>
26	14-16-0009-1535 U. of AK-Fairbanks Eff: 05-01-87	Estimation of gosling mortality in Pacific black brant on the Y-K Delta, Alaska. Comp: 06-30-91	<u>\$ 83,996</u>
27	14-16-0009-1535 U. of AK-Fairbanks Eff: 12-21-87	Influence of weather-related factors on the timing & extent of caribou movements. Comp: 09-30-90	<u>\$ 29,999</u>
29	14-16-0009-1535 U. of AK-Fairbanks Eff: 06-01-88	Assess. of characteristics & effects of winter habitat use by muskoxen on ANWR. Comp: 12-31-90	<u>\$ 45,000</u>
30	14-16-0009-1535 U. of AK-Fairbanks Eff: 07-16-88	Relationships between habitat availability & quality & body condition of caribou. Comp: 06-30-90	<u>\$ 81,774</u>
31	14-16-0009-1534 U. of Montana Eff: 05-05-88	Status & demography of the bristle- thighed curlew (<u>Numenius tahitiensis</u>). Comp: 12-31-90	<u>\$125,000</u>
32	14-16-0009-1535 U. of AK-Fairbanks Eff: 06-01-88	Relationship of forage quality & quantity to caribou use of insect relief habitat. Comp: 09-30-91	<u>\$ 35,108</u>
77	14-16-0009-1542 U. of Wyoming Eff: 03-02-87	Design of Polar Bear Survey. Comp: 12-30-90	<u>\$ 35,000</u>

TOTAL:

\$1,351,006

COOPERATIVE AGREEMENTS

Alaska Pacific Univ. 14-16-0007-88-7715 Comp: 09-30-91	Satellite imagery on ANWR. NTE: \$115,656
Alaska Pacific Univ. 14-16-0009-88-962 Comp: 04-30-89	Study of sea otters in Prince William Sound, AK. NTE: \$220,000
Alaska Dept Fish & Game 14-16-0009-86-954 Comp: 09-01-89	Sea otter & shellfish project--southeast Alaska. NTE: \$ 85,000
Alaska Dept Fish & Game 14-16-0009-85-914 Comp: 09-30-88	Recollar caribou on ANWR NTE: \$184,000
AK Dept Fish & Game 14-16-0007-89-7711 Comp: 09-30-93	Research on potential effects of petroleum development on wildlife & their habitats. NTE: \$800,000
Texas A&M Univ. 14-16-0009-86-951 Comp: 09-30-91	Pacific black brant study on Teshekpuk Lake, AK. NTE: \$200,000
Ohio State Univ. RF 14-16-0007-89-7738 Comp: 09-30-90	Remote sensing techniques for counting brant in nesting & staging areas. NTE: \$ 41,000
PWS Science Center 14-16-0007-90-7717 Comp: 3-31-90	Sea otter research in PWS re oil spill. NTE: \$126,122
<hr/>	
TOTAL:	\$1,771,778

INTERAGENCY AGREEMENTS

NOAA/OCAR 14-16-0009-84-967 Exp: 12-31-89	ARGOS processing of satellite collars.	NTE: \$520,950
NOAA/OCAR 14-16-0007-90-7702 Exp: 12-31-95	ARGOS processing of satellite collars.	NTE: \$500,000
USGS/EROS 14-16-0007-88-7709 Exp: 09-30-89	Computer & technical processing.	NTE: \$ 3,000
US Army/CERL 14-16-0007-88-7723 Exp: 04-30-89	Noise research on North Slope & Izembek	NTE: \$ 30,000
TOTAL:		<hr/> \$1,053,950

REIMBURSABLE AGREEMENTS

87200-1977-18 NASA--Radio telemetry techniques.
FWS #14-16-0009-86-1856
Exp: 08-01-91

NTE: \$40,000
Bal: \$11,939 FY 1989 C/O

87200-1977-32 MMS--Teshekpuk Lake brant project
FWS #14-16-0007-87-8717
Exp: 09-30-91

NTE: \$350,000
Bal FY 1990 \$70,000

87200-1977-33 BLM--Teshekpuk Lake brant project
FWS #14-16-0007-87-8717
Exp: 09-30-91

NTE: \$350,000
Bal FY 1990 \$70,000

TOTAL: \$740,000

Special Issues

Funding and FTE Strategies - The program of the Alaska Center has expanded significantly over the past 5 years. Approximately 51% of the FY 1990 budget is base; the remainder is a mixture of reimbursables, congressional add-ons, oil spill funding and transfer funds from Region 7. The "soft" funds do not typically have adequate FTE's to cover federal hires even of a temporary nature. The soft funding is also responsible for the Center's large percentage (50%) of temporary staff. Our primary funding strategy for the near future is to incorporate appropriate soft funding into the Center's base, to acquire sufficient FTE's to operate efficiently and to obtain basic operations and maintenance funding to cover annual recurring costs and offset erosion of our budget resulting from inflation.

Quantity/Quality of Publications and Scientific Professionalism - Performance of Center research biologists is evaluated with annual performance appraisals and every 3 years through an appropriate research grade evaluation panel. All position descriptions for wildlife and fishery biologists (research) at the GS-9 level and above have been developed in the four-factor format. Publishing results of field and laboratory investigations in professional outlets is strongly encouraged. Requirements for publishing manuscripts have been incorporated into all performance plans. Biologists are encouraged to present their data at appropriate scientific meetings and share ideas with their peers. Our unique relationship with Region 7 allows scientists to interact daily with managers and administrators and share results of field and laboratory investigations at numerous briefings. All manuscripts originating from the Center are tracked using an automated tracking system. Manuscripts for professional publications are edited by the Office of Information Transfer. Peer review of projects will continue and likely be expanded in the future.

Internal Center Management - Within the past year, the Center has made significant progress in internal management: 1) An administrative section has been established, 2) an excellent financial tracking system developed, 3) property records have been reconciled and automated, 4) all study plans have been updated and tied to the automated work plan, 5) an animal welfare committee was established, 6) position descriptions have been reviewed and updated, 7) organization plans for each of the branches have been developed and 8) strategies developed to meet near term needs for laboratory and office space. Additional attention will be paid to personal and professional growth of our staff. Emphasis will be placed on scientific productivity and quality and active participation in professional societies. A Center-level research evaluation committee has been established to monitor performance and recommend promotions based on scientific merit.

U.S./U.S.S.R. Cooperative Research - Opportunities for future cooperative research between the U.S. and U.S.S.R. appear unlimited at this time. The potential for the Center to significantly "overcommit" itself exists. Another concern is the potential for projects to develop at the scientist's level which might be of low priority to the Service. To address both of these issues, Region 7 and the Alaska Center are in the process of developing a document which will guide the future direction of cooperative work with the Soviets. The focus is likely to be on fish and wildlife resources shared by the two countries and exchange of technology of mutual interest.

Future Research Direction - The future appears to hold ample opportunity to expand the Center's research in various directions. Resource development conflicts, subsistence hunting and fishing, declining waterfowl populations, global change, reduced biodiversity, increased interest in cooperative research with the U.S.S.R. and documenting the value of northern wetlands for wildlife are examples of issues faced by the Service in Alaska requiring a scientifically sound information base from which to act. Some of these issues have been around a long time, some are just now emerging. The future is sufficiently complex to warrant updating the report, Alaska - Research for the 80's. A draft plan for the 90's will be completed by the end of the calendar year.

Role of the Alaska Center in Region 8 Initiatives - In recent years a number of broad initiatives have been developed which will likely result in new directions and increased funding for Region 8. The Alaska Center has successfully adapted an array of new technologies to resolve problems faced by researchers in the arctic. In the past, no Technical Development funds have been provided to support this activity. Participation of the Center in preparation of initiatives within the Technical Development Subactivity has been limited inspite if the fact that the Center has much to offer. For example, the President's FY 1991 Budget Justification contained an increase of over \$3,000,000 for research on global climate change without including the interests and capabilities of the Center. On the other hand, the Center has been asked to support Technical Development activities such as validation of HSI models with Wildlife and Fishery Research funds. The Center is continuing to expand Technical Development activities with the addition of projects dealing with DNA applications to population studies, high resolution video cameras to inventory wildlife and their habitats, and increased technology exchanges between the U.S. and U.S.S.R. involving satellite-based radar and other state of the art technologies. The Center should receive work guidance and funding support for Technical Development projects.

Sea Otter Research - On July 27, 1989, the Center applied for a permit to capture, tag, draw blood, and extract a premolar from up to 650 sea otters in Prince William Sound as part of the oil spill Natural Resources Damage Assessment (NRDA) Plan. We proposed to implant up to 275 otters with radio transmitters in an effort to contrast survival and reproductive performance between sea otters in oiled and unoled portions of the Sound. The application was greeted negatively by several animal rights groups. Center staff responded for requests for additional information from the Office of Management Authority and prepared an Environmental Assessment to address NEPA requirements. A request for a public hearing on the application was denied and a permit was issued on September 19. In early November, the National Society for the Protection of Animals filed civil suit in U.S. District Court against the Director of the Service to stop the ongoing research. The plaintiff alleges that: 1) the Service's research permit is deficient under standards outlined in the Marine Mammal Protection Act in that it poses risks of injury and mortality to sea otters that outweigh any benefits obtained from the research and 2) that the portion of research that calls for the

taking of sea otters in the control (unoiled) area is unnecessarily duplicative of existing research. The plaintiff's CERCLA challenge contends that the Service should be prohibited from performing any studies included in the NRDA Plan until the plan has been available for public comment for at least 30 days and that the study commenced at least 12 days prior to the end of that comment period. By November 27, at the request of the Department of Justice, Center staff assembled and sent to Washington, D.C. all relevant documents as part of the administrative record for the case and a paragraph by paragraph response to the allegations in the complaint. In early January 1990, the Department of Justice officially responded to the complaint following consultation with Center staff. The civil action is still pending. The plaintiff has not attempted to stop the field work through other legal means.

Adequacy of Facilities - All Center facilities except warehouse space are housed in the same building as the Region 7 Regional Office, a situation unique to Region 8 centers. Negotiations are now underway to lease office and laboratory space for the Center and the Regional Office for a 10-year period beginning in 1991. In late FY 1989, Center laboratories were inspected by GSA contract safety specialists and, as a result, major structural changes were recommended to correct ventilation problems. GSA then recommended that specifications for the new 10-year lease include arrangements for laboratory facilities to be located in a separate building from the general office space. The Center was able to provide lease specifications that incorporated space additions for planned laboratory expansion in the 1990's. Additional laboratory space provided by the new building should make additional office space available. This space should be adequate for proposed staff expansion in the 1990's.

Need For and Use of Maintenance Funds - In FY 1990, The Center identified and set priorities for our FY 1991 maintenance needs using the Maintenance Management System (MMS). Our priorities reflected guidance that routine maintenance activities are appropriately covered by the definition of maintenance in the MMS and should be funded using the 1415 subactivity. Use of 1415 funds to perform annual, recurring maintenance activities would provide badly needed relief from 1411 and 1412 research operating funds now used for these activities. For example, FY 1990 1415 funding will be used to bring the Center's word processing system into compliance with Service standards. The Center, until FY 1990, had not received any maintenance funding. In FY 1990, the Center received \$40,000 on 1415 funding probably as a result of a significant congressional add-on to Region 8. However, even though Region 8 will receive a major increase in base maintenance funds in FY 1991; the Center, according to the Congressional District Report, will not receive any of that increase to our base. We have determined that \$150,000 is needed to address annual recurring as well as major maintenance costs.

Region 7 Support Services - Region 7 provides most of our day-to-day administrative support such as personnel, contracting, library, ADP, etc. The fact that the Center is located in the same building as the Regional Office is unique within the Service. This situation creates opportunities for improved efficiency but also the opportunity for conflict. Over the years, conflicts have been largely resolved. In 1986, approximately \$80,000 was transferred from Region 8's funding base to Region 7's. This money was to cover essentially all costs at that time associated with administrative support to the Center provided by Region 7. It may be useful to review this agreement in light of existing and proposed changes in Region 8's administrative responsibilities and budget initiatives for FY 1992 and beyond as they affect Regional Administrative support.

Private-Sector Support of Research - The Center has, in the past, successfully secured funding from the private sector. For example, the brown bear project on Kodiak Island receives funding support from the Terror Lake Trust Fund, an account established as mitigation for the Terror Lake Hydroelectric Project on the southern end of Kodiak Island. The oil industry provides logistical support for Beaufort Sea polar bear studies. We have and will continue to work closely with the Office of International Affairs in securing funding from the private sector for our Soviet scientific exchange activities. In a broad sense, the Center annually benefits greatly from the more than 70 volunteers that work on Center field and laboratory projects.

Safety in Field Research - Safety is important in field research particularly in the harsh and remote environments of Alaska. The Assistant Director serves as the Center Safety Officer. A safety manual was compiled in early FY 1990 and disseminated to all project leaders. Each of the three branches has designated a safety representative who is responsible for organizing appropriate safety courses for staff biologists and biological technicians. Safety films are shown at some monthly staff meetings. Defensive driving requirements are strictly enforced. Project emergency plans are completed for all field activities. Individual emergency plans are maintained for all biologists and biological technicians participating in field research activities.

Cooperation and Coordination:
Summary of Center Interaction within Research,
between Regions, and between Other Agencies and Universities

<u>Organization</u>	<u>Description</u>
<u>Mammals Branch</u>	
1. Fish and Wildlife Service	
a. Region 7	
1) Budget & Admin.	Information Resources Management - share hardware, software, and expertise
2) Fish & Wildl. Enhance.	Marine Mammals (mgmt.) is conducting collaborative research on Pacific walrus, polar bear, and sea otters; extensive cooperative research is underway to assess the impacts of the "Exxon Valdez" oil spill on sea otters
3) Refuges & Wildlife	Arctic, Kodiak, Togiak, and Selawik NWR's provide logistic support for research; Arctic and Kodiak NWR's are conducting cooperative 1002 and brown bear research, respectively
b. Region 8	
1) CRUC	Maine - Coop. Ed. Student and a RWO for Pacific walrus research, Wyoming - RWO on sampling and census research for Pacific walrus and polar bear, Alaska - RWO's related to ANWR-1002 studies
2) NERC-Ft. Collins	Cooperative/collaborative research and development of advanced technology
3) NWHR-Madison	Cooperative research on sea otter and neonatal caribou calf mortality
4) OIT-Ft. Collins	Editorial review, publication, extension product, dissemination of research results
5) PWRC-Laurel	Cooperative research on eagles within the ANWR-1002 study area
6) AFWR branches	Sharing equipment, logistics, and expertise informally and formally cooperating on DNA research

- 7) Regional Office Provide input for and review of reports on marine mammals, arctic research; provide information for budget initiatives

- c. Region 9
 - 1) International Affairs Coordination of cooperative and collaborative research with the USSR

 - 2) Wildlife Permits Off. Research permits for handling marine mammals

- 2. Other Federal Agencies
 - a. Minearls Manage. Serv. Conducting cooperative research on sea otters and polar bears

 - b. U.S. Geological Survey Collaborative image processing and mapping projects for 1002 and oil spill studies

 - c. Marine Mammal Comm. Administration of the Marine Mammal Protection Act

 - d. U.S. Forest Serv. Cooperative development of remote sensing aircraft platforms

- 3. State Agencies
 - a. Alaska Div. Nat. Resources Cooperative GIS activities related to the oil spill

 - b. Alaska Dept. Fish & Game Cooperative reseach on caribou, muskox, brown bears, wolves, and their habitats

- 4. Universities and Conservation Organizations
 - a. Alaska Pacific Univ. Cooperative sea otter research

 - b. Univ. Alaska Fairbanks
 - 1) Inst. Arctic Biology Cooperative research on caribou forage and nutrition

 - 2) Geophysical Inst. Collaborative development of remote radar imagery for marine and terrestrial wildlife applications

 - c. Prince William Sound Science Center Cooperative sea otter research.

5. International Organizations

- a. Canada Collaborative research on polar bears, Pacific walrus, and caribou (Canadian Wildlife Service)
- b. Denmark Collaborative development of telemetry techniques for Pacific walrus
- c. USSR Collaborative and cooperative research on Pacific walrus, polar bears, sea otters and current technology (Ministry of Fisheries, Ministry of Agriculture, and Academy of Sciences)

Fisheries Branch

1. Fish and Wildlife Service

a. Region 1

- 1) Fish & Wildl. Enhance. Fishery Management Services - Routinely provide advice and technical assistance (particularly fish telemetric techniques) to numerous field offices such as those in Olympia, Sacramento, and Reno

b. Region 7

- 1) Budget & Admin. Information Resources Management - Use of mainframe; technical assistance on hardware and software; periodic interaction
- 2) Fish & Wildl. Enhance. Fishery Management Services - One joint project on genetics of Yukon River salmon; FMS is a cooperator on the Tustumena Lake study; staff routinely provides technical assistance for studies at Kenai, King Salmon and Fairbanks FMS field stations; frequent cooperation occurs in the development of new research proposals
- 3) Refuges & Wildlife Kodiak, Kenai, and various Yukon River NWR's - Routinely cooperate in identifying fishery research needs of NWR's; past and present interactions include Karluk Lake and proposed coho salmon research at Kodiak NWR, Tustumena Lake investigations at Kenai NWR, and genetic research on Yukon River salmon (Yukon Delta and Kanuti NWR's); refuge staff often provide logistical assistance to research staff

b. Region 8

- 1) CRUC
Alaska - periodic interaction and occasional joint projects; Unit recently completed an evaluation of an HSI model for Arctic grayling in cooperation with staff; two additional evaluations (chinook and lake trout) are being initiated; other interactions include use of Unit students for research studies and exchange of manuscripts for reviews
- 2) NFRC-Seattle
Constant interactions and exchanges occur for reviews of proposals, study designs, and manuscripts; recent cooperative efforts include development of genetic computer programs and two joint publications with NFRC staff
- 3) OIT-Ft. Collins
Periodic interactions; Fisheries staff provide advice to various cooperators identified by OIT; OIT recently assisted with a technical publication
- 4) AFWR branches
Equipment and advice commonly shared with Migratory Birds and Mammal Branches; mtDNA studies presently underway are an example of cooperative efforts between branches; high technology information exchange is routine
- 5) Regional Office
RO provides program advice, fiscal allocation, and routine interaction; RO staff recently assisted with logistics for the Tustumena study and aided in the development of the Yukon River genetics study

2. Other Federal Agencies

- a. National Park Service
Fisheries staff have engaged in several cooperative studies with NPS including those at Wrangell-St. Elias and Katmai NP's
- b. Minerals Manage. Serv.
Fisheries Branch is presently involved in a genetic study funded by MMS

- c. Bureau of Land Manage. Branch has cooperated periodically with BLM on fishery studies
- d. Nat. Marine Fish. Serv. Staff interacts with Auk Bay Laboratory, Juneau on genetic stock ident. studies of Pacific salmon; will participate in US/USSR cooperative studies

3. State Agencies

- a. Alaska Dept. Fish & Game Branch biologists work closely with Sport, Commercial Fish and FRED Division biologists who are normally major cooperators on our studies; ADFG is presently providing logistical assistance at Tustumena Lake; branch staff frequently assist ADFG by rendering technical assistance and by occasionally sharing equipment and personnel; ADFG is also a major cooperator on the Yukon genetics study; branch staff have cooperated with almost every ADFG office in Alaska
- b. Other Cooperation and information exchange also occurs periodically with biologists from agencies in Washington, Oregon, and California

4. Conservation Organizations

- a. American Fisheries Soc. Staff provided significant assistance in 1989 to the AFS which held their annual convention in Anchorage

5. International Organizations

- a. Canada, France, Australia Staff provided technical advice of fish marking and tagging, and genetics to biologists in these countries
- b. USSR Staff will participate in joint US/USSR cooperative studies involving genetic stock identification of Pacific salmon

Migratory Bird Branch

1. Fish and Wildlife Service

a. Region 7

1) Budget & Admin.

Information Resources Management - use of mainframe; technical assistance on computer hardware and software; periodic and less frequent interactions as staff employs personal computers for data storage and analyses

2) Refuges & Wildlife

Migratory Bird Management - joint projects involving aerial survey techniques for assessing population/age ratios and productivity of arctic nesting geese; survey pilot, aircraft, and some computer hardware and GIS software supplied by MBM; technical expertise, experimental design, and statistical/programming support by Center staff; daily interaction; cooperated in design and implementation of aerial migratory bird surveys for Prince William Sound; continue to provide observers for monthly aerial surveys

Izembek, Alaska Peninsula, Kodiak, Alaska Maritime, Togiak, Yukon Delta, Arctic, and Yukon Flats NWR's - housing, logistic support, materials, and some funding provided by refuges for projects on 1) disturbance to geese, 2) staging of geese, 3) seabird/fisheries interactions, 4) reproductive ecology of nesting geese, 5) subpopulations of greater white-fronted geese, 6) mortality of emperor geese, 7) breeding biology and population status of northern pintails, 8) mortality of migratory birds from the Prince William Sound oil spill; Center staff developed proposals and experimental design for research questions outlined by R-7 (and others including Pacific Flyway; Council and MBMO) and conducts research in cooperation with Refuge personnel

b. Region 8

1) CRUC

Alaska - RWO and 2 Ph.D.'s; Idaho - RWO and 1 M.S.; Missouri - RWO and 1 Ph.D. & 1 M.S.; Montana State - 1 Ph.D.

2) NPWR-Jamestown

Joint project of demographics and subpopulations of greater white-fronted geese in the Pacific Flyway; sharing of personnel for field work in Alaska, California, and Mexico; cooperating in data analysis and reporting; NPWR provided assistance in transmitter design for pintail ducks; participated in pintail workshop

3) NWHR-Madison

Survey of kittiwakes for disease to determine if it is a factor in poor reproductive success and recruitment; cooperated in assessment of cause of mortality to waterfowl and other waterbirds in a local military firing range and ordnance disposal site

4) OIT

Provided editorial assistance to staff who authored manuscripts intended for publication in peer reviewed journals

5) AFWR branches

Share equipment and other resources with other branches; cooperate in design and implementation of DNA genetics research on birds, mammals, and fish

2. Other Federal Agencies

a. BLM

Interagency agreement to assess potential disturbance of Pacific brant on north slope of Alaska

b. EROS

Coop. agreement to provide personnel/technology to delineate/classify vegetative communities important to molting geese using satellite data and ground truthing techniques

- c. MMS Interagency agreement to assess potential disturbance on Pacific brant on Izembek NWR; population assessment of seabirds on St. Lawrence Island

3. State Agencies

- a. Alaska Dept. Fish & Game Routinely share data from all Center bird research projects; joint project on staging of geese in Cook Inlet, and breeding biology of northern pintails in interior Alaska; cooperate with ADF&G Waterfowl Coordinator in matters relative to Pacific Flyway Technical Committee and Council; Branch staff assisted ADF&G in design of waterfowl studies in Prince William Sound following the oil spill

4. Universities and Conservation Organizations

- a. Texas A&M Coop. agreement to provide expertise in assessing disturbance to molting geese; design predictive model for brant energetics as it relates to disturbance
- b. Ohio State Univ. Coop. agreement to provide software and hardware necessary for enumeration of colony nesting geese; employing videography and other remote sensing techniques

5. International Organizations

- a. USSR Cooperative studies in migratory waterfowl (pintails, emperor geese and brant) and seabirds

ALASKA FISH AND WILDLIFE RESEARCH CENTER

BIBLIOGRAPHY
1986 To PRESENT1986

Amstrup, S.C. 1986a. Polar bear. Pages 790-804 in R. DiSilvestro, ed. Audubon Wildlife Report 1986. Natl. Audubon Soc., New York, NY.

Amstrup, S.C. 1986b. Polar bear maternity denning in the Canadian Beaufort Sea, 1983-1985. Interim report to the Yukon Dept. of Renewable Resources, for the Northern Oil and Gas Action Program (NOGAP).

Amstrup, S.C. 1986c. Research on polar bears in Alaska, 1983-1985. Pages 85-115 in Proceedings of the ninth working meeting of the IUCN Polar Bear Specialists Group.

Amstrup, S.C., I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildl. Soc. Bull. 14:241-254.

Baird, P.A., S.A. Hatch, R.D. Jones, D.R. Nysewander, and M.R. Petersen. 1986. The breeding biology and feeding ecology of marine birds in the Gulf of Alaska. Environmental Assessment of the Alaskan Continental Shelf. Final Report to the Principal Investigators 45:121-504.

Brundige, G.C. and T.R. McCabe. 1986. Summer habitat use by bighorn ewes and lambs. Proc. North. Wild Sheep Goat Conf. 5:408-420.

Burger, C.V., and L.A. Gwartney. 1986. A radio tagging study of Naknek drainage rainbow trout. Final completion report, U.S. Natl. Park Serv., Anchorage, AK. 57 pp.

Burger, C.V., D.B. Wangaard, and R.L. Wilmot. 1986. Kenai River salmon---a unique resource in southcentral Alaska. Fish and Wildl. Serv. Leaflet No. 3.

Fancy, S.G., J.M. Blanchard, D.F. Holleman, K.J. Kokjer, and R.G. White. 1986. Validation of doubly labeled water method using a ruminant. Am. J. Physiol. 251 (Regulatory Integrative Comp. Physiol. 20):R143-R149.

Fancy, S.G., and R.G. White. 1986. Predicting energy expenditures for activities from heart rates of caribou. Rangifer Spec. Issue No. 1:123-130.

Gardner, C.L., W.B. Ballard, and R.H. Jessup. 1986. Long distance movement by an adult wolverine. *J. Mammal.* 67(3):603.

Garner, G.W., H.V. Reynolds, M.K. Phillips, G.E. Muehlenhardt, and M.A. Masteller, 1986. Ecology of brown bears inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portion of the Arctic National Wildlife Refuge. Pages 306-314 in G.W. Garner and P.E. Reynolds, eds. Final report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Service, Anchorage, AK.

Garner, G.W., and P.E. Reynolds, eds. 1986. Final report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK, Vol. II, Section 1002C, Alaska National Interest Lands Conservation Act. U.S. Government Printing Office. 695 pp.

Gill, R.E., Jr. 1986. What won't turnstones eat? *British Birds* 79:402.

Hatch, S.A. 1986. Time allocation by northern fulmars during the breeding season. *Pac. Seabird Group Bull.* 13:31-32. Abstract.

Harris, R.B. 1986. Reliability of trend lines obtained from variable counts. *J. Wildl. Manage.* 50:165-171.

King, J.G., and D.V. Derksen. 1986. Alaska goose populations: past, present and future. *Trans. N. Am. Wildl. and Nat. Resour. Conf.* 52:464-479.

Layne, L.J. and T.R. McCabe. 1986. Use of ivermectin to increase lamb survival in a herd of Rocky Mountain bighorn sheep. *Proc. North. Wild Sheep Goat Conf.* 5:207-221.

Lensink, C.J. 1986. Recoveries of Alaska banded white-fronted geese in Mexico. *U.S. Fish and Wildl. Serv. Research Information Bull.* 86-32.

Lensink, C.J., and S.A. Hatch. 1986. Racial identity of relict populations of Canada geese in Alaska. *U.S. Fish and Wildl. Serv. Research Information Bull.* 10-86.

McCabe, T.R. 1986. Effects of muskrat grazing on emergent vegetation. *Conf. Sci. Natl. Parks.* 4:171. Abstract.

McCabe, T.R., H.J. Shave and L.J. Layne. 1986. Reproduction success and lamb mortality in Custer State Park bighorn sheep. Progress report - field season 1985. W-75-R-7531. Submitted to South Dakota GF&P. 35 pp.

Muehlenhardt, G.E. and G.W. Garner. 1986. Population size, composition, and densities of moose along the Canning and Kongakut rivers within the Arctic National Wildlife Refuge, Alaska, spring and fall 1985. Pages 280-288 in G.W. Garner and P.E. Reynolds, eds. Final report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Nelson, J.W. 1986. Ecological notes on male Mydas xanthopterus (Loew) (Diptera: Mydidae) and their interactions with Hemipepsis ustulata (Dahlbohm) (Hymenoptera: Pompilidae). Pan-Pac. Ent. 62(4):316-322.

Oates, R.M., A.W. Brackney, M. McWhorter, R.M. Platte, and G.E. Muehlenhardt. 1986. Distribution, abundance and productivity of fall staging lesser snow geese on coastal habitats of northeast Alaska and northwest Canada. Pages 141-151 in G.W. Garner and P.E. Reynolds, eds. Final report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Pank, L. F., and W. Regelin. 1986. Performance of a satellite tracking system for caribou. U.S. Fish and Wildl. Serv. Research Information Bull. 86-11.

Pank, L.F., W.L. Regelin, D. Beatty, and J.A. Curatolo. 1986. Performance of a prototype satellite tracking system for caribou. Pages 97-118 in R. Weeks and F.M. Long, eds. Proceedings fifth international conference on wildlife biotelemetry. Chicago, IL, Sept. 30, 1985.

Sedinger, J.S. 1986a. Biases in comparison of proventricular and esophageal food samples from geese. J. Wildl. Manage. 50:221-222.

Sedinger, J.S. 1986b. Growth and development of Canada goose goslings. Condor 88:169-180.

Sedinger, J.S., and D.G. Raveling. 1986. Timing of nesting by Canada geese in relation to availability and quality of their food plants. J. Anim. Ecol. 55:1083-1102

White, R.G., and S.G. Fancy. 1986. Nutrition and energetics of indigenous northern ungulates. Pages 259-269 in O. Gudmundsson, ed. Grazing research at northern latitudes. Plenum Press, NY.

Whitman, J.S., C.C. Gardner, W.B. Ballard. 1986. Home range and habitat use by wolverines in southcentral Alaska. J. Wildl. Manage. 50(3):460-463.

1987

Amstrup, S.C. 1987a. Marine denning of polar bears in Alaska. Seventh biennial conference on the biology of marine mammals, Dec. 1987. Abstract.

Amstrup, S.C. 1987b. Telezol is a better drug for capturing free-ranging polar bears. U.S. Fish and Wildl. Serv. Research Information Bull. 87-110.

Amstrup, S.C. 1987c. The Polar Bear. Pages 58-59 in J. Rennie, ed. Bears of Alaska in life and legend. Roberts Rinehart, Inc., Boulder, CO.

Anthony, R.M., and J.S. Sedinger. 1987. Productivity in a brant colony improves with removal of arctic foxes. U.S. Fish and Wildl. Serv. Research Information Bull. 87-7.

Ballard, W.B., J.S. Whitman, and C.C. Gardner. 1987. Ecology of an exploited wolf population in southcentral Alaska. Wildl. Monogr. 98. 54 pp.

Burger, C.V. 1987. Thermal adaptations in Alaskan chinook and sockeye salmon. Page 553 *in* M.J. Dadswell, R.J. Klauda, C.M. Moffitt, R.L. Saunders, and R.A. Rulifson, eds. Common strategies of anadromous and catadromous fishes. Am. Fish. Soc. Symp., MD.

DeGange, A.R., and G.A. Sanger. 1987. Marine birds of the Gulf of Alaska. Pages 479-524 *in* D. W. Hood and S. Zimmerman, eds. The Gulf of Alaska: Physical environment and biological resources. U.S. Dept. Commerce, U.S. Dept. of Interior.

Easterly, T.G., K.J. Jenkins and T.R. McCabe. 1987. Reproduction success and lamb mortality in Custer State Park bighorn sheep. Progress report - field season 1987. W-75-R-7531, submitted to South Dakota GF&P. 19 pp.

Ely, C.R. 1987. An inexpensive device for recording animal behavior. Wildl. Soc. Bull. 15(2):264-265.

Ely, C.R., D.A. Budeau, and U.G. Swain. 1987. Agressive encounters between tundra swans and greater white-fronted geese during brood rearing. Condor 89:420-422.

Fancy, S.G., L.F. Pank, W.L. Regelin, D. Douglas, S.C. Amstrup, and G.W. Garner. 1987. Development and evaluation of a system for tracking wildlife by satellite. 1987. Proc. Second Intern. Symp. Nutrition of Herbivores, Brisbane, Australia.

Fancy, S.G., and R.G. White. 1987a. Daily energy budgets of barren-ground caribou during spring migration. Proc. Second Intern. Symp. of Herbivores, Brisbane, Australia.

Fancy, S.G., and R.G. White. 1987b. Energy expenditures for locomotion by barren-ground caribou. Can. J. Zoo. 65:122-128.

Fellows, D.P., L.F. Pank, P.W.C. Paton, and P.Q. Tomich. 1987. Cattle egret ecology, behavior, and control at General Lyman Field, Hilo, Hawaii. Bird damage research report 391. Section of Bird Damage Control, Denver Wildlife Research Center, U.S. Fish and Wildl. Serv. ADC/APHIS/USDA, Denver, CO. 90 pp.

Haney, J.C. 1987a. Effects of a Gulf Stream warm-core ring on summer seabird distribution in the northwest Atlantic Ocean. Limnology and Oceanography 32:665-673.

Haney, J.C. 1987b. Ocean internal waves as sources of small-scale patchiness in seabird distribution on the Blake Plateau. Auk 104:129-133.

- Haney, J.C. 1987c. Aspects of the pelagic ecology and behavior of the black-capped petrel (Pterodroma hasitata). Wilson Bull. 99(2):153-168.
- Harris, R.B., L.A. Maguire, and M.L. Shaffer. 1987. Sample sizes for simulating minimum viable population size. Conservation Biology 1:72-76.
- Harris, R.B., and L.H. Metzgar. 1987a. Estimating harvest rates of bears from sex ratio changes. J. Wildl. Manage. 51:802-811.
- Harris, R.B. and L.H. Metzgar, 1987b. Harvest age-structures as indicators of decline in small populations of grizzly bears. Intern. Conf. Bear Research and Management 7:109-116.
- Hatch, S.A. 1987a. Adult survival and productivity of northern fulmars in Alaska. Condor 89(4):685-696.
- Hatch, S.A. 1987b. Copulation and mate guarding in the Northern Fulmar. Auk 104:450-461.
- Hatch, S.A. 1987c. Did the 1982-1983 El Nino-southern oscillation affect seabirds in Alaska? Wilson Bull. 99:468-474.
- Hatch, S.A. 1987d. Testing for individual variation in breeding success. Auk 105:193-194.
- Hatch, S.A. 1987e. Productivity and survival of black-legged kittiwakes in Alaska. Pac. Seabird Group Bull. 14:29. Abstract.
- Kelly, B.P., S.C. Amstrup, C.L. Gardner, and L.T. Quakenbush. 1987. Predation on ringed seals in the western Beaufort Sea. Seventh biennial conference on the biology of marine mammals. Dec. 1987, Miami, FL. Abstract.
- Klein, D.R., M. Meldgaard, and S.G. Fancy. 1987. Factors determining leg length in Rangifer tarandus. J. Mammal. 68:642-655.
- Klein, D.R., P.E. Reynolds, and S.G. Fancy. 1987. Testing and calibration of activity-monitoring radio collars on captive muskoxen. Proc. 2nd Intern. Muskox Symp., Saskatoon, Saskatchewan, Canada.
- Montevecchi, W.A., and J.F. Piatt. 1987. Dehydration of seabird prey during transport to the colony: effects on wet weight energy densities. Can. J. Zool. 65:2822-2824.
- Pank, L.F., S.F. Fancy, M.C. Hansen, and W.L. Regelin. 1987. Remote sensing of animal location and activity by satellite. Proc. Intern. Congress Game Biologists, Krakow, Poland.
- Petersen, M.R. 1987. Strong philopatry, frequent non-nesting, and high mortality exhibited by emperor geese. U.S. Fish and Wildl. Serv. Research Information Bull. 87-120.

Piatt, J.F., and R.L. McLagan. 1987. Colony attendance patterns of common murres (Uria aalge) at Cape St. Mary's, Newfoundland. Can. J. Zool. 65:1530-1534.

Piatt, J.F., and D.N. Nettleship. 1987. Incidental catch of marine birds and mammals in fishing nets off Newfoundland, Canada. Marine Poll. Bull. 18:344-349.

Reynolds, H.V., III, and G.W. Garner. 1987. Patterns of grizzly bear predation on caribou in northern Alaska. Pages 59-67 in P. Zager, ed. Bears - their biology and management. Seventh Intl. Confer. on bear research and manage. Intl. Assoc. Bear Research and Manage.

Sanger, G.A. 1987a. Winter diets of Common Murres and Marbled Murrelets in Kachemak Bay, Alaska. Condor 89(2):426-30.

Sanger, G.A. 1987b. Trophic levels and trophic relationships of seabirds in the Gulf of Alaska. Pages 229-257 in J.P. Croxall, ed. Seabirds: feeding biology and role in marine ecosystems. Cambridge University Press.

Sanger, G.A. 1987c. Puffin diets used to study Alaskan commercial fish. U.S. Fish and Wildl. Serv. Research Information Bull. 87-9.

Sedinger, J.S., and K.S. Bollinger. 1987. Autumn staging of cackling Canada geese on the Alaska Peninsula. Wildfowl 38:13-18.

Shields, G.F., and A.C. Wilson. 1987a. Subspecies of the Canada goose (Branta canadensis) have distinct mitochondrial DNA's. Evolution 41(3):662-666.

Shields, G.F., and A.C. Wilson. 1987b. Calibration of mitochondrial DNA evolution in geese. J. Mol. Biol. 24:212-217.

Vermeer, K., S.G. Sealy, and G.A. Sanger. 1987. Feeding Ecology of Alcidae in the Eastern North Pacific Ocean. Pages 189-277 in J.P. Croxall, ed. Seabirds: feeding biology and role in marine ecosystems. Cambridge University Press.

Ward, D.H. 1987. The availability and nutrient content of seagrasses eaten by Pacific black brant at Laguna De San Ignacio, B.C.S., Mexico. Pacific Seabird Group, 14(1):40. Abstract.

Ward, D.H., D.V. Derksen, and P.D. Schomer. 1987. Effects of aircraft noise on Pacific black brant and other geese in Alaska. J. Acoust. Soc. Am. 82:99.

Whitten, K.R., F.J. Mauer, and G.W. Garner. 1987. Calving distribution, initial productivity, and neonatal mortality of the porcupine caribou herd, 1985. Pages 496-572 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Wilmot, R.L. 1987. Method to predict total return of sockeye salmon. U.S. Fish and Wildl. Serv. Research Information Bull. 87-24.

1988

Amstrup, S.C., and D. DeMaster. 1988. Polar bear Ursus maritimus. Pages 39-56 in J.W. Lentfer, ed. Selected marine mammals of Alaska: species accounts with research and management recommendations. Marine Mammal Commission, Washington, DC.

Bowyer, R.T., S.C. Amstrup, J.G. Stahmann, P.E. Reynolds, and F.A. Burris. 1988. Multiple regression methods for modeling caribou populations. Proc. N. Am. Caribou Workshop 3. Alaska Dept. Fish and Game Wildl. Tech. Bull. 8:89-118.

Brundige, G.C., L.J. Layne, and T.R. McCabe. 1988. Early pregnancy determination using serum progesterone concentration in bighorn sheep. J. Wildl. Manage. 52(4):610-612.

Burger, C.V. 1988. Thermal adaptations in Alaskan populations of chinook salmon. Pages 98-106 in W. R. Heard, ed. Proc. of the 1987 chinook salmon workshop, Natl. Marine Fish. Serv., Auke Bay, Alaska.

Day, R.H., A.R. DeGange, G.J. Divoky, and D.M. Troy. 1988. Distribution and subspecies of dovekie in Alaska. Condor 90:712-714.

DeGange, A.R. 1988. Surface-mount transmitters enhance studies of sea otters in Alaska. U.S. Fish and Wildl. Serv. Research Information Bull. 88-48.

Dieter, C.D. and T.R. McCabe. 1988. Beaver crop depredation in eastern South Dakota. Prairie Nat. 20(3):143-146.

Divoky, G.J., G.A. Sanger, S.A. Hatch, and J.C. Haney. 1988. Fall migration of Ross' gull (Rhodostethia rosea) in Alaskan Chukchi and Beaufort seas. Final Rep. Minerals Management Service, Anchorage, AK. OCS Study MMS 88-0023. 120 pp.

Douglas, D.C., J.C. Greslin, and L.F. Pank. 1988. Satellite telemetry and geographic information systems: powerful tools for wildlife research and management. Pages 83-93 in J.B. Gregory, ed. Proceeding Resource Technology 88. Intl. Symp. Adv. Technol. in Nat. Resour. Manage., June 1988, Ft. Collins, CO. Am. Soc. Photogrammetry and Remote Sensing, Falls Church, VA.

Fancy, S.G., L.F. Pank, D.C. Douglas, C.H. Curby, G.W. Garner, S.C. Amstrup, and W.L. Regelin. 1988a. Satellite Telemetry: A new tool for wildlife research and management. U.S. Fish and Wildl. Serv. Resour. Pub. 172. 55 pp.

Fancy, S.G., L.F. Pank, D.C. Douglas, C.H. Curby, G.W. Garner, S.C. Amstrup, and W.L. Regelin. 1988b. Development and evaluation of a system for tracking wildlife by satellite. Proc. Second International Symp. on Nutrition of Herbivores, Brisbane, Australia.

Fancy, S.G., and M.N. Silbert. 1988. Satellite-aided recovery of auroral rocket payload in northern Alaska. Pages 173-180 in Proceed. Intl. Argos Users Conference, Greenbelt, Maryland, Sept. 15-17, 1987.

Fancy, S.G., K.R. Whitten, L.F. Pank, W.L. Regelin, and R.B. Harris. 1988. Seasonal movements and activity of the porcupine and central arctic herds determined by satellite telemetry. Proc. Third N. Amer. caribou workshop. Alaska Dept. of Fish and Game, Wildl. Tech. Bull. No. 8:185. Abstract.

Fellows, D.P., L.F. Pank and R.M. Engeman. 1988. Hazards to birds from zinc phosphide rat bait in a macadamia orchard. Wildl. Soc. Bull. 16(4):411-416.

Gill, R.E., B.J. McCaffery, and T.G. Tobish. 1988. Bristle-thighed curlews, biologists, and bird tours--a place for all. Birding 20:148-155.

Handel, C.M., and C.P. Dau. 1988. Seasonal occurrence of migrant whimbrels and bristle-thighed curlews on the Yukon-Kuskokwim Delta, Alaska. Condor 90:782-790.

Haney, J.C. 1988. Foraging by northern fulmars (Fulmaris glacialis) at a nearshore, anticyclonic tidal eddy in the northern Bering Sea, Alaska. Colonial Waterbirds 11(2):318-321.

Haney, J.C., and A.E. Stone. 1988a. Littoral foraging by red phalaropes during spring in the northern Bering Sea. Condor 90(3):723-726.

Haney, J.C., and A.E. Stone. 1988b. Seabird foraging tactics and water clarity: Are plunge divers really in the clear? Mar. Ecol. - Prog. Ser. 49:1-9.

Hatch, S.A. 1988. Attendance of common and thick-billed murres at breeding sites: implications for population monitoring. Pac. Seabird Group Bull. 15:30. Abstract.

Hatch, S.A., and M.A. Hatch. 1988. Colony attendance and population monitoring of Black-legged Kittiwakes on the Semidi Islands, Alaska. Condor 90:613-620.

Hills, S., and C.H. Ficus. 1988. Cephalopod beaks from the stomachs of northern fulmars (Fulmarus glacialis) found dead on the Washington coast. The Murrelet 69:15-20.

Johnson, A.M. 1988. Sea otters of Prince William Sound, Alaska. Contract 98210-01024-86, final report to the Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, Anchorage, AK.

Jones, L.L., and A.R. DeGange. 1988. Interactions between seabirds and fisheries in the North Pacific Ocean. Pages 269-291 in J. Burger, ed. Seabirds and other marine vertebrates: competition, predation, and other interactions. Columbia Univ. Press, New York. 144 pp.

Knick, S.T., and W. Kasworm. 1988. Shooting mortality in small populations of grizzly bears. Wildl. Soc. Bull. 17:11-15.

Lensink, C.J. 1988. Survival of aluminum and monel bands on black brant. N. Am. Bird Bander 13:33-35.

McCabe, T.R. and M.L. Wolfe. 1988. Effects of simulated muskrat grazing on emergent vegetation. Pages 147-158 in Wilcox, D.A., ed. Interdisciplinary approaches to freshwater wetlands research. Michigan State Univ. Press, East Lansing, MI.

McIntyre, J.D., R.R. Reisenbichler, J.M. Emlin, R.L. Wilmot, and J.E. Finn. 1988. Predation of Karluk River sockeye salmon by coho salmon and char. Fish. Bull. 86:611-616.

Monson, D., and A.R. DeGange. 1988. Sea otters and Alaska's developing sea farming industry. Unpubl. report, Alaska Fish and Wildlife Research Center, U.S. Fish and Wildl. Serv., Anchorage, AK.

O'Gara, B.W., and R.B. Harris. 1988. Age and condition of deer killed by predators and automobiles. J. Wildl. Manage. 52:316-320.

Olson, R.A., J. D. Winter, and J.M. Haynes. 1988. Resource partitioning in summer by salmonids in southcentral Lake Ontario. Trans. Am. Fish. Soc. 117:552-559.

Palmisano, A.N., and C.V. Burger. 1988. Use of a portable electric barrier to estimate chinook salmon escapement in a turbid Alaskan river. N. Am. J. Fish. Manage. 8:475-480.

Piatt, J.F., S.A. Hatch, B.D. Roberts, W.W. Lidster, J.L. Wells, and J.C. Haney. 1988. Populations, productivity, and feeding habits of seabirds on St. Lawrence Island, Alaska. Final Rep. Minerals Management Service, Anchorage, AK. OCS Study MMS 88-0022. 235 pp.

Rextad, E.A., D.D. Miller, C.H. Flather, E.M. Anderson, J.W. Hupp, and D.R. Anderson. 1988. Questionable multivariate statistical inference in wildlife habitat and community studies. J. Wildl. Manage. 52(4):794-798.

Sanger, G.A., and D.A. Ainley. 1988. Review of the distribution and feeding ecology of seabirds in the oceanic subarctic north Pacific Ocean. Pages 161-186 in T. Nemoto and W.G. Percy, eds. Biology of nekton of the oceanic subarctic North Pacific Ocean. Bull. Ocean. Res. Inst., Univ. Tokyo.

Vacca, M. M., and C.M. Handel. 1988. Factors influencing predation associated with visits to artificial goose nests. J. Field Ornithol. 59(3):215-223.

Ward, D.H., and D.V. Derksen. 1988. Response of staging and molting Pacific black brant and other geese to aircraft disturbances in Alaska. Page 7 in Asherin, D.A. and D.N. Gladwin, eds. Effects of aircraft noise and sonic booms on fish and wildlife: a research needs workshop. U.S. Fish Wildl. Serv., National Ecology Research Center, Fort Collins, CO. NERC-88/23.

1989

Ainley, D.G., H.R. Carter, D.W. Anderson, K.T. Briggs, M.C. Coulter, F. Cruz, J.B. Cruz, C.A. Valle, S.I. Fefer, S.A. Hatch, E.A. Schreiber, R.W. Schreiber, and N.G. Smith. 1989. Effects of the 1982-83 El Nino-southern oscillation on Pacific Ocean bird populations. Proc. 19th Intl. Ornithol. Congress 2:1747-1758.

Amstrup, S.C., and C.A. Nielsen. 1989. Acute gastric dilatation and volvulus in a free-living polar bear. J. Wildl. Dis. 25(4):601-604.

Amstrup, S.C., and C. Gardner. 1989. Philopatry in maternal denning of polar bears in the Beaufort Sea. Eighth biennial conference on the biology of marine mammals, Dec. 1989, Pacific Grove, CA.

Amstrup, S.C., C. Gardner, K.C. Meyers and F.W. Oehme. 1989. Ethylene glycol (antifreeze) poisoning of a free-ranging polar bear. Vet. Hum. Toxicol. 31:317-319.

Ballard, W.B., S.G. Fancy, D.J. Reed, K.E. Roney, and M.A. Spindler. 1989. Demography and movements of wolves in northwest Alaska. Alaska Dept. Fish and Game Spec. Rep., Juneau. 45 pp.

Barnes, V.G., Jr., 1989. Effects of encounters between deer hunters and bears on Kodiak Island. Alaska 56(1):12.

Benson, C., C. Curby, B. Zimont, and E. Jozwiak. 1989. Spatial and temporal distribution of biting and parasitic insects on the coastal plain and adjoining foothills of the Arctic National Wildlife Refuge. Pages 1236-1281 in G.W. Garner and P.E. Reynolds, eds. 1985 update report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Cameron, R.D., S.G. Fancy, and W.T. Smith. 1989. Reproductive performance of caribou in relation to habitat availability and quality. Pages 39-60 in T.R. McCabe, ed. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Annual Progress Report, 1988. U.S. Fish and Wildl. Serv., Anchorage, AK.

Cameron, R.D., W.T. Smith, and S.G. Fancy. 1989. Distribution and productivity of the central arctic caribou herd in relationship to petroleum development. Fed. Aid in Wildl. Rest. Report, Proj. W-23-1 and W-23-2. Alaska Dept. Fish and Game, Juneau. 52 pp.

DeGange, A.R. 1989a. Assessment of the fate of sea otters oiled and rehabilitated as a result of the "Exxon Valdez" oil spill. Marine mammals study #7. Unpubl. report, U.S. Fish and Wildl. Serv., Anchorage, AK.

DeGange, A.R. 1989b. Environmental assessment - the magnitude, extent, and duration of effects from the "Exxon Valdez" oil spill on sea otter populations. Unpubl. report, U.S. Fish and Wildl. Serv., Anchorage, AK.

DeGange, A.R., and D.M. Burns. 1989. Assessment of the magnitude, extent, and duration of oil spill impacts on sea otter populations in Alaska. Marine mammals study #6. Unpubl. report., U.S. Fish and Wildl. Serv., Anchorage, AK.

DeGange, A.R., J.W. Fitzpatrick, J.N. Layne and G.E. Woolfenden. 1989. Acorn harvesting by Florida scrub jays. Ecology 70(2):348-356.

DeGange, A.R., and M.M. Vacca. 1989. Sea otter mortality at Kodiak Island, Alaska, during summer 1987. J. Mammal. 70(4):836-838.

Dieter, C.D. and T.R. McCabe. 1989a. Factors influencing beaver lodge site selection on a prairie river. Am. Midl. Nat. 122(4):408-411.

Dieter, C.D. and T.R. McCabe. 1989b. Habitat use by beaver along the Big Sioux River in eastern South Dakota. Pages 135-140 in Gresswell, R.E., B.A. Barton, and J.L. Kershner, eds. Practical approaches to riparian resource management. U.S. Bur. Land Manage., Billings, MT.

Douglas, D.C., 1989. Comparison and implementation of classified vegetation maps derived from LANDSAT-TM and SPOT satellite imagery data bases for delineating wildlife habitat availability and distribution. Pages 90-92 in T.R. McCabe, ed. Terrestrial research: 1002 area - Arctic National Wildlife Refuge. Ann. Prog. Rep., U.S. Fish and Wildl. Serv., Anchorage, AK.

Douglas, D.C., L.F. Pank, G.W. Garner, and S.C. Amstrup. 1989. Satellite telemetry used to monitor the movements and behaviors of large mammals in arctic environments. Proceedings, new technological developments in support of arctic research, Univ. of Alaska, Fairbanks, Sept. 89.

Eastland, W.G., R.T. Bowyer, and S.G. Fancy. 1989. Effects of snow cover on selection of calving sites by caribou. J. Mammal. 70:824-828.

Ely, C.R. 1989. Extra-pair copulation in the greater white-fronted goose. *Condor* 91:990-991.

Ely, C.R., and D.G. Raveling. 1989. Body composition and weight dynamics of wintering greater white-fronted geese. *J. Wildl. Manage.* 53:80-87.

Ely, C.R. and J.Y. Takekawa. 1989. Distribution of subpopulations of greater white-fronted geese in the Pacific flyway. *Alaska Bird Conference. Abstract.*

Esler, D. 1989. An assessment of American coot herbivory of hydrilla. *J. Wildl. Manage.* 53:1147-1149.

Fadely, B.S. 1989. Seawater drinking and isotopic turnover determination of food intake in captive northern fur seals (*Callorhinus ursinus*). Page 18 *in* Proceedings of the eighth biennial conference on the biology of marine mammals. Pacific Grove, CA, Dec. 1989.

Fadely, B.S., J.F. Piatt, S.A. Hatch, and D.G. Roseneau. 1989. Populations, productivity, and feeding habits of seabirds at Cape Thompson, Alaska. Final Rep. Minerals Management Service, Anchorage, AK. OCS study MMS 89-0014. 429 pp.

Fancy, S.G., L.F. Pank, K.R. Whitten, and W.L. Regelin. 1989. Seasonal movements of caribou in arctic Alaska as determined by satellite. *Can. J. Zoo.* 67:644-650.

Fancy, S.G., K.R. Whitten, R.D. Cameron, and R.B. Harris. 1989. Population dynamics and demographics of caribou in developed and undeveloped areas of the Arctic coastal plain. Pages 1-11 *in* T.R. McCabe, ed. *Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Annual Progress Report, 1988.* U.S. Fish and Wildl. Serv., Anchorage, AK.

Fancy, S.G., K.R. Whitten, and R.B. Harris. 1989. Population status and trend of the porcupine caribou herd, 1988. *Annual Wildlife Inventory in* T.R. McCabe, ed. *Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Annual Progress Report, 1988.* U.S. Fish and Wildl. Serv., Anchorage, AK.

Garner, G.W., and P.E. Reynolds, eds. 1989. 1985 Update report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, Alaska. 1281 pp.

Garner, G.W., H.V. Reynolds, M.K. Phillips, G.E. Muehlenhardt, and M.A. Masteller. 1989. Ecology of brown bears inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portions of the Arctic National Wildlife Refuge. Pages 665-690 *in* G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

- Garner, G.W., S.C. Amstrup, D.C. Douglas, and C.L. Gardner. 1989. Performance and utility of satellite telemetry during field studies of free-ranging polar bears in Alaska. Pages 67-76 in C.J. Amlander, Jr., ed. Biotelemetry proceedings of the 10th international symposium on biotelemetry. The Univ. Arkansas Press, Fayetteville.
- Gilbert, J.R. 1989. Aerial census of Pacific walruses in the Chukchi Sea, 1985. *Marine Mammal Science* 5(1):17-28.
- Gould, P.J., and D.J. Forsell. Techniques for shipboard surveys of marine birds. 1989. U.S. Fish and Wildl. Serv., Fish Wildl. Tech. Rep. 25.
- Haney, J.C. 1989a. Remote characterization of marine bird habitats with satellite imagery. *Colonial Waterbirds* 12(1):67-77.
- Haney, J.C. 1989b. Iterative techniques for characterizing marine bird habitats with time series of satellite images. *Colonial Waterbirds* 12:78-89.
- Hatch, S.A. 1989. Individual variation in behavior and breeding success of northern fulmars. Abstract. *Pac. Seabird Group Bull.* 16:30.
- Hatch, S.A., and M.A. Hatch. 1989. Attendance patterns of murres at breeding sites: implications for monitoring. *J. Wildl. Manage.* 53:483-493.
- Hupp, J.W., and C.E. Braun. 1989a. Endogenous reserves of adult male sage grouse during courtship. *Condor* 91:266-271.
- Hupp, J.W., and C.E. Braun. 1989b. Topographic distribution of sage grouse foraging in winter. *J. Wildl. Manage.* 53:823-829.
- Knick, S. 1989. Grizzlies of the Selkirks. *Idaho Wildl., Winter* 1989:5-7.
- Knick, S.T. 1989. Polar bear studies bridge Bering Strait. *North Slope Now* 16(2).
- Kreeger, T.J., D. Monson, V.B. Kuechle, U.S. Seal, and J.R. Tester. 1989. Monitoring heart rate and body temperature in red foxes (*Vulpes vulpes*). *Can. J. Zool.* 67:2455-2458.
- Lensink, C.J., and A.R. DeGange. 1989. Numbers, distribution and composition of sea otters killed during the "Exxon Valdez" oil spill. Eighth biennial conference on the biology of marine mammals, Dec. 1989, Pacific Grove, CA. Abstract.
- Marks, J.S., and P. Hendricks. 1989. On the flushing behavior of incubating white terns. *Condor* 91:997-998.

McCabe, T.R., ed. 1989a. Annual wildlife inventories: Arctic National Wildlife Refuge. Submitted to U.S. Fish Wildl. Serv. 16 pp.

McCabe, T.R., ed. 1989b. Arctic National Wildlife 1002 studies. Annual progress report - field season 1988. Submitted to U.S. Fish Wildl. Serv. 114 pp.

McWhorter, M., D.C. Douglas, R.M. Oates, S.D. Gehman, T.C. Maxwell, J.M. Morton, R. Field, and C.A. Babcock. 1989. Species accounts of birds observed at eight study areas on the coastal plain of the Arctic National Wildlife Refuge, Alaska, 1985. Pages 255-324 in G.W. Garner and P.E. Reynolds, eds. 1985 Update report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Mendenhall, V.M., A.R. DeGange, and R.H. Day. 1989. Seabird mortality in Pacific high-seas driftnet fisheries. 3rd Alaska bird conference and workshop, Mar. 1989, Fairbanks, AK. Abstract.

Methven, D.A., and J.F. Piatt. 1989a. Importance of capelin (Mallotus villosus) in the summer diet of cod (Gadus morhua) at Witless Bay, Newfoundland. J. Cons. Mer. 45:223-225.

Methven, D.A., and J. F. Piatt. 1989b. Seasonal and annual variation in the diet of Atlantic cod (Gadus morhua) in relation to the abundance of Capelin (Mallotus villosus) off western Newfoundland, Canada, J. Cons. Int. Explor. Mer. 45:223-225.

Muehlenhardt, G.E., and G.W. Garner. 1989. Population size, composition, and distribution of moose along the Canning and Kongakut rivers within the Arctic National Wildlife Refuge, Alaska, spring and fall 1985. Pages 649-664 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Muehlenhardt, G.E., T.R. McCabe and F.J. Mauer. 1988. Abundance of forage species at caribou feeding sites on the calving grounds of the Porcupine caribou herd. 1987 field season report, Arctic National Wildlife Refuge. U.S. Fish and Wildl. Serv., Fairbanks, AK. 16 pp.

North, M.R., and M.R. Ryan. 1989. Characteristics of lakes and nest sites used by yellow-billed loons in arctic Alaska. J. Field Ornithol. 60:296-304.

Oates, R.M., A.W. Brackney, M. McWhorter, R.M. Platt, and G.E. Muehlenhardt. 1989. Distribution, abundance and productivity of fall staging lesser snow geese on coastal habitats of northeast Alaska and northwest Canada. Pages 370-392 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Service, Anchorage, AK.

Oates, R.M., D.C. Douglas, M. McWhorter, and C.A. Babcock. 1989. Terrestrial bird populations and habitat use in coastal plain tundra of the Arctic National Wildlife Refuge. Pages 66-254 in G. W. Garner and P. E. Reynolds, eds. 1985 Update report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Pank, L.F., W.L. Regelin, C.H. Curby, and S.G. Fancy. 1989. Caribou use of potential oil and gas development areas in the 1002 region of the Arctic National Wildlife Refuge. Pages 1205-1216 in G.W. Garner and P.E. Reynolds, eds. 1985 Update report, baseline study of the fish, wildlife and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Piatt, J.F., and Lensink, C.J. 1989. "Exxon Valdez" bird toll. Nature 342:865-866.

Piatt, J.F., D.A. Methven, A.E. Burger, R.L. McLagan, V. Mercer, and E. Creelman. 1989. Baleen whales and their prey in a sub-arctic coastal environment. Can. J. Zool. 67:1523-1530.

Reed, A., R. Stehn, and D. Ward. 1989. Autumn use of Izembek Lagoon, Alaska, by brant from different breeding areas. J. Wildl. Manage. 53:720-725.

Reynolds, J.B. 1989. Evaluation of the HSI model for riverine arctic grayling in relation to Alaskan project impacts. Unit contrib. no. 32, ACFRU, Univ. of Alaska, Fairbanks. 23 pp.

Schell, D.M., and S.C. Amstrup. 1989. Oceanic gradients in stable isotope ratios and application to marine mammal studies. Eighth biennial conference on the biology of marine mammals, Dec. 1989, Pacific Grove, CA.

Schmutz, J.A., and C.E. Braun. 1989. Reproductive performance of Rio Grande wild turkeys. Condor 91:675-680.

Schmutz, J.A., C.E. Braun, and W. F. Andelt. 1989. Nest habitat use of Rio Grande wild turkeys. Wilson Bull. 101:591-598.

Sedinger, J.S., R.G. White, F.E. Mann, F.A. Burris, and R.A. Kedrowski. 1989. Apparent metabolizability of alfalfa components by yearling Pacific black brant. J. Wildl. Manage. 53:726-734.

Shepherd, D.A. 1989. Foraging interactions among black-billed magpies, northwestern crows, and red foxes on Kodiak Island, Alaska. Murrelet 69:68-69.

Smith, R.B., V.G. Barnes, Jr., and L.J. VanDaele. 1989. Brown bear-human conflicts in the Kodiak Archipelago, Alaska. Pages 111-119 in Marianne Bromley, ed. Bear-human conflicts: proceedings of a symposium on management strategies. Northwest Territories Depart. Renewable Resources, Northwest Territories, Canada.

Takekawa, J.Y., and C.R. Ely. 1989. Migration and winter distribution of greater white-fronted geese breeding in western Alaska. Sixth North American snow goose conference and workshop. Abstract.

Wahl, T.R., D.G. Ainley, A.H. Benedict, and A.R. DeGange. 1989. Associations between seabirds and water masses in the northern Pacific Ocean in summer. *Mar. Biol.* 103:1-11.

Ward, D.H. 1989. Black brant aircraft disturbance studies. Pages 129-131 in Jarvela, L.E., and L.K. Thorsteinson, eds. Proceedings of the Gulf of Alaska, Cook Inlet, and North Aleutian Basic information meeting. U.S. Dept. of Commerce.

Ward, D.H., and R.A. Stehn. 1989. Response of brant and other geese to aircraft disturbances at Izembek Lagoon, Alaska--final report to Minerals Management Service. U.S. Fish Wildl. Serv., Anchorage, AK, 265 pp.

Weiler, G.J., and G.W. Garner. 1989a. Food habitats of denning wolves on the Arctic National Wildlife Refuge. Pages 743-763 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Weiler, G.J., and G.W. Garner. 1989b. Wolves of the Arctic National Wildlife Refuge: their seasonal movements and prey relationships. Pages 691-742 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Weiler, G.J., G.W. Garner, R. Ambrose, H.V. Reynolds and T.R. McCabe. 1989. Differential impacts of predators on caribou calving in the 1002 area and potential displacement areas: an assessment of predation risk. Pages 25-37 in McCabe, T.R., ed. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Annual Progress Report, 1988. U.S. Fish Wildl. Serv., Anchorage, AK.

Whitten, K.R., F.J. Mauer, G.W. Garner, and D.E. Russell. 1989. Fall and winter movements, distribution, and annual mortality patterns of the porcupine caribou herd, 1984-1985. Pages 484-495 in G.W. Garner and P.E. Reynolds, eds. 1985 update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK.

Whitten, K.R., T.J. Roffe, R.B. Harris, and S.G. Fancy. 1989. Effect of potential displacement of caribou from the 1002 area on mortality rates of calves. Pages 12-24 in T.R. McCabe, ed. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Ann. Prog. Rep. U.S. Fish and Wildl. Serv., Anchorage, AK.

Wilmot, R.L. 1989a. Genetic stock identification techniques aid in the management of Yukon River chum salmon. U.S. Fish and Wildl. Serv. Research Information Bull. 89-23.

Wilmot, R.L. 1989b. Genetic stock identification of north slope arctic char. Pages 57-58 in Proceedings: a synthesis of environmental information on causeways in the nearshore Beaufort Sea, Alaska. Minerals Manage. Serv. study MMS 89-0038.

Wilmot, R.L., R. Everett, and W.A. Gellman. 1989a. Genetic stock identification of sockeye and chum salmon from Bristol Bay, Alaska. Pages 31-33 in C.W. Macklenburg, ed. Proceedings Gulf of Alaska, Cook Inlet, and North Aleutian Basin information update. Point Stevens Press, Auke Bay, AK.

Wilmot, R.L., R.J. Everett, and W.A. Gellman. 1989b. Genetic stock identification of sockeye and chum salmon from Bristol Bay, Alaska. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 63 (1989):553-599.

1990

Amstrup, S.C. 1990. Research on polar bears in Alaska, 1985-1988. Proceedings of the 10th working meeting of the IUCN polar bear specialists group, Sochi, U.S.S.R. In press.

Bajzak, D., and J.F. Piatt. 1990. Computer-aided procedure for counting waterfowl on aerial photographs. Wildl. Soc. Bull. In press.

Barnes, V.G., Jr. 1990. The influence of salmon availability to movements and range of brown bears on southwest Kodiak Island. Int. Conf. Bear Res. and Manage. 8:___ In press.

Bruce, D.S., N.K. Darling, K.J. Seeland, P.R. Oeltgen, and S.C. Amstrup. 1990a. Does the polar bear (Ursus maritimus) hibernate?: Continued studies on opioids and hibernation. Paper presented at 73d annual meeting of FASEB, New Orleans. FASEB J. 3:A396(#988), 1989. Abstract.

Bruce, D.S., N.K. Darling, K.J. Seeland, P.R. Oeltgen, and S.C. Amstrup. 1990b. Is the polar bear (Ursus maritimus) a hibernator?: Continued studies on opioids and hibernation. Pharmacol. Biochem. and Behavior. 35(3):___ In press.

Bruce, D.S., N.K. Darling, K.J. Seeland, P.R. Oeltgen, S.P. Nilekani, and S.C. Amstrup. 1990. Continued studies on opioids and hibernation: Do polar bears hibernate? Living in the Cold II. Le Hohwald, Strasbourg, France, Apr. 1989. Abstract.

Burger, A.E., and J.F. Piatt. 1990. Flexible time budgets in breeding common murre: buffers against variable prey availability. Stud. Avian Biol. In press.

Ely, C.R. 1990a. Effects of neck bands on the behavior of wintering greater white-fronted geese. J. Field Ornith. In press.

Ely, C.R. 1990b. Goose roundup at the Old Chevak corral. Alaska Fish and Game Magazine. In press.

Fadely, B.S., G.A.J. Worthy, and D.P. Costa. 1990. Assimilation efficiency of northern fur seals determined using dietary manganese. J. Wildl. Manage. 54:246-251.

Fancy, S.G., R.B. Harris, D.C. Douglas, L.F. Pank, K.R. Whitten, T.R. McCabe, and G.W. Garner. 1990. Application of satellite telemetry to wildlife research and management in Alaska. Ecologia Mediterranea. In press.

Fellows, D.P., L.F. Pank, H.W. Hilton, and A.H. Teshima. 1990. Rats and their control. Pages 91-147 in Agronomic and factory practices manual. Hawaiian Sugar Planters Association, Aiea, HI.

Garner, G.W., S.T. Knick, and D.C. Douglas. 1990. Seasonal movements of adult female polar bears in the Bering and Chukchi seas. Int. Conf. Bear Res. and Manage. 8:____ In press.

Harris, R.B., S.G. Fancy, D.C. Douglas, G.W. Garner, S.A. Amstrup, T.R. McCabe, and L.F. Pank. 1990. Tracking wildlife by satellite: current systems and performance. U.S. Fish and Wildl. Service, Resource Publ. In press.

Harris, R.B., S.G. Fancy, D.C. Douglas, G.W. Garner, T.R. McCabe, and L.F. Pank. 1990. Tracking wildlife by satellite: Current systems and performance. U.S. Fish and Wildl. Serv. Resour. Pub.____. In press.

Petersen, M.R. 1990. Nest site selection by emperor geese and cackling Canada geese. Wilson Bull. 102(3):____ In press.

Piatt, J.F. 1990. Aggregative response of common murrelets and Atlantic puffins to their prey. Stud. Avian Biol. In press.

Piatt, J.F., and C.J. Lensink. 1990. "Exxon Valdez" oil spill kills over 27,000 marine birds. U.S. Fish & Wildl. Serv. Research Information Bull. In press.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D. Nysewander. 1990. Immediate impact of the "Exxon Valdez" oil spill on marine birds. Auk 92:____ In press.

Piatt, J.F., B.D. Roberts, and S.A. Hatch. 1990. Colony attendance and population monitoring of least and crested auklets on St. Lawrence Island, Alaska. Condor 92:109-116.

Piatt, J.F., B.D. Roberts, W.W. Lidster, J.L. Wells, and S.A. Hatch. 1990. Effects of human disturbance on breeding success of least and crested auklets at St. Lawrence Island, Alaska. Auk 92:____. In press.

Piatt, J.F., J.L. Wells, A. MacCharles, and B. Fadely. 1990. The distribution of seabirds and their prey in relation to ocean currents in the southeastern Chukchi Sea. Can. Wildl. Serv. Occasional Papers. Accepted.

Van Daele, L.J., V.G. Barnes, Jr., and R.B. Smith. 1990. Denning characteristics of brown bears on Kodiak Island, Alaska. Int. Conf. Bear Res. and Manage. 8:____. In press.

Ward, D.H., R.A. Stehn, and D.V. Derksen. 1990. Behavior and energetics of Pacific black brant in response to aircraft overflights at Izembek Lagoon, Alaska. In Proceedings of Minerals Management Service information transfer meeting. U.S. Dept. of Interior, Minerals Management Service, Anchorage, AK. In press.

Ward, D.H., R.A. Stehn, D.V. Derksen, M. White, B. Hoover, and P.D. Schomer. Response of molting Pacific black brant to helicopter noise near Teshekpuk Lake, Alaska. In Proceedings of the Minerals Management Service information transfer meeting. U.S. Dept. of Interior, Minerals Management Service, Anchorage, AK. In Press.

SUBPOPULATIONS OF GREATER WHITE-FRONTED GEESE: IMPLICATIONS FOR MANAGEMENT

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Abstract: We followed the movements, and documented the distribution of wintering adult greater white-fronted geese radio-marked on the Yukon-Kuskokwim Delta (YKD) and in the Bristol Bay Lowlands (BBL) of Alaska during July in 1988 and 1989. The BBL component was represented by 30 geese captured near Hook Lagoon on the Alaska Peninsula, and 22 geese marked with radios on the Nushagak Peninsula. Forty-one radios were placed on geese near the Kashunuk and Manokinak Rivers as a sample of geese from the central YKD population. All geese were captured during wing molt; geese radio-marked on the YKD were from brood flocks and molting flocks, whereas geese captured in the BBL were thought to be non-breeding birds. Geese from the BBL were significantly larger than geese trapped on the YKD, with respect to culmen and body weight (males) and tarsus length (females).

Radio tracking in Alaska revealed that some white-fronted geese from the YKD stopped along the Alaska Peninsula on their southward migration. Over 80% of the radio-marked geese were relocated outside of Alaska, primarily in the Klamath Basin; the most important fall and spring staging area of greater white-fronted geese in the Pacific Flyway. BBL greater white-fronted geese arrived in Oregon and California significantly earlier (mean arrival 18 September) than geese marked on the YKD (mean arrival 12 October). Geese from the BBL also departed the Klamath Basin earlier than geese from the YKD (3 October vs. 8 November), and were more likely to use the Sacramento-San Joaquin Delta than geese from the Delta.

Sixteen geese marked in the BBL and two from the YKD population were relocated in the interior highlands of northern Mexico in 1989; one additional BBL bird was located on the west coast of Mexico. Fifteen of the BBL geese which wintered in Mexico returned to the Sacramento-San Joaquin Delta and San Joaquin Valley of California in late January. Our data indicate that greater white-fronted geese from the BBL are part of a subpopulation which migrates into Oregon and California in early September and continues into Mexico by mid-October. Geese from the BBL population suffer little if any hunting mortality in the United States, and although little is known of harvest rates in central Mexico, winter mortality rates are likely substantially different between the two populations. The 10 to 20 thousand geese from the BBL may represent up to 15 percent of the Pacific Flyway population of greater white-fronted geese. It is suggested that BBL geese be managed as a separate subpopulation.

FOX PREDATION ON NESTING GEESE OF THE YUKON-KUSKOKWIM DELTA

R. Michael Anthony

Abstract: Studies of fox predation on nesting geese on the Yukon Delta NWR, which were initiated in 1985, have produced information on arctic fox biology (home range, productivity, food habits, den characteristics), predation rates on nests, and efficacy of fox control to improve next success.

Arctic foxes are by far the most serious predator on goose eggs. In the absence of foxes next losses to predators are generally >15% for cackling Canada geese and brant.

Nest predation is greatest on brant due to their inability to defend nests and high nesting densities. Cacklers also are vulnerable to foxes because of their small size. Emperors are less vulnerable, but can suffer high predation rates. White-fronts are least likely to be affected by predators because of their large size and aggressive defense of nests. Predation on adult geese is negligible. Predation on broods by foxes is largely unknown.

Fox productivity has been increasing since 1987 with increasing microtine populations, which peaked in 1988. High microtine populations have resulted in lower nest predation by changing the distribution and foraging behavior of foxes.

Control of foxes in late spring at a large brant colony near Tutakoke River has coincided with consistently high nest success (>80%) in 1986-1989 following nearly complete nesting failure in 1984-1985. Control of foxes over a larger area with high densities of nesting cacklers, emperors, and white-fronts has produced significantly greater nest success for cacklers and emperors compared to an adjacent area without fox control.

Immigration of foxes into removal areas has been negligible during the nesting period (mid-May to early July). Reoccupation of vacated habitat occurs with dispersal of fox families in fall and winter. Radio-tracking indicates fidelity to summer home ranges by adults through fall and winter.

BREEDING ECOLOGY OF NORTHERN PINTAILS IN ALASKA

J. Barry Grand

Abstract: Studies of the productivity and survival of northern pintails (*Anas acuta*) in Alaska were initiated in 1989 at Canvasback Lake on the Yukon flats NWR (YFNWR). Our objectives were to determine the chronology and success of nesting and the survival rates of hens and broods through fledging.

Twenty-four hens were radio-marked April 30 - May 7. Three of the six hens remaining on the study area were killed by predators. Searches of the Arctic Slope of Alaska, the Alaska-Yukon Breeding Pair Strata, and other wetland areas near YFNWR located only three additional birds. Other hens were found near Healy, Alaska during May, near Kluane, Yukon Territories, Canada in August, and northern California in October. Nesting was not detected by any of the radio-marked hens. Hens remaining on YFNWR were lighter and had lower condition indices than hens leaving the study area ($P > 0.05$). Weight and condition of hens killed by predators were not lower than those of surviving hens ($P \geq 0.05$).

In 154 person hours, 25 duck nests were discovered, only 4 of which were pintail nests. Success rates were not calculated due to small sample size and possible effects of human visitation. The mean date of nest initiation by pintails was June 26 which corresponded roughly to increased sex ratios recorded on weekly surveys.

Field studies in 1990 will focus on 3 areas: 1) comparative nutrient dynamics and their effects on nesting effort on YFNWR and the Yukon Delta, 2) the factors influencing nest success, and 3) brood survival on YFNWR.

STATUS AND TRENDS OF PACIFIC BLACK-LEGGED KITTIWAKES AND
ECOLOGICAL STUDIES ON MIDDLETON ISLAND

Scott Hatch

Abstract: Black-legged Kittiwakes are widely distributed in the subarctic North Pacific Ocean and adjacent seas, with a total breeding population of some 2.5 million individuals. Compared to their performance in the North Atlantic, kittiwakes have exhibited poor productivity in Alaska since at least the mid-1970's (0.32 young/pair in Alaska versus 1.1 young/pair in the northeastern Atlantic). The situation has worsened during the 1980's, with recent (1986-1989) estimates of annual productivity averaging 0.17 young/pair. The frequency of "colony failures" (<0.1 young/pair) has exceeded 50% in Alaska since 1980. Populations are down on some islands (30% on the Pribilofs, 50% on Middleton), and widespread declines may occur unless productivity improves.

It has been proposed that breeding failures in the Bering Sea (the Pribilof Islands in particular) are the result of commercial overfishing of walleye pollock, one of the birds' principal foods in that region. Data are needed on adult survivorship, because an alternative view is that current rates of reproduction reflect natural, long-term patterns, which are offset by high rates of post-fledging survival. It is equally important to evaluate the productivity of Bering Sea colonies by comparison with selected controls. The colony on Middleton Island is appropriate because there is no fishery for pollock or other known prey of kittiwakes in the region (north-central Gulf of Alaska).

With or without competition from commercial fisheries, there is evidence that reproductive failures in kittiwakes are caused by food shortages near the colonies. Stress apparently can occur at any stage of the breeding cycle, resulting in highly variable numbers of birds laying eggs, hatching eggs, or raising young. In principle, the specific causes of breeding failure, if they are related to nutrition, can be identified by monitoring time and energy budgets over the course of the nesting season. The development of remote instrumentation is required to do this. The Middleton Island colony offers several advantages for deploying such instrumentation at individual nest sites and also for measuring adult survival rates. Studies in progress are providing information on the energy balance of kittiwakes breeding on Middleton Island and a basis for evaluating alternative explanations of breeding failure at colonies throughout Alaska. Computer-controlled electronic balances developed in this project may have applications to other problems of avian breeding energetics. Information obtained on adult survival will be the first available for any population of kittiwakes in the North Pacific.

STATUS, DISTRIBUTION, AND BIOLOGY OF BRISTLE-THIGHED CURLEWS:
AN INTERNATIONAL STUDY

Colleen M. Handel
Robert E. Gill, Jr.

The bristle-thighed curlew has been targeted as a species of concern because of its apparently small population, limited reproductive capacity, potential threats from contaminants and subsistence hunting, and complicated, multinational jurisdiction. In spring of 1988, the Center began a 5-year study of the bristle-thighed curlew to: 1) assess the status of the population; 2) identify critical areas used for breeding and staging; 3) determine basic life history parameters and requirements throughout its annual cycle; 4) identify threats to the population; and 5) provide options for management of the species.

Through studies on the breeding grounds in cooperation with the Yukon Delta NWR (YDNWR), we have delineated two disjunct and very limited breeding areas in mountains of the northern Yukon Delta and western Seward Peninsula. We are now calculating an estimate of the size of the breeding population and describing key physiographic and habitat characteristics of the breeding areas based on extensive census work in 1988 and 1989. In 1989 we began an intensive study within the core breeding area on the Seward Peninsula to compare with results of a similar ongoing study by the YDNWR in the southern core breeding area. We are quantifying factors limiting reproductive success, measuring survivorship of marked individuals, identifying potential threats to production, and estimating the comparative importance of the two core areas in recruitment to the population.

Fieldwork on the coastal staging area of the Yukon Delta is focused on intensive ground surveys to calibrate data from 4 years of extensive aerial surveys that we had done earlier. Aerial data provide a comprehensive picture of critical staging areas and interannual variation in abundance of postbreeding birds; replicated ground surveys are being analyzed to describe seasonal use patterns and possibly estimate turnover rates. Experimental air and ground surveys done simultaneously are being analyzed to calculate correction factors. Our goal is to develop a simple, reliable, cost-effective survey protocol for monitoring the status of the population.

Finally, work was conducted at three sites in the central Pacific during spring and has continued at one during fall, winter and summer in cooperation with Montana Cooperative Wildlife Research Unit. No major staging areas have yet been identified as "bottlenecks" during spring migration, but logistical constraints have hampered that aspect of the study. Data from a color-banded population indicate that curlews probably do not breed until at least 3 years old, and that a period of flightlessness during molt may make the species particularly vulnerable to introduced predators throughout its wintering range.

Several critical gaps in the knowledge of this species will be addressed during the next 3 years. On the breeding grounds, work will focus on: 1) calibrating census data to actual breeding densities so we can accurately estimate the size of the population; 2) identifying factors limiting reproduction and estimating interannual variation in productivity of this

long-lived species; and 3) visiting three sites identified in 1989 as critical for defining the disjunct distributions and estimating the size of the breeding population. Work on the staging grounds in Alaska will focus on: 1) analyzing comprehensive survey data to determine current distribution and temporal abundance; 2) calibrating aerial and ground surveys; and 3) developing a reliable method for monitoring the status of the population. Work on the wintering grounds will focus on: 1) determining the importance of flightlessness in the population; 2) refining methods to age and sex live birds; 3) providing an estimate of annual survival rates for different age and sex classes; and 4) identifying migratory routes and distribution in relation to threats of contaminants, subsistence hunting, and depredation by introduced animals.

The bristle-thighed curlew is the most unique and challenging species with which we have ever worked. The inaccessibility that may have provided protection for the population in the past hinders simple efforts at determining their status and developing sound models for management. Characteristics and behaviors that may have once been adaptive in remote, inaccessible areas may now be rendering the species particularly vulnerable to threats associated with human encroachment.

RESPONSE OF STAGING PACIFIC BLACK BRANT TO HUMAN DISTURBANCE
AT IZEMBEK LAGOON, ALASKA

David H. Ward
Robert A. Stehn

Abstract: Effects of increased disturbance on Pacific black brant (Branta bernicla nigricans) were studied at Izembek Lagoon, Alaska, 1985-1988. In 2,038 h of daylight observations, rate of potential disturbance occurred at 1.1 per h. Aircraft (54%) and people on foot (6%) were the most frequent human-related causes of disturbance and bald eagles (Haliaeetus leucocephalus) (24%) were the most important natural disturbance. The entire brant flock responded to 48% of all events and took flight in 35%. Bald eagles and boats elicited the greatest response in flocks of brant. Experimental flights by aircraft along prescribed flight lines allowed precise determination of aircraft altitude and lateral distance to test flocks. The response of brant to fixed-wing aircraft decreased with both greater altitude and lateral distance. In contrast, the response of brant to helicopters did not diminish with increased altitude. A model was developed to evaluate the potential impact of disturbance on the energetic requirements of brant. The model predicted that one daily disturbance would decrease total body weight at departure by 7.4 g. The loss of 7.4 g of lipids is equivalent to 53 min or 73 km of migratory flight. Ten daily disturbances reduced body weight to 96% of the expected departure weight. If 45 disturbances occurred daily, brant would not gain any weight at Izembek. Predictions of body weight were most sensitive to changes in the amount, quality, and assimilation of the food. A 10% increase in forage intake caused a 34% increase in weight gain and 2-fold increase in number of disturbances tolerated. The model will permit wildlife managers an opportunity to predict the magnitude of disturbance effects relative to the expected weight gain.

GENETIC DIFFERENTIATION OF FISH AND WILDLIFE POPULATIONS IN ALASKA:
RESEARCH PLANS, TECHNIQUES, AND POTENTIAL MANAGEMENT IMPLICATIONS

Matthew A. Cronin

Abstract: Within the last 15 years the rapid development of molecular biological techniques has resulted in extensive analyses of DNA variation in taxonomy and population biology. Analysis of DNA, the actual genetic material, allows greater resolution of genetic variation than was previously available with protein analyses. Most studies of natural populations have concentrated on mitochondrial DNA (mtDNA) which is relatively easier to isolate and analyze than nuclear DNA. In addition, mtDNA is haploid and maternally inherited which allows accurate assessment of matriarchal relationships within and among populations. Analysis of mtDNA and nuclear genes (either allozymes or nuclear DNA) in tandem allows a thorough assessment of the genetic structure of populations.

Several such projects dealing with fish, birds, and mammals are being initiated at the Center DNA lab including assessment of population differentiation of: 1) northern pintails, 2) white-fronted geese, 3) polar bears, 4) caribou, 5) chinook salmon, and 6) chum salmon.

Specific objectives are different in each case, but generally involve assessment of genetic differentiation on different geographic scales, from concentrations within Alaska to holarctic distributions. The basic hypotheses to be tested in each case are: 1) significant genetic differentiation accompanies the spatial subdivision of putative subpopulations identified in field studies; 2) genetic differentiation among subpopulations is temporally stable; 3) there is greater differentiation of maternally inherited mtDNA than nuclear genes, particularly when there is greater male than female dispersal; and 4) there is less genetic differentiation among populations of highly mobile species than that for other species which display greater fidelity to breeding areas and less overall movement.

Methods will involve analyses of restriction fragment length polymorphisms (RFLP) on Southern blots using both mtDNA and nuclear DNA probes. RFLP analysis will also be done on genes amplified with the revolutionary polymerase chain reaction (PCR). Sequencing of PCR-amplified DNA will also be done when appropriate. In some cases, most notably the salmon work, allozyme (protein electrophoresis) data from the Genetic Stock Identification Projects will be combined with the DNA data for a comprehensive description of genetic differentiation of salmon populations.

Management implications include the ability to better identify the degree and duration of segregation of subpopulations identified in field studies. In the case of the migratory ducks and geese, identification of the breeding area of birds on wintering areas may be possible. Similarly, in the salmon projects, the breeding area of fish caught on the high seas may be identified. In the case of the bears and caribou, the level of gene flow among herds or subpopulations will be estimated.

An additional management use of the genetic data will be forensic identification of species or even individuals. This is often required in poaching investigations and we will share information with the Service Forensic Lab in Ashland, OR, in developing techniques and baseline data.

POLAR BEAR STUDIES IN THE BEAUFORT SEA

Steve Amstrup

Abstract: Northern Alaska habitats occupied by polar bears increasingly are being invaded by humans in pursuit of other resources of the North. The 10th largest oil field in North America is already in polar bear habitat, and much more development on and offshore is proposed. Direct mortalities resulting from human activities have recently caused the deaths of two female polar bears—one by shooting and one by poisoning. Since present estimates suggest mortalities are already at the maximum sustainable, these interactions must be taken seriously.

Changes occurring and proposed in northern Alaska and the stated needs of managers who must respond to those changes have led to the following objectives of polar bear studies in the Beaufort Sea: define the population of polar bears using the Beaufort Sea, and determine its size and status; determine recruitment and survival rates of the population; determine ice habitat use patterns and preferences of polar bears, and establish the temporal significance of particular geographic areas; determine the distribution and timing of polar bear maternity denning in northern Alaska; determine whether there are geographic or substrate related variations in denning success; determine locations and habitats preferred for dens relative to proposed and existing petroleum activities; and where possible, establish mitigation measures for identified impacts of petroleum related activities upon polar bears of the Beaufort Sea.

There appears to be a pattern of long-term fidelity of polar bears to the Beaufort Sea region. However, observations collected between 1986 and 1989 verify that in some years there is considerable seasonal movement of animals between the Beaufort and Chukchi seas. Several animals for which we have 5 or more years of telemetry data occupied very different areas in the past couple years than they did earlier emphasizing the value of long-term monitoring of individual animals. A promising new technique has been developed that may help us determine where polar bears live, and how they move. The ratios of ^{12}C to ^{13}C in samples taken from claws of "western" polar bears were different from similar samples from "northern" bears at the .0001 level of probability, with bears from northern Alaska being consistently lighter isotopically. We have found that the tissue comprising the claws of polar bears will be completely replaced from the base to the tip in a little over a year, and sequential samples from the lengths of claws of captured bears have shown a good correlation between isotope ratios and the known locations of the bear.

Through spring 1989 another 15 maternity dens were located by telemetry. Two dens were found within ANWR's 1002 area and 2 others were located just west of ANWR on Flaxman Island. We have now found 96 dens by telemetry, only 23 of which were on land. Twelve of those land dens were on ANWR, and 9 within 1002. Two additional dens have been found within ANWR this winter (1989-90), with a chance of more in the area to be found by subsequent radiotracking. ANWR still appears to be the single most important land denning area in Alaska. Twenty-three percent of dens on land appears to account for as much as 37% of the cubs produced; dens at sea are significantly less productive than those on land. Bears appear to be largely but not entirely faithful to

geographic areas and substrates in which they denned before. Individual females do not appear to be faithful to specific denning sites, however. On the other hand, some particular sites are used repeatedly by different females.

Future work will include continuing movements and den studies, habitat preference determinations, and analysis of current and past data on recruitment, survival, and physical parameters to assess present status of the population relative to its resilience to absorb added human perturbations.

WESTERN ALASKAN POLAR BEAR STUDIES

Gerald Garner

Abstract: Current and planned industrial development within the Chukchi Sea combined with an unregulated harvest of polar bears by Alaskan coastal natives has created an international concern for polar bear populations and their habitat within the United States. The 1976 International Agreement on the Conservation of Polar Bears mandated the Service to conduct research and to take appropriate action to protect and conserve polar bears. To comply, a research program has been established to delineate bounds of the two populations that are hypothesized to occur along the coasts of Alaska; to determine the extent the western populations is shared with the Soviet Union; to assess the size, composition, and status of the population; and to determine the effects of human activities, particularly subsistence hunting, on bear distribution and movements, maternity den selection and occupation, and survival of young.

Results to date indicate that the population is international in scope and is seasonally shared with the Soviet Union. The separation between the Beaufort and Chukchi/Bering populations is not as distinct as was once thought. Two bears that were originally captured in the Beaufort Sea have denned in the vicinity of Wrangel Island, and 7 bears marked in the transition zone between the Beaufort and Chukchi/Bering areas during spring 1989 are currently denned in Soviet territory. Three of 16 bears denning in the western Alaska study area during winter 1990 are on shore in Alaska, while 3 of the 16 dens are on drifting ice and the remainder are on land. The land-based dens are on Wrangel and Herald islands, and the northern coastline of the Chukchi Peninsula in Russia, and on shore in the vicinity of Cape Lisburne, Cape Sabine, and Point Lay in Alaska. Because bears live 20-30 years, conclusions on the interchange rates are premature at this time. The implications of this interchange to management relates to the need to allocate the allowable take between the U.S. and Russia.

Cooperative studies have been established with Soviet scientists and collaring of females emerging from maternity dens on Wrangel and Herald islands will occur this spring. The possibility of using results from the Soviet's annual den survey as an index to population status will also be investigated this spring. Another topic of discussion with the Soviets will be a joint cruise in the northern Chukchi during fall 1991 or 1992 to estimate the population size.

TECHNIQUES TO MONITOR MOVEMENTS OF PACIFIC WALRUSES

Susan Hills

Abstract: Under the Marine Mammal Protection Act, the Service is charged with managing Pacific walruses at their optimum sustainable population level. The population is shared with the Soviet Union and walruses are harvested by both Soviets and Alaskan Natives. Difficulties in establishing a U.S./Soviet Union shared management program have been exacerbated by the lack of precision and accuracy of current population estimation methods and population condition indices.

Techniques have been developed to increase precision and reduce inaccuracies due to estimation of numbers in large groups, differences in survey and analysis technique between Soviet and U.S. researchers, spatial and temporal variation in their use of haulout areas, and variations in the patterns of movement of walruses and ice. Past surveys have been analyzed by Soviet and U.S. methods, alternate sampling strategies and an alternate survey time were evaluated, several permanent recordings and counting methods were investigated, and techniques to capture walruses on land or ice, and to attach satellite transmitters to walruses were developed. Under some circumstances, the Soviet and U.S. methods result in the same population estimate but no variance is possible with the Soviet method. The survey methods recommended to management included: an autumn survey (August-September), systematic adaptive sampling design with strata based on expected walrus densities, photographing the walrus groups seen, and use of similar methods for estimating the number of walruses on terrestrial haulouts.

Satellite transmitter testing will continue in FY-90 and analysis of walrus haulout behavior and movements. Future research will focus on evaluation of condition indices, identification and evaluation of important habitat areas, and sub-population delineation. Population models will be used to determine the effect of the combined harvest on population size and structure.

SEA OTTER ECOLOGY
(1411)

Anthony DeGange

Abstract: Approximately 98% of the population of sea otters in North America resides in Alaskan waters. Along with continued increases in population size and re-occupation of former habitat, have come increasing conflicts with man over shellfish resources. Additional management related problems with sea otters include unregulated subsistence and illegal harvests, and an undocumented but potentially increasing take of sea otters in commercial fishing gear. Under current management, these problems may intensify. A zonal management program has been proposed as an alternative management strategy but its implementation is dependent upon amendments to the Marine Mammal Protection Act, adequate funding, and a more thorough knowledge of sea otter population dynamics and their relationship to their environment.

In 1986, with increased financial support from the Service, the Center initiated a 5-year research program to address the following objectives: 1) to evaluate the magnitude of the conflicts over shellfish; 2) to develop census, marking and condition techniques; 3) to develop population and movement models; 4) to develop techniques to control sea otter populations; 5) to develop techniques to measure "k" and OSP for sea otter populations; and 6) to assist Region 7 with formulating a management plan for sea otters in Alaska. Research was initiated at three locations in Alaska by Center staff, and by contractors and cooperators (ABA Consultants, Alaska Department of Fish and Game, Alaska Pacific University, University of Minnesota, University of Washington). Surveys indicate that sea otter populations in southeastern Alaska are increasing by 20% per year. As of 1987, nearly 5,000 sea otters resided in nearshore habitats in southeastern Alaska. Sea otter survey data and dungeness crab catch data suggest that sea otters reduce the abundance of dungeness crabs in areas where the two species coincide. At Kodiak Island, sea otters are most likely to conflict with commercial fisheries for green sea urchins and dungeness crabs. Sea otters markedly reduced the number, density and biomass of infaunal clams at Kodiak Island. Sea otters also altered community structure of soft-sediment habitats by destroying tube mats of polychaete worms, by providing clam shells which form attachment sites for kelps and anemones, and by providing foraging opportunities for sea stars. In general clams consumed by sea otters in recently exploited areas were larger than clams consumed in long-occupied areas.

Studies of radio-marked sea otters at Kodiak Island and Prince William Sound suggest that survival of sea otters is high except for periods of episodic mortality. Pulses of mortality of sea otters occurred at Kodiak Island in summer 1987 and in eastern Prince William Sound in late 1989-early 1990. Paralytic shellfish toxins have been suggested as one source of mortality; however experimental feeding studies indicate that sea otters can detect and avoid clam tissues with high concentrations of PST provided other foods of low toxicity are available. Other sources of mortality of sea otters are currently under investigation.

Telemetry studies of sea otters in Alaska indicate that sea otters move seasonally from protected locations in winter to more exposed locations in

summer. Young males tended to move greater distances than other sex-age classes at Kodiak Island. Dispersal distances of young animals varied with sex; males usually dispersed outside of the female natal area while females tended to remain within the female natal area. Mortality of young females that remained within their natal area was higher than males that dispersed outside of their natal area.

In 1990 several ongoing studies at Kodiak Island and Prince William Sound will be completed. New initiatives will likely focus on developing methods to estimate "k" and OSP, and evaluating measures of condition and habitat quality.

STATUS AND ECOLOGY OF KODIAK BROWN BEARS

Victor Barnes

Abstract: The Kodiak National Wildlife Refuge (KNWR) was established in 1941 by Presidential Executive Order "for the purpose of protecting the natural feeding and breeding range of the brown bears and other wildlife . ." Today the brown bear remains central to most issues confronting KNWR management. Land acquisition priorities, compatibility determinations on developments, and regulations for public use rely heavily on current and accurate information on the refuge bear population. The Brown Bear Project was established in 1982 to augment Service's commitment to conservation of Kodiak brown bears. Project objectives are to fill information gaps, update biological parameters established in previous studies, assist and disseminate information to Region 7 resource managers, and to provide interagency coordination with bear research and management activities throughout Alaska.

Objectives of specific studies have focused on identification of important brown bear habitat components and factors that influence selection, estimating demographic parameters, population monitoring, and bear/people interactions. These investigations have been conducted as cooperative projects with the Alaska Department of Fish and Game (ADF&G) and the KNWR; operational funding has largely come from KNWR, Region 7, or outside sources.

Findings that relate bear movement patterns to salmon availability have been used in the KNWR Public Use Management Plan to support limitation on public access to key bear concentration areas. Study results also have application to proposed fishery enhancement projects, salmon escapement goals, and aerial stream surveys of bear. A denning ecology study provided primary justification for proposed refuge regulations on snowmobile use. The study revealed that denning periods vary by geographic region on Kodiak Island and provided the foundation for altering the fall sport harvest season, if necessary, to give adult females added protection. Objective estimates of bear density have been determined for two dissimilar areas of Kodiak Island and results have been extrapolated to population estimates, by geographic region, for the entire Kodiak Archipelago. These data will play an important role in a Kodiak Bear Management Plan (e.g., harvest rates and guidelines) currently in preparation by the ADF&G, and have recently been used by the Service in land acquisition negotiations. Studies in progress will yield revised estimates of female survival and productivity, and assess impacts of deer hunting activity on brown bear.

Long-term welfare of brown bears on Kodiak and elsewhere in Alaska will depend on how well resource managers are able to deal with expanding levels of human activity. On KNWR, recreational use alone has increased 10% annually since 1985. Current data will be necessary to make judgments on how brown bears will be affected by specific uses and/or developments. Research needs for KNWR include refined population estimates and identification of key habitat components for eastside Kodiak Island, survival rates for subadult and adult male cohorts, and improved methodology for population estimates and population trend monitoring.

1002 PROGRAM - TERRESTRIAL RESEARCH

Tom McCabe

Abstract: The potential effects of oil and gas development on the wildlife and their respective habitats are a primary issue of concern in congressional deliberations over future management of the 1002 area of the Arctic National Wildlife Refuge. Prediction of specific impacts and recommendation of cost effective mitigation measures will require a comprehensive understanding of demographic, habitat, and behavioral factors that influence wildlife populations. To accomplish this task, 21 research biologists from 7 state, federal and Canadian resource agencies developed an integrated research program. Four major work units with a total of 12 work subunits, 4 Research Work Orders, and 1 cooperative agreement were developed for the research program. The work units addressed several key wildlife species (caribou, brown bears, wolves, golden eagles, muskoxen) and the habitat components of the Arctic Coastal Plain. The initial phase of the research was designed to assess potential impacts of future exploration in the 1002 area. Two of 3 years research have been completed for the exploration phase.

The Porcupine Caribou Herd (PCH) has increased approximately 5% annually since 1979. The Central Arctic Herd (CAH) has overlapped the PCH extensively in summer, and has not been censused since 1983--its size and trend are unknown. Calf production and survival in the CAH in 1989 were the lowest recorded in 15 years, and will be carefully monitored in 1990. In the PCH, predation risk from bears, wolves, and eagles on calves increased with elevational location. Displacement of calving from the 1002 area into the adjacent foothills may increase calf mortality.

Preliminary findings indicate that calf production, distribution, and movements of CAH caribou have been altered by oil development in the Prudhoe Bay area. Initial calf production and survival for caribou in contact with development were significantly lower than that for caribou east of the Sagavanirktok River. In addition, maternal body condition has been linked to calf production and survival.

Snowmelt patterns, forage plant phenology, and seasonal availability of plant nutrients and biomass appear to influence calving and post-calving movements of caribou. Differences in primary forage species exist between the concentrated calving areas and peripheral areas. A land cover map based on satellite imagery is being produced to provide information on the availability and distribution of important habitat types for key wildlife species. Initial data collected will provide verification and accuracy assessment of the satellite imagery.

In early April 1989, 506 muskoxen were seen between the Sagavanirktok River in northcentral Alaska and the Firth River in northwestern Canada. Distribution of muskoxen on the ANWR coastal plain and adjacent areas was similar in 1989 to that observed in 1987 and 1988, but has changed since 1982 when intensive studies of muskoxen began. The decline in numbers within the refuge, due to dispersal in 1986, and lower productivity in 1986 and 1989, and the lack of population growth during the past 2 years, indicate that numbers of muskoxen within the refuge coastal plain may be reaching an upper limit. Data from

satellite-collared and radio-collared muskoxen showed that during winter (November to February) animals remained within relatively small areas and made few long distance movements. Winter feeding sites were found to have significantly ($P < 0.001$) shallower and less compact snow cover.

Although the analyses are preliminary, they represent evidence of selective patterns of habitat use from which impacts on the populations can be assessed. These studies will provide the Service with a sound data base for assessing any effects of exploration and development, and for developing appropriate mitigation measures.

An additional field season will be conducted in FY-90 to complete as many of the research objectives as the present level of funding will allow. An interim report of findings for use in oil exploration mitigation decisions is due in 1991. Research proposals based on the accumulated data and analyses from the exploration phase will be prepared for the developmental phase in FY-91.

INTEGRATION OF TELEMETRY, REMOTE COMMUNICATION, REMOTE SENSING,
AND GEOGRAPHIC INFORMATION SYSTEMS

David Douglas

Abstract: Advanced technologies have provided wildlife scientists with new, cost-effective techniques to collect and analyze data. Advances in the fields of telemetry, satellite imagery, and computers have furnished methods to systematically acquire location, behavioral, and environmental data, and to overcome barriers associated with remote or inaccessible areas and highly mobile or migratory species. Alaska's extreme climate and isolated character have provided a natural laboratory for developing and testing remote sensing techniques.

Satellite telemetry can provide information necessary to address numerous Service issues including declining populations, endangered species recovery, census techniques, impact assessments, identification of population stocks, and assessment of critical habitat. Since 1985, the Center has led the world's most extensive wildlife satellite-tracking program. Initially experimental in scope, satellite telemetry has now become a fundamental tool for studies of caribou, polar bear, muskox, and brown bear. Two Service Resource Publications have been printed that document the procedures and results of satellite telemetry studies conducted by the Research Center and its cooperators. Prototype transmitters are being developed and field tested for monitoring Pacific walruses and large birds. Several computer programs have been written to process large volumes of data received by telemetry studies, and to provide researchers with up-to-date geographic information system data bases and assessments of transmitter performance.

A vegetation habitat map for ANWR coastal plain is being developed using LANDSAT-TM satellite imagery. The improved spatial and spectral resolution of LANDSAT-TM data has improved the capability to map important wildlife habitats and to address how species might respond to habitat modifications or displacements resulting from potential oil and gas development. Advanced Very High Resolution Radiometer (AVHRR) imagery is being evaluated for mapping snow cover conditions on the coastal plain to study the distribution of calving caribou relative to patterns of snow ablation. Airborne videography was tested as a method to acquire ground truth data for satellite imagery classifications. Video data were inferior to 1:6000-scale color infrared photography for verifying LANDSAT-TM classifications, but showed good results for ground truthing ice and snow maps derived from AVHRR imagery.

A cooperative research program has been established with the Soviet Union to develop compatible methods of exchanging and analyzing remotely sensed data for wildlife studies in arctic regions. Direction of this cooperative program will aim at enhancing studies of polar bear and walrus distribution relative to sea-ice characteristics and at assessing impacts of development in low arctic ecosystems. The program also aims at establishing marine and terrestrial data bases that would contribute to regional or global studies of environmental change in arctic ecosystems.

GENETICS OF YUKON RIVER SALMON

Richard Wilmot

Abstract: The Yukon River genetics study was initially funded through a Congressional add-on in FY-87 (\$125,000). This study arose from treaty negotiations between the U.S. and Canada over the allocations of Yukon River salmon stocks between countries. Negotiators identified an urgent need to determine the origin of chum and chinook salmon because, while these stocks are harvested by the U.S. fishery in the Lower Yukon River, many were believed to be of Canadian origin. The objective of this research is to determine the percentage of salmon contributed to the fishery by each country with genetic stock separation techniques. With the assistance and cooperation of biologists from Alaska Department of Fish and Game and from Canada, tissue samples were collected from chum and chinook salmon in all of the major spawning tributaries in both countries during FY-87, FY-88 and FY-89. The subsequent genetic analyses (electrophoresis) conducted on these samples have provided a baseline of gene frequencies. By comparing the baseline to the gene frequencies encountered in subsamples from the mixed-stock fishery in the Lower Yukon, genetic origins can be determined through complex computer analyses. Preliminary results to date indicate the occurrence of a large percentage of U.S.-origin, summer-run chum salmon that were not detected in previous Canadian studies. Results also show that stocks having origins in rivers near the U.S.-Canada border are difficult to separate and may require the use of additional genetic and non-genetic characters for separation. Overall results to date will be presented to the Joint Technical Committee and to the negotiating teams during spring of 1990. Region 7 (Fishery Management Services) is a major cooperator in our study. The project is scheduled for completion during FY-91.

TUSTUMENA LAKE SALMON INVESTIGATIONS

Carl Burger

Abstract: Natural stocks of sockeye salmon in Tustumena Lake (Kenai National Wildlife Refuge) have been augmented with hatchery-incubated fingerlings by the Alaska Department of Fish and Game since 1976. The need for enhancement was based on initial perceptions that: 1) the emergence timing for "wild" fry is often out of synchrony with peak aquatic productivity cycles in the lake each year; 2) juvenile growth and survival are density-independent; and 3) the drainage is spawning habitat-limited (spawning occurs only in lake tributaries). Because Tustumena Lake was recently designated as a wilderness area, priorities for refuge and state managers are to either maintain the natural level of sockeye stocks or to determine the magnitude of juvenile enhancement that can occur without inducing a negative impact on the native population. In cooperation with Region 7 and state biologists, the following major objectives were proposed: 1) determine the spawning distribution of sockeye salmon at Tustumena and, in particular, the degree to which successful beach spawning occurs along the lake's shoreline; 2) identify the peak emergence and outmigration timing of juveniles from tributaries into the lake and how these events correlate with environmental variables as a predictor of subsequent survival; and 3) determine if differences exist between the growth and survivability of "wild" and hatchery-reared juveniles at Tustumena. (Minor objectives identified in our study plan address certain genetic comparisons at Tustumena as well as research on a unique late run of chinook salmon in the drainage.) The Center began work at Tustumena during FY-89. Because in-house funding was limited (Congressional add-ons are presently being sought), only objective one was addressed. Preliminary results indicate that up to 35% of the 200 sockeye salmon we tagged at Tustumena last year spawned in shoreline areas of the lake--an indication that the drainage is not as "spawning-limited" as previously thought. This aspect of our study will be repeated in FY-90, in addition to the commencement of juvenile studies. The project is scheduled for completion in FY-92.

SEA OTTERS - EXXON VALDEZ OIL SPILL
(6310)

Anthony DeGange

Abstract: Two major studies were implemented by the Center following the Exxon Valdez oil spill on March 24, 1989 as part of the Natural Resource Damage Assessment (NRDA). The primary objective of Marine Mammal Study No. 7 was to determine the fate of sea otters that underwent oiling, capture, rehabilitation, holding and release back into the wild. That study required the instrumentation of 45 sea otters with implantable radio transmitters. The principal objective of NRDA Marine Mammal Study No. 6 was to investigate the acute and long-term effects of the oil spill on sea otter populations in Alaska. The second study is multi-faceted and includes: 1) boat surveys of sea otters in Prince William Sound; 2) pre- and post-spill aerial surveys of sea otters outside of Prince William Sound; 3) comparison of survival, reproduction, movements and dispersal of sea otters in treatment and control areas in Prince William Sound based on instrumented animals; 4) comparison of blood toxicology and blood parameters of sea otters in treatment and control areas in Prince William Sound; 5) analysis of necropsy, histopathology, and toxicology data for sea otters that died as a result of the oil spill; and 6) analysis of age and sex composition, timing of recovery, and population dynamics of sea otters that died during the oil spill.

In Marine Mammal Study No. 7, 15 rehabilitated sea otters released in Prince William Sound re-entered the oil spill zone. Of the instrumented, rehabilitated sea otters released in eastern Prince William Sound, males tended to remain relatively close to the point of release whereas females travelled widely and erratically. Four females returned to the Kenai Peninsula where they were initially captured. It is too early in the study to estimate overall survival of rehabilitated sea otters.

In Marine Mammal Study No. 6, 878 sea otter carcasses were recovered in the oil spill zone during the oil spill response. The sex ratio of carcasses recovered in Prince William Sound and on the Kenai Peninsula was significantly skewed towards females. The majority of sea otters recovered in the Sound and on the Kenai Peninsula was adults and nearly 60% of the adult females were pregnant or lactating. Pups made up a large proportion of carcasses recovered on the Alaska Peninsula and the Kodiak Archipelago. To date, few sea otters have been instrumented as part of the long-term damage assessment because of the late date the permit was received and the absence of sea otters in the oil spill zone in fall. Capture efforts will continue in the spring.

Preliminary analysis of blood parameter data suggests that liver and kidney dysfunction, which was an acute problem of sea otters captured during the oil spill response, was still evident in sea otters within the oil spill zone in Prince William Sound as late as fall 1989. Based on review of preliminary reports from the first year of sea otter damage assessment studies, the prognosis for further funding of oil spill related research on sea otters is good.

IMMEDIATE IMPACT OF THE "EXXON VALDEZ" OIL SPILL ON MARINE BIRDS

John F. Piatt
Calvin J. Lensink

Abstract: On March 24, 1989, the oil tanker spilled 260,000 barrels of crude oil in Prince William Sound, Alaska. Oil eventually drifted over 30,000 km² of coastal and offshore waters occupied by about a million marine birds. More than 30,000 dead birds, comprising 90 species, were retrieved from polluted areas by August 1, 1989. Of those identified, murres (75%), other alcids (7.0%) and seaducks (5.3%) suffered the highest mortality from oil and most (88%) birds were killed outside of Prince William Sound. A colony of 129,000 murres at the Barren Islands was probably devastated. Between August 1 and October 13, another 7,000 birds were retrieved but most of those birds appeared to have died from natural causes and were comprised largely of shearwaters and other procellariids (51%), gulls (22%), and puffins (14%). Based on aerial and ship-based surveys for populations at risk, and extrapolating from the number of dead birds recovered, we tentatively estimate that the total kill from oil pollution was in the order of 100,000 - 300,000 birds.

US/USSR COOPERATIVE PACIFIC BLACK BRANT (Branta bernicla nigricans)
RESEARCH—OPPORTUNITIES FOR THE FUTURE

Dirk V. Derksen

Abstract: The Pacific population of brant has exhibited a decline in numbers over the past 30 years, which prompted the United States and Mexico to work cooperatively to enhance the status of this important sea goose. The Center is conducting research on various aspects of the life history of brant on nesting, staging, and molting areas in Alaska in cooperation with the Canadian Wildlife Service, Direccion de Flora y Fauna Silvestres (Mexico), and member states of the Pacific Flyway.

Relatively little is known about the distribution, population status, and biology of Pacific black brant in the far eastern Soviet Union. In February, 1988 the need for additional information on brant was discussed at the Eleventh Meeting of the US-USSR Joint Committee on Cooperation in the Field of Environmental Protection. It was agreed that work would focus on the ecology, migration, and development of measures for restoration of brant.

In July, 1989 personnel from Region 7 and the Center traveled to Wrangel Island Reserve to commence a long-term research project on the status and population dynamics of brant on the Chukotski Peninsula. The objectives of the first field season were to: 1) assess the status of breeding and molting populations of brant on Wrangel Island, and 2) evaluate the autumn and winter distribution of brant that nest and molt on Wrangel Island. Activities on Wrangel Island were directed toward marking a sample of birds from a molting flock. A total of 231 brant were ringed with metal and plastic tarsal bands. Nine brant were fitted with battery-powered transmitters. Recaptures of Wrangel Island molting brant banded in Alaska on the Yukon-Kuskokwim Delta at a nesting colony and molting flocks near Teshekpuk Lake on the North Slope indicate an important affinity.

Personnel from the Academy of Sciences (Ringing Centre, Moscow) and Wrangel Island Reserve assisted Center personnel relocate marked brant at Izembek National Wildlife Refuge, a major spring and fall staging area in southwestern Alaska. Preliminary results of this work demonstrate that Wrangel Island brant stop at Izembek Lagoon along with other populations from Alaska and Canada. Radioed brant from Wrangel Island arrived at Izembek Lagoon in mid-September, and one bird departed on November 9. Wrangel Island birds used the central portion of the estuary with brant from the Yukon-Kuskokwim Delta, which were segregated from Canadian birds that selected the eastern part of the lagoon.

Cooperative work planned for 1990 includes: 1) banding up to 2,000 nesting and molting brant on Wrangel Island, 2) aerial census of brant and emperor geese (Anser canagicus) on the Chukotski Peninsula, and 3) characterization of nesting and molting habitats important to brant in the far eastern Soviet Union.

LISTING OF AVAILABLE SUPPLEMENTAL MATERIAL
FOR THE
FY 1990 CENTER REVIEW

1. Alaska Fish and Wildlife Research Center (AFWR) Research Highlights - FY 1987 - 1989
2. AFWR FY 1990 Annual Work Plan
3. AFWR Study Plans
4. AFWR Affirmative Action Plan
5. AFWR Safety Manual
6. Current Contracts of the AFWR:
 - a. Interagency Agreements
 - b. Research Work Orders
 - c. Cooperative Agreements
7. Minutes of AFWR Directorate Retreat, November 1989
8. Resumes of AFWR staff
9. AFWR Project Leaders' Administrative Field Manual