Alaska Cooperative Fish and Wildlife Research Unit

Annual Report—1999

May 2000

Alaska Cooperative Fish and Wildlife Research Unit
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Annual Report, 1999
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Unit Roster

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Staff

F. Joseph Margraf, Unit Leader, Effective September 12, 1999
James B. Reynolds, Unit Leader, Retired June 30, 1999
Brad Griffith, Assistant Leader–Wildlife
Jacqueline D. LaPerriere, Assistant Leader–Fisheries, RIP, October 30, 1999

Matthew Whitman (MS)
Alexander Wilson (PhD)
Scott Wolfe (MS)
Amy Zacheis (MS)
Xinxian Zhang (PhD)
Qianlai Zhuang (PhD)

Faculty Cooperators

W. Scott Armbruster, IAB
R. Terry Bowyer, IAB/DBW
Terry Chapin, DBW/IAB
Joseph A. Cook, UAM/DBW

1935, Cooperative Research Units were created to fill the vacuum of wildlife management information and the shortage of trained wildlife biologists. In 1960, the Unit Program was formally sanctioned by Congress with the enactment of the Cooperative Units Act. Each unit is a partnership among the Biological Research Division of the U.S. Geological Survey, a State fish and game agency, a host university, and the Wildlife Management Institute. Staffed by Federal personnel, Cooperative Research Units conduct research on renewable natural resource questions; participate in the education of graduate students destined to become natural resource managers and scientists; provide technical assistance and consultation to parties who have legitimate interests in natural resource issues; and provide continuing education for natural resource professionals. Presently, there are Cooperative Research Units in 38 states, conducting research on virtually every type of North American ecological community. The Program is staffed by more than 110 PhD scientists who advise as many as 600 graduate student researchers per year.

This past year was a time of change for the Alaska Unit. In May, Norma Mosso retired as administrative assistant, following nearly 30 years of service with the Unit. Norma is enjoying retirement in Deming, New Mexico, where she and her husband Gerry enjoy gardening in a temperate climate and traveling in their motorhome. She was replaced by Karen Enochs in July. Karen came to the Unit with 12 years of UAF experience in accounting and management of State-appropriated funds. In June, Unit Leader Jim Reynolds retired and accepted a 2-year appointment as the Frank and Marjorie Meek Endowed Chair with the School of Fisheries and Ocean Sciences. In September, Joe Margraf took over as Unit Leader. Joe is a fisheries scientist who has been in the Unit Program since 1980, having served at the Ohio, West Virginia, and Maryland units. Sadly, in October Jackie LaPerriere, Assistant Leader for Fisheries, passed away after a valiant fight against cancer. Jackie and Jim had been the only fisheries scientists to serve in their respective positions at the Unit.

Statement of Direction

The research program of the Unit will be aimed at understanding the ecology of

Unit Cost-Benefit Statement

Base Funds—FY99

U.S. Geological Survey/BRD/CRU (10/1/98-9/30/99		$381,500
Alaska Department of Fish and Game (7/1/98–6/30/99)		98,300
University of Alaska Fairbanks (7/1/98-6/30/99)		154,930
	Total	$634,703

Reimbursable Funding—CY99*

	Direct	Indirect	Total
U.S. Geological Survey/BRD	$227,470	$25,275	$252,745
U.S. Geological Survey/WRD	14,963	1,663	16,625
U.S. Geological Survey/CRU	27,000	3,000	30,000
National Park Service	108,000	12,000	120,000

• Troy Tydingco, MS: employed by ADFG/SF Sitka
Publications/Reports: 30
Presentations 60
Honors/Awards 5

Unit Benefits

Scientific Publications

Blundell, G. M., J. H. Kern, R. T. Bowyer, and L. K. Duffy. 1999. Capturing river otters: A comparison of Hancock and leg-hold traps. Wildlife Society Bulletin 27(1):184-192.

Brown, R. and K. P. Severin. 1999. Elemental distribution within polymorphic inconnu (*Stenodus leucichthys*) otoliths is affected by crystal structure. Canadian Journal of Fisheries and Aquatic Sciences 56:1898-1903.

Conroy,* C. J. and J. A. Cook. 1999. MtDNA evidence for repeated pulses of speciation within arvicoline and murid rodents. Journal of Mammalian Evolution 6(3):221-245.

Conroy,* C. J., J. R. Demboski, and J. A. Cook. 1999. Mammalian biogeography of the Alexander Archipelago of Alaska: A north temperate nested fauna. Journal of Biogeography 26:343-352.

Cook, J. A. and D. R. Klein. 1999. Beach vole/*Microtus breweri*. Pages 624-625 in D. E. Wilson and S. Ruff, eds. The Smithsonian Book of North American Mammals. Smithsonian Institution Press, Washington, D.C.

Demboski,* J. R., B. K. Jacobsen, and J. A. Cook. 1998. Implications of cytochrome b sequence variatio R o8(y)75.5(eo)-26b8(no)-8(o)9.1(R)hyg8(no)-qufy18.8(a08394(t)5.7(h)-8(

Klein, D. R. 1999. Comparative social learning among arctic herbivores: The caribou, muskox and arctic hare. Pages 126-140 in H. O. Box and K. R. Gipson, eds. Mammalian Social Learning: Comparative and Ecological Perspectives. Cambridge University Press, Cambridge.

Klein, D. R., D. F. Murray, R. H. Armstrong, and B. A. Anderson. 1998. Regional trends of biological resources—Alaska. Pages 707-745 in M. J. Mac, P. A. Opler, C. E. Puckett Haecker, and P. D. Doran, editors. Status and Trends of the Nation's Biological Resources. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Lance,* E. W. and J. A. Cook. 1998. Biogeography of tundra voles (*Microtus oeconomus*) of Beringia and the southern coast of Alaska. Journal of Mammalogy 79:53-65.

Mörschel,* F. M. 1999. Use of climatic data to model the presence of oestrid flies in caribou herds. Journal of Wildlife Management 63:588-593.

Nungesser, M. K., L. A. Joyce, and A. D. McGuire. 1999. Effects of spatial aggregation on predictions of forest climate change response. Climate Research 11:109-124.

Post,* E. and D. R. Klein. 1999. Caribou calf production and seasonal range quality during a population decline. Journal of Wildlife Management 63:335-345.

Reynolds, P. E., R. T. Bowyer, and D. R. Klein. 1999. Muskox/*Ovibos moschatus*. Pages 346-347 in D. E. Wilson and S. Ruff, eds. The Smithsonian Book of North American Mammals. Smithsonian Institution Press, Washington, D.C.

Tian, H., J. M. Melillo, D. W. Kicklighter, A. D. McGuire, and J. Helfrich. 1999. The sensitivity of terrestrial carbon storage to historical climate variability and atmospheric CO2 in the United States. Tellus 51B:414-452.

Tian, H., J. M. Melillo, D. W. Kicklighter, A. D. McGuire, B. Moore III, and C. J. Vörösmarty. 1999. Reply to Crutzen et al. and Schulman et al. (re: Tian et al., Nature 396:664-667). Nature 399:536.

Theses

Demboski, J. R. 1999. Molecular systematics and biogeography of long-tailed shrews (Insectivora: *Sorex*) and northern flying squirrels (Rodentia: *Glaucomys*). PhD dissertation, University of Alaska Fairbanks. 150 pp.

Ihl, C. 1999. Comparative habitat and diet selection of muskoxen and reindeer on the Seward Peninsula, western Alaska. MS thesis, University of Alaska Fairbanks. 81 pp.

Keech, M. A. 1999. Life-history consequences of maternal condition in Alaskan moose. MS thesis, University of Alaska Fairbanks. 46 pp.

Mallek, E. J. III. 1999. Plant architecture and forage selection by moose. MS thesis, University of Alaska Fairbanks. 63 pp.

Stark, T. C. 1999. Spawning stocks and juvenile summer habitat of rainbow trout and steelhead, Gulkana River, Alaska. MS thesis, University of Alaska Fairbanks. 119 pp.

Tydingco, T. A. 1999. The effects of timber harvest practices on fish habitat in Kenai Peninsula streams. MS thesis, University of Alaska Fairbanks. 56 pp.

Reports

Bowyer, R. T., G. M. Blundell, M. Ben-David, S. C. Jewett, T. A. Dean, and L. K. Duffy. 1999. Effects of the *Exxon Valdez* oil spill on river otters: Injury and

Presentations

Bidlack, A. L. and J. A. Cook. June 1999. Population genetics of an island endemic, the Prince of Wales flying squirrel (*Glaucomys sabrinus griseifons*). Seventy-ninth Annual Meeting, American Society of Mammalogists, Seattle, WA.

Blundell, G. M. May 1999. Effects of food resources on the spacing behavior of river otters: Does forage abundance control home range size? Fifteenth International Symposium on Biotelemetry, Juneau, AK.

Blundell, G. M., M. Ben-David, and R. T. Bowyer. September 1999. Social organization in river otters: Cooperative foraging or reproductive strategies? AAAS, 50th Arctic Science Conference, Denali National Park, AK.

Blundell, G. M., R. T. Bowyer, L. K. Duffy, T. A. Dean, S. C. Jewett, and J. J. Stegeman. April 1999. River otters ten years after the *Exxon Valdez* oil spill: Recovery or continued exposure? Annual Meeting, Alaska Chapter, The Wildlife Society, Fairbanks, AK.

Blundell, G. M., R. T. Bowyer, L. K. Duffy, T. A. Dean, S. C. Jewett, and J. J. Stegeman. April 1999. River otters ten years after the *Exxon Valdez* oil spill: Recovery or continued exposure? A Symposium of Women in Science, Fairbanks, AK.

Blundell, G. M., R. T. Bowyer, L. K. Duffy, T. A. Dean, S. C. Jewett, and J. J. Stegeman. June 1999. Chronic effects of the *Exxon Valdez* oil spill: Is recovery complete? Annual Meeting, Society for Conservation Biology, University of Maryland, College Park, MD.

Blundell, G. M., R. T. Bowyer, L. K. Duffy, T. A. Dean, S. C. Jewett, and J. J. Stegeman. September 1999. River otters ten years after the *Exxon Valdez* oil spill: Recovery or continued exposure? Sixth Annual Conference, The Wildlife Society, Austin, TX.

Blundell, G. M., R. T. Bowyer, M. Ben-David, T. A. Dean, and S. C. Jewett. April 1999. Effects of food resources on the spacing behavior of river otters: Does forage abundance control home range size? Annual Meeting, Alaska Chapter, The Wildlife Society, Fairbanks, AK.

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Blundell, G. M., R. T. Bowyer, M. Ben-David, T. A. Dean, and S. C. Jewett. June 1999. Sociality in river otters: Cooperative foraging or reproductive strategies? Seventy-ninth Annual Meeting, American Society of Mammalogists, Seattle, WA( )-29.1(.4A.Sw[St4S.

Copass, C., A. D. McGuire, and F. S. Chapin III. March 1999. A dynamic vegetation model for the Pan-Arctic. LAII (Land-Atmosphere-Ice Interaction) Workshop and ATLAS (Arctic Transitions in the Land-Atmosphere System) Meeting, Seattle, WA.

Danks, F. S. and D. R. Klein. August 1999. Development of a muskox habitat map for northern Alaska using GIS. Tenth Arctic Ungulate Conference, Trømso, Norway.

Debevec, E. M. and E. A. Rexstad. August 1999. Modeling temporal patterns in microtine abundance in Denali National Park and Preserve. Eighty-fourth Annual Meeting, Ecological Society of America, Spokane, WA.

Debevec, E. M. and E. A. Rexstad. September 1999. Detecting change in the small mammal population of Denali's Rock Creek watershed: Can it be done? AAAS, 50th Arctic Science Conference, Denali National Park, AK.

Debevec, E. M. and E. A. Rexstad. September 1999. Modeling temporal patterns in microtine abundance in Denali National Park and Preserve. AAAS, 50th Arctic Science Conference, Denali National Park, AK.

Debevec, E. M. and E. A. Rexstad. September 1999. Two avian components of Denali's long-term ecological monitoring program: Congruence of constant-effort mistnets and point-count routes. AAAS, 50th Arctic Science Conference, Denali National Park, AK.

Griffith, B. January 1999. Integrating the effects of climate and development a subsistence resource for Arctic communities. President’s Seminar, Institute of Arctic Biology, University of Alaska Fairbanks.

Griffith, B. February 1999. The need for herd specific predictive models that integrate the effects of climate and development on caribou as a subsistence resource for arctic communities. Invited Plenary Lecture, Workshop on Human Role in Reindeer/Caribou Systems, sponsored by the International Arctic Science Committee, Rovaniemi, Finland.

Griffith, B. April 1999. Habitat and foraging ecology of the Bathurst caribou herd on calving grounds:dtvet(d)1.219Kitikmeot Slave Study(d)1.219Soc--23(i)-26(et)-28.8(y,T5Tc-01In)-34(v)-

Griffith, B. August 1999. Effects--235( )24.4(o)-5.1(f)2.2(r)-20.2(e)-22(ce)-22(n)-9.2(t)-28.5(cli)-262(m
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Griffith, B. and D. E Russell. August 1999. Integrating the effects of climate and development on the Porcupine Caribou Herd. Tenth Arctic Ungulate Conference, Trømso, Norway.

Griffith, B., D. E. Russell, and R. G. White. September 1999. Assessing effects of calving ground displacement on June calf survival for the Porcupine caribou herd. AAAS, 50th Arctic Science Conference, Denali National Park, AK.

Ihl, C. and D. R. Klein. 3819.6)7519364(0.882iro.T11614413.5(-)9.h3819a(23819.a(a)5.59(3 di(K)6)t[T11

McDonough, T. and E. Rexstad. June 1999. Response of *Clethrionomys rutilus* to spruce beetle infestations in the Copper River Basin, Alaska. Seventy-ninth Annual Meeting, American Society of Mammalogists, Seattle, WA.

McGuire, A. D. June 1999. The role of high latitude ecosystems in the global carbon cycle: Insights and uncertainties identified from retrospective analyses. How Nutrient Cycles Constrain Carbon Balances in Boreal Forests and Arctic Tundra Conference, Obispo National Park, Sweden.

McGuire, A. D. and CCMLP Participants. December 1999. The response of terrestrial carbon storage between 1980 and 1989 to changes in atmospheric carbon dioxide, climate, and agricultural land use: A comparison among terrestrial biosphere models in the Carbon Cycle Model Linkage Project (CCMLP). American Geophysical Union conference, San Francisco, CA.

McGuire, A. D., J. M. Melillo, J. T. Randerson, W. J. Parton, M. Heimann, R. A. Meier, J. S. Clein, D. W. Kicklighter, and W. Sauf. February 1999. Modeling the effects of snow on heterotrophic respiration across northern temperate high latitude

Seiser, P. E. February 1999. Interannual variability in the reproductive success of

Cheryl Dion (MS Fisheries): Recipient of the Alaska Fly Fishers Natural Sciences Scholarship for academic year 1999–2000. She also received the Cultural Diversity Travel Award from the Alaska Chapter, American Fisheries Society, to attend the 1999 annual meeting.

David R. Klein; IAB Faculty Cooperator and former Senior Scientist: Recipient of the 1999 Aldo Leopold Memorial Award, presented by the Wildlife Society at the North American Wildlife and Natural Resources Conference, March 29, 1999, in recognition of "distinguished service to wildlife conservation."

Research Reports

Reports are listed as Completed or Ongoing, in Aquatic, Terrestrial, or Integrated categories. The List of Abbreviations comprises the final pages of this report.

Completed Projects—Aquatic

The Ecology of the Arctic Char and the Dolly Varden in the Becharof Lake Drainage, Alaska

Personnel:

Dr. Jacqueline D. LaPerriere, Principal Investigator, AKCFWRU
Dr. James B. Reynolds, Principal Investigator, AKCFWRU
Brendan Scanlon, Student Investigator (MS)JUn, ST*72sar.onl.vlt.,3 US)161 TDW02.4)2)-7.539)158(

Effects of Migratory Geese on Plant Communities of an Alaskan Salt Marsh

Personnel:
Dr. Roger Ruess, Principal Investigator, IAB
Amy Zacheis, Student Investigator (PhD), DBW

Funding Source: USGS/BRD/ABSC (RWO 27)

Completion Report:

Snow geese feed on plant roots in winter and spring when there is little aboveground shoot growth, resulting in uprooting and destruction of forage plants. Expanding populations of snow geese in some areas of North America have degraded habitat along migratory routes and in nesting areas. We studied the effects of a stable population of snow geese and several populations of Canada geese on two salt marsh plant communities in Cook Inlet, Alaska, an area used during spring migration. We compared plots where geese were excluded by fencing to plots where grazing could occur. We also counted numbers of birds using the marsh, and determined the type of vegetation they fed on. Grazing intensity, or the number of goose-days per km^2, was low. Canada geese fed mainly on aboveground shoots of salt marsh plants, while snow geese fed on belowground plant tissues. Plant communities responded differently to goose herbivory. In the sedge meadow community, where feeding was primarily on aboveground shoots, there was no effect of grazing on plant biomass. In the herb meadow community, where snow geese fed on belowground plant tissues, there was a shift in the relative abundance of plant species. Plant species less tolerant to herbivory decreased in biomass, while more tolerant plants increased. The type of herbivory (above- or belowground) was important in determining plant community response to herbivory. This study illustrates that even light herbivore pressure can alter plant communities and possibly affect forage availability for herbivores. However, snow geese are not rapidly destroying habitat in this Cook Inlet marsh.

Molecular Systematics and Biogeography of Long-Tailed Shrews (Insectivora: *Sorex*) and Northern Flying Squirrels (Rodentia: *Glaucomys*)

Personnel:
Dr. Joseph A. Cook, Principal Investigator, DBW
John R. Demboski, Student Investigator (PhD), DCB

Funding Source: USFWS (RWO 67)

Note: John Demboski graduated from UAF in August 1999. His dissertation abstract

Analysis of seven species of the *Sorex cinereus*

Plant Architecture and Forage Selection by Moose

Personnel:

Dr. David R. Klein, Co-Principal Investigator, IAB
Dr. Donald E. Spalinger, Co-Principal Investigator, UAA
Edward J. Mallek, II, Student Investigator (MS), DBW

Funding Source: None—All in-kind support

would recommend that if this research question is to receive further attention, that this procedure be developed and coupled with a significantly more intensive collection program.

In-Kind Support:

Laboratory space and equipment from UAF.

Understanding the Response of Caribou to Human Activities: A Literature Review

Personnel:

Dr. Brad Griffith, Principal Investigator, AKCFWRU
Scott A. Wolfe, Student Investigator (MS), DBW

Funding Sources: Department of Indian Affairs and Northern Development, and Northwest Territories, Department of Resources, Wildlife, and Economic Development

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none seemed to result in displacement of either species. Despite similar use of late

Ongoing Projects—Aquatic

Chemical/Physical Limnology and Zooplankton Ecology of Lake Clark

Personnel:

Dr. Jacqueline D. LaPerriere, Principal Investigator, AKCFWRU
Dr. Nicholas F. Hughes, Principal Investigator, SFOS
Alexander Wilson, Student Investigator (MS), DBW

Funding Source: NPS (RWO 84)

Progress Report:

Lake Clark, the sixth largest lake in Alaska, plays a critical role in the largest sockeye salmon fishery in the world. Sockeye salmon are a keystone species for which Lake Clark National Park and Preserve was established to protect. For unknown reasons, during the last four years the number of sockeye salmon returning to Lake Clark has been 75-95% lower than the previous 10-year average. Changes in the water quality

The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fish of Southern California: Genetics Subsection

Personnel:

Dr. Anthony J. Gharrett, Principal Investigator, SFOS
MeiMei Li, Student Investigator (MS), SFOS

Funding Source: USGS/BRD/Western Regional Office (RWO 32)

Progress Report:

There are more than 70 species of rockfish in the Eastern Pacific Ocean and many share morphological similarities, especially during the early life stages (larval and juvenile). In order to better understand their early life history and phylogenetic history, I worked on the development of a key for identification of rockfish species (Genus *Sebastes*) by mapping restriction sites and the assessment of the validity of their taxonomic assignment. The species I studied include six of the subgenus

around the U.S./Canada border. The Pacific Salmon Treaty mandates that the salmon resource be fairly allocated between the two countries. The ability to determine the country of origin for the chum stocks is essential for fulfilling this mandate. In order to accomplish this, a baseline of all stocks must be established. In the future, salmon coming into the Yukon will be compared against the baseline to determine where that school of salmon is headed. This information will enable managers to make better decisions. My experiment consists of identifying new genetic procedures useful for stock identification. I am assessing several DNA-based analyses. The methods that I find promising in a pilot study will be further evaluated using nine Yukon River stocks of chum salmon that are adjacent to the U.S./Canada border. The techniques that best define the stocks will be deployed on the remaining

In-Kind Support:

- ADFG/SF Fairbanks (especially Peggy Merritt, Matt Evenson, Tom Taube, and Tim Viavant) provided airplane travel to and from Cordova. They also provided all the sampling gear, accommodations, and a truck and 6-wheeler for travel between Glennallen, Chitina, and Fairbanks. I was also given an office and computer to work on my research at ADFG Fairbanks.
- ADFG/CFMD Cordova (especially Steve Moffitt) provided accommodations in Cordova, the opportunity to participate in the commercial fishery scale sampling, and determining the ages of sampled chinook.

Seasonal Movements of Broad Whitefish in Freshwater Systems of the Prudhoe Bay Oil Field

Personnel:

Dr. Erich H. Follmann, Princ-33.8 c-33i(r)5.vnh k.2-31.8()-20g(c-33.8)-3167.3t.4(r)r,r, r

Habitat Characteristics Selected by Arctic Grayling Fry and Fingerling in Badger Slough, near North Pole, Alaska

Personnel:

Dr. James B. Reynolds, Principal Investigator, AKCFWRU
Dr. Nicholas F. Hughes, Co-Principal Investigator, SFOS
Cheryl A. Dion, Student Investigator (MS), SFOS

Funding Source: ADFG/SF (RSA)

Progress Report:

Badger Slough is a result of flood control projects initiated in the early 1940s. Since then it has become a highly productive spawning and rearing habitat for Arctic grayling and local fishery. However, establishment of the fishery coincided with residential and commercial development along its shore and ADFG/SF has expressed concern over the apparent decline in grayling numbers. The quality and quantity of favorable spawning and rearing habitat may be declining due to anthropogenic (e.g. urbanization, road culverts) and/or successional (e.g., beaver dams, filling in of gravel riffles/pools with sediment, eutrophication) changes. In this study, we are examining interactive effects of drifting prey and physical habitat characteristics (water depth, velocity, temperature, and substrate) on foraging, growth, and habitat selection of grayling. This knowledge will be essential for restoring/enhancing habitat and understanding early life history energetics of grayling. In 1999, average daily temperature, weekly fish growth, discharge measurements, and fish distribution was documented; 64 fish were preserved for diet analysis. Gravel cleaning/vegetation removal was conducted in September, using a suction dredge and garden rakes. The objectives for 2000 are to (1) test cleaned versus uncleaned gravel areas for fish preference and invertebrate density; and (2) examine difference in temperature, depth, velocity, and food in areas with high, intermediate, and low fish density, then put into a bioenergetics model. The model will be used to explain differences in fish abundance and growth between habitats and to test its ability to predict habitat quality for use as a guide for restoration.

In-Kind Support:

Curtis Josaitis and Jim Spence approved the deposition of sediment on their property.

Standardized Evaluation of Electrofishing Injury among North American Freshwater Sport Fishes

Personnel:

Dr. James B. Reynolds, Principal Investigator, AKCFWRU
F. Michael Holliman, Student Investigator (PhD), SFOS

Funding Source: USFWS (RWO 57)

Progress Report:

Electrofishing is a fish population sampling technique used widely by freshwater fisheries managers. In recent years, fisheries managers have expressed concerns about electrofishing-induced injuries in fish. In some cases, moratoriums on electrofishing have been enacted without evidence of significant injury, thereby eliminating the use of a likely effective management tool. In 1999, the second year of our three-year study, we conducted three experiments to evaluate risk factors

the point where national guidelines could be developed, thus providing a basis for widespread comparison and communication of data, something that is now difficult to obtain without guidelines. Two primary obstacles remain in establishing such guidelines: authentication (operational validity) and acceptance (operational value). The basic approach of this study is to achieve authentication of national guidelines for electrofishing through the practical application of power transfer theory. The guidelines will be based on the basic elements of electrofishing: power density, electrical waveform, electrode design, and fish response. Authentication, and this project, will be completed by December 2001. Acceptance of the guidelines will only occur after this project has been completed, given time for use and trust of the guidelines by a wide variety of agencies and organizations.

Effects of Smolt Size and Emigration Timing on Marine Survival and Age at Maturity of Wild Coho Salmon (*Oncorhynchus kisutch*) at Auke Creek, Southeast Alaska

Personnel:

Dr. William W. Smoker, Principal Investigator, SFOS
Judith Lum, Student Investigator (MS), SFOS

Funding Source: ADFG/SF (RSA)

Progress Report:

Survival, age of males at maturity, and adult size of coho salmon may be influenced by their size as smolts (young salmon leaving freshwater for the ocean) and by their ocean entry time. Understanding differences in survival, age, and size over years is important to fishery managers also charged with conserving stocks, and to scientists trying to explain and predict effects of natural and human-caused ecological changes. How these factors vary within or between populations of wild coho salmon, particularly for Alaskan stocks, is unclear. As part of ongoing NMFS research, I am examining effects of smolt size and ocean entry time on marine survival, age, and size of return, in a population of wild coho salmon at Auke Creek, Alaska. Beginning

- NOAA/NMFS, Auke Bay Laboratory, Juneau provided use of the Auke Creek weir facilities for the collection of samples, tagging, and the recovery of coded wire tags. Four months of work effort each year of the study by facility personnel was provided.
- NOAA, NMFS, Auke Bay Laboratory, Juneau provided expertise in tagging, sampling, and aging procedures. Four months of work effort each year of the study by facility personnel was provided.
- ADFG/SF Juneau provided sequential coded wire tags for coho salmon smolt tagging from 1993-1997 at a cost of approximately $2000/year for five years of study.
- ADFG/CFMD Juneau provided expertise and time on the aging and analysis of collected scales. A month of salary cost for a Fish Technician III was provided in each of the five years.
- ADFG/CFMD, Coded Wire Tag Lab, Juneau provided information on CWT recoveries from the commercial and sport fishery.
- SFOS/Juneau Center provided expertise in data analysis.

Effects of Urbanization on Small Stream Salmonid Communities in Southcentral Alaska

Personnel:

Dr. Nicholas F. Hughes, Principal Investigator, SFOS
Matthew Whitman, Student Investigator (MS), SFOS

Funding Source: USGS/WRD (RWO 95)

Progress Report:

Urban development can have a variety of direct and indirect effects on stream-dwelling salmonids. It can modify habitat structure, degrade water quality, and cause shifts in food resources that can alter the size and structure of the salmonid community. Anadromous Pacific salmon as well as resident trout and char inhabit streams in the Anchorage area where urbanization is a significant issue. It is important to recognize the pressures on these fish that have commercial, recreational, ecological, and aesthetic importance. This study will investigate the impacts of urbanization on Anchorage streams and examine how this is affecting the salmonid communities. Fourteen study sites were established within five stream

Pigeon Guillemots and River Otters as Bioindicators of Nearshore Ecosystem Health in Prince William Sound

Personnel:

Dr. A. David McGuire, Principal Investigator, AKCFWRU
Dr. R. Terry Bowyer, Co-Principal Investigator, IAB
Dr. Lawrence Duffy, Co-Principal Investigator, IAB
Gail M. Blundell, Student Investigator (PhD), DBW
Pamela E. Seiser, Student Investigator (MS), DBW
Howard Golden, Cooperator, ADFG/WC/Anchorage
Lisa Thomas, Cooperator, USGS/BRD/ABSC

Funding Source: USGS/BRD/ABSC (RWO 40)

Progress Report:

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oil spill (EVOS) on river otters is currently in review as a Wildlife Monograph. Results from early post-spill studies revealed that otters inhabiting oiled areas in Prince William Sound had higher liver enzymes, lower body mass, and larger home ranges compared with otters in nonoiled areas. Results from data collected from 1996 to 1998 indicated that those differences between areas no longer existed. Although some biomarkers suggested that otters continued to be exposed to low levels of crude oil, the effects of that exposure were no longer sufficient to cause obvious injury. We cautiously conclude that river otters have recovered from the more pernicious effects of EVOS. As NVP was wrapped up, we continued to r

Interpopulation Divergence of Marten in Southeast Alaska

Personnel:

Dr. Joseph A. Cook, Principal Investigator, DBW
Karen D. Stone, Student Investigator (PhD), DBW

Funding Sources: USFWS (RWO 70); USFS, UAF Graduate Research Fellowship

Progress Report:

The Tongass National Forest and surrounding regions of British Columbia comprise the largest tract of old-growth temperate rainforest remaining in the world. Timber harvests fragment the forest and have the potential to harm many species of this region. Furthermore, trappers and hunters annually harvest thousands of fur-bearers (e.g., marten and mink) and trophy animals (e.g., brown and black bears). Because of deforestation and hu2(app)

the effects of these human activities on coastal resources, particularly grizzly bears. This study was initiated to address management concerns about potential effects associated with these human activities. Hallo Bay was selected as the study site because it allowed us to observe large numbers of bears at once. We used several methods to assess effects on coastal grizzly bears. The population of bears was divided into four groups: large males, sows with young-of-the-year, sows with older cubs, and single bears. Focal samples collect behavior, habitat use, and other variables associated with bear behavior in half-hour sessions. Scan samples provide

In-Kind Support:

ADFG/WC: Snowmachine (80 hr), fixed-wing aircraft support of radiotelemetry relocations (240 hr), helicopter support of field operations (30 hr), and travel funds to attend a moose browse research meeting in Anchorage.

of area with above-median NDVIrate was significantly lower in the treatment zone than in the reference zone during 7 of 9 years. Caribou did not consistently select any particular class of snow cover (0-24%, 25-49%, 50-74%, or 75-100%) in either zone. Suitability of the landscape may vary among years. Caribou need unrestricted access to respond to those changes, thereby maximizing use of the best habitats.

inter-annual warming trends in terms of the relative amount of green plant biomass. A separate vegetation classification based on a combination of Landsat-TM and SPOT XS imagery will be used to determine habitat selection.

Bathurst Caribou Calving Ground Studies: Influence of Nutrition and Human Activity on Calving Ground Location

Personnel:

Progress Report:

The population and distribution of muskoxen (*Ovibos moschatus*) in northern Alaska have been increasing since their reintroduction into the area nearly 30 years ago. However, their distribution and habitat selection within the local landscape remain

developed a version of the Terrestrial Ecosystem Model (TEM) that is capable of modeling post-fire carbon dynamics for boreal forest stands. Field work during the last two years has measured pre-fire and post-fire carbon pools in the area that was burned during summer 1999. Dr. McGuire, who is serving as a Co-Principal Investigator, is providing assistance from his NSF-funded ARCSS project and his NASA-funded project in the third of the study. One of Dr. McGuire's graduate students on his NASA project is assisting him with model simulations of the post-fire response of carbon storage. During the past year, Dr. McGuire has also helped the project recruit one post-doc who will be using inversion models of the global carbon cycle to help elucidate how fire disturbance in high latitudes influences the global carbon cycle. The investigations by this post-doc, who has been working in Dr. McGuire's laboratory since July 1999, will complement the forward modeling research on the role of fire being conducted by Dr. McGuire and his student.

Land-Cover Change in High Latitude Ecosystems: Implications for the Global Carbon Cycle

Personnel:

Dr. A. David McGuire, Co-Principal Investigator, AKCFWRU
Dr. David Verbyla, Co-Principal Investigator, FSD
Dr. W. Scott Armbruster, Co-Principal Investigator, IAB
Qianlai Zhuang, Student Investigator (PhD), DBW (partial support)
Matt Macander, Student Investigator, FSD
Cherie Silapaswan, Student Investigator (MS), DBW (partial support)
Aaron Woods, Student Investigator, FSD

Funding Source: NASA

Progress Report:

The purpose of this study is to develop a prototype spatially explicit modeling framework focused on Alaska that is capable of using satellite-derived data to estimate how changes in land cover cause changes in ecosystem carbon storage at high latitudes. This study involves four tasks: (1) development of spatially explicit contemporary land-cover data sets in Alaska; (2) development of transient spatially explicit land-cover data sets for the historical satellite record in Alaska; (3) development of a successional biogeochemical model; and (4) application of the modeling framework for estimating the consequences of land-cover change on terrestrial metabolism in retrospective, contemporary, and prognostic analyses. Four students have been recruited for this project. Three of the students are working on tasks 1 and 2 and the other student is working on tasks 3 and 4. The project has developed a formal collaboration with the Alaska Field Office of the EROS data center for assistance with acquisition of satellite scenes. A memorandum of understanding has been developed to share data and analyses with the Alaska System Support Office of the National Park Service. These data and analyses are related to the bark beetle infestations in the vicinity of Wrangell-St. Elias National Park. Dr. McGuire has developed a successional version of the Terrestrial Ecosystem Model that uses a

development and testing of a version of TEM that simulates the interaction between the soil thermal regime and biogeochemical dynamics for mature forest stands in interior Alaska. Remote-sensing research by the other students continues to focus on developing change-detection algorithms for fire, logging, insect infestation, and natural vegetation dynamics. Research during the next year will focus on coupling transient vegetation data sets developed from the remote sensing research with the successional biogeochemical version of TEM.

Development of Forest Disturbance Scenarios for the United States

Personnel:

Dr. A. David McGuire, Principal Investigator, AKCFWRU
Cherie Silapaswan, Student Investigator (MS), DBW

Funding Source: USFS (RWO 94)

Progress Report:

The purpose of this study is to (1) develop spatially and temporally explicit data sets of historical forest disturbance for a subregion of the United States, and (2) to use these data to assess the role of forest management in historical changes in carbon storage for the subregion. The study is part of a USFS Resource Planning Act (RPA) Special Study, which has been granted to Dr. Linda Joyce of the USFS Rocky Mountain Forest and Range Experiment Station. The initial phase of the work focuses on using regional data on inventory and harvest to develop the disturbance data sets. Dr. Joyce's lab is currently evaluating different methods for developing the data sets, with advice from Dr. A. David McGuire of AKCFWRU, who has worked with others .(s)-Gf 3(t(-Gf 3(t(y)5539(e)31.6(l)6(s))Dr)p0r)24.4r aa19..(s)1939(e)3124.4(.66(s-45f9(e)6(sl)18(
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satellite analyses in development and testing. The dynamic vegetation model will generate spatially explicit distributions of plant functional types and suggest possible

List of Abbreviations

ADFG	Alaska Department of Fish and Game	
	CFMD	Commercial Fisheries Management Division
	HR	Habitat and Restoration Division
	SF	Sport Fish Division
	WC	Wildlife Conservation Division
ADNR	Alaska Department of Natural Resources	

NPP	National Park and Preserve
NPR-A	National Petroleum Reserve-Alaska
NPS	National Park Service
NSB	North Slope Borough
NSF	National Science Foundation
NWR	National Wildlife Refuge