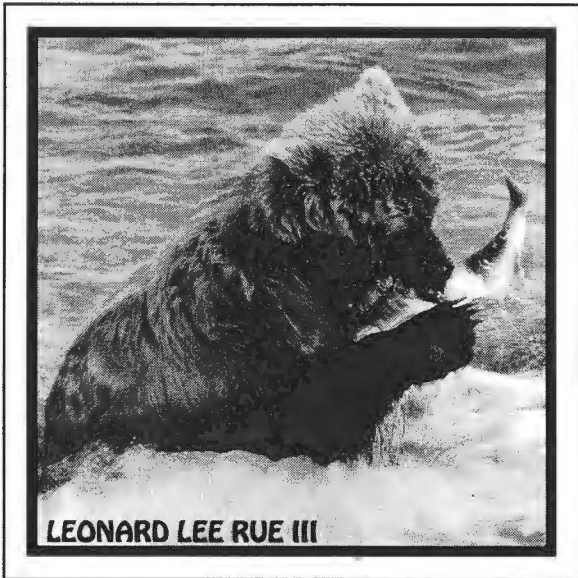


Alaska Department of Fish and Game
Division of Wildlife Conservation

Federal Aid in Wildlife Restoration
Research Progress Report
1 July 1993 - 30 June 1994

Serologic Survey of Alaska Wildlife for Microbial Pathogens

by
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Grant W-24-2
Study 18.7
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Tony Knowles, Governor**

**DEPARTMENT OF FISH AND GAME
Carl L. Rosier, Commissioner**

**DIVISION OF WILDLIFE CONSERVATION
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PROGRESS REPORT (RESEARCH)

State: Alaska

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Project Title: Wildlife Research and Management

Study No.: 18.7

Study Title: Serologic Survey of Alaska Wildlife for
Microbial Pathogens

Period Covered: 1 July 1993-30 June 1994

SUMMARY

During the last few years, several small disease-oriented projects have been initiated. All are still in progress. In-depth reports will be filed when the projects are completed. The brief reports which follow constitute this year's report of activities.

Key Words: Alaska, serologic, survey, wildlife

CONTENTS

	Page
SUMMARY	i
BACKGROUND	1
OBJECTIVES	1
METHODS	1
RESULTS AND DISCUSSION	2
Part I	2
Part II	2
Part III	3
Part IV	4

BACKGROUND

The Alaska Department of Fish and Game (ADF&G) has conducted serologic surveys of varying degrees of sophistication since the early 1960s. In the early days these surveys were limited in scope, consisting of tests for evidence of 1 or 2 diseases in 1 or 2 host species. Since the late 1970s, however, the surveys have been expanded to include up to 30 disease agents and 23 potential host species. Such a framework provides a meaningful health profile of Alaska's wildlife.

OBJECTIVES

The goal of this study is to serologically monitor Alaska wildlife populations for evidence of previous exposure to infectious diseases. Maximum benefit will be derived by keeping the survey as broad as possible, both in terms of diseases and potential hosts. In an attempt to keep the cost of this study as low as possible, samples will be collected opportunistically with other research and management operations.

METHODS

From 1970 through 1990 surveys have included approximately 9000 samples. Blood samples are usually collected in conjunction with other research and management projects. Preliminary preparation of samples is in Fairbanks before shipment to laboratories in other parts of the world. When results are received in Fairbanks, the data are relayed to the contributor, with an evaluation of potential management implications.

RESULTS AND DISCUSSION

Part I

There is little information available in the published literature regarding exposure of free-ranging lynx (*Felis lynx*) to infectious disease agents. In the absence of large-scale research projects, it is difficult to collect blood samples from enough lynx to constitute a meaningful serologic survey.

Several years ago, ADF&G staff members contacted wildlife disease investigators and lynx biologists in the Yukon Territory and the Northwest Territories. The ADF&G proposed that all lynx sera from these areas be pooled with sera collected in Alaska for the purpose of conducting a large-scale survey. Samples have been slowly accumulating. A goal of 100 samples has been established.

Sera will be tested for evidence of exposure to the following disease agents:

- (1) feline panleukopenia virus,
- (2) feline leukemia virus,
- (3) feline herpes virus,
- (4) feline calicivirus,
- (5) feline coronavirus, and
- (6) feline influenza virus.

A manuscript which describes the results of the tests will be prepared and submitted to a referred journal.

Part II

Prior to 1990, all ADF&G sera were tested by the U.S. Department of Agriculture. Service was terminated apparently for fiscal and political reasons. Since that time, ADF&G has been trying to reconstruct the serologic testing program. The ADF&G currently has a viable arrangement for testing ungulate sera. However, testing of carnivore sera (principally, bears and wolves) is unsettled.

A testing program for wolf and bear sera was negotiated with the veterinary college at the University of California-Davis (UCD). Sera have been submitted and tested (572 grizzly/brown bear, 433 wolf, and 162 black bear).

Comparison of tests conducted at UCD with tests conducted at other laboratories revealed major discrepancies for some disease agents. Results for infectious canine hepatitis virus were

quite comparable. However, there was poor correlation of test results between the labs for both canine distemper virus and canine parvovirus.

It is not unusual to find minor differences between tests completed at different labs. However, the discrepancies referred to above were much more significant. Test results from one lab may have indicated that a particular sample had a high antibody titer to a selected disease agent. The other lab may have reported the sample as "negative," i.e., no measurable antibody was detected. Another sample may have been the opposite with the first lab reporting a "negative" result, whereas the other lab reported a high titer. There was no pattern suggesting that one lab was continually reporting higher or lower test results. This type of inconsistency is unacceptable.

In order to resolve these discrepancies, matched samples have been sent to three labs. If results from tests conducted at UCD are comparable with tests conducted at the other labs, ADF&G will resume submissions to UCD. If results are not comparable, ADF&G will resume the search for an acceptable lab to test bear and wolf sera.

Part III

For the past several decades, animal disease investigators have been trying to develop a reliable serologic test for trichinosis. Microbial disease agents elicit an antibody-mediated immune response in mammals. These antibodies are relatively easy to detect and measure. Parasitic diseases do not elicit the same degree of antibody-mediated response. Therefore, development of a serologic test for trichinosis has been less successful.

Since approximately 1980, several research groups have focused attention on an enzyme-linked immunosorbent assay (ELISA) procedure for diagnosing trichinosis. Staff members with Agriculture Canada have successfully developed this method for use with domestic swine.

The ADF&G approached Agriculture Canada with the possibility of adapting their ELISA for use with bear sera. Agriculture Canada agreed to the proposal. Several hundred grizzly/brown bear sera were tested. Test results revealed a distinctive pattern. Antibody prevalence on Kodiak and Admiralty Islands was 0%. Prevalence in Game Management Units 20A and 13B was 15%. On the North Slope, prevalence exceeded 50%.

A manuscript describing adaptation of the ELISA for use with bear sera was submitted to the *Journal of Wildlife Diseases*. The manuscript was rejected. Reviewers indicated that it would be necessary to validate the ELISA by comparing serologic test results to results obtained by a more traditional procedure. Such comparisons should ideally be conducted on a significant number of bears.

A method known as enzyme digestion is the long-term standard procedure for diagnosing trichinosis. This procedure is based on enzymatic digestion of a muscle sample. The resulting digested material is subsequently examined with a microscope for presence of *Trichinella* spp. larvae.

It is difficult to obtain both muscle tissue and blood from the same bear. Blood is routinely collected by biologists who capture bears. However, muscle samples are rarely collected. Conversely, muscle samples can be collected from skulls which successful bear hunters are required to submit for attachment of a permanent tag. However, hunters are usually unwilling and/or unable to collect blood. Thus, it appears unlikely that current practices can provide an adequate number of paired samples from the same bears.

In 1994, the ADF&G hopes to evaluate the effectiveness of internally-implanted radio transmitters in grizzly bears. Implantation of these transmitters will obviously require minor surgery. If this project is approved, the ADF&G will collect a small sample of intercostal muscle for the purpose of validating the ELISA test results. Biologists on the North Slope have been approached to collect similar specimens. Hopefully, an adequate number of paired samples can be collected and tested. This comparison will allow validation of the ELISA procedure. The original manuscript describing adaptation of the ELISA test for use with bear sera will then be resubmitted. A second manuscript describing results of the large-scale survey of bears in Alaska will also be submitted.

Part IV

In the mid 1980s, marine mammal disease specialists in Europe identified a herpesvirus which had caused illness and death in a harbor seal (*Phoca vitulina*) nursery. A serologic testing agreement was negotiated between the ADF&G and the group which conducted this pioneering study. Sera from marine mammals collected in Alaska waters were submitted for testing.

In 1988, a distemper virus decimated seal populations in northern European waters. Serologic testing for this virus was added to our existing agreement with colleagues in Europe.

Approximately 1000 sera have been tested for evidence of exposure to these two viruses. Results of tests for seal herpesvirus have been analyzed. A manuscript has been prepared and reviewed by the European collaborators. The manuscript is currently being reviewed by North American experts. It will be submitted to the *Journal of Wildlife Diseases* in 1994.

Results of tests for phocine distemper virus have been questioned by other experts in the field. Extensive discussions are underway in order to resolve the disagreement. At present, differences of opinion appear minor and may be easily resolved. The two factions essentially agree on the amount of antibody present in each sample. However, they disagree on a threshold value to distinguish between those animals exposed to the virus and those animals which have

not been exposed. Selection of this threshold value will have a major effect on the conclusions to be drawn from the survey. The ADF&G is coordinating discussions between the two groups.

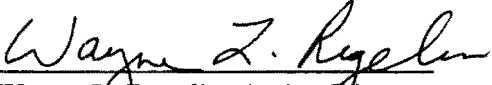
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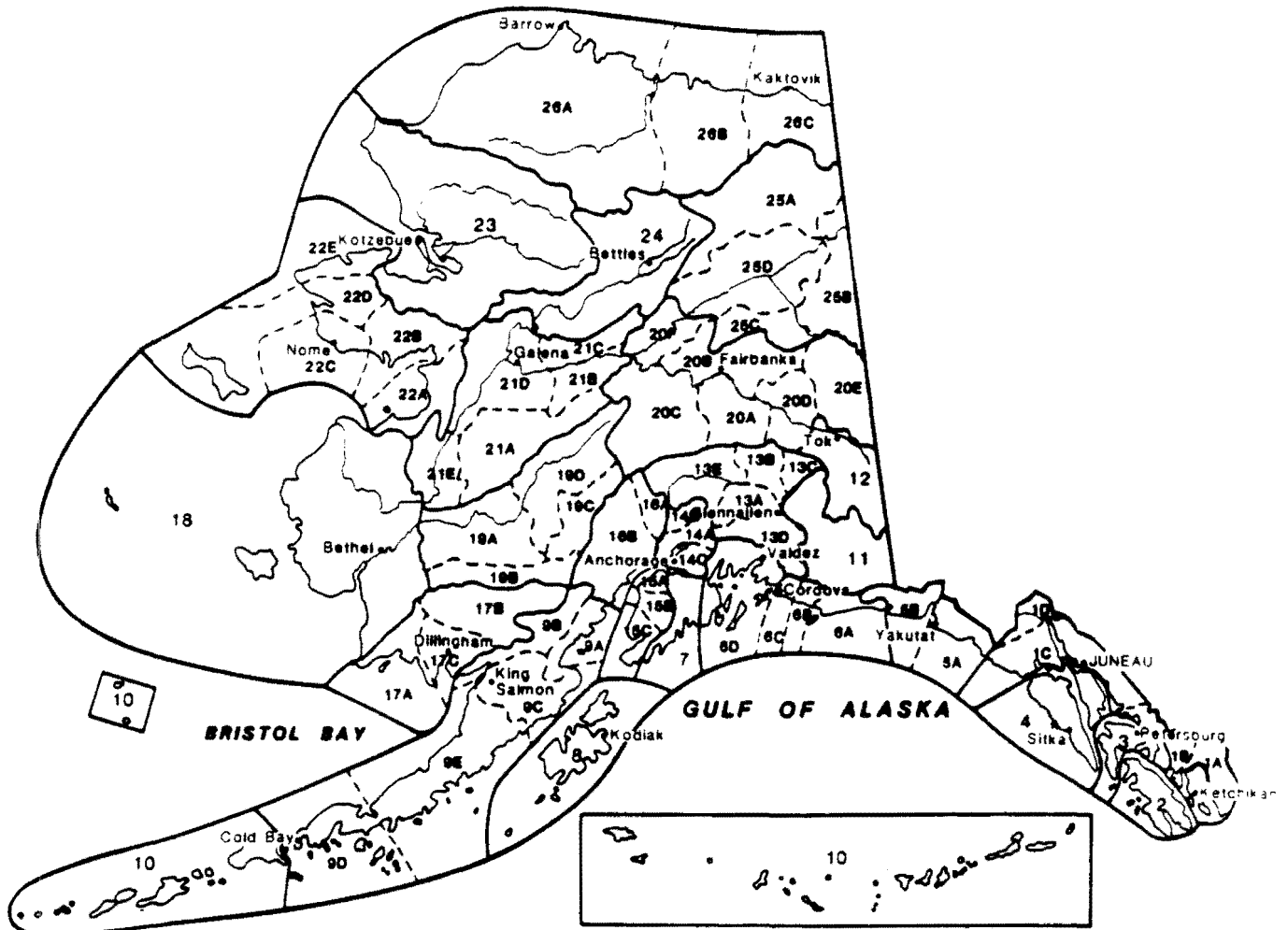
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Alaska's Game Management Units





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