ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
William A. Egan, Governor

DEPARTMENT OF FISH AND GAME
Wallace H. Noerenberg, Commissioner

DIVISION OF GAME
Frank Jones, Acting Director

REPORT OF 1971 SURVEY-INVENTORY ACTIVITIES-LAND EVALUATION AND GAME LABORATORY

by
Peter E. K. Shepherd
Scott Grundy
Kenneth Neiland
and
Charles Lucier

Volume XI
Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-3

(Printed July 1972)

JOB PROGRESS REPORT

State: Alaska

Project No.: W-17-3 Title: Land Evaluation

Section: Lands (Region II)

Period Covered: July 1, 1970 to June 30, 1971

ABSTRACT

The Lands Section's activities in the Anchorage office are presented for the years 1970 through 1971. Joint participation with state and federal agencies in land use planning, management agreements, and access investigations is discussed briefly. Suggestions are given for management and development plans on Potter-Campbell Marsh, Chickaloon Marsh, and the Susitna Flats Resource Management Area.

Summer field studies in 1971 were directed towards investigation of several critical habitat areas. Plant communities of special importance to wildlife are described in detail. Relationships of game and fur populations to these communities are explained.

Aerial surveys of the Kanuti River Flats revealed concentrations of 5,637 adult waterfowl, including nearly 2,000 white-fronted geese, on an area of 300 square miles. Brood production data for 1971 over selected census areas are presented for the Kanuti River. Census figures from the Imuruk Basin surveys are given for waterfowl residing in this coastal area.

Two proposed routes for the Alaska Peninsula Crossing were studied in relation to the fish and game resources along the road right-of-way. Data covering whistling swan populations along the northern road route suggest densities of two swans per square mile. Preliminary investigations indicate that selection of the Paint River-Alagnak route would be more compatible with wildlife values.

Selection of tideland waterfowl habitat is recommended for Safety Lagoon, Golovin Bay and Moses Point.

CONTENTS

Lands Activities
- Introduction 1
- Project Activities 1
- Federal Agencies 1
  - U. S. Forest Service. 1
  - Bureau of Land Management 2
  - U. S. Fish & Wildlife Service 3
  - Corps of Engineers. 4
- State Agencies 4
  - Department of Natural Resources 4
  - Department of Highways. 5
- Local Governments. 5
  - Greater Anchorage Area Borough. 5
  - General Contacts. 5
- Multi-Agency Agreements. 6
  - Potter-Campbell 6
  - Chickaloon. 6
  - Susitna Flats Resource Management Area. 8

1971 Summer Field Investigations. 9
- Introduction 9
- Procedures 10
- Findings 11
  - Kanuti River Flats. 11
  - Imuruk Basin. 22
  - Lake Iliamna. 28
  - Other Critical Habitats 32

Appendix. 36

PART I. LANDS ACTIVITIES

INTRODUCTION

This report will cover the Lands Section's progress for years 1970 and 1971. The writer occupied the Land Coordinator's position from September 1970 until November 1971. The Lands Coordinator position from January 1970 to August 1970 was filled by Joseph R. Blum.

The Lands work has been generally along the same lines as that of the preceding years. This included joint participation with state and federal agencies in land use planning, formulation of management agreements, and access investigations. Emphasis on habitat evaluation, especially waterfowl, was increased measureably during this reporting period. Field work was directed to evaluate critical game habitat over the state. This resulted in identifying several areas of management importance. A new study was also initiated during the summer of 1971 to evaluate the Bristol Bay watershed wildlife resource and land use patterns.

This report also contains a narrative section discussing formulation of land use plans for Potter Marsh, Susitna Flats Resource Management Area and the Chickaloon Flats. Included in the narrative portion are reports on several critical waterfowl areas and an evaluation of the proposed Peninsula Road in relation to game habitat within the proposed highway right-of-way.

PROJECT ACTIVITIES

Cooperation between agencies, as mentioned in the 1969 segment report, has been consistently excellent, which is certainly a credit to past personnel. The Lands input towards these ends has been that of review, discussion and distribution of wildlife data to the federal land managers. Continued close relationships are an integral part of our function and should be encouraged.

FEDERAL AGENCIES

U. S. Forest Service

The Chief of the Forest Service's approval for study of the 600,000 acre Nellie Juan Wilderness Area, located on the west side of Prince William Sound, set in motion a comprehensive investigation of this area. Although the Forest Service is equipped and organized to undertake this study, the department has been invited to participate in these investigations.

A brief discussion concerning joint participation in the Nellie Juan Wilderness Study was held in October of 1970. At this time it was decided that department personnel would contribute data and personal knowledge towards the study. The Forest Service later, (in correspondence)

in April, stated they would appreciate several days help of one Alaska Department of Fish and Game biologist sometime during the summer of 1971. Because the Forest Service is projecting a spring 1972 target date for completion of a use plan, it might behoove the department to keep a close liaison with this organization.

Further contacts with the Forest Service in 1970 involved a meeting to discuss participating in aerial and ground surveys of birds and mammals in Prince William Sound. At this time tentative plans were made for a reconnaissance survey and the designing of a sampling system. With all parties cooperating it was anticipated that the data gathered would supplement the following goals:

1. a winter waterfowl inventory;

2. needs for the Nellie Juan Wilderness area; and

3. the federal requirements for pipeline environmental data.

A field trip was made to Cordova late in May to discuss the planting of waterfowl food plants by the Forest Service on the Copper Delta. While this project may be of good public relations value, it seems questionable that a scarcity of food plants is causing the poor waterfowl hunting on the Copper Delta. Drastic tidal changes in this area since the 1964 earthquake have been causing wide-ranging ecological effects on the plant communities and there have been evident differences in bird movements which are correlated with the tide changes. Study of these interrelationships seems warranted in regard to the poor duck hunting experienced in the past few years.

During this May meeting the ATV problem was discussed with Forest Service personnel. A questionnaire sent to local citizens was read and it gave the impression that the public was in favor of ATV controls on the Copper Delta. The draft of regulations to be enforced was reviewed and became effective in October of 1971.

Bureau of Land Management

A public hearing was attended in Fairbanks in late October 1970. This hearing was in regard to the proposed White Mountain and Fortymile Classification Units. The meeting was well attended, but vocally dominated by mining and homesteading interests. Testimony by conservation agencies and other interested parties was much in favor of these classifications. To this date neither unit has received approval.

Throughout the period of October 1970 to March 1971, I participated in monthly meetings of the Interagency Wildlife Team. This group, headed by the Bureau of Land Management, was brought together to encourage exchange of information relative to the Trans-Alaska Pipeline. Input from this section involved comments regarding effects of road construction on furbearers and waterfowl.

The problems of ATV regulation and public domain trespass were discussed with the district manager and staff during November 1970. The BLM suggests developing a use permit limiting the number of permittees in certain areas as well as establishing fees commensurate with particular activity. Action on this proposal is pending consultation with the federal solicitor for a legal opinion concerning applicability of present land use permits (SLUP) to this scheme.

Results of the ATV discussions were largely in the form of suggested approaches which included:

1. flexible time and area zoning;

2. development of more access trails;

3. restricting machines to trails, except to haul meat.

Action on these proposals will require more study and the introduction of regulation changes to the legislature.

In January of 1971 the Department of the Interior's Environmental Impact Study draft was reviewed and criticized after soliciting comments from several of the game biologists in this office. Generally we found the wildlife section biologically weak and inaccurate in many instances. The consensus was that this report needed revision and updating. Later in April of 1971 a brief statement concerning the impact of pipeline construction and operation on waterfowl populations was drafted and submitted to the Juneau office.

This section became involved in an effort to map and locate sheep and animal licks during the summer of 1971. Requests were sent to area biologists in Region II and observations were solicited from other personnel. While working in the vicinity of sheep licks near Bettles, the Coordinator mapped several areas which were located by air. The BLM will handle the withdrawal of these licks to protect them from exploitation.

U. S. Fish and Wildlife Service

Close contact with the Bureau of Sport Fisheries and Wildlife continued through this reporting period. Most of our contacts were to resolve problems arising through joint agreements or at meetings of interest to both agencies. A lengthy meeting was held with a Bureau biologist regarding the Fish and Wildlife Service approach to the wilderness proposals, especially the Kenai Refuge. The Fish and Wildlife Service's participation in the Potter-Campbell Marsh studies and in the Chickaloon agreement has been appreciated by this section. Several other Habitat Section decisions, in regard to the highway problems, were aided by Fish and Wildlife personnel and, again, this help was certainly appreciated.

Corps of Engineers

In June of 1971, while conducting habitat surveys in the vicinity of Golovin Bay, it was noted that the tug "Cherokee" was leaking oil into the Bay. An oil slick was visible from the boat to the shore (several hundred yards) and along the beach from Golovin east to Cheenik Creek. The Corps was contacted regarding this "hulk" and its status. Apparently, the "Cherokee" has been abandoned by its owners. Removal of this wreck can only be accomplished if it is declared a navigational risk, since this would allow the Corps to request funds through Congress for its removal.

Several days in July 1971 were utilized to study, analyze and comment on the Corps of Engineers Impact Report concerning the Chena River Lakes Flood Control Project. In short, it was suggested that the Corps consider completely stripping the proposed reservoir basin to mineral soil, establish islands, channels and inter-connected small ponds in the south pools, and divert some moving water into the head of Piledriver or Badger sloughs. It is felt that these measures might result in creating a waterfowl hunting area, rehabilitate the Badger Slough and, in the long run, still accomplish the purpose of the central project.

STATE AGENCIES

Department of Natural Resources

The Division of Lands is probably the most frequently contacted agency at both federal and state levels. Contacts in 1970-71 involved negotiations of the Susitna Flats Resource Management Area, grazing leases, oil and gas leases, Chickaloon Agreement, Potter and Campbell marshes and the dedication of access trails.

Comment was requested by the Division of Lands in December of 1970 regarding a proposed grazing lease north of the Little Susitna near Bald Mountain. This lease area comprises a large portion of the summer and fall range of the Matanuska Valley moose herd. The department's recommendation in this case was that these leases not be let--because of cattle conflicts with moose on an important summer forage area and interference with the moose harvest.

The Susitna Flats Resource Management Area agreement was signed in December of 1970 and work began on developing a land-use plan for this area. No sooner had this document reached this section's hands than we were appraised of upcoming oil and gas leases for the entire area. A special interdivisional meeting was held to set stipulations for oil and gas leasing on this area as well as to establish priority studies and needs for development of a land-use plan. All recommendations were incorporated into a memo which was presented to the Chief of the Minerals Section, Division of Lands. To this date, planning for the resource management area has consisted of developing maps and overlays of various species habitat requirements, priority areas, roads, access trails and

power lines. A beaver cache survey to determine distribution and relative abundance of this furbearer or the management area was made in early October 1971. Results of this count are presented in Appendix I.

The acquisition and dedication by the Habitat Section of 70.85 miles of public access right-of-way (22 trails) became a reality in February of 1971. Most of these trails are in the Mat-Su Borough and within a heavily used public recreation area.

Department of Highways

Beginning in September of 1970 the problem of controlled access highway fencing reached the discussion stage with Game and Highway personnel. The meeting concerning this problem was held with Highways' engineers and resulted in several suggestions. One was that large culverts (11'x12') might allow moose passage under the road. (Construction of a simulated culvert was proposed but never implemented.) Use of overpasses was also suggested, but costs were thought to be prohibitive. Correspondence regarding this problem continued throughout the winter and finally resulted in a general policy statement issued by the district engineer. Highways would only require 6-foot chain link fences through residential areas, crossroads, etc.

The problem of Fish and Game Department signs along state highways has caused some concern in regard to placement and safety precaution. A policy regarding placement and safety procedures for sign placement was tentatively given to this Section in June. However, the original specifications were changed somewhat in later correspondence and signs must be placed at least thirty (30) feet from the traveled way of edge of the pavement unless it is physically impossible due to cut, bank and slope. Standard breakaway posts should be provided (Alaska Department of Highways T-17, 18, 19, 21 and 22). Aluminum posts less than three (3) inches in diameter, or square and perforated posts are acceptable. Teechannel iron is also considered acceptable as breakaway.

LOCAL GOVERNMENTS

Greater Anchorage Area Borough

Comments affecting the Greater Anchorage Area Borough in regard to Campbell air strip were submitted in February of 1971. The department's stand on this issue was to protect the anadromous fishing in Campbell Creek and to recognize the value of the area as a watershed with great public recreational potential.

GENERAL

Several public appearances were made during the year. One was before the Alaska Dog Mushing Association to discuss dedication of dog-race

trails. A PARC's meeting was attended to explain the Game Division plan to conduct moose habitat rehabilitation on Fort Richardson. The public was not sympathetic to this program. If this project develops further, an informative news release should be written explaining the reasons behind such a program.

MULTI-AGENCY AGREEMENTS

Because land managers at all federal, state and local levels experience overlaps in their purposes and planning it is often necessary to form agreements involving several agencies. In 1970-71 the state entered into several joint management agreements; these will be discussed briefly in the following paragraphs.

Potter-Campbell Marsh

The first meeting concerning the Potter-Campbell Marsh was held in November at the U. S. Fish and Wildlife Service office. Attending were representatives of the Borough Land Planning Section, Department of Highways, Division of Lands, Department of Fish and Game, and Fish and Wildlife Service personnel. Discussions at this time centered around developing a study and land-use plan for the marsh. The responsibility for working out this plan was placed in the Habitat Section's (ADF&G) hands.

A preliminary development plan was drafted by the coordinator and made available to the groups in January of 1971. Meanwhile, an Anchorage legislator introduced Senate Bill #214 which established this area a state wildlife refuge. The Bill was adopted and became law on April 20, 1971.

Unfortunately no one checked into land ownership of this area in depth. Investigations into this factor in late summer 1971 revealed considerable private ownership and several large land leases on the state refuge. Those land problems essentially split the refuge into three separate areas. Moreover, refuge boundaries were not clear in the original document and will require surveying if the department is to have a manageable refuge. Legislative action will be required to set aside funds for access, land, and boundary surveys if this refuge is to become a reality. Transfer of state land held in application by the Borough and several other agencies must be requested in addition to the above recommended action.

Chickaloon Agreement

Basically the Chickaloon Agreement was proposed to allow management of a unique tidal marsh located a few miles southwest of Anchorage across Turnagain Arm. Four agencies have been involved in developing the basic

agreement. These include: (1) U. S. Forest Service, (2) U. S. Fish and Wildlife Service, (3) Department of Natural Resources, and (4) Department of Fish and Game.

The Chickaloon Flats became an active issue after a formal meeting of all concerned agencies was held in March of 1971. Corrections to the memorandum of agreement covering agency responsibilities was the main topic of this meeting. A new draft of the agreement was written and copies distributed to participating agencies.

In April letters were sent to the three other agencies preparatory to holding a review meeting on the agreement. Responses were received from state Departments of Fish and Game and Natural Resources. During May the Chickaloon Agreement was re-drafted and copies circulated to all agencies.

By the end of August 1971, all participants had signed the agreement with the exception of the Forest Service. Unfortunately the document was lost in the September 4, 1971 crash of an Alaska Airlines jet. A new agreement was drawn up and sent for all agencies' final signature.

Recommended action on a development plan.

The Chickaloon Flats represents a provocative management challenge to all concerned agencies. First, this area presents one with difficulty of access and movement. Second, overnight cabins are few and not distributed so as to allow equal coverage of the marsh. Therefore, it seems plausible that we must first consider these points in developing a management plan for the area. Cabins should be developed in clusters at designated places within short walking distance of huntable areas. Access points close to these groups of cabins such as temporary wheel airstrips or float landing should be established. Use of the cabins should be on a reservation basis when public demands require such action. A minimal rental fee for use of the cabins is suggested.

Habitat management of the Flats seems needless at this time and should be considered only when future investigations demonstrate a need for developmental projects. In the interim a thorough examination of waterfowl use and movements should be attempted. Immediate consideration should be given any pressing ecological problems such as loss of food plants by erosion or changes such as replacement by invading species. This has apparently been occurring on the area since the 1964 earthquake.

Construction of a highway across Turnagain Arm certainly will increase the recreational uses of the Kenai Peninsula wildlife resource. Any future planning would include projections of such use to allow flexibility in area use plans such as the Chickaloon Flats. With the possibility of increased use and accessibility, planning should include priorities for reduction in the number of days open to waterfowl hunting and bag limits on certain species.

Susitna Flats Resource Management Area

Future management planning for the Susitna Flats Resource Management Area should take into consideration the rehabilitation of waterfowl habitat. The first move in this direction would be that of selecting priority areas for pond development and rehabilitation. Conditions such as those existing on Stump Lake (see Part I), might require construction of levees to prevent high tide waters from inundating the lake basin. Blasting the potholes would seem very desirable in many areas of brush which are now waterless. Ground reconnaissance of current high use area would be helpful in determining waterfowl food plants and what constitutes attractive wetland cover. Furthermore, I believe the developmental work should be directed towards providing feeding and nesting areas, with little or no emphasis placed on establishing nesting sites (except for Canada geese).

A manageable waterfowl hunting area can hardly be administered with the present distribution of cabins on the Susitna tide flats. Ownership of present cabins and lands should be determined as soon as possible (some work has already been accomplished along these lines by Cunningham in 1968). These people could be given so many years to remove these structures in areas of conflict. No more land entry should be encouraged until studies are conducted to determine where cabins can best be fitted into the overall management plan. I would suggest clustering of cabins at designated locations within reasonable walking distance of huntable areas. Again this would also require providing access corridors, such as certain lakes for float landings, or marked earth landing strips for wheel-planes, and perhaps extension of seismic roads into some parts of the tidelands. Cabins showing no ownership should be removed. If public use continues to increase, I would consider condemnation of all structures and go to a registration type of cabin use. Present owners could be given a lease for a specified number of years and upon expiration these cabins would become public shelters.

Control through special regulations may become a reality on the Susitna Tidelands within a few years. That is, we may need to have closed days, special bag limits, etc., in order that more people can enjoy waterfowl hunting of some quality. These restrictions are recommended only when hunting pressure reaches proportions incompatible with the available waterfowl.

At present, beaver seem abundant on the Susitna Flats Management Area; however, beaver fur prices have nearly doubled in the last year. Pressures are apt to increase drastically and might reduce breeding stocks to a low level. I suggest that the area manager keep close track of trapping effort if interest increases. Surveillance should include annual cache counts in the areas as transected in 1971.

Other fur animals appear to be in little danger of overutilization, largely because of lower prices on some and the relative remoteness of most of the Susitna Flats. Problems of overtrapping can be handled by season manipulation in most cases.

PART II. SUMMER FIELD INVESTIGATIONS

INTRODUCTION

Special ground investigations of selected wildlife habitat areas during the summer of 1971 were prompted by the following land use situations:

1. Alaska Native Land Claims;

2. need for comprehensive data to implement state land use planning; and

3. oil and gas exploration.

Foremost of these and essential to the progress of agencies concerned with land use and resource management was the settlement of the Alaska Native Land Claims Bill. The passing of this bill accelerated land selections of unprecedented proportions by the federal government and the State of Alaska. These selections included much of the critical wildlife habitat in the state. Furthermore, proposed plans for hydroelectric projects and highway construction impelled the Habitat Section to take a hard look at several other critical wildlife habitats.

One need not long be a student of wildlife biology in Alaska before it becomes apparent where a great segment of our critical wildlife habitat is found. These are the broad delta areas of the Yukon, Kuskokwim and Copper rivers and others; the tundra lake systems of the western coastal drainage; and the broad marshes of the interior rivers. In a timely paper given at the 36th North American Wildlife and Natural Resources Conference, Bartonek, et al., 1971, pointed out potential wetlands habitat problems facing game managers in Alaska. The major emphasis of this paper was devoted toward discussion of development which could affect critical waterfowl habitat. However, it also provided insight into the possible losses of valuable fur and game habitat. Recognizing that in-depth studies had been completed in many of these areas, or that investigations were already implemented on others, the Lands Coordinator selected several small areas of high wildlife value which appeared to warrant immediate attention. These areas were the Kanuti River Flats on the Koyukuk River and the Imuruk Basin on the Seward Peninsula.

The Kanuti River Flats deserved special attention because it is an area of complex and highly critical wildlife habitats that may be completely lost in the near future. The threats to the continued existence of this area are as follows:

1. potential hydroelectric development in the Kanuti River Canyon;

2. the Trans-Alaska Pipeline crossing on the headwaters; and

3. inconsistent fire control policy in regard to caribou wintering areas and the game habitat.

The Imuruk Basin is representative of a unique tundra and lake habitat type formed by a receding inland sea. A hydroelectric possibility exists in the Tucsuk Channel and if implemented would completely inundate the basin. This area provides nesting and rearing habitat for many thousands of geese and ducks. It is used heavily by herbivores such as moose and reindeer. Both aquatic and terrestrial fur animals are abundant. A highly productive fishery of salmon and many fresh water species is important to local subsistence.

Further selection of critical habitat areas was motivated by knowledge of a newly proposed road on the Alaska Peninsula Crossing Study. Preplanning reconnaissance routes were used as a guide to the choice of wildlife habitat to be studied. Since this proposed road may pass through some of the most valuable commercial fish, sport fish and wildlife habitat in North America (and even worldwide), it certainly deserved at least a cursory look into the various habitat types supporting game populations. Our knowledge in the area of habitat needs and use by furbearers and waterfowl was weak. However, data were also collected concerning big game movements and relative numbers as noted during the course of field work in the general area of Iliamna Lake.

Notes on other seemingly critical habitat areas are presented as an addendum to the main body of this report.

PROCEDURES

Probably the most important piece of equipment needed to conduct field investigations over widely separated areas is a suitable aircraft. These needs were met by chartering a 185 Cessna on floats. This aircraft is capable of long-range work at reasonable speeds while carrying a maximum payload. While not entirely suitable for some game counts, the 185 Cessna filled the need for a reliable reconnaissance aircraft.

Ground travel over wetland areas was accomplished by the use of a fiberglass canoe and a collapsible kayak (Foldboat). Usually the procedure was to select an area of study, then land on a large lake to use as a starting point from which other lakes could be reached by canoe and foot. After a route of travel was selected, a prearranged pick-up spot was found where the pilot could land and retrieve the canoe and myself. Whereas the Foldboat lends itself more readily to transportation needs in an aircraft, the lighter fiberglass 'rat canoe is preferred by this writer.

Aerial and ground photographs were taken with a Koni-Omega Rapid with a 35 Konica hexanon lens; 58 mm Konica hexanon 5.6 wide angle lens; and a 180 mm 4.5 hexaonon lens. This camera proved to be a valuable asset, especially when taking aerial photographs of game habitat. It uses color or black and white film in interchangeable 120 or 220 film packs. Black and white prints used to illustrate this report were made from Ectachrome color transparencies.

Floral nomenclature as used in this report follows that of Eric Hultén in Flora of Alaska and Neighboring Territories. (Stanford University Press, Stanford California, 1968). Plant community descriptions generally follow the "climax" concept and are only to be regarded as tentative until more detailed studies are made of their composition.

Waterfowl nesting-cover preferences were sought by randomly searching various cover types in each area of study. Particulars concerning all nests were recorded in field notebooks, and were transferred to nest record cards provided by the University of Alaska at College, Alaska.

Aerial population surveys were made by randomly transecting lakes and streams and making an estimate of total numbers and species. Flight routes and waterfowl numbers and locations were marked on 1:63,360 or 1:250,000 topographic quadrangles. Brood counts were made from the canoe by paddling through emergents or glassing open water areas with 7x35 binoculars. Brood age categories follow those established by Gallop and Marshall, 1954. A guide to Aging Duck Broods in the Field. Miss. Flyway Council Tech. Sect. Rept. (mimeo).

FINDINGS

Critical Habitat Areas

Kanuti River Flats: The Kanuti River Flats, as described in this report, covers an area of approximately 1,260 square miles, including the lake systems drained by the South Fork of the Koyukuk River. The Kanuti River enters the Koyukuk at a point 20 miles downstream from Allakaket, Alaska, and is located between 67°00' and 60°00' north latitude and 153°00' and 150°00' west longitude (Bettles 1956; 1:250,000 quadrangle). The Kanuti River is composed of several smaller tributaries and a main course which has its origin in a small series of lakes called Olsen's Lake. Major tributaries of the main river are as follows: Kanuti Chalatna, Nolitna, and Kanuti Kilolitna rivers. The South Fork of the Koyukuk and its related drainages form the remainder of what can be considered part of the Kanuti Flats.

Located near the Arctic Circle, the Kanuti Flats exhibits characteristics of both the tundra and boreal biomes, but favors the boreal biome. Those upland portions which have not already suffered extensive burns support an open coniferous forest largely dominated by black spruce (*Picea mariana*) with a lush ground cover of lichens (Fig. 1).

Often in wetter locations one finds stands of tamarack (*Larix* spp.). Burned over areas and well drained sites are characterized by white spruce (*Picea glauca*), birch (*Betula papyrifera*), cottonwood (*Populus balsamifera*), and quaking aspen (*Populus tremuloides*). Dominant understory shrubs found on both tundra bogs and drier locations are willow (*Salix* spp.),

Fig. 1. Spruce-bog habitat in the Kanuti Chalatna area. These bog lakes provide much of the nesting cover used by lesser Canada geese. Predominant plant cover is black spruce, birch, alder, willow, ericaceous plants, and floating sedge or potentilla mat. Goose nests were most often located on islands or floating mat. This area is also heavily used as winter range by caribou and supports substantial populations of beaver, mink, otter, and muskrat.

alder (*Alnus* spp.), dwarf birch (*Betula nana*), shrub birch (*Betula grandulosa*), wild rose (*Rosa acicularis*), and high bush cranberry (*Viburnum edule*). The most common plants forming the ground vegetation of the tundra bogs and upland heaths are sedges (*Carex* spp.), mosses, lichens and ericaceous plants.

It is possible to broadly define the aquatic plant communities of the Kanuti Flats into two associations:

1. the stable bog lake (such as those along the Kanuti Chalatna); and

2. the relatively unstable fluctuating lakes connected to the main Kanuti, Nolitna and Kanuti Kilolitna.

The South Fork of the Koyukuk has representative plant communities from both these associations (Fig. 2), but lacks the submerged vegetation common to the others, except in the older oxbows and sloughs.

The stable water levels in lakes flowing into the Kanuti Chalatna tend to promote a floating mat type of aquatic plant succession. This mat community is pioneered by sedge or fivefinger (*Potentilla palustris*) in some sites. Bog lakes in this area are relatively steep banked, most rising from the waters' edge abruptly and joining the black spruce, with little or no vegetational ecotone. However, in some cases the disburbed earth banks support narrow, but weak stands of birch, alder or willow. Occasionally one can find relatively dense clumps of wild rhubard (*Polygonum alaskanum*) on these exposed slumps.

In most cases, little or no emergent vegetation becomes established along the shorelines of these lakes except sedge, fivefinger or, rarely, horsetail (*Equisetum fluvatile*). Therefore, sedge mat becomes the most important seral community in these types of waters. Free floating islands of sedge mat (Fig. 1) are not uncommon and in later stages of succession may support black spruce and shrub growth. For some reason unknown to this writer, buck bean (*Menyanthes trifoliata*) appears to assume little seral importance in the mat succession of lakes in the Kanuti Flats.

Another key indicator plant of the stable lake systems and one that is easily recognized from the air is the yellow pond lily (*Nuphar polysephalum*). Other submerged plants associated with the pond lily are pondweeds (*Potomogeton* spp.), bur reed (*Sparganum* spp.), and water milfoil (*Myriophyllum spicatum*).

The most productive section of the Kanuti River Flats is that area beginning on the Nolitna River and joining the main Kanuti at a point about 30 lineal miles upstream. This encompasses an area of approximately 300 square miles of which some 100 square miles is highly critical waterfowl habitat. It is within the area described above that one will find the fluctuating lake systems which support the plant communities so highly attractive to wildlife (Fig. 3).

Fig. 2. South Fork of the Koyukuk River. This river and slough system, along with the accompanying aquatic and riparian plant communities, serves an important function as a midsummer feeding and loafing area for adult and young lesser Canada geese.

Fig. 3. System of interconnected lakes on the upper Kanuti River. Exposed bars are a result of natural drawdown by gradual run-off and evaporation. These bars are composed of alluvium, sand, or fine river-washed gravels. Plant cover in July was dominated by spike rushes, sedge, mana grass, and bluejoint grass. While this habitat mosaic is particularly attractive to white-fronted geese and pintail ducks during the brooding, molting and pre-fall flight periods, it is also used extensively by many other waterfowl for the same purposes.

Annually the Kanuti River overflows its banks along this section of the Flats, inundating the interconnected lakes lying in the flood plain. Extensive stands of willow and alder as shown in Fig. 4 suggest a long history of yearly inundation and drawdown. This condition tends to maintain seral plant communities more favorable to waterfowl and other wetland oriented animals.

Deeper waters of the unstable lakes support pondweeds, bur reed, water milfoil and water smartweed (*Polygonum amphibium*). In shallower waters one finds stands of horsetail, mana grass (*Glyceria* sp.), sedge and spike rush (*Eleocharis* spp.). Marsh fleabane (*Senecio congestis*) sometimes occurs in extensive stands along exposed mud bars. Mixed with these plants are often marsh marigold (*Caltha palustris*) and water crowfoot (*Ranuculus trichophyllus*). Fig. 5 illustrates how the gradual summer drawdowns expose mud bars which soon become densely covered with spike rush. The slightly drier sediments are usually covered with dense stands of blue-joint (*Calamogrostis* spp.) and by midsummer may become surrounded with grass and spike rush (Fig. 6).

Dense stands of willow-alder-grass form a savannah-like community surrounding lakes of the type described. In other cases spruce forest borders the lake shore; however, in most aspects the lakes themselves still support similar plant communities. However, where the summer drawdown is not as severe, patches of yellow water lily can be found. Sedge mat assumes a seral position of little consequence in most lakes which undergo extreme water fluctuations.

Wildlife distribution and abundance surveys.

Aerial surveys of wildlife populations on the Kanuti Flats were begun June 12, 1971 with a reconnaissance flight beginning at Bettles and covering the northern edge of the Flats as far west as Allakaket. Flying from this village we followed a winter trail to the Kanuti Chalatna, landing on several lakes to observe waterfowl and look for nests. These lakes and those draining into Fish Creek and the South Fork seemed to attract numbers of old squaw, scaup, scoter, bufflehead and goldeneye, but few dabblers. Several Canada goose nests were found on islands occurring in the bog type lakes. These stable lakes appear to provide the type of nesting habitat needed by the Canada goose and some of the diving ducks.

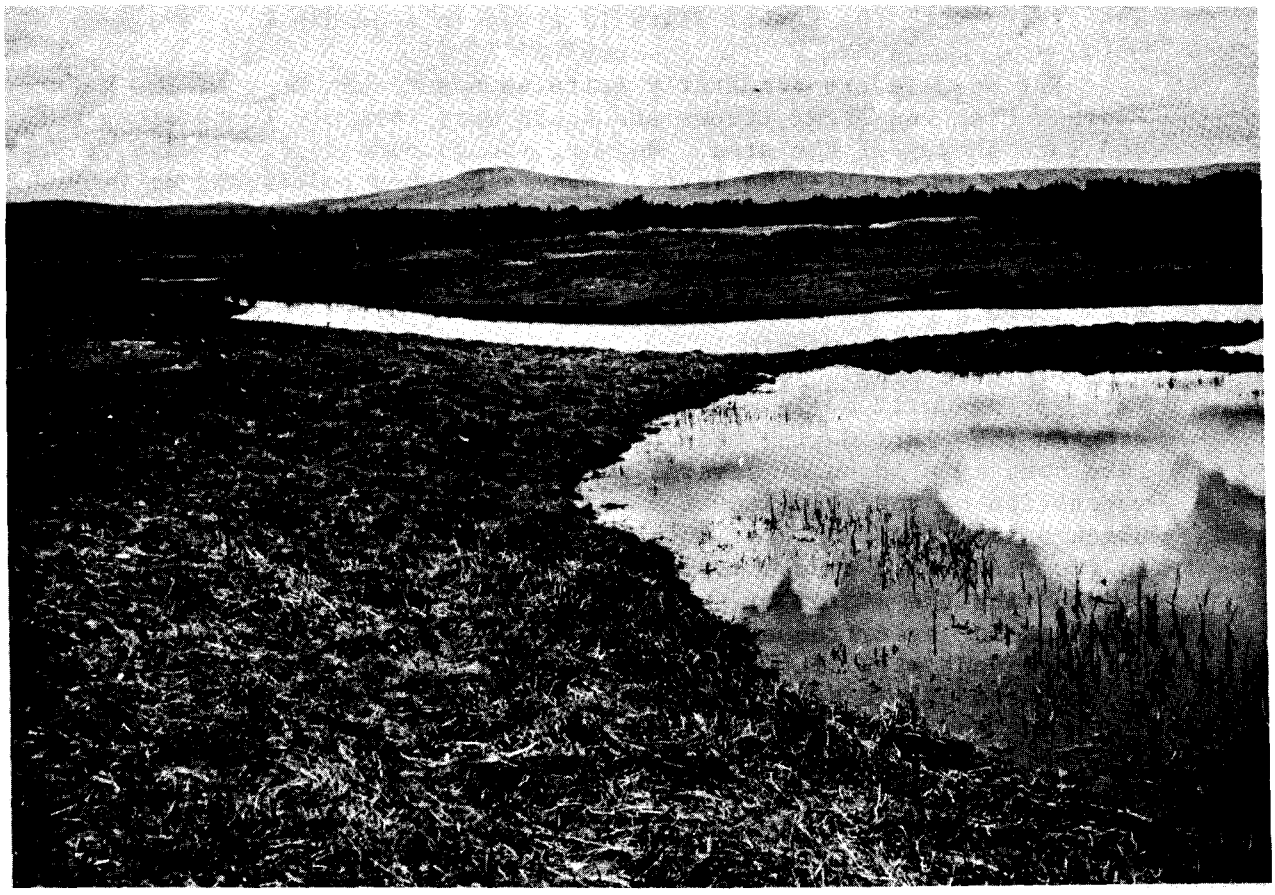
A totally different situation was noted on the main Kanuti River and its tributaries. Lakes in this area appeared to be in high water stage and were flooded back into the willows. Large numbers of white-fronted geese, widgeon, pintail, shovelers, mallards and teal, were observed on the lakes in this area. Later surveys revealed that these lakes were of the type described previously as fluctuating.

The discovery of only a single pair of nesting whistling swans came as a surprise to this writer. However, several pairs and a few single swans were seen during the summer. The nesting swans had built a nest

Fig. 4. View of fluctuating lakes on upper Kanuti taken looking from west to east. Extensive surrounding stands of scrub willow and alder suggest a long history of yearly inundation and drawdown. Over 1,200 white-fronted geese were located in this area.

Fig. 5. Ground view of the habitat types typical of a shallow, interconnected lake system on the upper Kanuti River. Exposed bars were covered with dense stands of spike rush. The riparian community was dominated by willow, alder, grasses and horse-tail; the drier and forested shoreline by deciduous trees, especially birch and poplar.

Fig. 6. Potholes and drainage channels bordering the molting lakes on the upper Kanuti. Note the heavy grazing by geese and other waterfowl. Cover is composed of mana grass, spike rush, and blue-joint. Emergent in right foreground is mana grass.



on a floating sedge island and had apparently just begun incubation when first found. A subsequent visit in mid-July caught the eggs just as they were hatching. A species list of other nests found on the Kanuti is presented in Appendix C.

Some of the larger shallow lakes which were later to become important molting lakes were heavily utilized by geese and ducks as early as mid-June (Old Dummy Lake, Kanuti Lake and Taiholman Lake). One white-fronted goose brood was noted on June 14, 1971. A list of avian species associated with the Kanuti Flats is given in Appendix D.

Fur animals are apparently quite abundant over most of the Kanuti Flats. Mink and otter tracks and scats were commonly found along outlets and lake shores of the area. Beaver, though once very abundant, appear to be at a low population level. Many abandoned lodges and destroyed dams suggest losses of this animal which did not occur from overtrapping, since trapping pressure has been relatively light over the past few years. Muskrats were much in evidence, but not in the numbers one associates with dense populations elsewhere.

Big game populations, especially moose, use the Kanuti Flats from late spring until early winter. Cow moose with calves were frequently seen on the Flats during mid-June. In late July and August nearly every lake boasted a moose or several moose. Use of the lake and lake shore vegetation on the main Kanuti River was especially heavy during July. Black bear are common over much of the Kanuti Flats and once served as an important food source to local residents. Most were taken in their dens during the winter or shot incidentally while moose hunting. Grizzly bear are not seen frequently, but may occur almost anywhere on the Flats. More frequent sign of this large carnivore was seen in the higher country at the head of the Kanuti Kilolitna.

Prior to the series of widespread forest fires which burned much of the eastern portion of the Kanuti Flats in 1969-70, caribou utilized nearly all of the Flats as a wintering area. At present caribou winter more on the Kanuti Chalatna River. This area, however, can still be considered as a highly important wintering area for North Slope caribou.

Aerial and ground surveys July 8 through 10 on the main Kanuti River provided some excellent data on productivity and distribution of waterfowl in this area. Table 1 presents a summary of goose and duck numbers over the small area described on page 15. The large number of white-fronted geese is especially significant, as this amounts to a hitherto unknown breeding population. The possibility that this population may be of the tule goose subspecies is a theory that should be investigated.

Brood productivity in this small area appeared good, considering the late spring and the fact that many waterfowl had yet to hatch. Ground observations by canoe provided species composition and brood data for several lake systems within the main Kanuti River. These counts are presented in Table 2.

Table 1. Summary of Kanuti River Waterfowl Census, July 8-10, 1971.

	Adult	Locals	Total
White-fronted goose	1,950	400	2,350
Canada goose	41	28	69
Whistling swan	4	3	7
Pintail	692		692
Widgeon	942		942
Mallard	35		35
Green-winged teal	37		37
Shoveler	15		15
Lesser scaup	726		726
Scoter*	55		55
Bufflehead	35		35
Old squaw	150		150
Uni. dabblers	422		422
Uni. divers	535		535
TOTAL	5,639	431	6,070

*Scoters include: common, surf and white-winged.

Table 2. Brood Counts from Selected Count Areas, Kanuti River, July 8-10, 1971.

Species	Age Class						
	I				II		
	a	b	c	Av.	a	b	Av.
Pintail	10	7,8, 8,6	3,9,7	(7.2	9,6,8, 3,5,4, 7,8,7	4,5,5 6,5	(5.8)
Widgeon	3,3,7, 8,8,8, 9	2,9		(6.3)			
Shoveler	4,8,9	6,5,7		(6.5)			
Green-winged teal	5	11	10	(8.6)			
Mallard		8	8,9	(8.3)			
Lesser scaup	7,9,8, 7,9			(8.0)			

Discussion

Considering the 5,637 adult waterfowl counted from the air (Table 1) over an area of roughly 300 square miles, and knowing most are concentrated in an area no larger than two townships, it is obvious that we are dealing with a dense breeding and molting population. In addition to this large breeding population there is the annual production of many thousands of young birds. Nearly all the densely populated habitat of the main Kanuti River is subject to extreme water fluctuations, not only in the spring, but in late July and August. This is a condition which is highly significant in relation to potential oil spills upstream. The consequence of a hydroelectric project in the Kanuti Canyon is self evident. However, some thought should be given to fire control priorities in this area and positive action taken to determine the value of this winter range to the North Slope caribou herd. Burns over waterfowl habitat tend to produce more benefits than harm by returning locked-in nutrients to the ecosystem. It is evident that this small flat contributes much as a unique area and also produces a fall waterfowl flight of some significance. These reasons alone justify considering the Kanuti River Flats as critical wildlife habitat.

Imuruk Basin: This small marsh located on the Seward Peninsula approximately 18 miles east of Teller, Alaska, is a highly fertile and productive wildlife area. The map coordinates for the Imuruk Basin are between 166° 00'W and 165°00'W longitude and 65°00'N and 65°15'N latitude (Teller, 1950. 1:250,000 quadrangle). Two main rivers drain into the basin, the largest of these is the Kuzitrin River which flows from the east. A slightly smaller river, the Agiapuk, enters the Imuruk Basin from the north. Many small streams flow into the area, especially those arising in the Kigluaik Mountains.

The plant associations of the Imuruk Basin are those of the tundra biome. Mose of the surrounding uplands are covered with a sedge tussock or heath cover. The lake basins of this area seem to be of one basic type; that is, they are steep-banked, fairly deep, often murky, and support meager stands of submerged and emergent vegetation (Fig. 7). Most are connected with narrow channels and tend, after many years, to gradually become shallower, nearly dry, or dry (Fig. 8). However, water levels in these lakes are usually replenished every spring or often enough to maintain the willow-alder-grass communities on the lake floors. Generally, most of the large, shallow or dried-up lakes occur in the northeast side of the basin.

The deeper, steep-banked lakes are normally favored by diving ducks in the area, especially flocks of nonbreeding molters. Aerial counts during the height of molt revealed molting flocks of over 500 birds on individual lakes. Of interest was the sighting of several flocks of molting canvasback ducks. The aggregate count of two flocks of this species was 65 hens and drakes. A flight on July 27, 1971 resulted in

Fig. 7. Large tundra lake in the vicinity of New Igloo, Upper Imuruk Basin. Ground cover is typical heath tundra consisting of mixed ericaceous plants, lichens, dwarf birch, sedges and grass. Several hundred molting greater scaup, old squaw, and a few canvasback were observed here. American widgeon with broods and a large flock of molting pintail were the most evident puddle ducks around the lake.

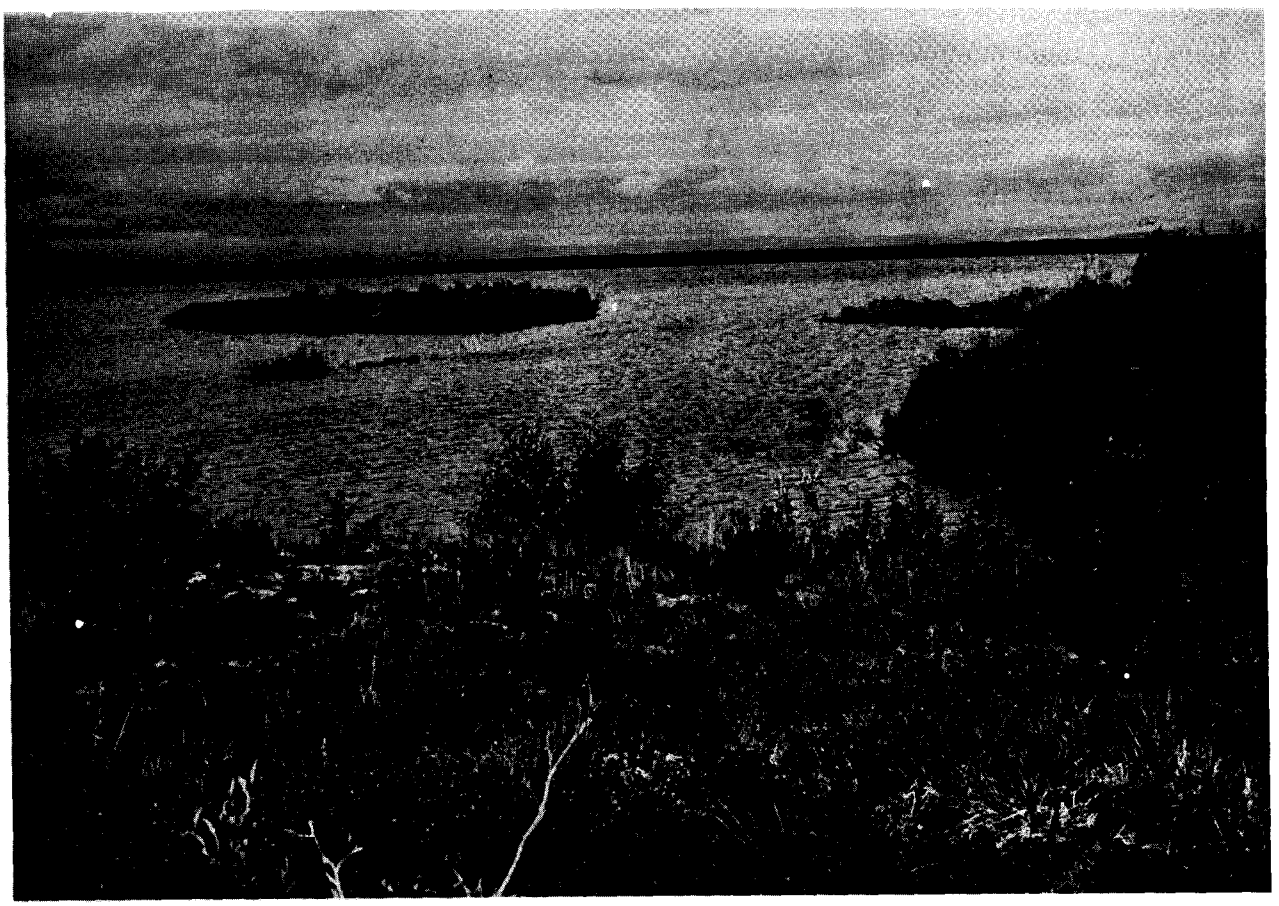


Fig. 8. Nearly dry lake basins along the northeast end of the Imuruk Basin. Former lake shorelines can be traced by following the narrow stands of alder. Remaining potholes are used extensively by molting and nesting waterfowl, especially lesser Canada geese and dabbling ducks. Dominant plant species of the wet areas included dense stands of marsh fleabane, mana grass and blue-joint. Drier portions of the lake floor supported a willow-alder-grass community.

a total count of 1,185 Canada geese (including young), 20 white-fronted geese, 75 whistling swans, 2,221 diving ducks (scaup, scoters and old squaw) and 500 molting adult dabblers (pintail, mallards, shovelers, green-winged teal, and American widgeon). A species list of the avifauna of the Imuruk Basin is presented in Appendix D.

Ground studies on selected habitat types within the Imuruk Basin provided some data regarding aquatic plant composition, plant community structure and a limited number of brood counts. It was immediately apparent after visiting many lakes in the area that the partially drained or nearly drained lakes were highly important to the waterfowl productivity of the Imuruk Basin. Molting flocks of geese use these richly vegetated lake beds for food and cover from mid-June through August. Broods of all species are abundant in the small potholes remaining after the spring high water. In fact, the entire vegetational mosaic of this unique habitat appears highly beneficial to most waterfowl.

The apparent successional stages from open water to the subclimax riparian shrub community consist of very few seral communities; vegetation which is either excellent cover or of high food value. Open water areas support stands of pondweeds (*Potomogeton filiformis, P. vaginatus, P. richardsonii*), water milfoil, and smartweed. Shallow emergents composing several of the seral communities included mare's tail, five finger, sedge, water crowfoot, marsh marigold, and marsh fleabane. The latter plant is often found growing as an emergent early in the summer, but usually blooms when the water levels have fallen below the ground level. Duck weed (*Lemna trisulca*) occurs in dense floating colonies where wind and wave action are absent. A characteristic subdominate of great importance as waterfowl food, spike rush, occurs abundantly in the fleabane stands. This diminutive plant also carpets exposed mud bars in homogeneous stands often resembling a well-kept lawn.

Progressing to drier ground, but often occurring in standing water are stands of mana grass with scattered clumps of Alaska cotton (*Eriophorum alaskanum*) interspersed at intervals. The final grass community in successional sequence is the blue-joint portions of the lake beds. Dry lake beds of older origin support extensive patches of willow and alders. Ground views of the above plant communities are shown in Figs. 9 and 10.

Wildlife Surveys

Aerial counts of waterfowl discussed previously suggested heavy waterfowl use of the Imuruk Basin. Such large numbers of adult molters certainly point to the possibility of a substantial brood crop. However, brood counts over selected areas produced only 16 broods, averaging 4.0 Class I young per brood. These broods were largely those of pintail, widgeon, green-winged teal, and old squaw. The obvious lack of broods, especially scaup, and the small size of the broods observed, point to a poor production season for the waterfowl of this area. The poor productivity this summer, which was especially noticeable over the northwest coastal habitat, was felt to be partially, if not entirely, a result of the extremely late season experienced the spring of 1971.

Fig. 9. Ground-level view of lake bed habitat pictured in previous photo (8). In the foreground is blue-joint, grading into a stand of mana grass as the soil moisture increases, and ending with a fringe of marsh fleabane (dense white-topped vegetation) at the water's edge. Alaska cottongrass is seen blooming abundantly among the mana grass community. The only other plants of any consequence were the emergents such as pondweeds, mare's tail, spike rush, water-milfoil, and marsh marigold.

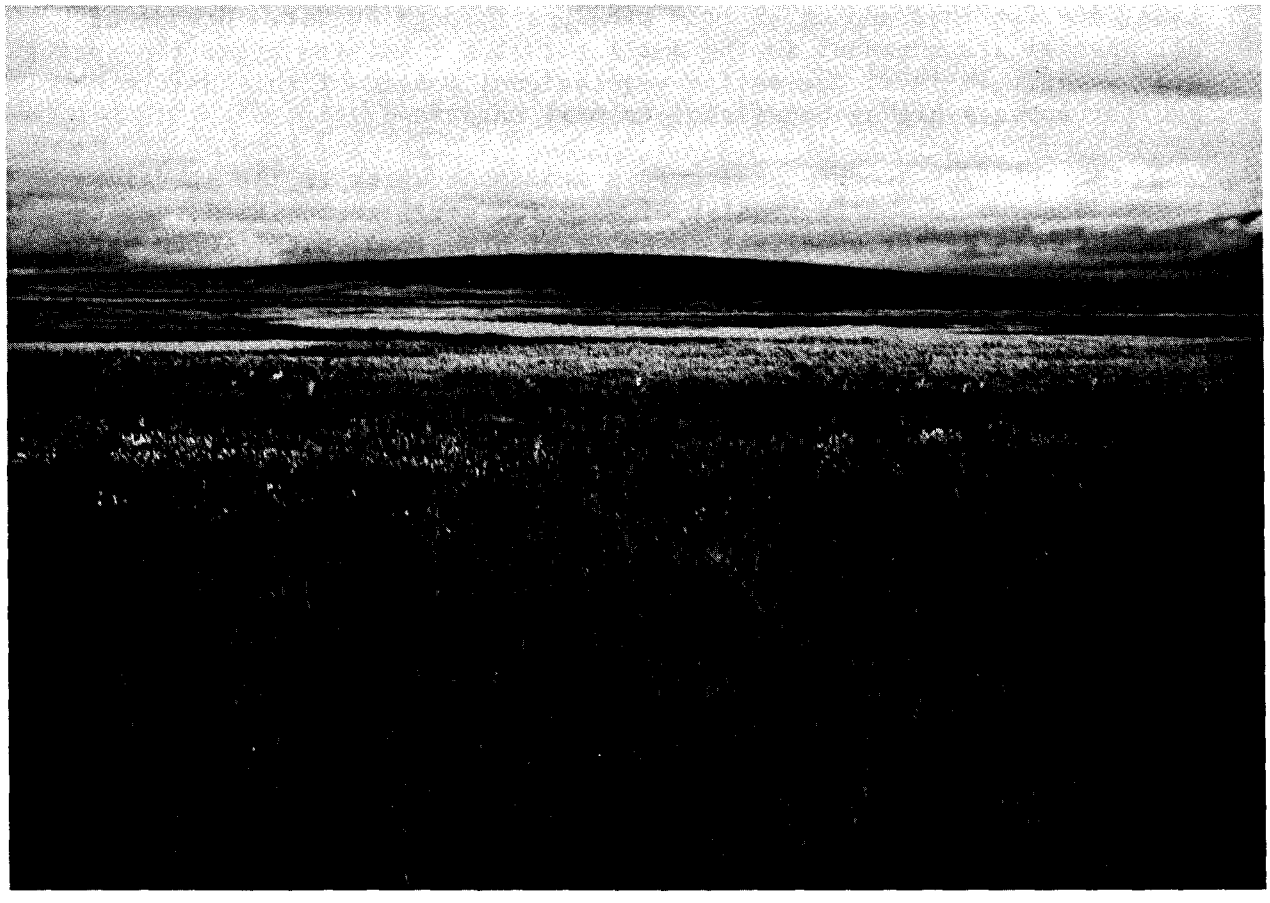
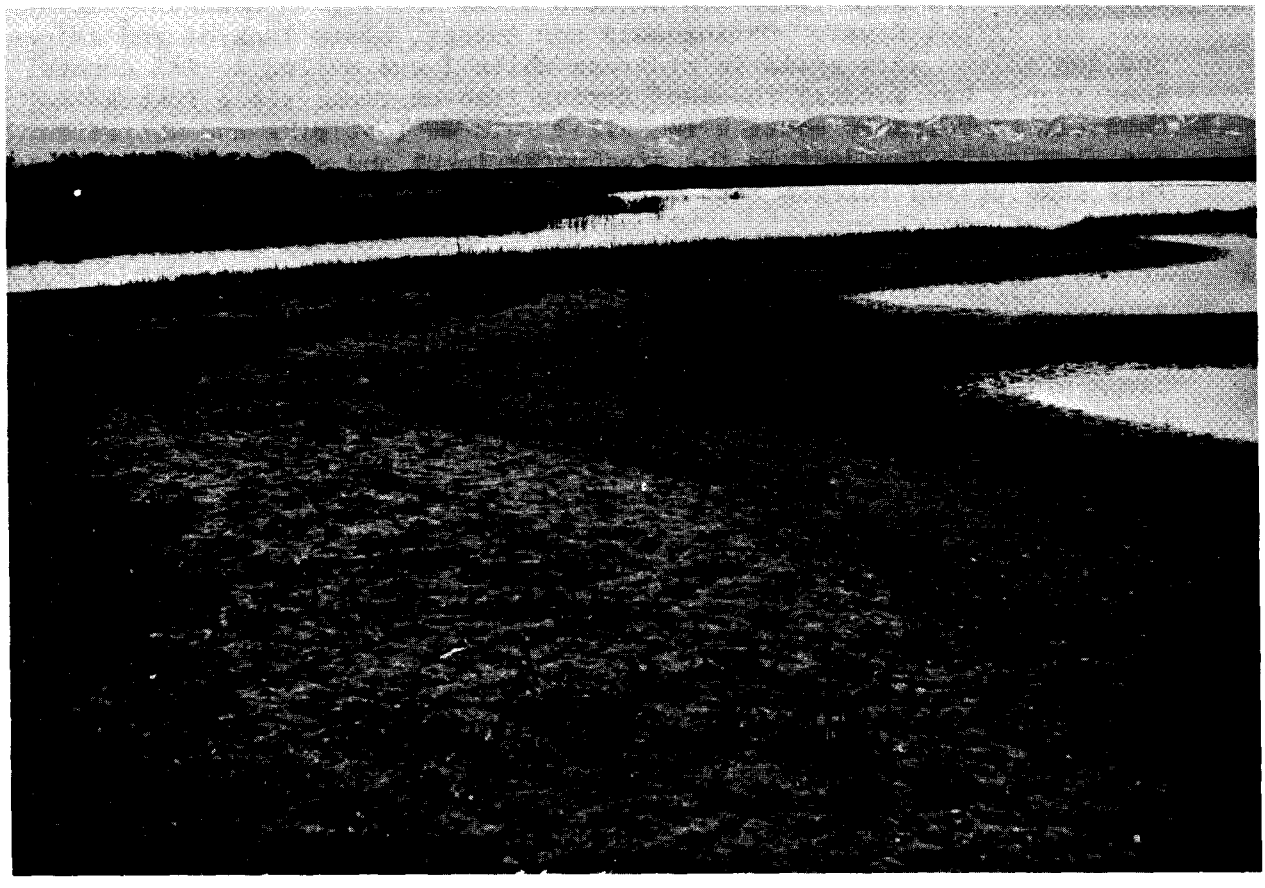


Fig. 10. Partially dry lake bed in the Imuruk Basin. Mud bar was in use by large numbers of geese -- note cropped stems of marsh fleabane. Shoreline vegetation in damp to wet sites is largely sedges grading into dense stands of blue-joint grass. Main submergent plants were pondweeds.



Local residents rely on the fish and game populations of the Imuruk Basin to a greater extent than at interior villages visited by this writer. Moose are frequently taken on the Kuzitrin River during the fall and winter months (Figs. 11 and 12). This area is generally recognized by the native hunters as a prime fur trapping location for mink, fox and muskrat. Hares and ptarmigan, when abundant, abound in the riparian communities along the Kuzitrin River and upper Imuruk Basin.

A spectacular run of salmon is also available to local residents, and many active fish camps can be seen along the Tuksuk Channel, Imuruk Lake and Agipuk River. During July and August, heavy runs of red salmon and dog salmon were still in progress while I was making aerial counts. Some people had several thousand drying fish on racks along Tuksuk Channel. A reliable contact in Teller told me that pike and whitefish are also quite abundant in the freshwater lakes and sloughs of the Basin. This same person related that normally there is a good late fall run of dog and silver salmon.

Waterfowl hunting, both in spring and fall, is another important food gathering chore which seems to still be practiced in the Teller-Brevig area. In mid-June I was actually surprised to see the number of camps along Brevig Lagoon, Grantly Harbor, and Imuruk Lake. Most of these people were hunting seal and waterfowl. Nearly all the hunters were using dog teams instead of snow machines for transportation.

Discussion

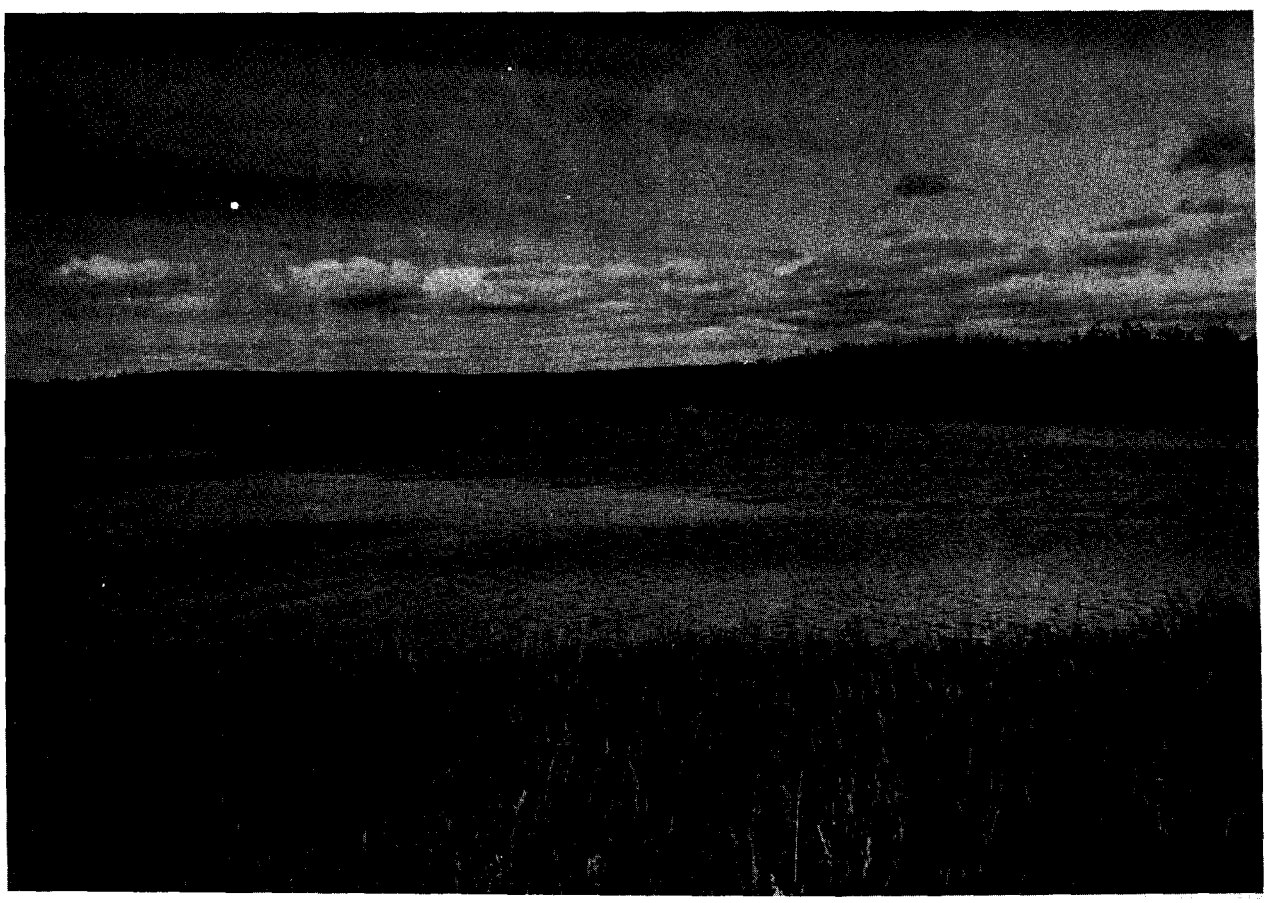
The Imuruk Basin deserves special attention from wildlife managers as a fragment of unique habitat which is extremely fertile and productive. Subsistence use of this area still takes an important place in the harvest of the fish and game resource. At present the legal kill of bull moose has been heavy enough to depress the percentage of large bulls in this herd. However, aerial count data suggest production is excellent and the herd is increasing. A good part of this hunting pressure originates from Nome, although I have been told that local residents take a number of these animals.

The future status of this area depends largely on native land selections in the vicinity of Mary's Igloo. However, I submit that this area be classified as critical wildlife habitat and in the event it is not wholly selected be given our most conscientious attention toward ultimate classification as a wildlife and recreational unit.

Iliamna Lake: The State of Alaska Department of Highways planning and research section has selected two tentative routes for the Alaska Peninsula Crossing Study. These are known as the northern route and the Paint or McNeil river route, respectively. Ground and aerial wildlife reconnaissance of these routes was begun in June of 1971. Both routes pass through areas of high wildlife and scenic value. However, in comparing values the southern route would seem to be more favorable.

Fig. 11. Aerial view of the upper Imuruk Basin in the vicinity of Mary's Igloo. Many sloughs and deeper lakes here were populated by diving ducks, American widgeon and green-winged teal. Heavier and more extensive stands of alder and willow characterize the shrub community of this area.

Fig. 12. Slough plant communities along a fork of the Kuzitrin River at New Igloo. In the foreground is a stand of grasses, largely blue-joint, with mana grass on the bank. On the far side of the slough are emergent stands of horsetail and sedges, followed by a dense willow and alder community. Three different species of pondweeds were found in submerged locations up to 12 feet in depth.



Proceeding along the north shore of Iliamna Lake one will notice the rather abrupt transition of forest to tundra beginning in the vicinity of the Newhalen River, and continuing westward without interruption. The open tundra gives way to some dense stands of timber along parts of the southern route, especially around Nonvianuk Lake.

The tundra lakes on the north side of Iliamna Lake are clear, with gravel or rock bottoms and very little submergent or emergent vegetation. These lakes are not especially attractive to dabbling ducks, but do attract large numbers of divers. This is possibly due to rich animal life found in these waters. Although nesting cover is scarce, waterfowl in this area tend to nest in dense clusters on islands where land mammals cannot easily destroy eggs. The most common nesting birds in this area are listed in Appendix C. Because these lakes with islands serve a highly important function as waterfowl rearing areas, it seems logical that they should be protected from exploitation.

Big game, especially brown bear, abound over much of the Iliamna Lake area. Because they prefer to either travel at night or among the dense alders, one does not often see this large carnivore except when the salmon are in the streams. Residents of Iliamna Lake claim it is possible to observe over a hundred bears in a short period during the salmon runs. I attempted to survey this population in mid-August, 1971, but high winds and poor flying conditions curtailed intensive aerial searches of the feeder streams.

Caribou were seen almost daily and appear to frequent the north and northwest lake shore year-round. Large groups of caribou were seldom seen and most observations consisted of six to 20 animals. Large bulls, singularly and in small groups, often frequent the wet ridge meadows during midsummer.

Moose are not abundant, but are seen commonly around the streams and lakes. This large herbivore is much more in evidence south of Lake Iliamna.

Land otter are probably the most abundant fur species in the area, with the exception of mink and beaver. However, the Iliamna area did not strike me as especially good fur country. Some marten may be found in timbered locations, and fox are seen occasionally. A few wolf packs frequent the lake area, but are not often caught by local residents.

An aerial survey of lakes on the west and southwest end of Iliamna Lake provided some interesting data relative to whistling swan populations. The areas surrounding the Kaskanuk River, Ole Lakes and southeast to King Salmon along the proposed road route supported many hundreds of these birds. Roughly 100 square miles of this habitat were censused on July 17, 1971. Residing within this area were 31 paired adults, 14 pairs with young (55 cygnets), and 54 adults in flocks. This amounted to a total of 199 swans or about two birds per square mile. Thirty-one per cent of the adult swans had young, averaging 3.9 cygnets per brood. These figures suggest the swans in this area experienced a fairly successful production year despite a late spring.

Discussion

Construction of a road from Iniskin Bay through the Chigmit Mountains and along the north and west shores of Iliamna Lake is not felt to be advisable from a fish and wildlife standpoint. To open this area to vehicular traffic would soon destroy its natural attractiveness. The Newhalen River, Upper Talarik Creek and Lower Talarik Creek (and many others) are recognized as trophy rainbow trout streams. Pressure on these fish stocks are now great and with further pressure the department may be forced to become more restrictive. At some point fishing pressures would be so great as to preclude self-maintenance of natural fish stocks. Once this occurs management of a trophy population of fish becomes impossible.

Residents of the Iliamna area are at present vocally opposed to developing a road system open to sportsmen from the larger population areas. These opinions included those of several lodge owners, hunters, fishermen, etc. People feel the area is now accessible enough to provide quality fishing and hunting and they feel that increased pressure would deteriorate the quality of sport which is now offered.

An alternative to the northern route is that one beginning at Amakdedulia Cove, following Paint River to the head of Kukaklet Lake, and down the Alagnak River to King Salmon. This route would definitely be a better choice, if and when such a decision has to be made. Fish and wildlife here are not as vulnerable to overexploitation, and the area is scenically more attractive.

Whatever is decided concerning alignment of a Peninsula crossing road, I certainly suggest that this department keep alert to problems inherent with such a project. Further, in-depth studies are recommended to provide a pool of background data in defense of any objections to road routing. Walk-in areas may become a common occurrence in the area. Certain areas of wildlife concentration may have to be closed. At any rate, it behooves us to try and keep this area in as natural a state as possible, but at the same time provide maximum fishing and hunting opportunities.

Other Critical Habitat

Situated along the west coast of Alaska are numerous small river deltas, bays and lagoons. Many of these serve as staging and resting areas for waterfowl during the spring and fall migration. In the summer of 1971, I had an opportunity to look at several of these areas. Coastal habitats investigated included Safety Lagoon, Golovnin Bay and the Koyuk River Delta.

Safety Lagoon is the last tidal lagoon on the northwest coast which supports dense beds of eel grass (*Zosteria maritima*). This grass is a high-quality waterfowl food and provides migrant black brant with tons of needed nourishment each year. On June 17, 1971, some 1,000 black

brant were seen feeding in this lagoon. Many thousands more stage and feed here while making the northward trip. Since these waters are state-owned, there exists means for the department to assure protection of the eel grass beds.

Small quantities of eel grass and high-quality waterfowl feeding habitat also occur in Golovnin Bay, Moses Point and the Koyuk River Flats (Figs. 13 and 14). Selection of certain tidal areas here is advisable and should be accomplished as soon as possible.

PREPARED BY:

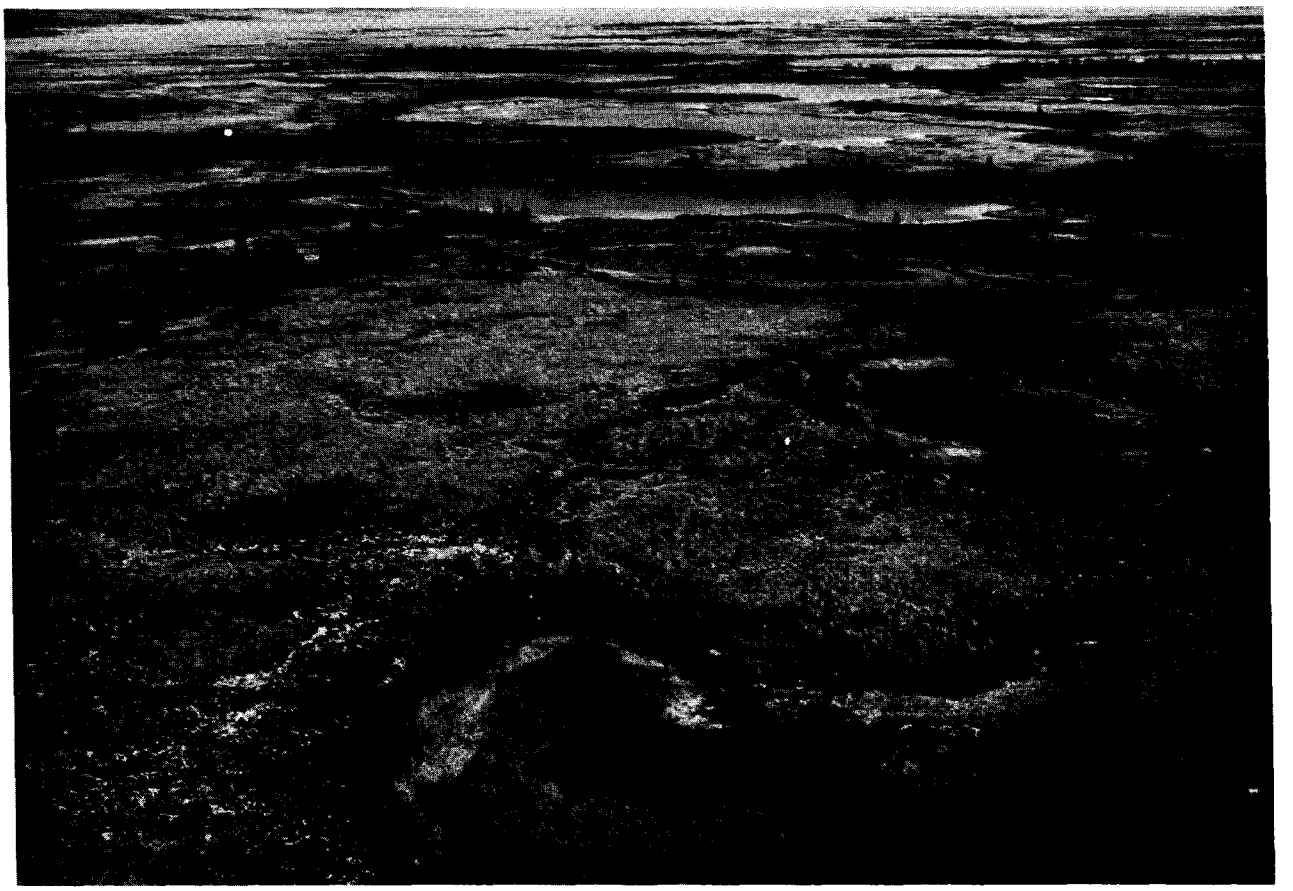
Peter E. K. Shepherd
Habitat Biologist

APPROVED BY:

Frank Jones
Acting Director, Division of Game

Fig. 13. A river and slough complex on the Koyuk River Flats. Lakes and ponds in this area are largely old, stream meanders. This type of habitat functions largely as a spring and fall resting area and is also used by diving and dabbling ducks during the nesting and brood period.

Fig. 14. Series of lakes on the southeast end of the Koyuk Flats. Broods of greater scaup, common scoter, and old squaw seem to be the most common waterfowl associated with this type of habitat. This general area exhibits characteristics of both the boreal forest and tundra biome and probably constitutes a narrow ecotone, dividing both. Floating mat on the lakes is either sedge or buckbean. Dominant emergents are sedge, horsetail, and mare's tail.



APPENDIX A

BEAVER CACHE COUNTS, SUSITNA FLATS RESOURCE MANAGEMENT AREA

Transect[1]	Lineal Miles Transect	Number of Caches
A	11	5
B	11	4
C	11	1
D	22	4
E	22	3
F	22	5
G	25	3
H	25	8
I	25	13
J	28	15
K	28	11
L	28	8
M	31	8
N	27	6
O	26	3
P	6	3
Q	7	0
R	5	0
S	4	0
T	1	0
	365[2]	100

[1] Aerial coverage on each transect was one-half mile on each side of the survey aircraft or scanning one-square mile of area for each lineal mile of flight.

[2] This figure can be computed as square miles of habitat censused.

APPENDIX B

RECONNAISSANCE AND AERIAL SURVEY OF THE BRISTOL BAY WATERSHED, MAY 18-22, 1971

Royce Perkins and I departed Anchorage in a wheel-equipped 185 piloted by Charley Allen at 10:30 a.m., May 18, 1971. We flew to the Susitna Flats and followed the shoreline as far as Redoubt Bay thence through Lake Clark Pass down Lake Clark and followed the Koktuli River (south branch) to its confluence with the Mulchatna River. Several moose were seen along the Koktuli River and signs of bear were fairly abundant. Beaver activity was evident along much of this river. One cabin in fair condition was noted at the confluence of the Koktuli River and the Mulchatna. Caribou trails were in evidence but no caribou were seen on this flight. Signs of human activity were scarce along the Mulchatna to the Nushgak. Only two villages (Ekwok and New Stuyuhok) seemed to be active above Dillingham.

After landing at Dillingham and fueling we flew up to Aleknagik and north through the Tikchik Lakes. Here we photographed the commercial fish camps between Nerka and Beverly lakes (east end at inlet-outlet). A commercial fisheries location at the outlet of Nuyakuk Lake was photographed. All lakes in this group were still frozen solid and considerable snow was present over much of the low, forested muskeg. No animals were seen in this area, although I did not note moose tracks in much of the timbered areas. Signs of otter were fairly abundant between lakes and along some frozen creeks.

We crossed from Lake Nerka to Togiak where another commercial fish location was photographed (outlet of lake into Togiak River). Most of the Togiak River was free of ice in the upper reaches except where it had jammed. This stream had already crested and was dropping at the time we flew this survey.

Next we flew to Ualik Lake and Amanka Lake. Another commercial fish tower site was photographed here.

Cutting across country we headed for Ekwok and photographed a commercial fish camp one mile below that village. While crossing the upland tundra in transit, I noted that only about 10 per cent of the lakes were ice-free. Few waterfowl were in these lakes and most were seen later in concentrations on the tidal mud flats. This flight concluded our aerial work for the day and we then returned to King Salmon.

May 19 we departed King Salmon at 9:30 a.m. and followed the coastline down the Alaska Peninsula. Several incubating swans were seen on nests only a few miles out of King Salmon. Beach net sites were very numerous along the shore of Bristol Bay causing me to wonder how many are under state lease. Many eiders and scoters were noted feeding along the beach. Most lakes were thawed about 10 to 20 per cent but nearly

all streams were ice-free. Small herds of caribou were seen frequently--most were composed of yearlings and cows; however, several groups of bulls were noted. A total of 250 caribou were seen. Air was extremely turbulent and became more so as we traveled on down the Peninsula towards Port Heiden. Many, seemingly old, beaver lodges and dams were in evidence--some far out in the grass flats. Whereas fair numbers of geese and ducks were seen at Egegik, the most heavy concentrations were gathered between Ugashik Bay and Port Heiden. Notable was the concentration of many thousands of emperor geese which were resting and feeding in this area. Some large flocks of scaup were gathered in the coastal lagoons along with many other divers. A few bear tracks were seen on the beach, but most signs were confined to the river deltas or up-river bars. We landed at Port Heiden briefly, intending to continue on to Cold Bay and Port Moller; however, unfavorable weather predictions forced us to turn around and head back to King Salmon. Two brown bear were seen in the vicinity of Cinder and King Salmon rivers. Nearly every grove of cottonwoods was occupied by groups of five to 20 moose.

Thursday, May 20, 1971, we did not attempt any aerial flights due to high winds and poor visibility.

Friday, May 21, 1971, weather conditions had improved to the point where we attempted a flight to Iliamna and Iniskin Bay. Our flight path to Iliamna took us up the Kvichak River to Iliamna Lake and thence along the northwest shore to Iliamna. Several moose were noted along the drier, bushy uplands bordering the Kvichak River and scattered bands of caribou were in evidence on old lake shore strands below the prominent lake terrace which borders this part of the lake. Most streams feeding into Iliamna Lake were open, at least at the inlets, and fishermen had been catching some nice trophy rainbow on the Newhalen River according to the owner of Iliamna Lodge. After an hour stop at the lodge, we continued to fly along the north shore of Iliamna Lake to Pedro and Pile bays. Weather conditions did not permit us to cross over the mountains to Iniskin Bay. Bear signs along the east end of the lake were numerous, especially where open water was present. No moose were seen on the wooded islands. Charley Allen reports that local hunters prefer to hunt moose on the islands as it is possible to drive them and, therefore, is a more productive hunting technique. Several recent entries were noted at the east end of streams as were some older "homesteads." Threatening weather again prompted us to beat a hasty retreat back to King Salmon, where we landed precariously with about a 500 foot ceiling and two miles forward visibility.

Saturday morning, May 22, 1971, we checked the weather situation and because forecasts for the Alaska Peninsula were unfavorable, we decided to return to Anchorage. Leaving King Salmon at 11:00 a.m. we flew directly towards Iliamna. On the way we passed over several swan nests, one of which I believe may be a trumpeter. This nest was halfway between King Salmon and the Alagnak River.

After reaching Iliamna Lake the weather situation near Lake Clark Pass prompted us to cross the mountains near Iniskin Bay. We did make it this way and took several aerial photos of the proposed ferry dock landing site for the Alaska Peninsula Road. From here we followed the beach back to Anchorage--noted many hundreds of green-winged teal along tideline of coast side of Cook Inlet. Goose concentrations were sparse and only a few local pairs were seen on the Susitna Flats.

APPENDIX C

LIST OF NESTS FOUND IN JUNE AND JULY 1971, BY AREA AND SPECIES

	Kanuti	Iliamna	Selawik	Shaktolik	Kantishna River
Common loon		2			
Whistling swan	1		3		
Trumpeter swan					2
Lesser Canada goose	2		1		
Black brant			1		
Pintail		3			
Greater scaup		6			
Lesser scaup	1				
Old squaw		9			
Common scoter		2			
Red breasted merganser		5			
Little brown crane				1	
Western sandpiper	1				
Northern phalarope	1				
Glaucus winged gull		10		1	
Mew gull		1			
Bonapart's gull	1				
Arctic tern		28			
Tree sparrow	2				

APPENDIX D

LIST OF BIRDS OBSERVED DURING 1971 FIELD STUDIES

	Kanuti River	Imuruk Basin	Iliamna
Common loon	x	x	x
Arctic loon	-	x	x
Red-throated loon	x	x	x
Whistling swan	x	x	x
Trumpeter swan	-	-	-
Canada goose	-	x	-
Black brant	-	x	-
Emperor goose	-	x	-
White-fronted goose	x	x	-
Mallard	x	x	x
Pintail	x	x	x
Green-winged teal	x	x	x
American widgeon	x	x	x
Shoveler	x	x	x
Canvasback	x	x	-
Greater scaup	-	x	x
Lesser scaup	x	-	-
Common goldeneye	x	x	x
Bufflehead	x	-	x
Old squaw	x	x	x
Harlequin duck	x	-	x
Steller's eider	-	x	-
Common eider	-	x	-
Spectacled eider	-	x	-
White-winged scoter	x	-	-
Surf scoter	x	-	-
Common scoter	x	x	x
Red-breasted merganser	x	-	-
Golden eagle	x	-	x
Bald eagle	-	-	x
Marsh hawk	x	-	-
Osprey	-	-	x
Peregrine falcon	x	-	x
Willow ptarmigan	x	x	x
Sandhill crane	x	x	x
Semipalmated plover	x	-	-
Killdeer	-	x	x
Golden plover	-	x	-
Common snipe	x	-	-
Lesser yellowlegs	x	-	-
Least sandpiper	x	x	-
Western sandpiper	x	x	-

APPENDIX D (continued)

	Kanuti River	Imuruk Basin	Iliamna
Northern phalarope	x	x	x
Parasitic jager	-	x	-
Glaucus gull	-	x	x
Mew gull	x	x	x
Bonapart's gull	x	-	-
Arctic tern	x	x	x
Common raven	x	x	x
Crow	-	-	x
Rusty blackbird	x	x	x
Tree sparrow	x	-	-

JOB PROGRESS REPORT

State: Alaska

Project No.: W-17-3 Title: Land Evaluation

Section: Lands - Region III

Period Covered: July 1, 1970 to June 30, 1971

ABSTRACT

Objectives and procedures of the Region III Lands staff are provided.

Activities of the Lands staff in Region III are presented.

CONTENTS

Introduction. 1
Project Activities. 1
Federal Agencies 2
U. S. Forest Service. 2
Bureau of Land Management 2
U. S. Fish and Wildlife Service 3
Corps of Engineers. 4
Federal Water Pollution Control Administration, Environmental Protection Agency, and U. S. Coast Guard. . . . 4
State Agencies 4
Department of Natural Resources 4
Division of Lands. 4
Division of Parks and Recreation 5
Department of Highways. 5
Department of Health and Welfare. 5
Department of Law 5
Boroughs 6
Fairbanks North Star Borough. 6
Private Lands 6
Discussion 6

INTRODUCTION

To understand the role of the Region III position in the statewide Habitat Section Program, the position objectives and procedures as outlined by Section Leader Joseph R. Blum, are included below:

Objectives:

1. To assure that wildlife values are considered in all land-use activities in Region III.

2. To submit to the Regional Game Supervisor recommendations for the orderly selection by the state, land classification by federal and state agencies, or purchase of land important for habitat protection, public access, and public use.

Procedures:

1. Prepare recommendations concerning effects of specific land use on wildlife, which will require:

   a. compilation of land ownership maps through examination of land agency records;

   b. cooperative studies and close liason with agencies involved in land use;

   c. assessment of public and management needs by area and species, both short-term and long-term;

   d. assessment of research data pertaining to land management.

2. Prepare recommendations concerning selection, classification, or purchase of specific lands for stated purposes, which will require:

   a. identification of key wildlife areas using existing studies, wildlife census, hunter use and harvest data;

   b. determination of the best procedure available for accomplishing the desired objective.

3. Physically examine and mark access routes and recreational sites or areas.

4. Evaluate current legislation and regulations to determine if new procedures should be recommended to increase habitat protection.

PROJECT ACTIVITIES

During this reporting period, maximum effort was expended to establish a close working relationship and liason with the various federal agencies.

As previously reported, the Section has established Memoranda of Agreements with the various land-controlling state and federal agencies. These agreements are mutually beneficial as data supplied by our department are acknowledged by recognition of our wildlife management objectives in land management programs of the land-controlling agencies.

FEDERAL AGENCIES

U. S. Forest Service

The Forest Service does not play as important a role in Region III as elsewhere in the state because the majority of merchantable timber areas economically feasible for harvest are controlled by the State of Alaska. The two major contacts with the Forest Service during the report period involved interagency projects. The first was a Fuel-Break Game Habitat Project in the Delta Junction area which was headed by the State Department of Natural Resources, Division of Lands, and will be discussed in their section of this report. The second was at the scene of the 16,000-acre Wickersham Dome forest fire about 20 miles north of Fairbanks on the Elliott Highway. A comprehensive study, led by the Pacific Northwest Experimental Station, Institute of Northern Forestry, commenced immediately after the July 1971 fire. Our department is interested in the effects of wildlife on browse regeneration following a forest fire and plans to construct animal exclosures at the site. Land tenure problems are presently being handled by the Habitat Section.

Bureau of Land Management

Considerable effort was expended supplying BLM with data regarding the wildlife resource and sportsmen access locations within the areas proposed for classification under the Classification and Multiple Use Act of 1964 (PL 88-607). This Act enables BLM to classify their lands for disposal or for retention and multiple use management. The following classifications were proposed during the report period in Region III:

A. White Mountains Planning Unit contains approximately 6,105,442 acres located north and east of Fairbanks and includes the White Mountains and towns of Central and Circle.

B. The Fortymile Planning Unit is a 12,450,000 acre tract located in eastcentral Alaska between the Canadian border and the Alaska Range south of the Salcha-Charley River Valley drainages. It includes a portion of the Yukon River Valley, the Tanana Hills and the Upper Tanana River Valley.

C. The central Brooks Range Classification is a 24,500,000 acre tract of land located in northcentral Alaska.

The Classification and Multiple Use Act of 1964 expired December 30, 1970. The Fairbanks District of BLM submitted the White Mountains and Fortymile Planning Units to their Washington office for final approval in early December 1970. However, the BLM Washington office did not submit the proposals for final approval prior to expiration of the Act on the advice of their solicitor who said that final approval of a classification could be granted anytime within two years after promulgation and was not dependent upon the life of the Act. The Fairbanks district of BLM is stating at the time of writing of this report that this interpretation was not valid and it is doubtful that the proposed classifications will be approved. Although the Taylor Grazing Act of 1934 is another vehicle for BLM to classify public domain against the indiscriminate settlement laws, it does not apply to Alaska. After expiration of the current land freeze, Alaska's public domain will once again be subjected to the ravages of unplanned land development unless Congress, in the interim, promulgates a much needed stopgap measure.

I represented the department in an interagency recreation group led by BLM. The group was concerned with recreation development along the highway system from the settlement of Fox to the Yukon River via the new Alyeska haulroad. It was gratifying to be in the position of selecting lands most suitable for recreation development, rather than attempting to create a suitable recreation area to meet the public demand from those lands remaining after unplanned settlement. The forthcoming report by the Committee will be entitled "Fox-Yukon River Recreation Recommendations." The report will be circulated to appropriate governmental agencies and, hopefully, will stimulate action to meet the immediate and long-range recreation needs of the public in the area. It is also hoped that the report will be utilized as a guideline for development of other similar areas in the state.

During the reporting period considerable input and meetings were involved regarding the proposed Trans-Alaska Pipeline project and its facilities. I also served as a member of the Wildlife Section of the Interagency Fish and Wildlife Team coordinated by the BLM Pipeline Section.

U. S. Fish and Wildlife Service

I had little contact with the Fish and Wildlife Service other than limited discussions and review of proposed Refuge Wilderness Regulations as published in the August 3, 1971 issue of the Federal Register. Generally speaking, members of Region III favor wilderness areas. But when sport harvest of fish and wildlife resources occurs within a refuge, confusion arises when one questions which takes precedence - the Wilderness Act or the action establishing the refuge. Department fears, based upon a strict interpretation of the proposed Wilderness Regulations, are that they would reduce and often eliminate fish and game management programs within the area. We, of course, do not advocate unrestricted access; however, some forms of access must be allowed at least to points within the proposed wilderness areas. Refuges within the region are in very remote areas: if one cannot get to the area, who is going to use it?

Corps of Engineers

Actions in or about a stream which might affect its navagability require a permit from the Corps of Engineers prior to project execution. I coordinated comments from the various divisions of our department and responded either directly to the Corps or through the section's Juneau office. I followed the same procedure regarding projects proposed by the Corps and associated environmental impact statements, such as the Chena Lakes Flood Control Project for the Chena River basin.

Federal Water Pollution Control Administration, Environmental Protection Agency, and U. S. Coast Guard

The above agencies were contacted in regard to potential or actual oil spills in the region and recommendations for rectification or prevention were made.

STATE AGENCIES

Department of Natural Resources

Division of Lands

Considerable dialogue on gravel, timber and requests for access occurred during the reporting period.

An interagency land management transfer of 1,520 acres between departments was finalized. This acreage, combined with the department's purchase of 247.6 acres in 1968, comprises the Fairbanks Wildlife Management Area located adjacent to the northern boundary of the City of Fairbanks. A supplemental agreement to the master Memorandum of Agreement between the Department of Natural Resources and the Department of Fish and Game was signed by the commissioners of each department.

The Division of Lands, in cooperation with our department and the U. S. Forest Service, conducted a Fuel-Break Game Habitat Project in the Delta Junction area. Since the predominant vegetative type in the area was the climax black spruce (*Picea mariana*), our interest was in the possibility of reproduction of willow (*Salix* spp.) and birch (*Betula* spp.) in the stands for utilization by moose for browse. The Division of Lands was largely interested in breaking up blocks of timber as a means of fire suppression. Vegetation plots and photo points were established in July. A strip approximately 4-1/2 miles long by 450-500 feet in width was crushed during August utilizing caterpillar-drawn LeTourneau crushing drums. At this writing, a report has not been received from the Division of Lands regarding the operation. However, viewing the area during the month of September, I am of the impression that the crusher did not create the desired soil disturbance I believe necessary for deciduous regeneration.

In areas of dense black spruce the rollers did push the spruce to the ground but left many trees uncrushed. Also, the crusher did not harm many small spruce trees (less than three feet in height) at all. It is my opinion that the accomplishment in these areas was the growth release of the unharmed spruce trees.

Division of Parks and Recreation

A close working relationship with this new division was initiated and maintained during the reporting period. Although their present program is one strictly of maintenance, my objective was to identify the needs of sportsmen; hopefully, these needs will be included in their future programs.

Department of Highways

I coordinated all comments from the various divisions regarding proposed Department of Highway projects and, in most cases, responded directly to the appropriate highway district.

Considerable effort was expended assisting the Department of Highways formulate and critique environmental impact statements now necessary prior to federal (Bureau of Public Roads) participation in project funding. As is the case with all permit applications and project proposals, I received and circulated them with my comments to the various divisions for their perusal and response to me. I then corresponded directly to the appropriate highway district.

Department of Health and Welfare

I notified the Department of Health and Welfare of situations thought to be in violation of the Water Quality Objectives of the Alaska Administration Code (Title 7, Division 1, Chapter 2, Subchapter 4).

Department of Law

Occurrences requiring litigation brought me in contact with this department. The first case involved a contractor operating on Alaska's North Slope. The contractor was depositing raw sewage directly into Kuparuk River and was cited as in violation of Alaska Statute 16.05.870(b). He plead guilty to the charge and received the maximum fine of $1,000.

A citation was issued to a Fairbanks sand and gravel operator for removing material from the bed of the Chena River when he failed to produce a permit required by our department (A.S. 16.05.870(b)). However, a permit was produced in court and the case was dismissed.

The same sand and gravel operater was cited one year later by the Alaska Division of Lands for failure to meet their regulations and the Department of Law requested my participation. A court injunction stopping further removal of material is in effect and court trial is pending.

BOROUGHS

Fairbanks North Star Borough

Zoning of lands in and adjacent to the Fairbanks Wildlife Management Area, approval of construction plans for the department office building, and proposed pollution ordinances brought me in contact with the Borough.

Private Lands

The only acreage privately owned by the Department of Fish and Game occurs within the Fairbanks Wildlife Management Area and was previously discussed in this report under the State Department of Natural Resources, Division of Lands. The development plan for the area was completed and submitted to the Federal Aid in Wildlife Restoration office in Portland, Oregon.

DISCUSSION

I handled all leases and/or rights-of-way necessary for capital improvements proposed by the various divisions of our department. Upon request, I supplied the status of lands in specific areas. The Game Division, for instance, was interested in the acreage withdrawn for the Ft. Wainwright, Ft. Greely and Eielson Air Force Base military reservations and a cursory review of the status plats revealed an excess of 2,200,000 acres withdrawn in the Tanana Valley between Delta Junction and Fairbanks for military use. Present and proposed future land status in the Delta Junction area was submitted to the Division of Game for inclusion in their bison management plan. Access and land tenure information was submitted to the Sport Fish Division on numerous occasions.

Inventory of sportsmen access locations along the contiguous road systems of the region is nearly complete. Several critical access locations on state lands were applied for through the Division of Lands. Sportsmen access locations on federal lands were given low priority because of the "security" provided by the proposed multiple use classification areas. Although recommendations for withdrawal of key access routes were provided to BLM during review of the proposed classifications, detailed requests were made to the appropriate area manager when it was learned the proposed classifications might fail.

At the request of the regional supervisor, I participated in various Game Division projects and meetings.

Six rivers in Alaska have been selected, at least in part, and given a 5(d) status under the Wild and Scenic Rivers Act of 1968 (Public Law 90-542). Section 5(d) of the Act states that the Secretaries of Agriculture and Interior "shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas in the United States shall be evaluated in planning reports by all Federal agencies as potential alternative uses of the water and related land resources involved." Selection of these rivers does not prohibit planning construction or programs to change existing uses in the river areas but such programs must proceed on the basis of complete understanding of how existing values in the river areas would be altered. Alaskan rivers given the 5(d) status are:

1. Birch Creek--segment from North Fork Bridge, Milepost 94 of the Steese Highway, to highway bridge at Mile 147 of the Steese Highway;

2. Chatanika River--segment from the head of McManus Creek to the bridge at Milepost 11 of the Elliott Highway;

3. Chitina River--the entire river;

4. Delta River--segment from Round Tangle Lake at Milepost 21 of the Denali Highway to the Delta's confluence with Phelan Creek at Milepost 212.5 of the Richardson Highway;

5. Fortymile River--entire river with major tributaries within Alaska;

6. Gulkana River--the entire mainstream and its Middle and West Forks between the lower end of Paxson Lake and the town of Gulkana.

It is hoped that these and other Alaskan drainages will eventually be given full protection of the Act. Section 5(c) of the Act provides for state participation in these studies and preliminary review by the Habitat Section has occurred on the entire Birch Creek proposal and a segment of the Fortymile proposal.

The Department of Fish and Game assumed full responsibility for the fish and wildlife portion of the Northern Alaska Land Use Study. This joint federal-state land use policy project concerns those lands lying north of the Porcupine and Yukon drainages and also lands north of the Kuskokwim drainage essentially west of 160° longitude. I was assigned as Wildlife Coordinator for the study and activities during the period included attending planning seminars and inventory at the second degree level (file search, literature search and personal communications).

I was also assigned to coordinate the department's field studies of the wilderness potential of the Arctic National Wildlife Range. Little occurred during the reporting period other than familiarization with objectives of the study.

PREPARED BY:

Scott Grundy
Habitat Biologist

APPROVED BY:

Frank Jones
Acting Director, Division of Game

JOB PROGRESS REPORT

State: Alaska

Project No.: W-17-3 Title: Laboratory Services

Section: Game Laboratory Services (Region II)

Period Covered: July 1, 1970 to June 30, 1971

I. Introduction and Objectives

This report describes the activities of the Region II Laboratory Section of the Division of Game in the fiscal year, 1971. The laboratory continued to process wildlife specimens obtained in Region II (Southcentral Alaska, Kodiak Island, the Alaska Peninsula and the Aleutian Islands), and to a lesser extent, from Regions I and III.

Specimen work in 1971 was similar to work done in 1970. Preparation of teeth for aging and aging of teeth were the principal assignments of laboratory personnel.

Work carried out by the Anchorage Laboratory with few exceptions was related to documented projects with a bias toward projects designed to help solve pressing game management needs.

CONTENTS

Procedures 1
Work Performed 1
Brown-Grizzly Bear, Statewide 1
Polar Bear, Statewide 2
Dall Sheep. 2
Caribou, Regions II and III, 1970-'71 Season. 2
Moose, Region II. 3
Deer, Region I. 3
Elk, Region II. 3
Bison and Miscellaneous Species 3
Disease and Parasites, Region II. 3
Blood Sera, (brucellosis), Region II. 5
Blood Chemistry, Region II. 6
Bone Marrow, Region II. 6
Personnel. 7
Appendix 10

II. Procedures

Since the reorganization of the Division in 1969, laboratory work in Region II has been closely coordinated with Survey-Inventory activities under the general guidance of the Regional Supervisor. This laboratory served other regions, in 1971, particularly by processing and aging teeth of several wildlife species. Conversely, the Region III laboratory processed specimens from Region II.

The greatest functional change in F.Y. 1971 was dispersal of the grinding and aging of Region II moose teeth (approximately 2,500) to the area biologists and their assistants. The transfer of accepted, relatively simple procedures such as tooth grinding to area biologists' offices probably will be continued in Region II. Specimen techniques requiring costly equipment will continue to be done by the Laboratory Section or elsewhere under contract.

The laboratory facilities at Anchorage became increasingly obsolete in 1971. While this report was being written, bids were accepted to equip the Game laboratory in a leased Fish and Game building scheduled for construction in the Anchorage area in 1972. The new laboratory will provide a safer, healthier work place and better storage. Laboratory and autopsy work space will be available simultaneously for four to six biologists in addition to three biologists assigned to the laboratory.

The Laboratory Section in 1971 was able to accomplish most scheduled work. A Game Biologist I, temporary, substituted in the fall for a permanent employee and enabled brown-grizzly bear tooth work to be completed on schedule. First-ranked specimens, from brown-grizzly and polar bears, and perishable disease specimens, were handled without serious delays. The next-ranked Dall sheep specimens were few in number. Pollution events produced no specimens that were directed to laboratory personnel. Caribou, moose, deer, elk and bison specimens were given second priority. As previously noted, area biologists ground and aged most moose incisors. Seals and other marine mammals specimens were handled by persons in charge of these species. The lowest ranked category, "other species", accounted for a minor part of the work load.

III. Work Performed

Tooth Processing and Aging, Region II and Statewide

Brown-Grizzly Bear, Statewide. The laboratory followed procedures for the processing of teeth for aging that were developed in part by Survey and Inventory and Research biologists at the Anchorage office. Incoming bear teeth were channeled through a Survey and Inventory technician stationed at Anchorage; these teeth were decalcified, microsectioned, stained and slide-mounted for aging by Research and Survey and Inventory personnel.

Of a reported kill of 732 brown-grizzly bears, Survey and Inventory sent 645 teeth to the laboratory to be sectioned. Research-derived bear teeth numbered 88.

Processing of brown-grizzly bear teeth from the spring and fall seasons, from miscellaneous kills, and research-derived teeth from immobilized live bears used 48.1 man days. Survey and Inventory tooth work used about 38.5 man days or 80 percent of the total time spent on brown-grizzly bear teeth. Laboratory records show that completion of brown-grizzly bear tooth section mounts required an average of about .49 hours, that is, 29 minutes per slide. An estimate of cost can be made allowing for labor, materials and equipment depreciation. Cost was around $2.60/slide if we consider all slides produced. Cost of the slide mounts discounting unusable slides, was about $3.15 per bear in 1971. Production of brown-grizzly bear tooth section mounts in 1971 cost about $2,210.00.

Brown-grizzly bear teeth processed for aging numbered 733 in 1971 as compared to 440 in 1970, an increase of roughly 67 percent. Time required for the tooth work was 34.0 man days in 1970 versus 48.1 man days in 1971, an increase of 41 percent. Game biologists David Harkness, Carl McIlroy and Nathan Johnson were largely responsible for increased efficiency in the preparation of bear teeth for aging.

Polar Bear, Statewide. Polar bear teeth obtained from hunter harvested animals were microsectioned at the Region III laboratory. David Harkness sectioned eight remaining uncut teeth at Anchorage after he was transferred from the Fairbanks laboratory. The mounted polar bear tooth sections were aged by personnel of Region III.

Dall Sheep. All work devoted to Dall sheep will be reported on by the responsible biologist under Research auspices. Aging of machine sectioned and hand ground Dall sheep first incisors was accomplished by means of fluorescence microscopy.

Caribou, Regions II and III, 1970-'71 Season. The 1970-71 collection of Nelchina area caribou teeth from Game Management Unit 13 consisted of 446 usable teeth. These were embedded, cross sectioned at 75-100 microns thickness, and slide mounted. The teeth were aged by counts of fluorescing cementum annuli.

Time required to process 446 slide mounts of Region II caribou teeth and to age them was 51.7 man days. The cost of aging each animal computed on the basis of labor, materials and equipment maintenance and depreciation over a 20 year equipment depreciation period was approximately $2,101.00, an average cost of $4.90 per animal. Large numbers of specimens, in the 600 - 800 range will reduce the laboratory cost of aging caribou by the fluorescence method to approximately $4.40 per animal. Still larger yearly samples will probably reduce the cost to around $4.00 per animal. These figures approximate the total cost of aging brown-grizzly bears in similar numbers, using decalcified and stained tooth sections and ordinary microscopy.

The Anchorage laboratory processed and aged teeth from 149 caribou that were killed by hunters along the Taylor Highway, Region III, in the fall of 1970. Time required for this job was 127 hours or 17.0 man days.

Moose, Region II. Moose teeth were aged by wet grinding and counting cementum annuli. The work, excepting cross-checks of counts by laboratory personnel, was done in this laboratory by visiting biologists or in area offices. A two-wheel wet grinder was loaned to the Palmer and Glennallen offices to accommodate their needs.

Deer, Region I. A collection of 128 deer incisors from the Sitka area of Southeastern Alaska was processed and aged by counts of fluorescing cementum annuli. The area biologist wished to compare cementum ages with ages derived from observations of eruption and wear to evaluate the usefulness of the fluorescence technique as applied to Southeastern Alaska deer. Completion of this work required 59.3 hours, an average of .46 hour per tooth. Estimated cost of the job was about $475.00 or $3.20 per specimen.

Elk, Region II. The fall, 1970 elk harvest contributed 43 incisors for aging by the fluorescence method. Quality of the specimens was generally good or fair-good. Results will be reported by the responsible Kodiak-Afognak Islands area biologist. Double checking of cementum annuli counts and especially careful examination of all dentine-cementum interfaces slowed the job.

Bison and Miscellaneous Species. Twelve bison teeth from the Copper River area were aged in 1971. These were from animals taken in the fall of 1970.

One black bear (glacier or blue color phase) tooth taken from an animal shot at Yakutat in May, 1970 was processed in 1971.

Seal specimens were handled exclusively by the responsible biologist.

Disease and Parasites, Region II. Many of the disease and parasite samples collected in Region II and destined for testing or identification were sent through the Anchorage laboratory. Some samples were shipped directly to laboratories or to Mr. Kenneth Neiland at the Fairbanks laboratory. The accounting of disease-parasite specimens given in Table 1 is incomplete when we consider the widespread activities of area and research biologists and other personnel who frequently receive disease-parasite specimens or reports of diseased living animals.

The more significant disease-parasite specimens (Table 1) consist of the following categories: hoof rot, "pus pockets", rabies, trichinosis and benign tumors. A black bear meat sample showed no evidence of *Trichinella* worms. Six animals suspected of being rabid were found to be negative for rabies. Rabies samples were submitted to Dr. Robert L. Rausch of the Arctic Health Research Center at Fairbanks (formerly, College), Alaska for screening and transmittal to the National

Table 1. Resume of wildlife samples sent from Region II Laboratory Section to private and public laboratories.

1971

Category	Species	Area of Origin	Individual Animals
Nutritional and blood chemistry	Moose	Kenai Peninsula, Susitna River	168
Nutritional and blood chemistry	Dall Sheep	Kenai Peninsula	48
Blood chemistry, genetic studies	Polar Bear	North and Northwest Alaska	125
Disease (Brucellosis)	Moose	Units 13, 14 and 15	106
Disease (Brucellosis)	Caribou	Nelchina Basin	87
Disease (Brucellosis)	Dall Sheep	Kenai Peninsula	44
Disease (Hoof Rot)	Caribou	Nelchina Area	1
Disease (Pus Pockets)	Caribou	Nelchina Area	1
Disease (Pus Pockets)	Moose	Kenai Peninsula	1
Disease (Rabies Test)	Red Fox	Alaska Peninsula	1
Disease (Rabies Test)	Domestic Dog	Eagle River	1
Disease (Rabies Test)	Wolf	Willow	1
Disease (Rabies Test)	Coyote	Eagle River	1
Disease (Rabies Test)	Black Bear	Juneau Area	1
Disease (Rabies Test)	Mink	Anchorage	1
Disease (Trichinosis Test)	Black Bear Meat	Pile Bay, Lake Iliamna Area	1
Pathology (Skin Tumor, benign)	Brown Bear	Kenai Peninsula	1
Pathology (Skin Tumor, benign)	Moose	Susitna River	1
Pathology (Skin Tumor, benign)	Deer	Hawkins Island, Prince William Sound	1
Pathology (Skin Tumor, benign)	Moose	Pipeline Road, Kenai Peninsula	1
Pathology (Lip mucosa, tumor, benign)	Moose	Cordova Airfield	1
			593

Summary:		
	Nutritional, blood chemistry and genetic study samples	341
	Disease (brucellosis)	237
	Disease (hoof rot)	1 positive
	Disease (pus pockets)	2 (1 isolate)
	Disease (rabies tests)	6 negative
	Disease (trichinosis)	1 negative
	Pathology (benign tumors)	5
	Total individual animals	593

Communicable Disease Center at Atlanta, Georgia. Wild animal samples were sent for rabies tests from widely scattered areas of Region II usually because persons became worried after having skinned or otherwise handled an animal that behaved abnormally. One sample from a domestic dog was submitted after the animal had bitten an employee of the Department of Fish and Game. The person who was bitten began a series of anti-rabies "shots" before the negative laboratory finding was received.

Telephoned inquiries and personal visits to the Anchorage laboratory in 1971 frequently were concerned with the occurrence of tapeworm larvae in caribou and moose meat and livers.

Blood Sera, (brucellosis), Region II. The most commonly collected samples of this kind were sera from hunter-killed caribou and moose. Survey and Inventory requested that these samples be tested for brucellosis. Sera were sent to two laboratories: the Alaska State-Federal Laboratory (State of Alaska - U.S. Department of Agriculture) at Palmer, Alaska, for an agglutination test by Richard Barrett; and the University of Wisconsin's Veterinary Science Department at Madison, Wisconsin, for agglutination and complement fixation tests under the supervision of Professor D. T. Berman.

A total of 237 blood sera were sent for brucellosis tests, 87 of which were from caribou, 106 from moose and 44 from Dall sheep. Survey and Inventory activities were the source of these moose and caribou sera. Dall sheep sera came from Research directed activities.

All animals tested for brucellosis were reported to be negative reactors. The University of Wisconsin, was able to test all specimens, but a number of samples were reported to be hemolyzed and unsatisfactory for agglutination tests.

The Palmer laboratory tested all sera submitted by this laboratory with the exception of one badly hemolyzed sample.

The unanimous agreement of tests done by the two laboratories is all the more interesting since duplicate tests of sera for brucellosis in the past not uncommonly gave conflicting results.

Moose sera were collected in several game management units. A December permit hunt on Fort Richardson, near Anchorage, produced good, testable blood sera.

Caribou sera, although of slightly lower overall quality than the moose sera, represent many man hours and persistent efforts by the area biologist and his assistant who are based at Glennallen. Most of the caribou sera were collected late in the year in extreme cold weather with attendant problems. Division personnel other than those based at Glennallen also contributed caribou sera for testing.

Animal Condition

Blood Chemistry, Region II. Not covered in this report are moose sera collected in various game management units and analyzed at the Alaska Medical Laboratories at Anchorage, Alaska for research purposes.

Bone Marrow, Region II. Most bone marrows listed in Table 2 were collected in the spring of 1971 in conjunction with surveys of winter-killed moose in Southcentral Alaska. Other marrows were collected from remains of moose and caribou thought to have been killed by wolves, vehicle-killed animals and animals that died from unknown causes. Femurs were collected whenever possible in order to evaluate the fatness of the bone marrow and hence the animal's probable nutritional state at the time of death.

Wildlife Specimen Techniques

Writing of the more common specimen techniques that are employed in this laboratory and in the field used 32.2 man days in 1971. These in-house papers were written by personnel assigned to the laboratory, sometimes with the help of Survey and Inventory and Research personnel. The Wildlife Specimen Techniques series are destined to be distributed in loose leaf notebooks to Division of Game biologists and technicians. Titles completed in 1971 include: PREPARATION OF TOOTH SPECIMENS FOR AGING, Grinding, by Carl McIlroy, 2 pp.; TOOTH CEMENTUM AGING TECHNIQUE FOR MOOSE, by Robert Rausch and Carl McIlroy, drawings by David Harkness, 3 pp. including illustrations; PREPARATION OF SEA OTTER TEETH FOR AGING BY COUNTS OF CEMENTUM ANNULI, by Karl Schneider, Carl McIlroy and Nick Steen, 2 pp.; PREPARATION OF POLAR BEAR TEETH FOR AGING BY COUNTING CEMENTUM ANNULI, by Nick Steen and Carl McIlroy, 2 pp.; PREPARATION OF BROWN BEAR TEETH FOR AGING BY COUNTS OF CEMENTUM ANNULI, by Nick Steen and Carl McIlroy, 2 pp.; OPERATION OF THE CRYOSTAT, by Nick Steen and Carl McIlroy, 2 pp.; OPERATION OF THE THIN SECTIONING MACHINE, by Nick Steen, Charles Lucier and Carl McIlroy, 2 pp.; BIG GAME AUTOPSY SUPPLIES, by Charles Lucier, 1 pp.

Equipment Usage and Productivity

Previous to 1971, no thorough record was kept of equipment use and related specimen production. Beginning July 27, 1971, through December 31, 1971 a complete record of cryostat (freezer microtome) use showed the following.

Month	Species	Number of Specimens	Time	Average Specimens/hour
July	Brown Bear	88	14.6 hrs.	6.0
August	Brown Bear	200	22.1 hrs.	9.0
August	Polar Bear	37	6.8 hrs.	5.4
August	Dall Sheep	1	.2 hrs.	5.0
Sept.	Brown Bear	16	2.0 hrs.	8.0

Month	Species	Number of Specimens	Time	Average Specimens/hour
Sept.	Polar Bear	20	1.8 hrs.	11.0
Oct.	Brown Bear	64	7.7 hrs.	8.3
Oct.	Polar Bear	8	1.5 hrs.	5.3
Nov.	Brown Bear	275	52.8 hrs.	5.2
Dec.	Seal	9	1.5 hrs.	6.0
Dec.	Brown Bear	276	29.8 hrs.	9.2
Dec.	Polar Bear	10	1.5 hrs.	6.6
Total		1,004	142.3 hrs.	

994 bear specimens = average of 7.0 cut/hour
919 brown bear specimens = average of 7.1 cut/hour
75 polar bear specimens = average of 7.6 cut/hour
10 miscellaneous specimens = average of 5.4 cut/hour

The Zeiss Standard RA microscope was used with the mercury burner a total of 137.4 hours from the beginning of detailed record keeping on June 17 until December 31, 1971. Caribou Survey and Inventory used 102.4 hours; Dall sheep Research, 20.5 hours, elk Survey and Inventory, 9.0 hours and polar bear Survey and Inventory, 5.5 hours of ultraviolet microscopy time. This equipment was used in all months except August in the period June-December.

Descriptions of Wildlife Specimen Techniques were written to foster efficient specimen processing in and outside the Laboratory Section.

IV. Personnel

Four laboratory trained personnel were transferred to other operations in 1971: three persons were promoted within the Division of Game, one man was hired as a permanent employee of the Division of Commmercial Fisheries. The two laboratory flexible staffing positions were used as training positions. The quality of laboratory work was maintained at an acceptable level through hiring of highly motivated biologists with prior experience, and through continuous training. The easy availability of high quality people for hire is attributable largely to a surplus of game management graduates.

The three permanent laboratory positions in Region II were filled throughout most of the year. Laboratory personnel, including one temporary hire, are listed with dates and amount of service:

Table 2. Marrow Samples.

Species	Date Collected	Location	Reported Cause of Death	Quantity
Moose	Mar.-Apr.	Nelchina, G.M.U. 13	Unknown	9
Moose	Mar.-May	Kenai Peninsula	Unknown	9
Moose	June	Matanuska Valley	Unknown	1
Moose	March	Kenai Peninsula	Probable wolf kills	3
Moose	March	Susitna River	Dying of malnutrition, killed by Department	1
Moose	April	Kenai Peninsula	Road kill	1
Moose	April	G.M.U. 14	Winter kill	32
Moose	April	G.M.U. 16	Winter kill	1
Moose	April	G.M.U. 15	Winter kill	3
Moose	May	G.M.U. 13	Winter kill	1
			Subtotal	61
Caribou	February	G.M.U. 13	Wolf kill	1
Caribou	May	G.M.U. 13	Road kill	1
			Subtotal	2
Dall sheep	May	G.M.U. 13	Winter kill	1
			Subtotal	1
			TOTAL	64

Causes of death summarized.

Moose: winter kill, 37; unknown, 19; probable wolf kill, 3; road kill, 1; dying of malnutrition, animal was killed by Division employee.

Caribou: wolf kill, 1; road kill, 1.

Dall sheep: winter kill, 1.

Name	Position Number	Effective Date	Man Months*
Charles Lucier	2022 (Coordinator)	Jan. 1-Dec. 31	12.0
Nicholas Steen	2091	Jan. 1-Aug. 13	7.5
Carl McIlroy	2069	Jan. 25-Oct. 15	8.8
David Harkness	2091	Oct. 19-Dec. 31	2.5
Charles Irvine	2092	Nov. 1-Dec. 31	2.0
Nathan Johnson	(Temporary)	Aug. 17-Dec. 15	4.0
Regional Operations and Training Personnel			.9

About 50 man days or 2.5 man months spent away from the laboratory were devoted to Survey and Inventory. Field work generally was not supervised by the Laboratory Coordinator.

In addition to the laboratory staff, most game biologists assigned to Region II used laboratory facilities and equipment during 1971.

PREPARED BY:

Charles Lucier
Game Biologist

APPROVED BY:

Frank Jones
Acting Director, Division of Game

APPENDIX I

Region II Laboratory Section Specimen Work Breakdown, January-December, 1971.

	Survey-Inventory	Research	Management	Man Days	Equivalent Man Months
Brown-Grizzly Bear	77.5	60.5		138.0	6.91
Dall Sheep		79.9		79.9	4.00
Caribou	75.7	3.8		79.5	3.98
Moose	34.6	23.2		57.8	2.89
Polar Bear	40.1	15.4		55.5	2.77
Disease and Parasites	21.8		15.3	37.1	1.85
Wildlife Specimen Techniques Manual	32.2			32.2	1.61
Elk	8.8			8.8	0.44
Sea Otter	8.4			8.4	0.42
Deer	7.9			7.9	0.40
Bison	3.0			3.0	0.15
Wolf		2.0		2.0	0.10
Totals	310.0	180.8	15.3*	510.1**	25.52

* Disease and parasite specimens and inquiries from the public and disease-parasite dealings with other agencies.

** The Region III Laboratory Section cleaned a large number of bear skulls, time for which is not included above. Contained in the specimen work breakdown for 1971 is 93.4 man days or 4.67 man months of labor for other regions. Time devoted to Region I work was 13.9 man days; that devoted to Region III specimen work was 79.5 man days, together about 18 percent of the specimen work load. Deer, moose and brown bear teeth were processed for Region I; work from Region III consisted of brown-grizzly and polar bear teeth, blood and samples for pesticides analysis, and caribou tooth processing and aging.

JOB PROGRESS REPORT

State: Alaska

Project No.: W-17-3 Title: Laboratory Services

Section: Game Laboratory Services (Region III)

Period Covered: July 1, 1970 to June 30, 1971

I. Introduction and Objectives

A variety of laboratory services are required to support the research and routine survey-inventory activities of the Game staff of the Alaska Department of Fish and Game. These service activities have been organized into a statewide laboratory services project comprised of laboratory facilities located in Anchorage (Region II) and Fairbanks (Region III).

The Fairbanks facility is the major area of operations and houses most of the state-owned specialized equipment required for parasite and disease work. This facility, which will be located in new, expanded quarters late in 1971, also has special equipment for preparing large quantities of skeletal material and has access to facilities for holding experimental animals. The Region III laboratory benefits from the close cooperation of the Arctic Health Research Center, University of Alaska; Department of Veterinary Science, University of Wisconsin; and various other institutions or individual research scientists on activities of mutual interest.

The primary objective of the laboratory is to provide the special laboratory assistance and materials required by management and research biologists in the conservation of the wildlife resources of Alaska. A subsidiary objective of the laboratory is to carry out research and/or survey-inventory studies on wildlife disease and closely related topics. The laboratory is the Alaskan correspondent for the Wildlife Disease Association's wildlife disease surveillance project which accumulates yearly statistics on disease in North American wildlife.

CONTENTS

Procedures 1
Work Performed 2
Age Determinations. 2
Analysis of Reproductive Organs 2
Chemical Analyses 2
Identification of Pathogens 2
Necropsies. 2
Clinical Hematology 2
Skeletal Preparations 2
Collecting Supplies 2
Field Operations. 2
E & I Services. 3
Technical References. 3
Technical Assistance. 3
Wildlife Disease Association Activities 3
Photographic Services 4
Miscellaneous Activities. 4
Personnel. 4

II. Procedures

The laboratory facility in Fairbanks and its cooperators serve a statewide function by providing the following routine services among others:

1. Age determination of specimens collected during Divisional studies, or from the annual harvest by hunters--primarily tooth sectioning procedures.

2. Routine and experimental analyses of reproductive organs--macro- or micro-histological procedures.

3. Routine chemical analyses--dry-weight marrow fat procedure, etc.

4. Identification of, and routine serological tests for, potential pathogens--taxonomic descriptions of new and known forms, preliminary isolation of pathogens, serological surveys for prevalence of specific pathogens, etc.

5. Necropsies--examination of carcasses for pathogens, pathological conditions or selected tissue samples.

6. Serological analyses as indicators of physiological condition of animals--routine clinical hematology.

7. Preparation of skeletal materials for morphological studies--cleaning and measuring, etc.

8. Supply regional biologists with specialized laboratory-field supplies.

9. Assist or carry out field operations as required.

10. Preparation, presentation or editing of various technical materials for the Department's bimonthly magazine, technical journals and other media.

11. Collection of special technical reference materials--reference texts, reprints, etc.

12. Technical assistance to cooperating agencies, members of the public, etc.

13. Compilation of yearly Alaskan wildlife disease statistics submitted by Alaskan agencies for the Wildlife Disease Association.

14. Preparation of photo-macro- and micrographs of tissue sections, pathological materials, etc.

15. Miscellaneous assistance as required--slide preparation, etc.

III. Work Performed

Brief summaries of the work performed are presented in the following section under the appropriate procedural categories cited in the preceding section.

1. Age Determinations. Approximately 124 moose teeth and over 400 lynx teeth were prepared for the age-determinations by counts of annuli.

2. Analysis of Reproductive Organs. Over 200 lynx ovaries were hand-sectioned and *corpora albacantia* were counted.

3. Chemical Analyses. Marrow samples from 109 moose and 21 caribou were analyzed for fat content by the dry-weight procedure.

4. Identification of Pathogens. Two hundred eighteen serum samples from sled dogs, bison, caribou, snowshoe hares and ground squirrels were collected and submitted to a cooperator for serological studies on brucellosis, leptospirosis and various arbovirus disease entities.

Various parasitic and/or infectious materials derived from Divisional activities were identified or submitted to cooperating laboratories for diagnosis.

5. Necropsies. Carcasses or selected organ systems of the following species were necropsied. The number of each species is shown in parentheses: lynx (46), moose (59), red fox (2), little brown crane (1), fur seal (1), black bear (5), grizzly bear (1), bison (22), Dall sheep (14), arctic hare (35).

6. Clinical Hematology. No samples processed.

7. Skeletal Preparations. Selected skeletal materials, particularly skulls, were prepared from the following species. The number of each species is shown in parentheses: grizzly bear (18), black bear (3), bison (7), musk ox (2), lynx (412), wolf (20), caribou (3), beaver (30), wolverine (25), marten (252), moose (1), Dall sheep (18), polar bear (7), seal (8), deer (1), miscellaneous (36).

Over 100 sets of sheep horns were measured for growth studies.

8. Collecting Supplies. Approximately 30 man-days were spent on ordering and distributing collecting supplies, etc., to regional personnel and on inventory.

9. Field Operations. Laboratory personnel assisted in a variety of field operations. These included an antlerless moose hunt on the Kenai Peninsula in Region II and a sheep trapping operation at the Dry Creek study area. In addition, serum collections were made at Fort Yukon, Barrow, Wainwright, Point Hope, Nome, Big Delta and Anaktuvuk Pass as part of the studies on brucellosis and arboviruses in caribou and moose.

10. E & I Services. Several activities of this kind were performed by laboratory personnel during the past year.

A lecture on common diseases and pathogens of wildlife was presented as part of the yearly military conservation indoctrination course at the University.

An article on rabies was prepared for the Department's bimonthly magazine, Fish Tales and Game Trails.

A report on the possible impact of the oil pipeline and related activities on black bear in interior and northern Alaska was prepared.

A paper on parasites of waterfowl was edited at the request of the editor of the journal, Bioscience.

One hundred and twenty-five pages of a Divisional comprehensive report on the Nelchina Caribou Range were edited.

A bibliography of the diseases and parasites of deer, genus *Odocoileus*, was completed in rough draft form.

A manuscript on the parasites of mustelids of southeastern Alaska was finished.

Technical assistance was provided to personnel of the Alaska Native Hospital, Anchorage, in the preparation of an educational pamphlet dealing with the prevention of hydatid disease in humans.

11. Technical References. The world literature on parasitic diseases presented in the Heminthological Abstracts and Veterinary Bulletin, and infectious diseases and nutritional physiology in the latter journal was reviewed for pertinent information which was included in the laboratory card files.

Other appropriate reference materials including reference texts, reprints and technical bulletins and journals were added to the laboratory collection. Appropriate items were called to the attention of Departmental biologists or loaned to them at their request.

12. Technical Assistance. Appropriate assistance was rendered upon request to other Departmental divisions, and other state or federal institutions. Requests from hunters concerning disease conditions in harvested fish and game palatability of meat were handled. Assistance as an expert witness was rendered in court to the Protection Division.

13. Wildlife Disease Association Activities. Statistics on the occurrence of diseases in Alaskan wildlife were solicited from all appropriate Alaskan agencies and compiled for the Wildlife Disease Association's nationwide Surveillance Reporting Committee.

The Laboratory Coordinator was also asked to found and serve as chairman of a committee on the Contribution of Basic Research on Wildlife Disease to Human Welfare. Membership on the committee was accepted by individuals of Cornell University, University of Wisconsin, Texas A & M, Washington State University, California Department of Fish and Game and the Arctic Health Research Center. The report which was substantially completed during this fiscal year will be submitted at their request to the American Biological Council for inclusion in their report to the President and Congress in 1972.

14. Photographic Services. Photo-macro- or micrographs of selected tissue sections (e.g. teeth) and various pathological materials (e.g. parasitic specimens) were prepared for Divisional projects.

15. Miscellaneous Activities. The balance of the time of laboratory personnel was devoted to the following miscellaneous activities:

a. weekly, monthly and yearly reports;

b. preparation of slides of various materials for microscopic study;

c. laboratory maintenance;

d. administrative meetings;

e. preparation for possible flooding during the spring break-up;

f. storage and inventory of Departmental materials (e.g. scientific specimens, evidence, etc.) in the walk-in freezer, or other sites.

IV. Personnel

During the fiscal year the previously assigned personnel were to have included three permanent, full-time laboratory positions (i.e., Game Biologist II, Game Biologist I and Fish and Game Technician IV) under the supervision of the Laboratory Coordinator. However, the GB II position was transferred out of the laboratory project to another duty station. Assignment of 3 3/4 months of temporary assistance to the laboratory reduced this loss of planned manpower to 8 1/4 man-months. Members of Region III laboratory staff and their status during this fiscal year are as follows:

1. Mr. Kenneth A. Neiland, Laboratory Coordinator, GB III, 3 months.

2. Mr. David Harkness, GB I probational, 12 months.

3. Mr. Edward Kootuk, Fish and Game Technician IV, 12 months.

4. Miss Clarice Dukeminier, GB I temporary, 2 1/2 months.

5. Mrs. Georganna Ranglack, GB I temporary, 1 1/4 months.

PREPARED BY:

Kenneth Neiland
Laboratory Coordinator

APPROVED BY:

Frank Jones
Acting Director, Division of Game