



ALASKA
DEPARTMENT OF FISH AND GAME

**ANNUAL REPORT
FOR 1958**

TERRITORY OF ALASKA

Alaska Department of Fish and Game
Annual Report for 1958

ERRATA SHEET

- Page 50—Paragraph 1: Line 6—Change "Tahlton" to "Tahltan."
" 51—Figure 2—Change "Tahlton" to "Tahltan."
" 52—Paragraph 4: Line 6—Change "Berrington" to
"Barrington."
" 57—Paragraph 14: Line 6—Eliminate "and 10".
" 61—Paragraph 2: Line 2—Change "Figure 11" to "Figure 10."
" 64—Paragraph 4: Line 4—Change "Figure 12" to "Figure 11."
" 64—Paragraph 8: Line 2—Change "Figure 13" to "Figure 12."
" 69—Paragraph 1: Line 1—Change "Figure 14" to "Figure 13."
" 70—Paragraph 2: Line 6—Change "Figure 15" to "Figure 14."
" 101—Paragraph 3: Line 2—Insert "not" after "have."
" 101—Footnote, Middle Page: Line 1—Substitute "be" for
"have been."
" 101—Footnote, Middle Page: Line 2—Substitute "F" for
"C."
" 101—Footnote, Bottom Page: Line 2—Change "aid" to
"paid."

COVER: CARIBOU ON MIGRATION
ALASKA RANGE

Photo by Greany

1958 ANNUAL REPORT

**Alaska Fish and Game Commission
and
Alaska Department of Fish and Game**

**MICHAEL A. STEPOVICH
Governor**

**WAINO HENDRICKSON
Acting Governor**

**ARTHUR H. HAYR
Chairman**

**C. L. ANDERSON
Director**

**REPORT NO. 10
JUNEAU, ALASKA**

TO:

THE GOVERNOR OF ALASKA
MEMBERS OF THE TERRITORIAL LEGISLATURE AND THE
CITIZENS OF ALASKA

Herewith is submitted the tenth Annual Report of the Alaska Fish and Game Commission, created by the 23rd Territorial Legislature and approved April 1, 1957.

This report covers the activities of the Commission and the Alaska Department of Fish and Game based on the calendar year January 1 to December 31, 1958.

C. L. ANDERSON, Director
ARTHUR H. HAYR, Chairman
ROBERT C. KALLENBERG, Member
DOUGLAS BABCOCK, Member
NEIL E. GRANT, Member
JAMES HUNTINGTON, Member
NELS E. NELSON, Member

Although the Alaska Fish and Game Commission and the Alaska Department of Fish and Game was created April 1, 1957, for all practical purposes they are a continuation of the former Alaska Fisheries Board and the Alaska Department of Fisheries and accordingly these reports are numbered consecutively.

FOREWORD

The 1957 session of the Legislature enacted Chapter 63, S.L.A. 1957, which repealed Chapter 68, S.L.A. 1949, which created the Alaska Fisheries Board and the Alaska Department of Fisheries. Under the new act, all duties and powers of the Alaska Fisheries Board were relegated to an Alaska Fish and Game Commission to be composed of seven members, viz. three commercial fishermen, one processor, one hunter, one sport fisherman and one trapper. The four commercial fishery members of the old Board were automatically made members of the new Commission. The functions of the Alaska Department of Fisheries were transferred to the new Alaska Department of Fish and Game with fur and game activities being added. This change became effective April 1, 1957.

The Division of Commercial Fisheries continued its work in watershed improvement on various programs. A new chemical, toxaphene, was utilized in six Southeastern Alaska lakes to remove predators and competitors to salmon. When the lakes are clear of the chemical, plants of red and silver salmon will be made, probably in the spring of 1959. Work on the physical inventory of the Stikine River was intensified.

A large run of adult red salmon numbering 7,400, returned to Laura Lake, Afognak Island. These salmon were derived from egg plants made in this system which was opened to salmon by means of a fish ladder in 1951. Research on the life history of the Nushagak king salmon was expanded over previous years.

The Biological Research Division pursued research on a variety of projects. These included activities at the Kitoi Bay Research Station, king crab research at Kodiak, Taku River studies and silver salmon investigations in Southeastern Alaska.

Lactic acid experiments to determine the extent of fatigue in troll-caught salmon were continued by Robert R. Parker in connection with his work at the University of British Columbia.

The Division of Sport Fish continued lake stocking of rainbow trout from the Fire Lake and Fairbanks hatcheries in the Interior. Starting with a four-trough operation in 1952 and a lake stocking of 68,000 fry, Sport Fish in 1958, with two hatcheries and 58 troughs, stocked 935,000 hatchery-hatched fish. It was found that the pits along the Richardson Highway could not be set aside by the Fish and Game Commission for the exclusive use of juveniles, because of the lack of authority to do so in the Alaska law. It was suggested that this might be initiated and accomplished on a voluntary basis by sportsmen's organizations.

The Division of Game added two Associate Biologists who staffed offices in Fairbanks and Anchorage. Investigations were conducted on the Walrus Islands, moose calves were transplanted to Berner's Bay in Southeastern Alaska, caribou calving studies were conducted in the Interior and pelt primeness and beaver management studies were initiated.

The Engineering Division provided technical and professional engineering service to the several other Divisions including field surveys, designs, preparation of plans and specifications, and supervision of force account and contract construction.

Fifteen lake surveys were completed; a new type smolt screen was designed and an experimental model built and installed for field checking; development work on a prefabricated portable steepass fishway for upstream migrants was continued, and the first operational installation of it was made; an upstream migrant holding tank was constructed at the outlet of Little Kitoi Lake; and construction under contract of the Bakewell Falls fish ladder was well along toward completion by the end of the year.

The Education and Information Division conducted an experimental showing of Department-produced fishery films to more than 7,000 persons in 45 audiences located in nine Southeastern Alaska maritime communities within a month's time. Evaluated, the response revealed the motion picture as a useful tool in disseminating fish and game knowledge, and especially in attracting sizable audiences. It is an effective way of enlisting public support for the Department's program to restore the fisheries to a place near their former abundance where they can be harvested on the highest sustained level. The local District Biologist conducted a forum and answered questions stimulated by the showing of the films.



Members of the Board of Fish and Game holding a public hearing.

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All photographs by Alaska Department of Fish and Game Staff

DIVISION OF GAME

By James W. Brooks

This division will be responsible, when control of resources is transferred from the Federal government, for management of all mammals and birds, and for conducting research to provide a sound basis for such management. Present functions are designed to equip the division to assume the above responsibilities and, in the interim, to contribute new knowledge about Alaska's game resources.

At the close of the year, the division staff consisted of James W. Brooks, Senior Biologist, and Wilbur L. Libby and Albert W. Erickson, Associate Biologists. Brooks, formerly head of the Division of Predator Investigation and Control, was placed in charge of the new Division of Game upon its creation in 1957; Libby joined the Department in January and Erickson in March.

BIOGRAPHICAL SKETCHES

James W. Brooks was introduced in a biographical sketch which appeared in the 1955 Annual Report. In the interim, he has obtained additional schooling at the University of British Columbia, and has continued his investigations of marine mammals and their effects on commercial fisheries.

Albert W. Erickson was born in Chicago in 1929 and grew up in Michigan's upper peninsula. Following service in the Marine Corps from 1947 to 1950, he entered Michigan State University and obtained the B.S. degree in 1954. Having begun an investigation of the bobcat while still a senior, he wrote a thesis on that animal and received his M. S. degree in 1955. Following this he began research on the black bear in Michigan and also was employed as a biologist by the Game Division of the Michigan Department of Conservation, and as an instructor at Michigan State. He completed most of the course work for the Ph. D. degree, which he will receive on completion of his thesis. He established a Division of Fur and Game office in Anchorage upon his employment by the Department in March.

Wilbur L. Libby, born in Vanceboro, Maine, in 1922, obtained the B.S. degree from the University of Maine in 1949. He was employed as a biologist by the Maine Department of Inland Fisheries and Game before coming to Alaska to attend the University of Alaska on a fellowship with the Cooperative Wildlife Research Unit there. Writing a thesis on beaver, which is the basis for Alaska's management program for this important furbearer, he received his M.S. degree in wildlife management in 1955. Following this, he was employed for a time by the U.S. Fish and Wildlife Service, and by the University of Alaska. In the latter position he worked on the classification of wildlife habitat in connection with a grant to the University by the U.S. Air Force. He was placed in charge of the Division's Fairbanks office upon his employment in January.

ACTIVITIES

As a new division, formed in 1957, a considerable part of the program in 1958 consisted of reconnaissance-type surveys to reveal problems which would warrant more intensive study. Nevertheless, certain activities were more specific in nature and are reviewed below.

Mr. Brooks devoted the spring and summer months primarily to marine mammal investigations and the introduction of Mr. Calvin Lensink to these projects. Most of this work is now Mr. Lensink's responsibility and is presented elsewhere in this report (Predator Investigation and Control). Additional comments on walrus and belugas are presented here.

Walruses

During the period June 23 to June 28, 1958, Brooks, in company with Dr. Francis H. Fay of the Arctic Health Research Center, Anchorage, and Mr. Karl W. Kenyon of the Bureau of Sport Fisheries and Wildlife, visited Round Island, which is the easternmost island of the Walrus Island group. These islands, located in Bristol Bay, are each summer occupied by several hundred adult bull walruses. The animals crawl out on the beaches in large herds and can be approached very closely by humans. In similar fashion, walruses formerly crawled out on land in several places in Alaska. With excessive killing and harassment, however, they abandoned all of these except the Walrus Islands, which remain the sole place in Alaska where they regularly leave the water and ice floes and spend lengthy periods on land. As a result, these islands are of great importance to all who have an interest in walruses and who wish to see, study, and photograph the animals.

While the investigators were on Round Island, about 1500 walruses were present; a great majority of them were adult males though a few young young bulls were also observed. Thirty-two dead animals were found on the beach, from 30 of which the tusks had been removed: from discussion with people residing in adjacent areas and from examination of carcasses, there was strong suggestion that the animals had been killed solely for their ivory.

Three walruses were collected by the investigators for scientific study. They averaged 3,177 pounds in weight with the largest weighing 3,432 pounds. Blood accounted for 8.4 percent of the total weight, which is roughly comparable with that found in land animals. Many of the walruses were molting and appeared grey-white in color after being in the water for a time: upon lying out on the beach the color changed to pink. It was also noted that a rather large number (perhaps 15 percent) of the animals had broken tusks.

Twelve walruses were tagged on the hind flippers with metal cattle ear tags. Most of these tags were placed on the walruses while they slept, which indicates how closely humans can approach with reasonable caution. The object of such tagging was to gain new information on the distribution of these animals at other times of year: the success of this undertaking is contingent on the somewhat remote possibility that tags will be recovered by walrus hunters elsewhere and reported to this or some other conservation agency.

The abandonment of the Walrus Islands by walruses in future years is almost certain unless protection from killing and excessive disturbance is afforded. It is therefore recommended that the islands be dedicated to the preservation of this last remaining walrus retreat in Alaska by making some or all of the islands in the Walrus Islands group a walrus sanctuary. This action could provide the needed protection and assurance that this highly interesting and important segment of Alaska's game resources would be perpetuated indefinitely for the benefit of all.

Belugas

In connection with the beluga investigation in Bristol Bay it was convenient to take a few animals alive in response to requests for such specimens by the New York Zoological Society and Pacific Ocean Park of California. No belugas had been held in captivity for over half a century and there appeared to be an opportunity here to acquire much information of scientific value.

Techniques for live capture of belugas were developed by Brooks and his assistant, Mr. Charles Wilson. Three methods proved satisfactory in that they permitted capture of the animals either without injury or injury so slight as not to jeopardize later survival. All three methods depend upon the selection of small animals, preferably yearlings, and the chasing or herding of them into water four feet or less in depth.

The first capture technique involves harpooning the beluga, with a small toggle-type harpoon head fixed to a sharpshoot shaft, in such a manner that the harpoon head penetrates only the skin and lodges in the underlying blubber. It is possible to bring the chase skiff sufficiently close to an animal held in this way to allow a choke collar to be placed over the beluga's head. By sliding this collar back to a point just anterior to the fore flippers, fairly positive control of the animal is obtained.

The second method involves laying a salmon gill net from a fast-moving skiff completely around an animal in the manner of a purse seine. The beluga becomes entangled in the net and a collar or harness can rather easily be placed on it.

The third and last method, and the one to be preferred because it causes no injury, is for a man to jump upon the animal from a moving boat and place the choke collar or harness on it. It was found that once the harness was in place, the animals were reasonably tractable and could be held and directed without much difficulty even by a man wading. Belugas captured by the above described methods were beached, rolled on to a stretcher and carried by four men into a freshwater pond for holding prior to shipment.

Two belugas were captured in June, transported to the King Salmon Airport by boat, and then shipped by air to Anchorage. Unfortunately, one of these animals died in Anchorage before it could be flown on to New York. The other animal died minutes before the aircraft landed in New York. The cause of this mortality can be credited to lack of knowledge concerning proper care of the animals while they are out of water. Two facts of importance were revealed by this undertaking: (1) The animals must be supported on very soft mattresses, and (2) the animals must be kept moistened at all times to avoid desiccation of the skin and to promote cooling and proper temperature regulation by the whale.

During August, three belugas (one calf and two yearlings) were captured for shipment to California and New York. Two of these were taken by the salmon net method and one was subdued by pure manhandling in shallow water. After holding for a few days in a freshwater pond, the animals were taken by boat to King Salmon and shipped by air to Santa Monica, California. The calf was subsequently flown on to the New York Aquarium where it died within a few days. Mortality was apparently due to skin desiccation and damage during shipment. The remaining animals continue to thrive in Pacific Ocean Park and have shown themselves to be very adaptable to confinement and training.

Many thousands of people have already observed the performance of these belugas which involves retrieving batons, tooting horns, leaping out of water on command, towing small boats, etc. As might be expected, food is the reward given during training. It is remarkable and indicative of a great innate intelligence that the animals have been quick to learn a variety of activities which are altogether unrelated to behavioral patterns displayed in their natural environment.

Moose

The Division participated with the Bureau of Sports Fisheries and Wildlife and the Territorial Sportsmen Association in the transplant of moose from the Susitna River area near Anchorage to the Berner's Bay area in Southeastern Alaska. Mr. Erickson and Mr. Libby both assisted in the capture of 17 moose calves. The animals were transported to Southeastern Alaska by the Alaska National Guard in a DC-3 aircraft. After being held for several weeks near Juneau, they had put on sufficient growth to warrant release with reasonable prospect of survival (Figures 1 and 2).

During late August, the Bureau of Sports Fisheries and Wildlife and the Territorial Sportsmen Association cooperated in transporting the



Figure 1 — Transplanted moose calves feeding in corrals on Lena Loop near Juneau.



Figure 2 — Small lad giving moose calf a tid-bit.

animals to the Berners' Bay area (Figure 3). Subsequent checks indicate the moose were thriving and the prospect for success of this transplant appears excellent.



Figure 3 — Moose calves being released at Berner's Bay.

Caribou

In late May and early June Mr. Libby, acting in concert with Bureau of Sports Fisheries and Wildlife personnel, conducted post-calving composition counts of the Steese-40 mile caribou. These counts, conducted in the vicinity of Eagle Summit as the animals crossed the Steese Highway, indicated that the 1958 initial calf production was approximately 74 calves per 100 adult cows. A total of 17,360 caribou were counted as they crossed the road: this figure included 11,076 adult (including yearlings), and a calculated (based on observed ratios) 6,284 calves. An early calf mortality of about 19 per cent was indicated. The peak of the movement across the highway occurred between the 10th and 15th of June.

Beaver

Mr. Libby inaugurated beaver management studies during 1957 that were based on work previously done by the Alaska Cooperative Wildlife Research Unit at College. This involved flying over selected check areas during late September or early October to observe the number of live beaver colonies.

Another facet of the beaver study dealt with an analysis of beaver affidavits which revealed the number of beaver taken and the average number of beaver taken per trapper for each game management unit. The greatest value of such data is realized when comparisons are made

on an annual basis, for trends in the beaver population therefore become evident.

The following table based on data from the Bureau of Sports Fisheries and Wildlife and the Cooperative Wildlife Research Unit depicts the total harvest figures for the past ten years. It will be noted that a declining number of trappers has resulted in an increasing number of beaver taken by each trapper.

TABLE I.

BEAVER HARVEST DATA FOR THE YEARS 1949 THROUGH 1958

Year	No. of Trappers	No. with Limit	Percent with Limit	No. of Beaver	Average No. of Beaver per Trapper
1949	3,202	1,509	47.07	23,812	7.43
1950	2,966	1,499	50.53	22,571	7.60
1951	2,444	1,203	49.22	18,192	7.44
1952	2,119	1,124	53.04	16,313	7.70
1953	1,991	934	46.91	15,359	7.71
1954	1,873	896	47.84	15,192	7.42
1955	1,986	853	48.28	17,455	8.79
1956	1,648	599	36.35	16,259	9.86
1957	1,351	519	38.41	14,344	10.62
1958	1,940	609	30.50	24,506	12.27

PELT PRIMENESS STUDY

For the purpose of setting seasons on fur animals a fairly precise knowledge of the time of the year that the skins of these animals are prime and at a maximum market value is essential. Eventually it will be necessary to have such information on all types of fur animals in all parts of Alaska, but as a first step attention was limited to mink and marten in the Interior region of Alaska.

This investigation required the taking of specimens, prior to, during and after the regular open season and the grading of such pelts according to primeness, pattern, color, sheen, hair length, wear and size.

Mr. Val Blackburn of Lake Minchumina was hired to do the actual collecting while Mr. Libby was responsible for the grading of pelts and the overall conduct of the investigation.

The results thus far indicate that mink in the Minchumina area are fully prime and acceptable in all respects by November 10. The pelts of marten were found to be fully prime by October 20 but were definitely superior peltage, having longer guard hairs and a better sheen after November 1.

These are preliminary results only and more work will be necessary before variations due to weather, age of animals and locality can be confidently established.

PREDATOR INVESTIGATION AND CONTROL

by Calvin J. Lensink

This division is responsible for the investigation and control of predation that appears seriously detrimental to human interests. Harbor seals, sea lions, belugas, gulls, Dolly Varden trout and wolves are the principal

predator species with which the Department of Fish and Game is concerned. The important prey species include salmon, halibut, black cod, herring and Sitka deer.

The general policy of the Department with respect to predation may be found in the 1954 Annual Report, and as below in abbreviated form: "Control of predation by any species will be conducted only subsequent to establishment of the need for the control and the methods employed will be those that are most efficient and at the same time, the least destructive of animal life having natural or other values. Under no circumstances will control be carried to the point where any species is threatened with extinction."

The Department of Fish and Game is pleased to acknowledge the continued co-operation and assistance extended by the Cordova Seal Committee, The U.S. Fish and Wildlife Service, and the numerous commercial fishermen who have replied to our sea lion questionnaires or otherwise rendered valuable aid.

Several changes have occurred in the permanent staff of the division during the past year. James W. Brooks, Senior Biologist, in charge of the division was assigned to the Division of Fur and Game which he now heads. Calvin J. Lensink was employed as Associate Biologist to continue the work on marine predators that had been initiated by Brooks. Harold Z. Hansen, Deputy Seal Hunter in Cordova, resigned when he chose to be a candidate for the First State Legislature. Mr. Hansen deserves most of the credit for the development of techniques and the conduct of the seal control on the Copper Delta. Paul Garceau continued his work on wolves in Southeastern Alaska, and thus, at the end of the year was the oldest employee in terms of experience within the division.

Nine men were employed on a temporary basis. Of these, special mention should be made of Stanley Miller who is our seal hunter in the Stikine district, Charles S. Wells who continued his excellent work in the Copper River seal control program, and Charles F. Wilson who was the mainstay of the beluga investigations in Kvichak Bay.

HARBOR SEAL CONTROL

The control of harbor seals in the gill net fisheries of the Stikine, Taku, and Copper Rivers was continued as a small but important segment of the Division's activities. The take of seals by Department hunters in 1958 and the total take since the start of the seal control program are listed below by locality:

	1958	TOTAL
Stikine River	1058	4,999
Taku	49	914
Copper River	1350	30,250

The number of seals killed in the Stikine River Delta is the record take for this area during one fishing season, and represents an almost dawn-to-dark schedule of hunting inclusive of many weekends by Mr. Stanley Miller of Wrangell. Mr. Miller had killed 998 seals before July 19 when he acquired an infection known as "spekk" finger, or seal finger, which resulted from contamination in a small cut in his hand. This infection became so serious that it was feared for a time that amputation of a hand might become necessary. We are fortunate indeed that such was not the case.

All persons who hunt seals should know that the danger from infections incurred when handling seals or other marine mammals is very real and that such infections may not respond to the usual treatment with antibiotics. Spekk finger is common among Norwegian seal hunters in the North Atlantic area, but has so far been rare in Alaska.

It was believed that Miller's early season work had been so effective that it would not be necessary to employ another hunter for the remainder of the season. By early September, however, depredations by seals became so severe that Charles S. Martin was employed for the duration of the fishing season. This is the second year in which hunting was stopped in midseason in the Stikine area, and in both years it became necessary to resume operations. These results point out two important considerations: First, the seal population that uses the Stikine area as a feeding ground is not seriously reduced by hunting at the present level of intensity — this being indicated by the immediate return of seals to the area when hunting stops, and also by the record number of seals taken in this, the eighth year of hunting. Secondly, seal control on the Stikine may be affected fully as much by the continual harrassment of the rifle fire as it is by the actual death of the seals. Both factors may be an essential phase of the control work.

A minimum of seal control work is required in the Taku area where a brief period of hunting just prior to and during the early part of the fishing season appears to prevent most depredations.

An evaluation of the seal control program in Southeastern Alaska and on the Copper River Flats is revealing in that it shows that depredations by seals can be effectively prevented by localized control programs restricted to the period just prior to and during that in which depredations normally occur. On the other hand, bounty of hair seals which results in the destruction of many more individuals during all seasons, is far more costly and has nowhere resulted in adequate control of damages.

A considerably greater effort has been required to protect the Copper River gill net fishery than for those on the Stikine and Taku Rivers. Shooting and harrassment are impractical in such an extensive area, and recourse to large scale destruction of seals proved necessary. Since 1951, a total of over 30,000 seals have been killed. Although each year the number taken decreases, a continued pressure will have to be exerted upon the seals in this area. Such continued pressure will not only assure protection of the fishery, but will avoid the expensive repetition of the large scale control operation needed in the earlier stages of the program.

WOLF CONTROL AND INVESTIGATIONS

The Department continued its co-operative program with the Fish and Wildlife Service on the control and study of wolves in Southeastern Alaska. Control operations are under the direction of the Fish and Wildlife Service and are confined to areas selected on a priority system which takes into consideration the abundance of deer and the condition of the deer range.

The investigational phase of this program is being conducted by Paul Garceau. Primary emphasis has been on the relationship between deer and wolf populations. There is at present little close association between the populations of the two species — areas of high deer population may have few or many wolves. The Sitka deer is the primary food of wolves in Southeastern Alaska. Deer remains were found in 68 of 83 fecal samples found at a den; beaver remains were found in 12, and mouse remains in 6. Of the 68 samples containing deer remains, at least two-thirds could be identified as those of fawns. Similar percentages were obtained from examination of 15 samples found on trails during the summer. All this seems to indicate that wolves are opportunists, and that in the summer at least, wolves rely on the animals which are easiest to get — the fawns. The importance of the predation on weak animals is conjectural, and we cannot safely extrapolate our summer data to the fall and winter months when the fawns are larger and better able to escape. Evidence from other sources suggests, however, that even in winter wolves may depend to a considerable extent on the weakest animals such as those which may have been injured or those which are poorly nourished because of over-utilization of their range.

SEA LION INVESTIGATIONS

The investigation of sea lions was less extensive this year than previously because of the extensive changes in personnel. Some work on food habits and reproductive biology was continued, and largely confirmed earlier observations. A wide range of food has been found in sea lion stomachs, and the evidence indicates that depredations of sea lions is usually of concern only when they rob long lines or trolling gear of cod, halibut or salmon. Sea lions are also a nuisance around salmon traps and purse sein-ing operations in certain localities.

The Department considers the depredations of sea lions to be a serious problem, and the work on sea lions will be extended as personnel and funds permit.

BELUGA INVESTIGATIONS AND CONTROL

Previous investigations have revealed that Bristol Bay belugas prey heavily on migrating salmon. This predation is considered to have its most harmful effects when it involves the Kvichak River downstream migrating red salmon smolts of year classes that are already extremely small. It is believed that the most serious depredations occur where the salmon are concentrated and confined in the channels of the river, and that the depredations become less severe as the smolts move into the outer portions of the bay.

Because of the nature of the depredations, the Department has attempted to control belugas by driving them from the river. This harassment of belugas has been previously accomplished with a fast outboard driven skiff. During the same operation about 160 belugas have been harpooned to obtain data on food habits, reproduction, and other information of biological interest. During the 1958 smolt migration, most belugas remained almost 40 miles downstream from where they normally could be found at this time.

Because harassment with a skiff is hindered by weather, tides and darkness, other means are being sought to frighten belugas from the river. In one experiment, small charges of dynamite were set off as the belugas moved up the river. These were not so large or so close to the animals as to cause them serious injury, but were adequate to give quite a jar, and we hope a fright that would be remembered. The indications for success from this method are considerable, and further use of explosives will be attempted. Sonic devices are also to be tried.

The only two belugas living in captivity are a by-product of the work in Bristol Bay. In June, two belugas were captured in the Kvichak River for air shipment to the New York Aquarium, but both died enroute. A second attempt was made in August when three belugas were shipped by air to Pacific Ocean Park in California. One of these animals was later shipped to New York where it died after a few days, but the two left at Pacific Ocean Park still survive. A more detailed account of these captives belugas is presented elsewhere in this report. (Division of Game).

PREDATOR CONTROL WITH THE BOUNTY SYSTEM

By Calvin J. Lensink

The first Territorial Legislature established a \$10 bounty on wolves in 1915 as an initial step in the conservation of Alaska's game animals. Since then eight other species of birds, mammals and fish have been on the bounty list: the bald eagle second in 1917, and then hair seals* in 1927, coyote in 1929, Dolly Varden trout in 1933, and wolverine in 1953. Bounties now cost Alaskans over \$125,000 annually, and the total cost of bounties since their establishment is nearly \$3,000,000 apportioned to the various species as follows:

* Includes the harbor seal, ringed seal, ribbon seal, and the bearded seal.

Wolf and Coyote	\$1,530,743
Bald Eagle	164,561
Hair Seals	1,174,084
Dolly Varden Trout	96,344
Wolverine	31,875
TOTAL	\$2,997,607

Two species have been removed from the bounty lists: the Dolly Varden trout in 1941 when it was discovered that many salmon were being bountied as trout, and the bald eagle in 1953 when public sentiment resulted in federal legislation which made killing of eagles unlawful.

Although bounties on predatory animals were initiated as a protection for valuable game animals and fishes, recent justification of bounties has emphasized the "welfare" aspect of bounty payments to natives and other residents of less prosperous localities. A bounty system is thus necessarily judged on both its merit in protection of fish and wildlife, and as a relief measure.

The Cost of Bounties: A glance at the bounty appropriations listed in Tables I, IV and VI for wolves, wolverines, and hair seals will provide a clear picture of the high cost and characteristics of bounty payments. Bounties on wolves and coyotes reached a peak in the late 1930's when over \$80,000 annually was spent in an attempt to reduce their numbers. This peak however was not so much a measure of wolf numbers as it was of trapping intensity, because weasels, mink, fox, lynx, and muskrat were all taken in record numbers during this period. At the onset of World War II, trapping intensity declined and is reflected in the parallel decline in wolves and coyotes bountied. Since the war, the bounties have again gradually increased as a result of aerial hunting, and Alaska's present annual expenditure on wolf and coyote bounties is about \$65,000.

Wolverines have only been on the bounty list since 1953, but already over \$31,000 has been spent on their destruction. The wolverine is not a serious predator of any game animal, but suffers from an exaggerated reputation for destruction of trappers' cabins and equipment. It is doubtful that all of the damage done by wolverines since the purchase of Alaska would equal the amount spent since 1953 to destroy them.

The appropriations for hair seal bounties have risen gradually until at present about \$60,000 is expended annually for their scalps. The only significant exception to this trend of increase came in the biennium of 1949-50 when a \$6 bounty was in effect over the entire coastline. These two years cost Alaskans \$298,000 for seal bounties alone.

There are other aspects to consider in evaluating the cost of bounties. Table V shows the annual harvest of wolverines before and after the initiation of the bounty. The expected increase in the wolverine harvest under the bounty system did not materialize, and we find that there have been consistently fewer wolverines taken than there were previously. The decreased harvest of wolverines can be attributed to the recent lack of trapping caused by low fur prices on other furbearers. The \$15 wolverine bounty does not provide sufficient inducement to trap for this animal alone. The significant point is the fact that we are paying \$10,000 a year for wolverines which would be trapped anyway for the value of their fur.

Contrary to the case for wolverines, there is little doubt that the wolf bounty significantly increases the kill of wolves. However, we know also that many wolves would be taken without the bounty — probably at least half. In this group "taken anyway" we can include nearly all wolves taken by sportsmen and many of those taken by natives and white trappers. To

be specific, about \$35,000 annually is paid for bounties on wolves, coyotes, and wolverines that would be killed if we had no bounty. This does not sound like good economics. The situation is similar when related to hair seals. To get a true picture of the cost of the bounty per animal, it is thus necessary to add the costs incurred as above to the costs for those animals for which the bounty was the primary inducement. Doing so just about doubles the actual cost of each animal killed.

The Efficiency of Bounties as a Means of Predator Control: If the bounty is an effective means of controlling predators, it would appear that the number of animals bountied should gradually decrease. This decrease has not taken place and we seem to have been merely harvesting the annual crop and to have left the breeding population intact. If we could crop our deer or caribou in the same fashion, we would consider it good game management. Harvesting only the annual surplus, however, is not adequate management for predators if protecting big game or fish is necessary.

Other data is available to corroborate this suggested lack of efficiency in the bounty system. The lack of efficiency in wolverine bounties has already been mentioned. Table II shows the bounty claims for wolves on a regional basis. These claims indicate that in areas where the Fish and Wildlife Service has conducted intensive predator control programs the number of wolves is much reduced, and as a consequence the number of bounty claims has diminished. It thus appears that the bounty system alone does not result in any appreciable control on wolf numbers.

Results of the Alaska Department of Fish and Game seal control programs on the Stikine and Copper River Deltas show a striking contrast with the results of the bounty system. Although many seals were killed annually by bounty hunters in these areas, losses to the gill net fishery were extremely high. Since initiation of Departmental control, about 5,000 seals have been killed on the Stikine fishing grounds and about 30,000 on the Copper Delta fishing grounds (Table VII). In both localities, the major portion of damages to fishermen was soon relieved. The reasons for the success of the Department's seal control program as compared to the bounty is that all efforts are concentrated in those areas where damages are being inflicted. Department hunters can stay at work on these problem areas at seasons when most shot seals sink and cannot be retrieved, or when seals get wild and difficult to shoot instead of moving on as a bounty hunter must do.

The characteristics of the seal control operations on the Stikine and Copper Flats are quite different. On the Stikine Flats, a single hunter equipped with a high velocity rifle manages by continual harassment of seals on the fishing grounds to keep damages to a minimum despite the fact the over-all seal population in the region has probably not declined greatly. This year, the eighth of the operation, a record number of 1,058 seals were killed at a cost of only two-thirds that of the same number killed for bounty. The difference is even greater in results. On the Copper Flats, however, control operations are spread over a large fishing area, and they seem to have resulted in a significant decrease in the population (Table VI) so that early intensive control efforts have been much reduced. Thus, both reduction of the seal population and harassment of seals during the fishing season have contributed to the reduction of damages. The short-term cost of each seal taken on the Copper Flats under the operation may exceed that of the bounty cost per seal, but since the population is being constantly reduced, the cost diminishes whereas the record for the bounty system is that costs remain constant or even tend to increase. Again, the greatest difference is in results.

It seems evident in the above examples that the bounty system is not providing adequate protection from depredations by either wolves or seals, and that planned programs can do the job with smaller expenditures. Control of wolverines is unnecessary because damages by wolverines are specific to individual animals, and the trapper at the scene is best equipped to prevent them.

The Efficiency of Bounties as a Means of Distributing Welfare: Evidence pertaining to the efficiency of bounty payments as a means of welfare can be obtained from bounty claims and from reports submitted by the certifying officers.

Table III shows the distribution of bounty payments for coyotes, wolves, and wolverines among different types of hunters for the period from September, 1954, to April, 1956. During this time, \$94,945 was paid in bounties for these animals. Less than 30% of these payments can in any way be considered to have contributed to welfare — this only by including all native hunters. The top 10 wolf hunters, all of whom used airplanes (certainly not a sign of destitution) received \$25,675, or more than 40% of all wolf bounties paid. The second and third most successful of these hunters were non-residents from Minnesota who collected \$5,500.

The case of the hair seal bounty as a means of distributing welfare payments is perhaps slightly better than that for wolves, notably in the northern area and in portions of Southeastern Alaska. As in the case for wolves, however, the largest payments go to professional hunters least in need of welfare. One hunter has even helped finance his vacation to Mexico with payments he received for seal scalps. During the period between May, 1956, and January, 1957, a total of \$25,836 was paid in seal bounties to 307 hunters. The top 10 hunters received \$10,934 or 42 per cent of all bounties paid. On the other hand, 73 hunters received only \$15, or less, and 130 hunters \$30 or less for bounties. Considering the same information on the basis of villages, we find that 5 villages received 60 per cent of bounty payments (\$15,108) and all the rest (50 villages) only 40 per cent.

Other Implications of Predator Control with the Bounty System: The policy of the Alaska Department of Fish and Game on the control of predation is stated earlier in this report.

It should be noted that this policy does not emphasize the control of predators but **THE CONTROL OF PREDATION WHICH IS GENUINELY DETRIMENTAL TO MAN'S INTEREST**. This implies that the predators which are commonly subject to control are not always harmful. In fact, they are frequently of value for their fur, meat, or for their influence on the numbers of other animals. In spite of all that has been written about the role of predators, far too little is known about the exact role they play — just what damage they do, under what situations they are destructive, what harm might result from indiscriminate control, etc. We can read many statements, for instance, that predators take weak and unfit prey animals. To a certain extent we know that this concept is true and that it may be important in maintaining vigorous stocks of game, but at the same time we also can show that many prime animals or fish may be taken. Also, an animal that is not prime only because of old age may be genetically of the best stock. The situation is complicated and need not be discussed further. Examples of equally important problems that we know more about are available.

Hair seals are known to be definitely harmful in such areas as the Stikine, Taku and Copper River areas where their depredations on salmon already caught in gill nets have in the past caused serious losses to the fishery. This loss has been variously estimated at from 2 to 10 per cent of the fish caught or even more. If even the lowest estimate is considered as the loss and balanced against the costs and results of the Department's control work in these areas, we can see that this control can be justified. Elsewhere there is question as to the value of control. One hundred sixty-nine seal stomachs containing food were examined by Department of Fish and Game and Fish and Wildlife Service biologists who found that salmon were contained in 10 per cent of them. However, salmon were found only in the stomachs of seals taken on the Copper, Taku and Stikine rivers during salmon runs, but they have not been

found in seal stomachs at other seasons or in other localities. Apparently the abundance of salmon during the runs, their confinement to narrow channels or shallow water, and perhaps the turbid water of these rivers may give the seal an advantage it otherwise does not have.

In areas other than specified above, seals may actually be a benefit to the salmon fishery. For instance, we know that the tom cod and some other fishes commonly found near the mouth of streams take large numbers of small salmon when they enter salt water. Seals prey on these fish and may be of benefit to salmon here. The bounty, however, does not distinguish between these seals and those preying on salmon. In fact, most seals bountied in the northern waters are ringed and bearded seals which do not prey extensively on fish of any kind.

A similar situation exists for wolves. There is little doubt that in certain situations predation by wolves should be controlled. However, in other situations deer and other big game are their own worst enemy by becoming so abundant that they destroy their food supply and consequently starve. Such losses in bad winters may run to several thousands of animals. In such a situation, control of wolves is not warranted and, in fact, may be quite detrimental to the ultimate welfare of deer, caribou, or other game, and as a consequence results in future losses to the hunter.

The value of the predator for itself should also be considered. We have pointed out previously that control of wolverines cannot be justified. The fur of wolverines is a specialty product and is the best of all furs for parka trim. A single raw pelt may bring as much as \$30 to \$35, and when tanned and cut into strips its value is even higher. The destruction of wolverines at any time when the fur is unprime, or by methods by which they cannot be salvaged such as may occur in aerial hunting results in a net loss to the trapper and the State.

Wolves and hair seals also have value in themselves and should not be destroyed where it is unnecessary. Aerial hunters in northern Alaska average about \$25 for each pelt that they salvage. Other trappers have sold wolf pelts to tourists at a much higher average price, and pelts from some wolves cut for parka trim may reach a value of \$90. The marketing of hair seal skins is expanding, and both Alaskan and non-Alaskan fur manufacturers are interested in obtaining more pelts. Last year at least 4,000 pelts were processed in Alaska alone. In the northern area, seals are an important source of food for both humans and dogs.

The Experience of Other States: Every one of the other 48 states has tried the bounty system, so it is logical to examine the opinions developed through long experience. The directors of 37 state Fish and Game Departments that answered a questionnaire sent by the Oregon Department stated that bounties were ineffective and costly and believed that they should be abandoned. Seventeen states have done away with the bounty system. W. O. Nagel of the Missouri Conservation Department says: "Actually, any kind of bird or mammal may be destructive when it becomes overabundant or out of place, and the vegetation-eaters are most destructive of all. The very creature maligned as "predators" are actually our lowest-cost insurance against this kind of destruction. Only when they turn to destroying property themselves is it good business to cancel this insurance — and then only the destructive individual itself. Anything else will not profit us, and most often can do us only harm." Arthur W. Adams of the North Dakota Conservation Department has a similar opinion: "It is quite apparent that bounty money is paid out to a diversified group. It is also plain to see that the big majority of animals bountied would be taken if no bounty were being paid. From a game management standpoint, it is immaterial who collects the bounty as we sincerely believe that the bounty is totally ineffective in controlling predatory animal numbers." The Montana Game Department says that: "Bounties are considered unsatisfactory." From Oregon we hear that: "Most bounties in Oregon are paid to hunters who kill predators incidental to other hunting and 53 per cent bounty only one animal. It is seldom that the bounty increases the predator take by more than 30 per cent, thus making the removal of additional animals cost more than 3 times the

amount of the actual bounty paid. There is no selectivity in the bounty system, with predators living on destructive rodents bringing the same reward as those feeding on livestock and game. The State Game Commission favors the repeal of bounties." Jim Kimball, Director of the Minnesota Division of Fish and Game says that: "After studying wildlife populations for twenty years and analyzing studies made throughout the country, I'm convinced, as are other professional wildlife conservationists, that bounties are an expensive way of not controlling predators." In Wisconsin, the bounty on wolves has just been repealed; and with a complete turnabout, the wolf has been placed on the list of protected animals! We do not suggest this drastic step for Alaska, but would subscribe to changes which would permit the management of wolves or other predators so that their prey would be most benefited.

Summary: In summarizing the evidence that we have on the bounty system, we find that, at its best, it is ineffective and wasteful in that it does not provide satisfactory control of predation where it is needed, the distribution of payments is such that most do not go to those persons or communities which are most in need, and that the bulk of payments are for animals taken in areas where control is not essential. At its worst, we can add to the above the fact that animals which may have value in themselves are wastefully destroyed, and that in certain situations the destruction of predators may be harmful to the very animals that we are trying to protect.

Predator control is a necessary and valuable tool of wildlife and fisheries management. To be most useful, this tool should be applied at the right place, at the right time, and in the most efficient way possible. All of these requirements can be met by a carefully designed program, but none of them is achieved with the bounty system.



Biologist and aide examining mouth of beluga, Bristol Bay.

**TABLE I.
BOUNTY APPROPRIATIONS AND CLAIMS FOR WOLVES AND COYOTES, 1915 - 1958.**

BIENNIUM	BOUNTY WOLF	RATE COYOTE	Regular Ap- propriation	Deficiency Ap- propriation	Total Ap- propriation	NO. WOLVES BOUNTIED	NO. COYOTES BOUNTIED
1. 1915-16	\$10	none	\$ 20,000	\$	\$ 20,000		
1917-18	15		10,000		10,000		
1919-20	"		7,500		7,500		
1921-22	"		5,000	2,000	7,000	467	
1923-24	"		8,000	2,500	10,500	700	
1925-26	"		12,000	10,000	22,000	1467	
1927-28	"		30,000	12,000	42,000	2800	
2. 1929-30	10	\$ 5	25,000		25,000		
1931-32	15	15	40,000		40,000		
1933-34	"	"	25,000	4,000	29,000		
1935-36	20	20	40,000	45,000	85,000		
1937-38	"	"	80,000	85,000	165,000		
1939-40	"	"	165,000		165,000		
1941-42	"	17.50	165,000		165,000		
1943-44	"	"	75,000		75,000		
1945-46	30	25	60,000	60,000	120,000	1906	1733
1947-48	30	"	60,000	1,213	61,213	2356	2342
3. 1949-50	50	30	125,000	15,345	140,345	1229	765
1951-52	"	"	100,000	1,185	101,185	1360	844
1953-54	"	"	75,000	12,500	87,500	1239	738
1955-56	"	"	75,000	22,500	97,500	1531	922
1957-58	"	"	77,288	55,000	132,288		
TOTALS			\$1,202,500	\$327,243	\$1,530,743		

1. Chap. 3, SLA 1915. Bounty on wolves established.

2. Chap. 117, SLA 1929. Bounty on coyotes established.

3. Chap. 18, SLA 1949. Present bounty law for wolves and coyotes.

TABLE II.

**DISTRIBUTION OF BOUNTY PAYMENTS FOR WOLVES IN ALASKA
BY REGIONS FOR 1947 AND 1956**

REGION	Number of Wolves Bountied	
	1947	1956
Regions which include areas where the Fish and Wildlife Service has conducted intensive control measures since 1949.		
Southeastern Alaska	214	147
Alaska Peninsula	79	24
Central Alaska (Includes the Nelchina area)	190	110
Sub-total	483	281
Regions where intensive control measures have been conducted.		
Northwestern Alaska	47	490
North Central and Northeastern Alaska	143	330
Sub-total	190	820
TOTAL *	673	1101

* Total includes only those wolves that could have been assigned to one of the above regions. The total number of wolves taken in F.Y. 1947 was 793 and in C.Y. 1956 was 1226.

TABLE III.

DISTRIBUTION OF BOUNTY CLAIMS AMONG HUNTERS AND TRAPPERS DURING THE PERIOD SEPTEMBER, 1954, TO APRIL, 1956, FOR WOLVES, COYOTES, AND WOLVERINES.

Type of Hunter or Trapper	Bounties	
	Number	Percent
Natives	669	25
Sportsmen	812	31
White Professional Bounty Hunters *	994	38
Non-Residents	158	6
TOTALS **	2663	100

* The eight top professional hunters and two non-resident bounty hunters claimed \$25,675 for bounties on wolves or more than 40 percent of the total bounty aid for wolves.

** Total includes bounties on 1226 wolves, 836 coyotes, and 571 wolverines, for a total expenditure of \$94,945.

TABLE IV.

BOUNTY APPROPRIATIONS FOR WOLVERINES, 1953 - 1958.

Biennium	Rate	Regular Appropriation	Deficiency Ap- propriation	Total Appropriation
1953-54 *	\$15	\$ 5,000	\$ 3,500	\$ 8,500
1955-56	"	5,000	3,500	8,500
1957-58	"	6,875	7,500	14,375
TOTAL		\$16,875	\$14,500	\$31,375

* Chapter 61, Section 1, SLA 1953. Bounty declared and rate set at \$15.

TABLE V.

**ANNUAL NUMBER OF WOLVERINES HARVESTED BEFORE AND AFTER
THE ESTABLISHMENT OF A BOUNTY.**

	Fiscal Year	Wolverines Killed
Pre-bounty period	1947	527
	1948	488
	1949	490
	1950	500
	1951	350
	1952	400
	Average	459
Bounty period	1953	360
	1954	300
	1955	350
	1956	200
	Average	303

TABLE VI.
BOUNTY APPROPRIATIONS AND ESTIMATED NUMBER OF CLAIMS
FOR HAIR SEALS, 1927 - 1958

Biennium	Bounty Rate	Regular Appropriation	Deficiency Appropriation	Total Appropriation	Estimated No Seals Bountied (5)
1927-28 (1)	\$2	\$ 20,000		\$ 20,000	7,500
1929-30	"	15,000	\$ 3,000	18,000	9,000
1931-32	"	17,500	10,000	27,500	13,750
1933-34	"	25,000	7,500	32,500	16,250
1935-36 (2)	"	25,000	10,000	35,000	17,500
1937-38	"	40,000		40,000	20,000
1939-40	\$3	60,000	20,000	80,000	26,666
1941-42	"	80,000		80,000	20,000
1943-44	"	60,000		60,000	16,666
1945-46	"	50,000		50,000	16,666
1947-48	"	50,000	969	50,969	16,989
1949-50 (3)	\$6	100,000	198,000	298,000	49,666
1951-52 (4)	\$3	100,000	18,000	118,000	39,333
1953-54	"	60,000	12,500	72,500	24,166
1955-56	"	60,000	12,500	72,500	24,166
1957-58	"	74,115	45,000	118,115	39,705
32 years		\$ 836,615	\$ 337,469	\$ 1,174,074	358,023

(1) SLA 1927, Chap. 48, established bounty on "every hair seal inhabiting the island waters and all waters adjacent to the southern coast of Alaska and east of the 152nd meridian."

(2) SLA 1935, Chap. 62. Area considered the same as above with the addition of the "waters of Bering Sea and of Golovin Bay lying within a line drawn from the tip of Rocky Point to the tip of Cape Darby."

(3) SLA 1949, Chap. 16. Bounty extended from Dixon entrance to Demarkation Point.

(4) SLA 1951, Chap. 122. Bounty area reduced to that East of 152nd meridian, Bristol Bay and within 3 miles of mainland from Stebbins to Cape Kruzenstern.

(5) Estimates based on appropriations except that in cases where the regular appropriation was not entirely used the following appropriation, if smaller, was used as basis for estimate.

TABLE VII.
SEALS KILLED BY DEPARTMENT OF FISH AND GAME HUNTERS
IN THE STIKINE AND COPPER RIVER DELTAS, 1951 TO 1958.

YEAR	SEALS KILLED	
	Stikine Delta	Copper Delta
1951	946	500
1952	768	6,800
1953	552	6,800
1954	491	4,900
1955	362	3,350
1956	426	2,100
1957	396	4,450
1958	1,058	1,350
TOTAL	5,000	30,250



Sea lion pups in rookery off south coast of Montague Island, Alaska.