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I M P A C T S   O F   A G R I C U L T U R E   O N   W I L D L I F E

By

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Volume I

Project Progress Report  
Federal Aid in Wildlife Restoration  
Project W-21-~~7~~<sub>2</sub>, Job 18.6R

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(May 1982)

JOB PROGRESS REPORT (RESEARCH)

State: Alaska  
Cooperator: Diane J. Preston  
Project No.: W-21-1 Project Title: Big Game Investigations  
Job No.: 18.6R Job Title: The Impacts of  
Agriculture on Wildlife  
Period Covered: July 1, 1980 through November 1, 1981

SUMMARY

A bibliography of over 950 references was compiled on wildlife-agriculture interactions. Comments from biologists (35) with expertise in this area indicated that loss of wildlife habitat and crop depredations were the major concerns. An inventory of current and future agricultural activity in Alaska was prepared. In 1980, excluding acreage in large grazing leases, 138,000 acres were listed as farm land. Disposal of an additional 150,000 acres of State land to agricultural interests is planned and as much as 500,000 acres could be converted by 1990. An analysis of positive and negative impacts of agriculture on wildlife was completed. The major negative impacts include loss or alteration of habitat, wildlife depredation on crops or livestock, transmission of disease between livestock and wildlife, competition for range land, and access problems for wildlife users. The major positive impacts include increased food for small game and waterfowl and the provision of resting areas for waterfowl.

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## BACKGROUND

Interest in agricultural development led to the Alaska Agricultural Action Council in 1979. The legislature mandated the council with promoting and coordinating agricultural development within the State.

Since 1979, the legislature has appropriated over \$40 million for agricultural development with 86% of the funds designated for low interest loans to farmers and agricultural enterprises, and 14% direct appropriations to agricultural projects (Alaska Agricultural Action Council 1981). With both political impetus and funding, agriculturalists are pushing for the rapid expansion of agriculture on State lands.

Agricultural development became a State goal in 1976 and resulted in the current land disposals and legislative programs. This followed soil surveys by the Soil Conservation Service in the early 1970's identifying over 15 million a as suitable for cultivation (Alaska Rural Development Council 1974). That figure has since been increased to 20 million a (Alaska Agricultural Action Council 1981). The first large-scale agricultural land disposal, Delta I, took place in 1978 with the disposal of over 60,000 a in the Delta Junction area in 22 parcels averaging 2,500 a each. Delta II, another 55,000 a to the east and west of Delta I, is scheduled for disposal in 1982. A lottery of 15,000 a, primarily for dairy farms, was held in the Point MacKenzie area in 1981 although actual land disposal is being held up in

court. In addition, appropriations have been passed for studies in the Nenana area where 50,000 a have been scheduled for disposal in late 1982.

Except for Point MacKenzie, which would emphasize dairy production, the primary current and projected use of this land is for production of grain crops. Developmental strategies call for both the export and local use of grain to establish feedlots for a livestock industry capable of producing 50,000 harvestable head of beef per year.

The history of agriculture in Alaska shows that these projects represent a significant departure from previous ventures. The Russians introduced cattle to Kodiak Island in 1794, and gardening was common in settlements (Barron 1939). Reindeer were introduced from 1891-1902; the industry expanded until 1929 when the market collapsed. The herds continued to grow to over 600,000 animals by 1934, but range deterioration, disease, and predation contributed to a steep decline (Olson 1969). Herding continues, especially on the Seward Peninsula, with herds numbering only 16,000 animals.

Interest in grain and truck farming, on a small scale, has been present since the early 1900's. Experimental stations were established and farming was popular, particularly in the Tanana Valley when the discovery of gold produced new markets for agricultural products (Thomas 1976). In 1935, 200 families were relocated by the Federal Government onto 40-a farms in the Matanuska Valley north of Anchorage where the main crops were oats, barley, and potatoes. This area has continued to be the main agricultural area of Alaska, although in recent times urban sprawl has converted much farmland into subdivisions. There was a lull in agricultural interest in the 1940's followed by renewed interest after World War II, particularly in the dairy industry. That industry reached a peak in 1961, but dropped in half by 1978.

The rate of agricultural development was slow from 1960 to the late 1970's due primarily to inexpensive transportation costs for out-of-state producers. By 1977, only 20,000 a were planted in crops with 70,000 a listed as farms, excluding large grazing leases (Alaska Crop and Livestock Reporting Service 1978). By 1980, agricultural rights to an additional 70,000 a had been sold and 34,000 a were in crops (Alaska Agricultural Action Council 1981). Agriculturalists targeted 500,000 a to be in farms by 1991 and 1,500,000 by the end of the century.

To date, there has been little study on the potential effects of the increasing rate of agricultural development. This project was initiated to review pertinent literature and determine what the primary interactions between wildlife and agriculture have been elsewhere. With this knowledge, the effects of development can be anticipated and more informed decisions made regarding the means to minimize, mitigate, or capitalize on those effects.

## OBJECTIVE

To analyze the potential effects of Alaskan agricultural development on wildlife and its users and to recommend means to minimize, mitigate, or amplify (beneficial effects of) such impacts.

## PROCEDURES

### Bibliography

We reviewed much of the literature on the effects of agriculture on wildlife with the computer at the University of Alaska library. A complete search statement will be included in the final report. The topic search included: disease transmission between wildlife and livestock, loss or alteration of wildlife habitat, wildlife-pesticide problems, competition between wildlife and livestock, and depredation of wildlife on livestock or crops. Because the material available is voluminous and, given the constraints of time and finances, I limited the search to the following:

Time period - The initial search primarily included material published after 1970. This was the period covered by most of the data bases available for computer assisted literature searches. Older references were included as they were found.

Geographic coverage - The data bases used for the searches covered North American and Europe. Pertinent references from other areas were included as found, but no major effort was made to search for them.

Type of references - The greatest search effort was made to locate scientific papers. Unpublished references and pertinent popular articles were included if found.

Subject limitation - The search was directed primarily at the effects of agriculture on wild mammals and birds. A few articles on the effects of agriculture on fish are included, but no major effort was made to search this topic.

There are many references covering coyote-sheep problems, and not all references encountered have been included. Specific accounts of coyote predation were often omitted, as were most popular articles.

There is also a large volume of material on pesticide-wildlife problems. Since we do not have a history of extensive pesticide use in Alaska, I decided to omit most articles dealing with pesticides which are no longer used extensively in the United States. These pesticides include DDT, dieldrin, aldrin, and 2,4,5-T. Some references on these pesticides which seemed pertinent, such as review articles, have been included, but the coverage is irregular.

A wide range of references was included on disease transmission between wildlife and livestock. Included were articles on disease in a particular species and general articles on particular diseases that may pose problems.

### Survey

In September 1981, a letter (Appendix A) was mailed to 96 wildlife biologists and cooperative extension wildlife specialists who deal with wildlife-agriculture relationships throughout the United States, Canada, and Scandinavia.

### Other Sources

To remain informed about agricultural developments and agriculture-wildlife interactions statewide, the Department subscribed to a clipping service, that service provides clippings from Alaska's major newspapers on the following topics:

- 1) Agricultural land disposals
- 2) Progress of agricultural developments
- 3) Importation of livestock
- 4) Livestock diseases
- 5) Interactions of agriculture and wildlife
- 6) Impact of agriculture on other land uses

## RESULTS AND DISCUSSION

### Bibliography

We developed a master card file of over 1,000 references, and collected approximately 350 reprints. Acquisition of additional pertinent material is continuing.

### Survey

By 1 November 1981, 35 replies to our letter (Appendix A) had been received. The response rate is adequate considering the general nature of the questions asked. In addition to comments, most people enclosed copies of pertinent publications from their region. Habitat loss to agriculture is considered a problem by 54% of those replying and 66% mentioned depredation by wildlife on crops and livestock. Access problems for sportsmen, competition between big game and livestock, and a few instances of disease transmission are also noted. Many people emphasized the importance of participation by wildlife managers in the planning stages of any agricultural project. Both descriptions of ongoing programs and suggestions for mitigation of negative impacts are included in many letters.

## Current Agricultural Production

Agricultural production in Alaska is expanding rapidly. Excluding the acreage in large grazing leases, there were approximately 138,000 a in farms in 1980. The Delta I Project accounted for almost 60,000 a. Much of the additional acreage was a result of disposals, since 1978, of 265 small parcels of agricultural land scattered throughout the State. Over 30,000 a were cultivated in 1980; the remaining acreage was pasture or uncleared lands. There were 960 people employed on 380 farms, and the value of agricultural production approached \$10 million (Alaska Crop and Livestock Reporting Service 1981).

By 1981, it was estimated that approximately 45,000 a in Alaska were under cultivation--an increase of 50% in 1 year. Barley was planted on 17,000 acres, hay and silage on 19,500 acres, and oats, mixed grains, potatoes, and vegetables were planted on the additional acreage (Alaska Crop and Livestock Reporting Service 1981). In the Tanana Valley, bad weather delayed the harvest and as of 1 November 1981 approximately 1/3 of the 16,000 a of barley planted had been harvested.

The number of livestock in Alaska is increasing slowly. On 1 January 1981 there were 13 Grade A dairies with 1,100 milk cows. Most dairies are located in the Matanuska Valley. There were 6,800 beef cattle on Kodiak and the Aleutian Islands and in the Tanana Valley. The number of hogs increased from 1,100 in 1979 to 1,800 in 1980. Sheep numbers were at a 20-year low on 1 January 1981 with 95% of the 3,900 head located on the Aleutian Chain. There were 35,000 chickens in Alaska at the end of 1980 (Alaska Crop and Livestock Reporting Service 1981). There were approximately 16,000 reindeer in Alaska in 1980.

## Proposed Agricultural Developments

Agricultural development, as envisioned by the State's agriculturalists, will require extensive development to provide the support facilities, transportation, and marketing needed to sustain the industry. To justify the development of this infrastructure, production from additional acreage will be needed. To that end, a number of additional projects are scheduled for implementation throughout the State.

### Delta II Project:

This project is considered an expansion of Delta I and encompasses approximately 100,000 a in the Delta area. East and north of the existing Delta I project, 26,000 a are scheduled for disposal (Fig. 1). On the west side of the Delta River, plans call for the disposal of an additional 30,000 a (Fig. 1). Large tracts of 1,500 to 2,700 a have been laid out; primary use of the land will be for grain production. The disposal of both Delta II east and west is scheduled for spring 1982.

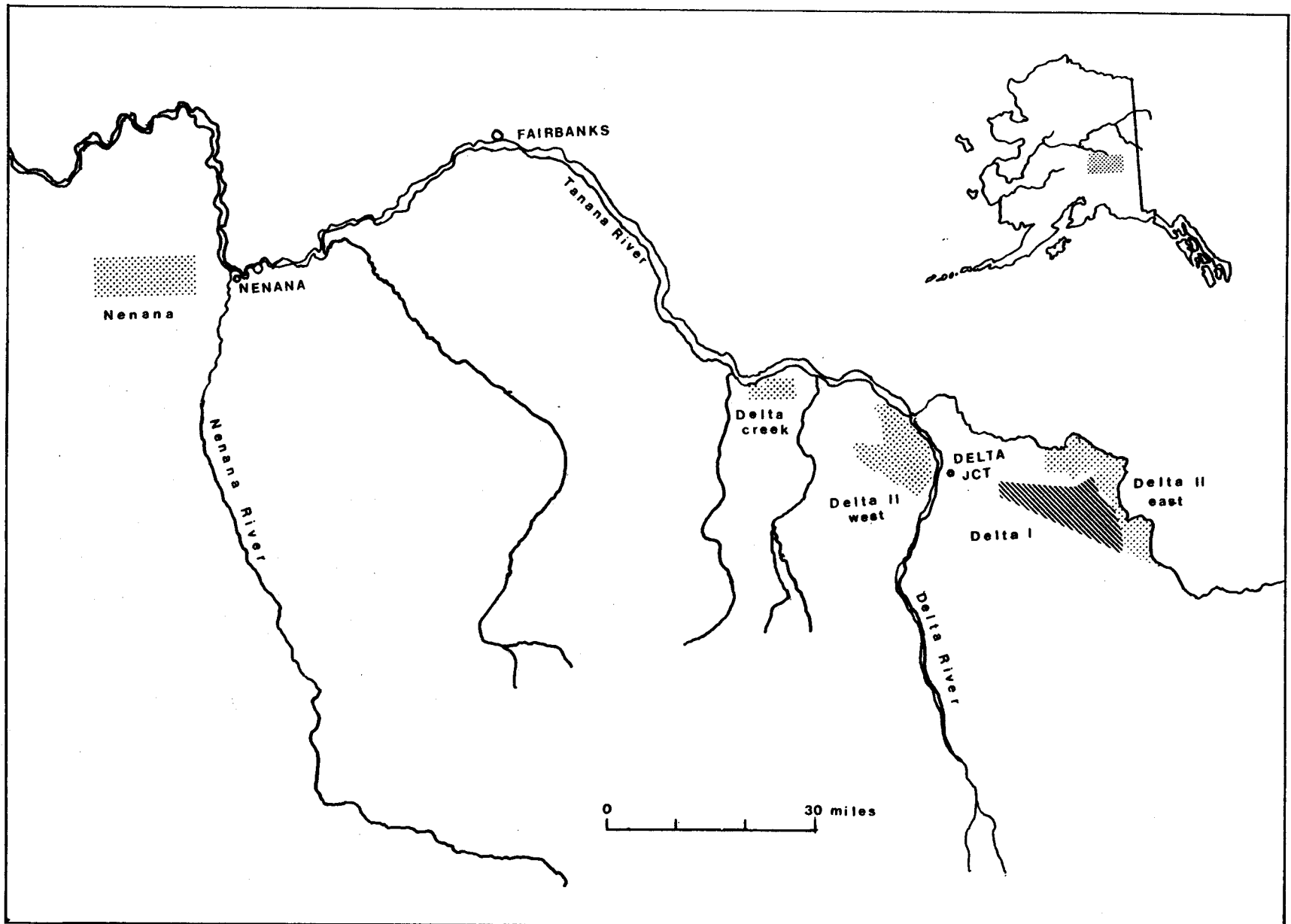


Fig. 1. Present and proposed agricultural development in Interior Alaska, 1981.



### Point MacKenzie Agricultural Project:

The Point MacKenzie Agricultural Project encompasses 14,568 a of land west of Anchorage across Knik Arm (Fig. 2). The project consists of 31 parcels ranging in size from 301 - 634 a. Nineteen of the 31 tracts were designed for use as dairy farms and the rest for grain or vegetable production. The lottery sale of the land was held 6 March 1981 amidst 2 lawsuits and considerable controversy. The 1st lawsuit was settled out of court a few days following the lottery. That suit, brought by loggers and conservation groups, protested the short amount of time allowed for the harvest of timber on the project. The out of court settlement required the winners of the lottery to offer the timber on their tracts to the highest bidder at public auction.

The 2nd lawsuit was brought by a group of farmers who challenged the State's requirement that lottery applicants submit farm conservation and development plans prior to the lottery. A permanent injunction was issued on 4 May 1981 barring the State from selling 29 tracts. A State appeal was still pending as of 1 November 1981. Two other tracts totaling 910 a were sold by the Matanuska-Susitna Borough, and clearing was begun on those tracts in 1981. The State had also conducted a test clearing of 718 a on the project in late 1980.

### Nenana-Totchaket Proposal:

West of Nenana is an area known as Totchaket, which contains 175,000 a with soils identified as suitable for agriculture (Furbush et al. 1980). The Agricultural Action Council has proposed a Phase I project in which 50,000 a would be developed for agricultural purposes in an area 9 mi west of Nenana (Fig. 1). In 1980, the Alaska Legislature appropriated \$500,000 for feasibility studies of agricultural potential. One study concluded that a livestock industry would be economically feasible in Alaska and suggested Nenana as a suitable area (Featherstone Corporation 1981). Preliminary tract layouts have been finished, and the projected disposal date is fall 1982.

### Delta Creek Grazing Proposal:

An application for a grazing lease was submitted to the Alaska Department of Natural Resources by the Delta Creek Grazing Association in 1979. This application for 10 parcels totaling close to 60,000 a in the area south of the Tanana River to the northwest and southeast of Delta Creek (Fig. 1), was subsequently denied by the Division of Lands. Plans had called for land clearing and planting grass. In 1981, another grazing lease proposal was submitted to the Department of Natural Resources by 2 members of the Delta Creek Grazing Association; the purpose being to determine the feasibility of grazing in this area. The land included in the proposal was 10,500 a, of which 2,000 would be cleared, fenced, and stocked with 316 head of cattle. The application was pending on 1 November 1981.

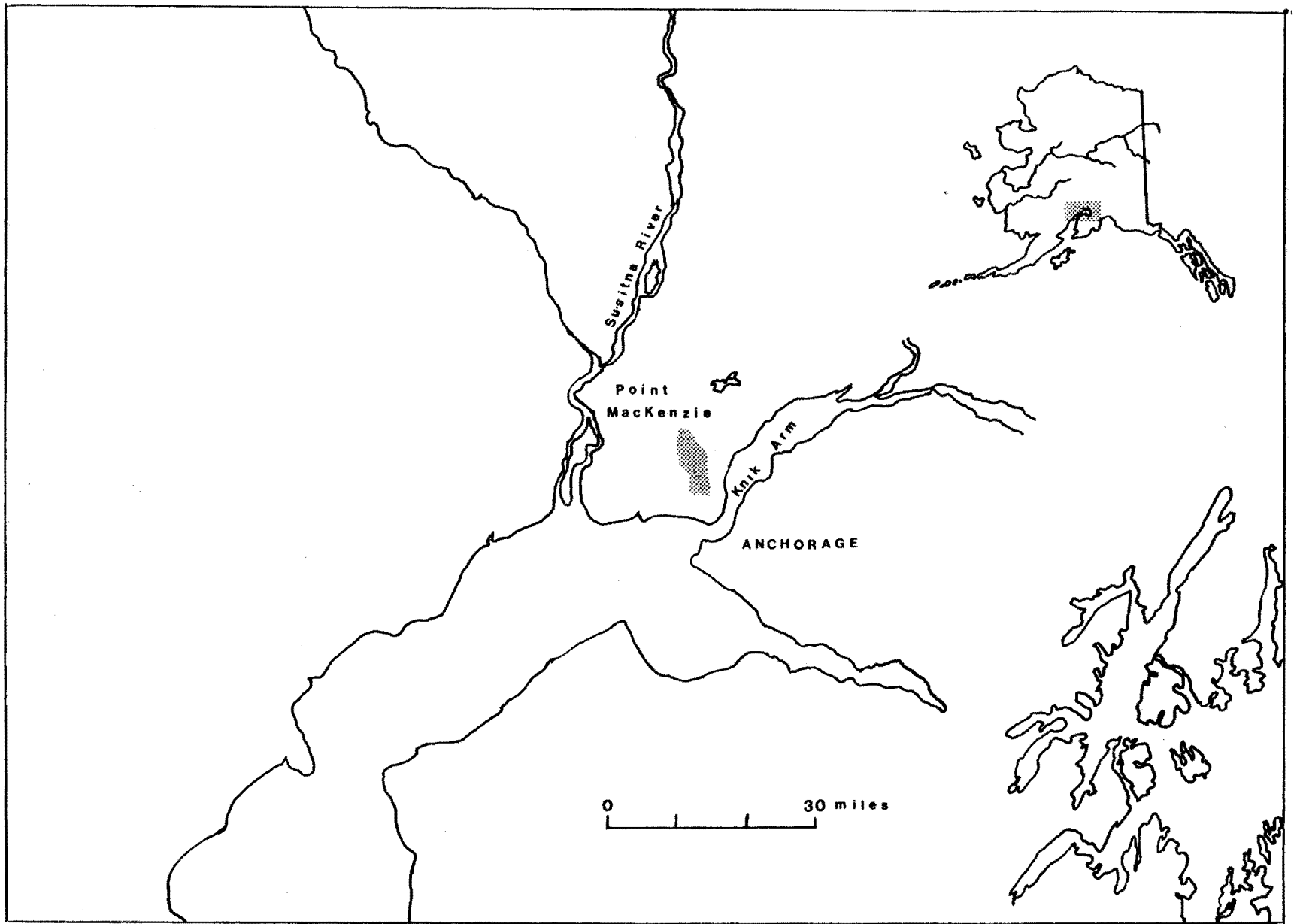


Fig. 2. Proposed agricultural development in Southcentral Alaska, 1981.

## Other Proposed Agricultural Development:

The State continues to sell agricultural rights to small parcels of land. In addition, private lands are also being converted to agricultural purposes. A number of other applications for grazing leases on State lands are pending. These include applications in the Healy, Johnson River, and Palmer areas. Village gardening programs are being encouraged and have received over \$1 million in funding grants.

## Preliminary Assessment of Major Impacts

A literature review and replies to our survey indicate serious impacts can be expected, if large-scale agriculture is developed in Alaska. The major impacts will be habitat changes, increased depredation problems, disease transmission, competition, and changes in access.

### Habitat Changes:

Loss of wildlife habitat to large-scale agriculture is a widespread and ongoing problem in the United States. McConnell and Harmon (1976) concluded that "the most severe and long lasting impact of European settlement in North America came not from the direct killing of wildlife but the elimination of wildlife habitat by intensified farming." Of the 35 replies to our inquiry letter (Appendix A), 55% indicated that loss of habitat is a major problem in their area. While a few respondents mentioned that urbanization and industrialization are also responsible for habitat loss, most felt that recent trends in agriculture are to blame. These trends include the use of larger farms to accommodate massive farm machinery, a shift toward monoculture, fall plowing, roadside mowing, conversion of rangeland to agriculture, and drainage of wetlands. Reductions in farmland and edge habitat have resulted in significant declines of upland game in many states (Shroufe and Florio, pers. commun.). The widely held notion that agriculture benefits wildlife by providing cover at the edges of fields and through diversity of habitat no longer applies to modern agriculture.

In addition to direct habitat loss from clearing; disturbances from road construction, buildings, or support facilities can also affect wildlife. For example, Mytton and Keith (1981) show that moose (*Alces alces*) are generally farther from human disturbance than would be expected in random distribution.

In Alaska, the negative effect of agriculture on wildlife habitat is relatively small due to the small amount of land involved and the type of agriculture. Klebesadel and Restad (1981) credited agriculturally induced habitat alterations for the increased moose populations in the Matanuska Valley. Small farms of 40-60 a settled in the 1930's and 1940's, plus fires and other activities which disturbed the climax forests did provide for habitat diversity and increased moose browse. However, this type

of agriculture is substantially different from the large farms being promoted for Alaska today. In a report on the potential for barley production in the Delta area, Lewis and Wooding (1978) concluded that large farms of 2,200 to 3,000 a would be more economically viable in Interior Alaska than smaller farms. Tracts in the Delta I project are large and leave little in fence rows or windbreaks for wildlife habitat. In addition to habitat loss for other species, the clearing of 60,000 a removed 3 - 4,000 a of good moose winter range (R. Larson, pers. commun.).

One direct benefit of modern large-scale agriculture has been the creation of resting area habitat and increased food for waterfowl. Cleared fields with crop residues from the previous fall are often used by waterfowl. For example, in the Delta area, large numbers of migrating Canada geese (*Branta canadensis*) and sandhill cranes (*Grus canadensis*) used a field in spring 1979 (MacDonald 1980). In many areas of North America, waterfowl feed on swathed grain in fall (Sugden 1976).

Accompanying habitat loss, is degradation of habitat by agricultural practices or chemicals. As Crowles (1979) points out, "From 1950 to 1976, pesticide production increased 8,000-fold from 200,000 to 1.6 billion pounds. Farmers...(used) 660 million pounds of active ingredients on crops and livestock in 1976 alone." The direct, harmful effects to wildlife of many organochlorides such as DDT, dieldrin, and aldrin are well documented. The development of embryos of certain fish can be delayed or stopped by 2,4-D, a common herbicide (Biro 1979). In Oregon there was reduced nesting success and direct mortality to Canada geese following the use of heptachlor-treated wheat seed by farmers in the area (Blus 1981). These pesticides are now banned except for special purposes. However, many other pesticides are being used in ever-increasing quantities, and few studies have been done on their long-term effects on wildlife although some short-term effects are known.

In addition to the direct effects on wildlife, insecticides can eliminate important food sources for birds and mammals, and herbicides can destroy food and cover. Decline in numbers and changes in distribution of duck nests have been documented in an area treated with 2,4-D (Dwernychuk and Boag 1973).

Pesticide use in Alaska is increasing. In 1978, 80,000 lbs of 2,4-D were applied to crops in Alaska (Bleicher et al. 1980); since then the Delta Barley Project has used this same pesticide extensively to control broad leaf plants.

Use of other agricultural chemicals has caused concern in Alaska. In 1980, 14 bison (*Bison bison*) were poisoned after ingesting urea from an improperly stored pile of the fertilizer. The potential for serious problems of this sort will intensify as agricultural expansion continues.

## Depredation:

Depredation by wildlife on livestock or crops can have serious repercussions. Deer depredation on cropland or haystacks was a problem mentioned frequently by wildlife managers who responded to our questionnaire (Appendix A). Other big game, beavers (*Castor canadensis*), black bears (*Ursus americanus*), small game, and waterfowl are also responsible for crop damages. In the West, coyote (*Canis latrans*) predation on sheep has caused major economic losses. In many states, game departments are required to compensate farmers for depredation by wildlife. Washington and Colorado are 2 examples of states paying substantial claims (Thornley, pers. commun.). In other states such as South Carolina and Indiana, compensation is not paid; instead, seasons on deer are liberal in problem areas (Shroufe and Moore, pers. commun.). Still other states provide damage control officers who train landowners to trap offending animals and protect crops. Many letters commented on the large amounts of time and money needed to deal with depredation by wildlife.

In Alaska, we can expect predation on livestock by bears, wolves (*Canis lupus*), coyotes, and eagles if large-scale grazing proposals are implemented. The Delta Creek grazing proposal is in an area frequented by major predator species. It is likely stockmen will demand substantial reduction of predators in areas of grazing leases. The ongoing conflict between brown bears (*Ursus arctos*) and cattle on Kodiak Island has resulted in the removal of large numbers of bears and typifies the expected results in other areas of the State.

Depredation of crops by wildlife is already a serious problem in Alaska; the prime example is bison in the barley fields of Delta I. Arguments noting that the Delta Bison Herd was established well before the conception of large-scale barley farming in the area have not deterred farmers from urging the elimination of the herd. Farmers are also currently suing the State for damages they claim bison have caused in the past. The proposed Delta II project is contiguous to portions of the bison summer range, and early and mid-summer depredation on crops is likely. The potential also exists for problems with moose. In Finland, moose are responsible for damages to cereal crops, and fees from moose hunters are used to pay compensation to farmers (Pallianen, pers. commun.).

Waterfowl damage to grain crops has not been serious in Alaska but is extensive in Canada. Sugden (1976) states that waterfowl damage to crops in Alberta, Saskatchewan, and Manitoba exceeded \$10 million annually, where most damage is done to swathed grain. Klein (1977) noted "waterfowl do not normally concentrate away from nesting areas in late summer in Alaska" and concluded "waterfowl are not likely to cause serious damage to grain crops in Alaska." However, large-scale grain production is new to interior Alaska, and changes in waterfowl populations and distribution may occur here in response to agriculture as they have in California (Calif. Dept. of Fish and Game 1980).

## Disease Transmission

The transmission of disease between livestock and wildlife may have serious effects on wildlife populations. In North America, serious losses in wildlife populations from disease have generally followed the introduction of domestic livestock. Buechner (1960) traces the history of the infection of bighorn sheep (*Ovis canadensis*) with scabies mites (*Psoroptes ovis*). In every incidence, the infection followed the introduction of domestic sheep. Bighorns are also susceptible to bluetongue (Robinson et al. 1967), a virus transmitted by gnats which can be carried by domestic livestock. Thousands of Wyoming antelope and a large number of deer (*Odocoileus sp.*) died in the 1970's from bluetongue (Thorne, pers. commun.). In South Carolina, Moore (pers. commun.) noted that "the large cattle stomach worm (*Haemonchus contortus*) occurs more frequently and causes more problems in deer herds that share a common range with cattle."

In addition to losses directly attributable to introduced disease, stockmen often call for the eradication of wildlife populations to prevent the reinfection of livestock. In the early 1960's, a bison herd in Utah was infected with brucellosis (*Brucella abortus*) from livestock. Hancock (pers. commun.) states "livestock people constantly use the disease factor as a reason for eliminating the bison herd even though we have not detected any reactors for almost 20 years."

Alaska's wildlife has suffered little from diseases of livestock because livestock numbers have been low and contact has been minimal. If plans proceed for a greatly expanded livestock industry, this situation may change.

## Competition

Livestock grazing can also result in competition between cattle or domestic sheep and wildlife for forage. Competition from domestic livestock contributed to the decline of the bighorn sheep in the late 1800's (Buechner 1960). Other big game have also been affected. Mackie (1970) found that elk (*Cervus canadensis*) preferred areas which had not been recently used by cattle and Galliziolo (1979) blamed overgrazing by domestic animals for severe competition between deer and cattle in Arizona. Small mammals also compete with livestock under certain conditions. Howard et al. (1959) found that ground squirrels (*Citellus beecheyi*) and cattle competed for forage in California.

Because of the low vegetative production capacities, vast acreages would be needed to sustain a livestock industry in Alaska. The best rangeland is now occupied by moose, caribou (*Rangifer tarandus*), or Dall sheep (*Ovis dalli*). Livestock grazing on these ranges could be particularly detrimental to wildlife during severe winters.

## Access Changes

Growth of agriculture can directly affect wildlife users. The development of agricultural lands can provide access into adjacent wildlife habitat for hunting or viewing. However, access to the agricultural land itself is often limited. This problem of restricted access for wildlife users occurs in much of the United States where land is in private ownership and was mentioned by respondents to our inquiry letter (Appendix A) (Hancock, Krauch, Moore, pers. commun.). In some areas, public access is denied and, instead, private lands are leased to individuals or groups for hunting (Jackson, pers. commun.).

Alaskans are already experiencing access problems related to agriculture. On the Delta Barley Project, section line easements were vacated to permit the use of more efficient farming methods and to prevent trespass while crops were growing. Farmers, concerned about bison depredations on crops, have refused access to both bison hunters and wildlife managers.

Other large-scale projects such as Delta II will also call for the suspension of easements. Grazing operators may fence large areas making practical access difficult.

## RECOMMENDATIONS

- 1) The study of the impacts of agriculture on wildlife should be continued. The bibliography should be updated and indexed, and the collection of reprints should be continued.
- 2) Research has been initiated to determine the effect of large-scale agricultural development on moose in interior Alaska. Additional studies are needed on the effects of development on other wildlife species.
- 3) An economic review of the value of wildlife in areas where agricultural development is occurring, or is scheduled, should be made.
- 4) An information and education effort should be aimed at informing the public about the potential impacts of agriculture on wildlife.
- 5) A study of the effects of loan policies and disposal requirements on habitat loss and other agricultural impacts on wildlife should be done.
- 6) There should be an animal health cooperative agreement between the Department of Fish and Game and the Department of Environmental Conservation to ensure no disease transmission between livestock and wildlife.

## ACKNOWLEDGMENTS

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APPENDIX A

SAMPLE MASTER LETTER

September 16, 1981

Dear

Agriculture is presenting a new challenge to wildlife in Alaska. Historically, with the exception of reindeer and cattle grazing in coastal areas, agriculture in Alaska has been primarily on small farms. In efforts to diversify the economy, the State is now supporting large-scale monoculture and livestock developments. We are concerned about the possible effects of this development on our wildlife and anxious to avoid or mitigate unfavorable interactions and capitalize on favorable effects.

In order to help us understand potential agriculture and wildlife interactions, we have prepared an extensive bibliography on that subject. We are also initiating a research study to determine the effect of large-scale grain development on moose habitat and moose populations in an area of Interior Alaska.

Because you or your organization have considerable experience with wildlife and agriculture, we hope to establish working correspondence with people such as yourself who have expertise in this area. Your comments, reports, or programs which deal with or describe problems and benefits of agriculture for wildlife in your region are of interest to us. Publications not readily found in the professional literature which deal with these effects would be appreciated.

We are particularly interested in what you consider the most important agriculturally related problem for wildlife in your area.

Our main concerns are wildlife depredation on crops and livestock, disease transmission between livestock and wildlife, habitat loss and alteration, competition for forage, and access problems for the public. If you have had experience with these problems or others, your comments would be greatly appreciated.

Information which you provide will be particularly valuable to help us anticipate and respond effectively to wildlife/agriculture interactions to ensure the long-term well-being of wildlife populations in Alaska.

Thank you for your time.

Sincerely,

Richard H. Bishop  
Regional Supervisor  
Division of Game  
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