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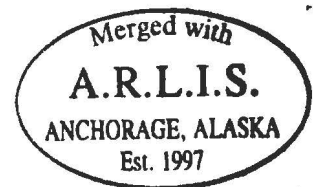
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MARINE MAMMAL REPORT



by

John Vania  
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Volume VII  
Annual Project Segment Report  
Federal Aid in Wildlife Restoration  
Project W-6-R-6, Work Plan G-b and W-14-R-1, Work Plan G

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WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

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STATE: Alaska

PROJECTS: W-6-R-6 TITLE: Alaska Wildlife Investigations  
AND: W-14-R-1 TITLE: Marine Mammal Investigations

WORK PLANS: G-b(W-6-R-6) TITLE: Sea Lions, Sea Otters, Hair  
AND: G(W-15-R-1) Seals, and Beluga Whales

JOBS: 2(W-6-R-6)  
AND: 1(W-15-R-1) TITLE: Sea Lions

PERIOD COVERED: January 1, 1965 to December 31, 1965

ABSTRACT

Observation made on Sugarloaf Island during the breeding season indicate that Steller sea lions breed annually. Pregnant females were observed with nursing yearlings and females which had recently given birth were observed copulating. A female with two fetuses was collected. Six rookeries; Sugarloaf Island, Marmot Island, Atkins Island, Jude Island, Round Island and Akutan were visited in June and classified as pupping rookeries. Tagging of pups was discontinued in 1965 because of apparent tag loss. Fifteen adult sea lions were tagged by first immobilizing the animals with the drug Succinylcholine Chloride administered with automatic projectile syringes fired from a shot shell gun. Seven other animals died as a result of an overdose of the drug. Sea lion pups were harvested on six islands and a total of 5,693 animals were taken.

RECOMMENDATIONS

No recommendations relating to management can be made at this time.

WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

|             |                     |        |                                       |
|-------------|---------------------|--------|---------------------------------------|
| STATE:      | <u>Alaska</u>       |        |                                       |
| PROJECTS:   | <u>W-6-R-6</u>      | TITLE: | <u>Alaska Wildlife Investigations</u> |
| AND:        | <u>W-14-R-1</u>     | TITLE: | <u>Marine Mammal Investigations</u>   |
| WORK PLANS: | <u>G-b(W-6-R-6)</u> | TITLE: | <u>Sea Lions, Sea Otters, Hair</u>    |
| AND:        | <u>G(W-15-R-1)</u>  |        | <u>Seals, and Beluga Whales</u>       |
| JOB:        | <u>2(W-6-R-6)</u>   |        |                                       |
|             | <u>1(W-15-R-1)</u>  | TITLE: | <u>Sea Lions</u>                      |

PERIOD COVERED: January 1, 1965 to December 31, 1965

OBJECTIVES

1. To determine factors relating to the breeding biology and productivity of sea lions.
2. To classify rookery and hauling out grounds in accordance with the types of animals frequenting them.
3. To obtain data on the movements of sea lions.
4. To monitor all commercial operations engaged in the harvesting of sea lion pups.

TECHNIQUES

Field observations were made on Sugarloaf Island from May 29 to June 18 to gain some insight concerning the frequency of breeding of Steller sea lions. Observations were made from an elevated location approximately 50 yards from a group of 225 adult sea lions. Selective collecting was employed in a few instances and reproductive tracts and lower jaws were preserved for further analysis.

In conjunction with monitoring harvest operations during June, various rookeries were surveyed on the ground and classified in accordance with the type of animals present.

During the breeding seasons in 1964 and 1965 the feasibility of marking adults was investigated. The large size and pugnacious nature of the animals made it necessary that they be immobilized with a drug before they were marked. This was accomplished by injecting the drug Succinylcholine Chloride (Succostrin) via automatic projectile syringes. A shot shell powered Cap-Chur gun was used to propel the syringe.

The animals were marked by using a cattle ear tag (Style M 19 of National Band and Tag Company, Newport, Kentucky) made of .036 monel metal with dimensions before folding of 3/8 X 6 1/2 inches. Tags were applied to the rear margins of both front flippers where furred skin ends and bare skin begins.

All sea lion pup harvesting operations were monitored by Department personnel. Personnel were stationed on two of the islands where harvesting took place and a biologist accompanied a vessel which harvested on four other islands.

## FINDINGS

### Reproduction

Based mainly on observations made on Lewis Island, Brooks (1957) concluded that biennial breeding is characteristic of Steller sea lions. Many cows with nursing yearlings had been observed during the breeding season. Thorsteinson and Lensink (1962) made similar observation on Marmot Island in 1959. Pike and Maxwell (1958) however, indicate many sea lions in British Columbia breed annually and the pregnancy rate is in excess of 70 per cent. Our observations made on Sugarloaf Island in 1964 and 1965 during the breeding season support Pike and Maxwell's conclusions.

The breeding season in Alaska is from May to July. During this period sea lions will abandon many of their winter hauling grounds and concentrate on rookeries. In areas where pups are born and mating occurs, adult bulls establish territories which are strongly defended against any male intruders. Females, which

are gregarious by nature, move into these territories and form loose assemblages which resemble harems. The cows, however, are not restricted in their movements by the bulls and come and go freely. Only after the female has given birth to her pup does she exhibit any attachment to a particular piece of ground, and then only because the pup is there.

During the period May 30-June 16, 32 hours were spent observing a segment of the population on the island. A steep hillside provided a convenient and clear view of all the animals on the study area. The most distant sea lions were less than 80 yards from the observer. Frequent censusing of the area indicated that 140 cows and 19 bulls were on the area on May 30. The number increased to 226 cows and 22 bulls by June 10 and stabilized at that level through June 16 when the study was terminated. A pup census of the area on June 11 showed that a minimum of 200 pups were present.

Several observations were made that support the idea that many sea lions breed annually in Alaska. On three occasions females who had just been bred were kept under continuous observation for a short period. After moving about the study area for five to twenty minutes, all returned to pups and began to nurse them. Since the gestation period of sea lions is less than a year, these animals were obviously breeding annually. Four other females were followed until each laid near a pup, but the pups were never observed nursing so we could not definitely establish if the pups belonged to those females.

We collected two females accompanied by yearlings. The yearlings had been observed nursing, which fairly well established the fact that they belonged to those particular females. A postmortem examination of the females revealed that both were pregnant and carrying full term fetuses. They had obviously bred two years in succession.

An interesting note is that one of the females had two fetuses. Twinning is rather rare in marine mammals and has not been previously recorded for Steller sea lions.

A final observation made relating to annual breeding of sea lions is the frequency of copulating animals that was observed. Practically all the females on the island appeared to have pups, yet during 32 hours of observation made at various hours of the day 31 females were observed being bred. It is very unlikely that all these females were coming from other islands and were without pups.

Why there might be a difference in the pregnancy rate between various rookeries in Alaska is not yet understood. Further investigations and selective collections planned for 1966 should shed some light on this interesting phase of sea lion reproduction.

### Rookery Classification

Past experience has shown that during the breeding season rookeries differ with respect to population composition. A tentative classification system has been set up using the following categories:

- Pupping rookeries
- Rearing rookeries
- Batchelor hauling grounds

Pupping rookeries are those areas on which most or all of the females present have pups; rearing rookeries are inhabited by females with yearlings; batchelor hauling grounds are areas on which non-breeding bulls congregate.

Six rookeries were visited in June while monitoring sea lion harvest activities and were classified as pupping rookeries. They are Sugarloaf Island, Marmot Island, Atkins Island, Jude Island, Round Island and Akutan Island.

It is interesting to note that Thorsteinson and Lensink (1962) after visiting Marmot Island in June 1959 did not consider it a pupping rookery. Although a few pups were present, many of the females had yearlings and under the proposed system of classification the island would more nearly fall into the category of a rearing rookery.

The reason for the apparent change in the population composition from 1959 to 1965 is not definitely known. A possible explanation is that females which normally pup on Sugarloaf Island are moving over to Marmot Island to pup. Since 1963 there has been a decline in the population on Sugarloaf Island and an increase in the Marmot Island population. Tagging experiments planned for Sugarloaf Island may help to answer this question.

## Movements

Tagging of pups was discontinued on Sugarloaf in 1965. In 1963 and 1964, 799 and 900 pups were tagged with cattle ear tags made of .036 inch monel metal with dimensions before folding 3/8 X 6 1/2 inches. Tags were attached to the rear margin of the front flippers where furred skin ends and bare skin begins. Observations made several weeks after tagging in 1964 indicated that many of the tags were pulling out. Tags were found on the tagging grounds; many pups were observed with holes in their flippers where the tag should have been, and on pups where the tag was still attached, the hole in the flipper was greatly enlarged. It appears that the tag is too large and the place of attachment not tough enough to hold the tag. A smaller cattle ear tag of the same design would not be suitable since it would not allow sufficient room for growth.

Tagging experiments utilizing nylon tags (Jumbo Rototag, manufactured by Dalton Company, Henley, England) will be conducted in 1966 to test their effectiveness. A cold branding technique might also be tried.

## Adult Tagging

In 1964, four adult females and five adult males were marked with cattle ear tags in the front flippers. In 1965, six adult females were marked in a similar manner. Tagging was accomplished by first immobilizing the animals with the drug Succinylcholine Chloride (Sucostrin). The drug was administered with automatic projectile syringes fired from a shot-shell gun.

Reaction to the drug varied greatly from one animal to the next. In seven instances the animal died from an overdose of the drug. Death was attributed to hypoxia resulting from respiratory arrest.

Sea lions successfully immobilized fell to the ground approximately 18 minutes after injection. The last voluntary response to be lost was movement of the head and neck. The eyes continued to move throughout the period of immobilization which lasted from 10 to 20 minutes. Recovery from the effects of the drug was slow and was first evident by movement of the head.

Most of the mortalities which occurred took place during the initial experiments. Inexperience with handling the drug and a lack of information on the size of dosages probably accounted for most of the deaths.

Two bulls tagged in 1964 were present on the rookery in 1965. They were occupying the same territories as in the previous year. The monel tags were still attached to the front flippers and showed little sign of wear. No tagged females from the 1964 experiment were observed.

Experiments with immobilizing drugs and tagging of adult animals are again planned for 1966.

### Harvest

Four different parties totaling 15 men harvested sea lion pups on Sugarloaf Island. Three of the parties had camps on the island and the fourth party operated from a vessel. Harvest operations started on May 28th and ended on June 15th when the island was closed by emergency regulation. During this period 2005 pups were harvested. The harvest represents approximately 50% of the pup production on the island.

A refuge area had been established on the island wherein harvesting was not allowed for several weeks. The area was later opened on June 11 when it became obvious that the level of harvest desired could not be obtained in the area opened to hunting.

The constant harrassment of the adult sea lions in the area opened to hunting cause large numbers of females to move to the closed area to pup. On one section of beach where 400 pups were counted in 1964, there were a minimum of 1000 pups in 1965. The area had been closed to harvesting both years.

The harvest on Sugarloaf Island in 1964 amounted to 1500 pups.

Two men harvested 1024 sea lion pups on Marmot Island during the period July 5 - July 25. The harvest represents a take of approximately 25% of the pup production for the island. No harvesting had been done on the island in 1964.

The pups taken on Marmot Island were considerably larger than those harvested earlier on Sugarloaf Island and the general pelt condition was not as good. Many had scars and large patches of hair missing. Indications are that the fur industry will not in the future accept skins which have been taken after July 1.

A 78 foot vessel with a crew of four plus four hunters harvested 2564 pups along the Alaska Peninsula. Of the total 259 were taken from Atkins Island, 72 from Jude Island, 574 from Round Island, and 1659 from Akutan Island. Harvesting started on June 11 on Atkins Island and ended on July 1 on Akutan Island.

#### REFERENCES CITED

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- Thorsteinson, F. V. and C. J. Lensink. 1962. Biological Observations of Steller Sea Lions Taken During an Experimental Harvest. Journal of Wildlife Management 24 (4): 353 - 359.

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Federal Aid Coordinator

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WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECTS: W-6-R-6 TITLE: Alaska Wildlife Investigations  
AND: W-14-R-1 TITLE: Marine Mammal Investigations

WORK PLANS: G-b(W-6-R-6) TITLE: Sea Lions, Sea Otters, Hair  
AND: G(W-15-R-1) Seals, and Beluga Whales

JOB: 3(W-6-R-6)  
AND: 2(W-14-R-1) TITLE: Sea Otter

PERIOD COVERED: January 1, 1965 to December 31, 1965

ABSTRACT

A preliminary investigation of the molt of sea otters was made by inspecting 155 pelage samples collected at various times of the year. All exhibited follicular activity which suggests that sea otters molt continuously throughout the year. Sea otters were captured in gillnets at Port Etches in Prince William Sound. The animals were held in a floating enclosure and fed live Dungeness crab until sufficient numbers were available for transport. An amphibious aircraft was used to transport them to the Klag Bay area in Southeastern Alaska. Prior to being placed in shipping cages, all animals were injected with a tranquilizer. Sixteen female and seven male otters of 41 captured were subsequently released. Observations shortly after release indicated that most or all of the animals were surviving at their new location.

RECOMMENDATIONS

A transplant of 25 to 30 sea otters should again be made to the Klag Bay area in Southeastern Alaska.

WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECTS: W-6-R-6 TITLE: Alaska Wildlife Investigations  
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JOBS: 3(W-6-R-6)  
AND: 2(W-14-R-1) TITLE: Sea Otter

PERIOD COVERED: January 1, 1965 to December 31, 1965

OBJECTIVES

1. To determine population abundance, distribution and trends of sea otter in the coastal area from Prince William Sound to the Shumagin Islands.
2. To obtain information relating to the molt, breeding biology and food habits of the sea otter in selected parts of its range.
3. To investigate and develop techniques for capturing, holding and transporting live sea otters.

TECHNIQUES

Molt Investigations

A preliminary investigation of the molt of sea otters was made by inspecting 155 pelage specimens collected from animals taken at Amchitka Island during March, April, July and August, 1963. From each sea otter a strip of skin about 2 cm was cut from the ventral side in the region of the tail. The samples were washed and placed in a 10 per cent neutral buffered formalin solution. Later the samples were removed from formalin, fleshed,

and dried at room temperature under light pressure. Thin slices paralleled to the lay of the roots were cut from the sample. A typical slice is about 1 mm thick and 10 mm wide. Examination of the slices was made under a low power microscope. Isopropanol or cedarwood oil was used as a medium for mounting the slides.

### Sea Otter Transplant

The investigation of methods for live capturing and holding sea otters in Prince William Sound was continued in 1965 and in March a suitable technique for catching the animals was developed. An experimental transplant was made in August when 23 sea otters were moved from Prince William Sound to Southeastern Alaska.

Sea otters (Enhydra lutris) were once abundant in the coastal areas of the north Pacific Ocean from southern California to the Aleutian Islands of Alaska and from Kamchatha to the northern islands of Japan. Starting with Vitus Bering's expedition in 1741 and continuing for the next 170 years, the animals were hunted and almost completely exterminated throughout most of their range. In 1911 small surviving groups were given protection under a treaty whose main purpose was to protect the fur seals of the north Pacific Ocean. Since that time sea otters have slowly repopulated much of their former range and now number more than 30 thousand animals in Alaska.

One of the few areas in Alaska where sea otters have not become re-established is the Alexander Archipelago in the southeast portion of the state. Apparently the distance between this area and Prince William Sound (Figure 1), which has the nearest sea otter population, is too great to permit frequent straying and natural repopulation. As a result, a transplant of sea otters by aircraft to this area appeared to be the only feasible method of re-establishing a population.

### Method of Capture

Sea otters were captured in Constantine Harbor and Port Etches, Prince William Sound, with specially constructed nylon gillnets. Five nets were used, each 50 fathoms long, 20 meshes deep with each mesh measuring nine inches stretched. The webbing was constructed of #123 green double knot multifilament nylon and

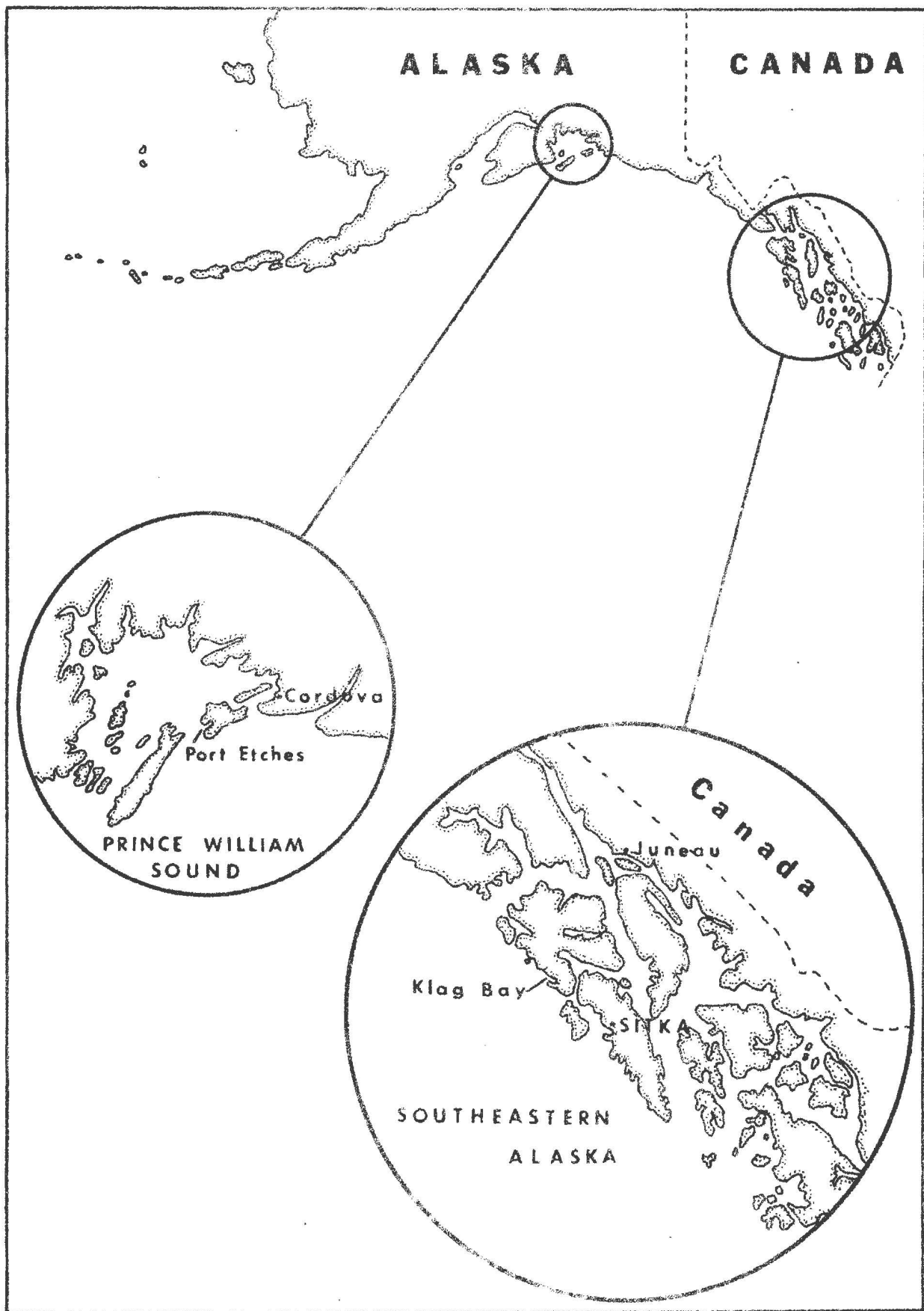


Figure 1. Capture site and release site.

was hung three meshes to each nine inch hanging. Sponge plastic gillnet floats were spaced 36 inches apart along the float line. A half inch braided nylon line was substituted for the lead line.

Otters were captured when they attempted to swim through one of the meshes in the net. Unable to swim completely through the hole (the opening was just large enough to allow the head of an adult otter to pass through) the animal would roll and turn, becoming completely entangled in the net. Because the net lacked a lead line, captured otters were able to swim and float on the surface of the water.

Tidal currents greatly influenced the manner in which the nets were set. In Constantine Harbor where the current was not strong, four nets were tied together and set in a straight line at right angles to the beach. The shore end of the net was anchored above the high tide mark. The offshore end was held in place by an anchor on a line attached to the float line. The web and the rope line at the bottom of the net hung free.

When the nets were used in Port Etches, they were set separately and in offshore kelp beds which were frequented by otter. Only one end of the net was attached to an anchor. The remaining end was free to drift with the tidal currents.

The nets were checked for sea otters at frequent intervals throughout the daylight hours. Two to five hours each day were spent cleaning the nets of debris and dead fish.

When an otter was seen to be entangled in the net, a boat with two men was dispatched to extricate the animal. Before it was cut free it was first given an injection of tranquilizer (Tranvet) and tagged. The dosage varied with the size of the otter. Small animals which were estimated to weigh less than 40 pounds were injected with 5 mg. of the tranquilizer. Average size animals estimated to weigh 40 to 60 pounds were given 10 mg. and larger animals were given 15 mg. The animal began to show signs of being affected by the drug within three to five minutes after being injected.

Approximately ten minutes after the drug was administered the otter and that part of the net in which it was entangled were lifted aboard the boat and set in a pen 20" x 40" x 20" high. While one man restricted the movement of the animal the other cut a number of meshes near the animal's tail. The net was then worked forward freeing the animal within the pen.

## Holding

Held in the pen, the otter was transported a short distance to a bay where a floating enclosure was anchored offshore. Here the otter was sexed and weighed, then released in the enclosure to be held until six to ten animals were captured.

The enclosure (Figure 2) was constructed in eight sections to facilitate handling. Two sections were 18' 2" long; four were 10' long; and two were 8' long. All sections measured 28" wide and were 18" deep. These sections were secured by 1/2" by 4" galvanized bolts. When assembled, the pen had an inside diameter of 19' by 14' and an outside diameter of 24' 8" by 18' 2".

Floatation was provided by styrofoam logs 10" deep by 20" wide. The entire outer rim of the pen was decked with 2" by 6" planks to form a catwalk and provide space for the otters to haul out. The enclosure was braced with 2" by 2" members and between the styrofoam logs.

To form an enclosed pool a 2" stretched mesh nylon net was suspended from the inside of the catwalk. The net was cut and sewn to form a pool approximately 4' deep, 19' long and 14' wide. Twelve two-by-fours held the net in place.

A 1" mesh chicken wire fence surrounded the outside edge of the enclosure and a gate with double latches provided entrance.

The enclosure was held offshore by anchors attached to all four corners. The anchors were made from wire baskets filled with rocks and tied to the enclosure with half-inch manila ropes. This type of anchoring prevented the pen from turning and reduced the amount of drift.

Tied to the enclosure was a live box which held up to 500 Dungeness crab. The otter were generally fed live crab four times daily with each otter receiving an average of three crabs per meal. The average weight of the crabs was approximately three pounds. Crabs were not always immediately available and occasionally the number of crabs fed daily was reduced. Clams dug from a nearby beach were occasionally fed to the animals. Although fed almost exclusively on Dungeness crab, the otters exhibited no apparent loss of appetite.

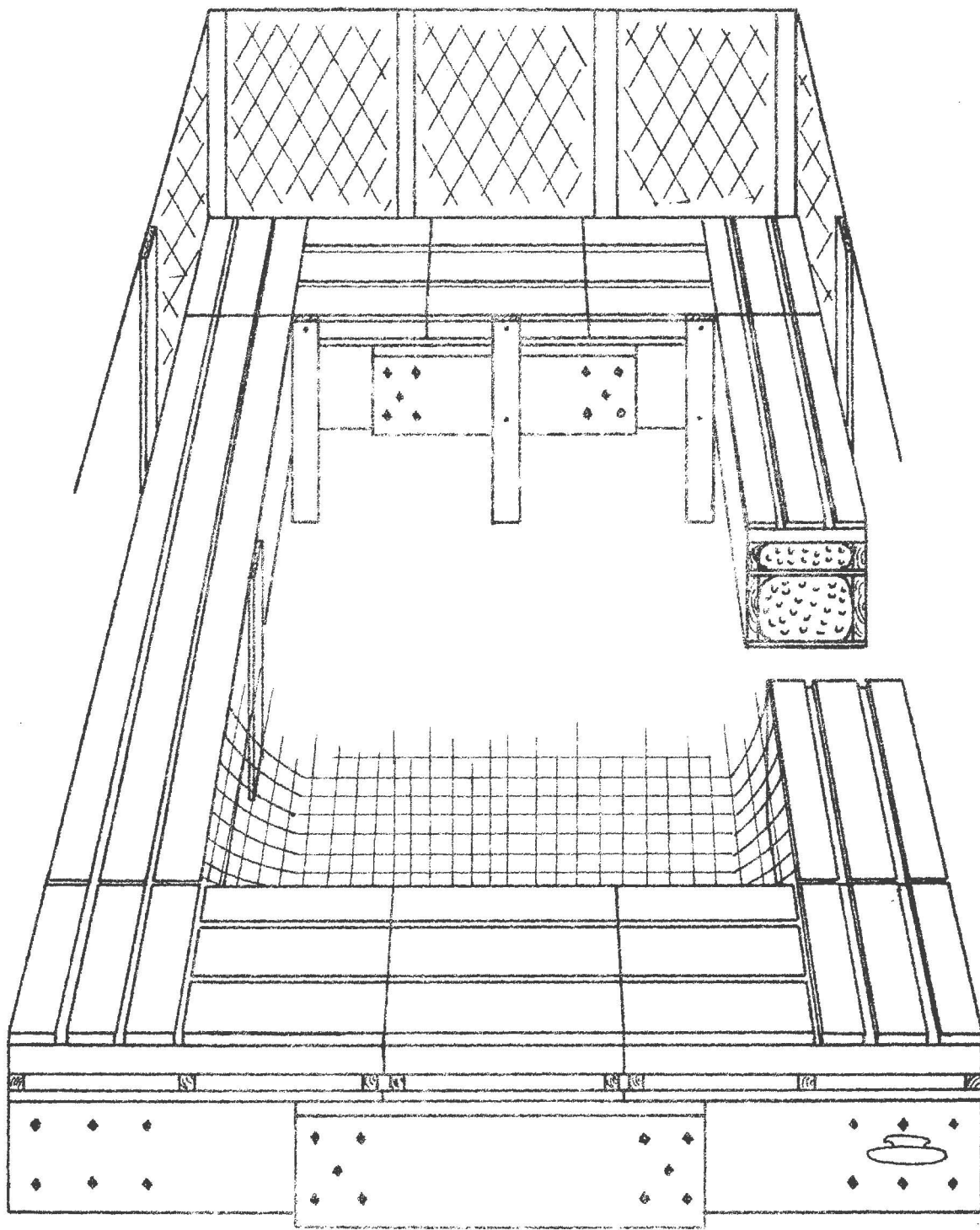


Figure 2. Sea otter holding pen.

Sea otters quickly adapt to captivity. The animals are not very aggressive and rarely did one attempt to chew or break through the wire fence surrounding the enclosure. They accept food readily, some will feed almost immediately after capture, and all take food within 24 hours.

Otters are gregarious by nature and very compatible. Given suitable quarters, both sexes and all age classes can be held together with little discord between them. Competition for food may result in larger animals stealing food from smaller ones, but fighting or mauling of a serious nature was never observed.

The enclosure was easy to keep clean and maintain. Excrement was seldom found on the deck and was easily washed off. Excrement in the water was rapidly carried away by tidal currents passing through the webbing. After a feeding all that remained of the crab was the carapace which was removed with the aid of a dip net.

### Transporting

When sufficient animals had been captured, an amphibious Grumman "Goose" was flown to the capture site and the otter was readied for shipment. A 30" salmon landing net was used to recapture the animals within the enclosure. The net was nylon herring mesh (one inch mesh). The pocket of the net was five feet deep and had a draw string at the bottom which facilitated removal of the animal.

While in the landing net the otter was given an injection of "Tranvet." The dosages at this time were 10 mg. for animals weighing up to 40 pounds, 20 mg. for animals weighing 40 to 60 pounds, and 30 mg. for animals over 60 pounds.

Placed in a wire cage 20" x 40" x 20" high and having a false bottom the otter were then set aboard the aircraft. With one animal per cage, the aircraft had a maximum capacity of ten cages.

During the flight to the release site, water was periodically sprinkled on the otter to cool them. Later the bottoms of the cages were modified by coating the bottom with fiberglass to hold three to four inches of water. The false bottoms were removed allowing the animals to lay in the water.

Flight time to the release site averaged three hours and forty-five minutes. A 30 minute fueling stop was made half way through the flight at Yakutat.

At the Klag Bay release site (Figure 1), the otter were liberated by setting the cages in the water and allowing the animals to swim free. Two men were stationed in the area to make observations of the released animals.

## FINDINGS

### Molt Investigation

A cursory examination of collected sea otter pelage specimens were made to gain an understanding of the timing of the molt and to pave the way for future more detailed studies of the structure, growth and replacement of sea otter fur fibers. Presently no scientific literature other than fleeting references exists on the subject of sea otter pelage.

Molt or fur growth in animals is signalled by a massing of pigment in the hair follicles. The molt is completed when the follicles appear clear.

Examination of 136 pelage specimens collected March 14 - April 2 and 19; specimens collected July 31 - August 3, 1963 all exhibited some follicular activity. On any one specimen all stages of hair growth could be observed. Some hairs were just emerging while others were completely grown and lacked pigment in the hair roots.

This suggests that sea otters molt continuously throughout the year. Old hairs are shed singly as new ones erupt. At no time are all of the hair follicles clear and in a resting state.

### Sea Otter Transplant

During the transplant operation, which lasted approximately one month, 41 sea otters were captured with the gillnets. Of these 23 survived to be released in Southeastern Alaska. Sixteen were females and seven were males. The females ranged in

weight from 36 to 54 pounds, the males from 23 to 90 pounds. Three of the females and one of the males were pups and the remainder were adult animals.

Of the 18 animals which died, six succumbed as a direct result of being captured in the gillnets. Three drowned (two were pups and one was a young male) and three adults died within 24 hours after being removed from the net. The three adults had been caught during the night and were considerably exhausted when released from the net. The remaining 12 otter died in transit to the release site. The probable cause of death was overheating.

Observation made at the release site during and shortly after the completion of the transplant indicated that most or all of the otters released were surviving.

SUBMITTED BY:

APPROVED BY:

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WORK PLAN SEGMENT REPORT  
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STATE: Alaska

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WORK PLANS: G-b(W-6-R-6) TITLE: Sea Lions, Sea Otters, Hair  
AND: G(W-15-R-1) Seals, and Beluga Whales

JOBS: 4(W-6-R-6)  
AND: 3(W-14-R-1) TITLE: Hair Seals

PERIOD COVERED: January 1, 1965 to December 31, 1965

ABSTRACT

Bounty records and claims revealed that over 60,000 hair seals were harvested in 1965. Seals in the southcentral and southern areas of the state were found to begin molting about the first week in July. Surveys of pupping areas on Tugidak Island and the Port Heiden-Port Moller region in June, July, and August disclosed peak seal population of 8,900 animals at Tugidak Island on June 17, and an estimated 8-10,000 seals at Port Heiden on July 1. Tagging of pups was attempted on Tugidak Island, but was abandoned because of the large size and wariness of the animals. Commercial operators harvested 4,100 pups from Tugidak Island and approximately 4,000 from Port Heiden-Port Moller.

RECOMMENDATIONS

No recommendations relating to management can be made at this time.

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JOB: 4(W-6-R-6)  
AND 3(W-14-R-1) TITLE: Hair Seals

PERIOD COVERED: January 1, 1965 to December 31, 1965

OBJECTIVES

1. To determine the response of hair seal populations to harvesting.
2. To obtain information on the timing of the molt.
3. To determine the current relative abundance and obtain information on the major pupping areas of the state.
4. To monitor commercial operations engaged in the harvesting of seals on selected rookeries.

TECHNIQUES

Information concerning the harvest of hair seals during this report period was obtained from bounty records, and claims for bounty, from seal hunters throughout Alaska.

Seal hunters and buyers were interviewed and pelage specimens were collected to gain a better understanding of the molting process.

Pelage samples are being collected at two-week intervals from a local buyer to better understand the degree and timing of hair wear, and hair replacement, of seals taken from various areas throughout the state.

Aerial surveys were conducted in the Tugidak Island and Alaska Peninsula areas to determine the abundance and distribution of hair seals. Three types of aircraft were used: A Supercub PA-18 and a Cessna 180 were used at Tugidak Island; and a Grumman Goose was utilized on the Alaska Peninsula to survey and take aerial photographs. All surveys were flown at an altitude of 300 to 400 feet and as near to the time of low tide as possible.

Seal pups were tagged on Tugidak Island by slowly approaching herds that had hauled out on the beach and then rushing in and catching the pups before they entered the surf. A two-inch Monel cattle ear tag was attached to the right hind flipper.

A motor scooter was used to travel to camps on Tugidak Island where hunters were interviewed to obtain harvest data. A biological aide at Port Heiden contacted hunters at camps and accompanied hunters on trips to outlying areas.

## FINDINGS

### Seal Harvest

Prior to 1963, the estimated number of hair seals bountied in Alaska averaged less than 20,000 annually. With the development of a European market for Alaskan seal skins, the harvest increased from 24,000 in 1963 to 40,000 in 1964, and to over 60,000 in 1965. Complete records of bounty claims for a 38-year period are presented in Table 1.

Bounty records for 1965 are incomplete, but available data indicate that the harvest of hair seals in Southeastern Alaska (Judicial District I) numbered approximately 13,000 animals, and in Southcentral Alaska (Judicial District III) 28,000. The harvest in Judicial Districts II and IV was 21,000.

### Timing of the Molt

Seal hunters and buyers were again interviewed to determine the general period of molt. Current information substantiates the findings as reported in Project W-6-R-6, Job G-b, that few seals in the southcentral and southern areas of the state (Game Management Units 1 through 16) began molting before the first week of July. Seals in the Prince William Sound - Kodiak area appear to begin molting at least three weeks before those in the Ketchikan area. No seals were observed molting after October 31.

Examinations of pelts received at a local seal processing plant indicated that yearling seals probably begin to molt before adults. Pups, which are born in May, June, or July, molt before birth or shortly thereafter, and do not molt again until the following year.

### Surveys

Aerial surveys were conducted on Tugidak Island (Figure 1) between May 30 and June 25, 1965. Results of these surveys are presented in Table 2.

TABLE 2

#### TUGIDAK ISLAND AERIAL SEAL SURVEYS, 1965

| <u>Date</u> | <u>No. of Seals</u> | <u>Remarks</u>                      |
|-------------|---------------------|-------------------------------------|
| May 30      | 300                 | In areas 13 to 17                   |
| June 14     | 1,000               | All areas except 20 to 33*          |
| June 17     | 8,900               | 4,000 of total in areas 35, 36 & 37 |
| June 22     | 3,500               | 2,000 of total in area 34           |
| June 25     | 6,650               | 3,000 of total in areas 33 to 38    |

\*Areas 20 to 33 are unsuitable habitat and are not used by seals.

Several variables, including hunter activity and stage of the tide, must be taken into account when analyzing the results of the aerial surveys. Ground observations revealed that seals

tend to haul out at periods of low or receding tides. It was during these periods that hunter activity was at its peak. Seals could be readily counted from the air during low tide, but in areas where hunters were operating, seals would leave the beach and move off shore. Seals in the water may be entirely missed on an aerial survey. Seals made extensive use of inaccessible offshore sandbars (Figure 1, Areas 35 to 38) when hunters were operating. The use of these sandbars may be normal, but it seems more likely that hunter activity forces seals to use outlying areas.

Incorporated into the aerial surveys of Tugidak Island was a flight to Sitkinak Island and Aiaktalik Island where 285 adult seals were seen. No pups were present in this area.

Inclement weather and unavailability of aircraft prevented aerial surveys of the Port Heiden - Port Moller areas during the months of June, July, and August. Surface counts and estimated population numbers for this period are presented in Table 3.

TABLE 3

**SURFACE COUNTS OF ALASKA PENINSULA SEAL POPULATIONS, 1965**

| Date     | Location     | No. of Seals   |
|----------|--------------|----------------|
| May 19   | Port Heiden  | 2,500 - 3,000  |
| May 19   | Port Moller  | 2,500 - 3,000  |
| May 19   | Cinder River | 1,000          |
| July 1   | Port Heiden  | 8,000 - 10,000 |
| August 1 | Port Heiden  | 2,500 - 3,000  |

An aerial survey on October 9, 1965 was flown from Naknek to Nelson Lagoon and 8-9,000 seals were seen. Most of the animals were seen at Port Heiden (3,000) and Port Moller (4,800).

## Tagging

Tagging of seal pups was attempted on Tugidak Island. Tagging equipment did not arrive until June 28. By this time the pup population was extremely wary and the tagging operation was abandoned after 18 animals had been tagged. The difficulties of transportation, capturing pups, and applying tags will have to be resolved before a successful tagging operation can be accomplished.

## Commercial Harvest

Commercial harvest operations were monitored on Tugidak Island from May 31 through July 2 and at Port Heiden - Port Moller from May 17 to August 6.

Eighteen individuals were engaged in harvesting hair seal pups on Tugidak Island. By June 15 less than 500 pups had been taken. This number jumped to 2,000 by June 20, with the peak occurring on June 18. The final harvest from Tugidak Island was 4,100 pup skins. All seal pups were taken by clubbing the animals that were accessible on the beach. Most hunters used motor bikes and motor scooters for transportation on the island's beaches.

Two seal hunting parties operated at Port Heiden and two at Port Moller, with some incidental hunting at Cinder River. Inclement weather prevented hunting until the week of June 21 when hunters averaged 105 pups per day at Port Heiden. This harvest continued until July 18. The combined Port Moller - Port Heiden seal pup harvest was approximately 4,000 animals.

Specimens of skulls, lower jaws, length-weights, reproductive tracts, feces, and pelts were collected. These will be processed under Job F-3 at a later date.

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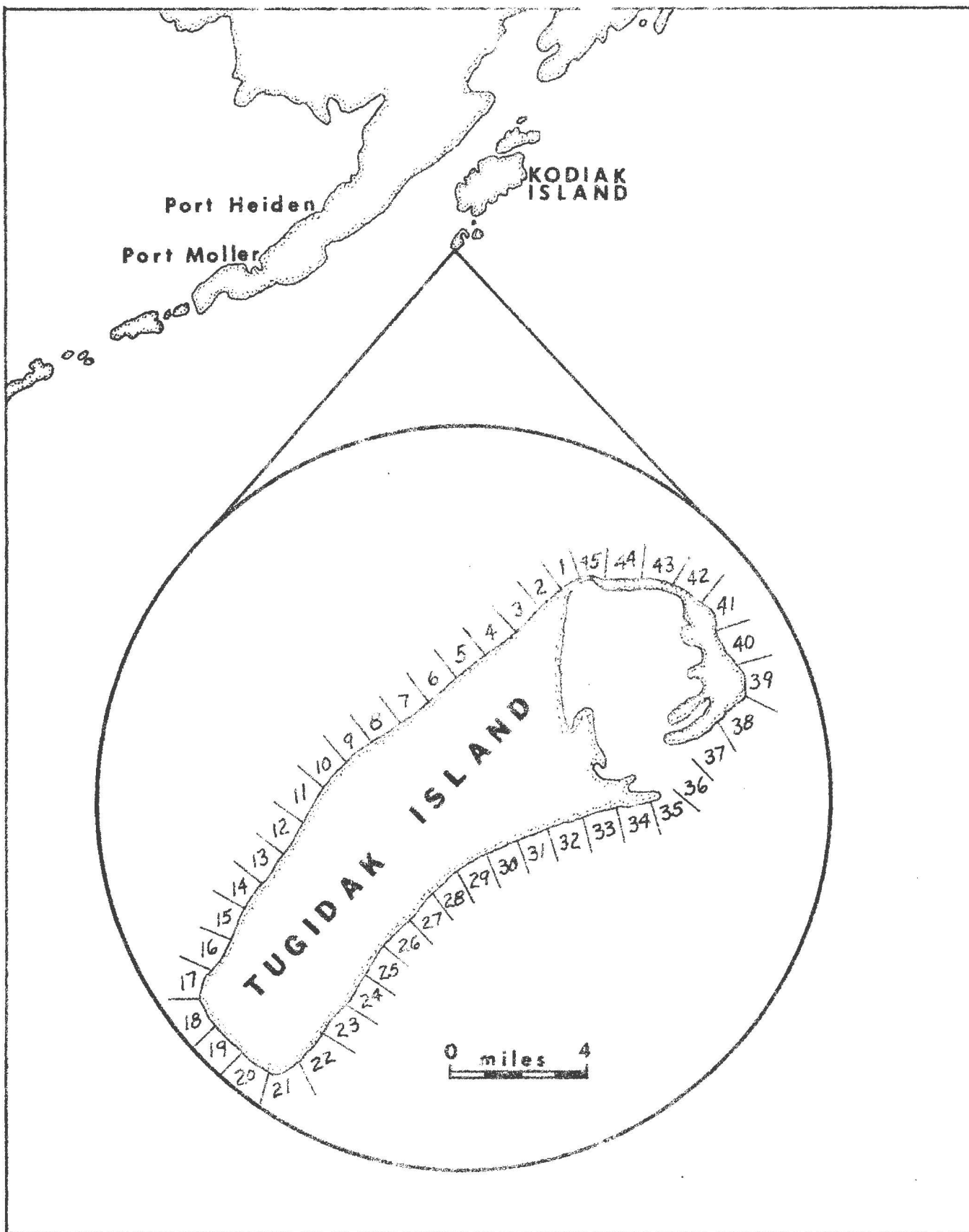


Figure 1 - Tugidak Island and one mile survey reference areas.

TABLE I

ESTIMATED NUMBER OF CLAIMS FOR HAIR SEAL  
BOUNTIES IN ALASKA, 1927 - 1965

| Biennium           | Bounty Rate | Estimated No.<br>Seals Bountied (5) |
|--------------------|-------------|-------------------------------------|
| 1927 - 28 (1)      | \$2         | 7,500                               |
| 1929 - 30          | \$2         | 9,000                               |
| 1931 - 32          | \$2         | 13,750                              |
| 1933 - 34          | \$2         | 16,250                              |
| 1935 - 36 (2)      | \$2         | 17,500                              |
| 1937 - 38          | \$2         | 20,000                              |
| 1939 - 40          | \$3         | 26,666                              |
| 1941 - 42          | \$3         | 20,000                              |
| 1943 - 44          | \$3         | 16,666                              |
| 1945 - 46          | \$3         | 16,666                              |
| 1947 - 48          | \$3         | 16,989                              |
| 1949 - 50 (3)      | \$6         | 49,666                              |
| 1951 - 52 (4)      | \$3         | 39,333                              |
| 1953 - 54          | \$3         | 24,166                              |
| 1955 - 56          | \$3         | 24,166                              |
| 1957 - 58          | \$3         | 39,705                              |
| <b>Fiscal Year</b> |             |                                     |
| 1959 - 60          | \$3         | 14,641                              |
| 1960 - 61          | \$3         | 13,396                              |
| 1961 - 62          | \$3         | 15,637                              |
| 1962 - 63 (6)      | \$3         | 23,788                              |
| 1963 - 64          | \$3         | 38,471                              |
| 1964 - 65          | \$3         | 60,000+                             |

(1) SLA 1927, Chapter 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, Chapter 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, Chapter 16. Bounty extended from Dixon Entrance to Demarkation Point.

- (4) SLA 1951, Chapter 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.
- (6) SLA 1962, Chapter 35. Bounty extended to cover all seals inhabiting all inland and coastal waters of Alaska.

WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECTS: W-6-R-6  
AND: W-14-R-1

TITLE: Alaska Wildlife Investigations  
TITLE: Marine Mammal Investigations

WORK PLANS: G-b(W-6-R-6)  
AND: G(W-15-R-1)

TITLE: Sea Lions, Sea Otters, Hair  
Seals, and Beluga Whales

JOBS: 1(W-6-R-6)  
AND: 4(W-14-R-1)

TITLE: Beluga Whales

PERIOD COVERED: January 1, 1965 to December 31, 1965

ABSTRACT

Killer whale sounds, in the 20 to 20,000 cps frequency range, were transmitted underwater by a tape recorder, amplifying system, and sound projector. Observations of belugas in the Naknek River indicated that the animals will react to such sound transmissions up to at least 300 yards from the sound source. Seven belugas were collected in the Kvichak River.

RECOMMENDATIONS

No recommendations relating to management can be made at this time.

WORK PLAN SEGMENT REPORT  
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECTS: W-6-R-6 TITLE: Alaska Wildlife Investigations  
AND: W-14-R-1 TITLE: Marine Mammal Investigations

WORK PLANS: G-b(W-6-R-6) TITLE: Sea Lions, Sea Otters, Hair  
AND: G(W-15-R-1) Seals, and Beluga Whales

JOB: 1(W-6-R-6)  
AND: 4(W-14-R-1) TITLE: Beluga Whales

PERIOD COVERED: January 1, 1965 to December 31, 1965

OBJECTIVES

To study the reaction of belugas to various types of underwater sound transmissions. To gather basic life history data.

TECHNIQUES

Tape recorded sounds of killer whales (Orcinus orca) were transmitted underwater in the Naknek River of Bristol Bay, Alaska. Sound producing equipment consisted of an Amplicorp Magemite portable tape recorder Model G10EV, a Heathkit audio generator Model 1G-72, a Bogan Model RP-2 preamplifier, a McIntosh Model MC-40 amplifier, and a Hydro Products Model DEA-7 hydrophone projector. Figure 1 is a skematic drawing of the system.

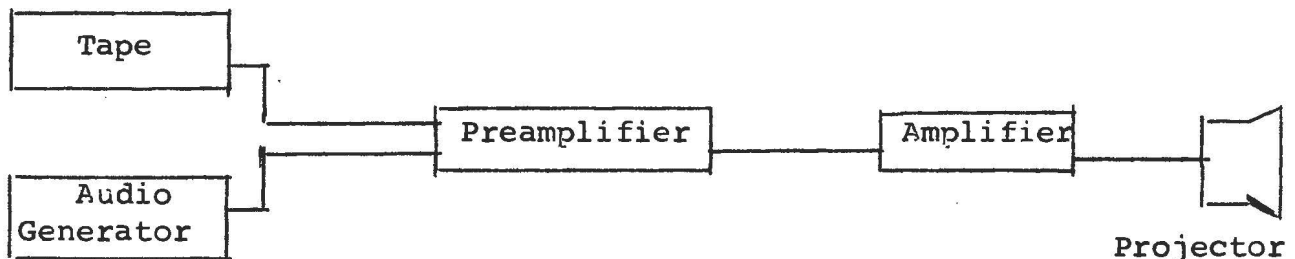


Figure 1. Skematic drawing of sound producing system

The equipment was used to project sounds within the spectrum of 20-20,000 cps. The frequency response of the tape recorder is in the vicinity of 50-15,000 cps at a tape speed of 15 ips. The preamplifier has a frequency response of 20-100,000 cps, the amplifier 10-100,000 cps and the projector 30-35,000 cps. The projector will transmit frequencies above 35,000 cps, but response drops off rapidly and distortion results. It is capable of handling 10 watts and evidences a -3db beam width characteristic of 80 degrees. The crystal motor is of lead zirconate enclosed in polyurethane. The projector, preamplifier, and amplifier require an output impedance of 600 ohms. The audio generator will be used in future experiments with frequencies above 20,000 cps, as well as the lower frequencies.

The sound producing equipment has recently been modified to enable the projector to be used as a hydrophone for listening to and recording underwater sounds.

All gear operated on 117 volts AC either from shore power or a portable AC generator.

Belugas were collected by Department personnel in the Kvichak River of Bristol Bay during the period May 20 - June 12. Specimens were obtained by driving the whales into shallow water with the aid of a skiff and outboard motor and harpooning them with a hand thrown spear. Shortly after being harpooned the whales were dispatched with a rifle bullet placed about a foot posterior to the blowhole. Stomachs were analyzed immediately in the field, recording numbers and species present. Reproductive tracts and teeth were collected and preserved for future analysis.

## FINDINGS

### Sound Transmissions

Sound producing equipment was set up on a cannery dock in the Naknek River of Bristol Bay approximately two miles from the entrance. The river at the transmitting site was approximately 3/4 mile wide and varied in depth from a few inches to four feet in the deepest channel at low tide. Tides of 25 feet flowed into the river and greatly affected depth and water conditions. At low tide large sand bars were evident in the river. The water was very turbid at all stages of the tide.

When the ice first leaves the river in April or May, belugas move into it apparently to feed on smelt. Normally they move up river shortly after the tide begins to flood and out again when the tide ebbs. In calm water their movements can be followed by watching their wakes when they are swimming in shallow water or noting their locations each time they surface to breathe. When not disturbed, they will generally surface quite frequently. When the water was rough, whales could occasionally be seen but their movements could not be followed.

Experimental transmissions were made on April 13, but it was not possible to assess the results because of rough water conditions.

On April 14 at 10:45 a.m. a group of whales appeared approximately 3/4 of a mile downstream from the transmitting site. A slight wind was blowing and the water was choppy. The transmitting equipment was turned on for eight minutes. The whales surfaced several times, then disappeared. Whether or not they were reacting to the sound transmissions could not be determined. The transmitter was turned off at 10:53 a.m.

At 11:05 a.m. four whales were observed upstream from the transmitting site. They were swimming in the direction of the transmitter and their movements could be easily followed by the wakes they were leaving. When the whales approached within 70 yards of the transmitter, the equipment was turned on. Their reaction to the sound was immediate and apparent. The whales made a quick turn away from the sound source and swam at a rapid rate upstream. Their wake could be followed for several hundred yards. One whale in its haste to move away from the sound nearly ran into the cannery dock.

At 11:20 am a small group of four or five whales again approached the dock. Their movements could be followed continuously because of their wakes. When they approached within 300 yards, the transmitter was turned on. They reacted immediately by diving and swimming very rapidly away from the sound source.

Poor visibility and rough water conditions did not permit further experimentations.

TABLE 1. MEASUREMENTS AND STOMACH CONTENTS OF BELUGAS FROM KVICHAK RIVER, 1965

| NO.  | LOCATION                    | DATE    | SEX | T L* | M G | G F | F A  | F G  | S F  | W F | L F  | F W | STOMACH CONTENTS                                        |
|------|-----------------------------|---------|-----|------|-----|-----|------|------|------|-----|------|-----|---------------------------------------------------------|
| 65-1 | 3 mi S of<br>Nakeen         | 5/29/65 | ♀   | 105  | 59  | 66  | 23   | 27   | 23   | 6.7 | 11.0 | 7.5 | 336 red salmon<br>fingerlings                           |
| 65-2 | 3 mi N of<br>Copenhagen Cr. | 5/31/65 | ♀   | 122  | 68  | 62  | 30.5 | 33.5 | 28.5 | 8.5 | 12.0 | 8.3 | 196 red salmon<br>fingerlings                           |
| 65-3 | Copenhagen<br>Creek         | 5/31/65 | ♂   | 105  | 70  | 67  | 28.5 | 37   | 25.5 | 8.0 | 11.3 | 7.5 | 316 red salmon<br>fingerlings                           |
| 65-4 | Graveyard                   | 6/11/65 | ♀   | 85   | 55  | 52  | 23.5 | 26.5 | 21   | 7.0 | 9.0  | 6.5 | 286 red salmon<br>fingerlings                           |
| 65-5 | 3 mi N of<br>Copenhagen Cr. | 6/11/65 | ♀   | 126  | 75  | 72  | 35   | 39   | 31   | 9.5 | 13.0 | 9.5 | 32 red salmon<br>fingerlings                            |
| 65-6 | Copenhagen Cr.              | 6/12/65 | ♀   | 102  | 64  | 60  | 27   | 30   | 27   | 8.0 | 11.0 | 7.5 | 121 red salmon<br>fingerlings and<br>3 shrimp           |
| 65-7 | Halfmoon Bay                | 6/12/65 | ♂   | 103  | 66  | 64  | 25.5 | 35   | 26   | 8.0 | 10.9 | 7.5 | 59 red salmon<br>fingerlings<br>(digestion<br>advanced) |

\*All measurements in inches

T L - notch of flukes to tip of snout

M G - girth at largest portion of body

G F - girth posterior to flippers

F A - notch of flukes to anal opening

F G - notch of flukes to genital aperture

S F - span of flukes

W F - maximum width of flukes

L F - axillary length of flipper

F W - maximum width of flipper

Results of the experiment indicate 1) the sound equipment is transmitting the tape recorded sounds underwater, 2) the gear has a minimum range of 300 yards, and 3) the whales will react to the sound.

Experiments will be conducted in the spring of 1966 to determine the maximum range of the transmitting gear and to learn if the whales, after repeated transmissions, will continue to turn away from the sound source.

### Beluga Collections

Seven belugas were harpooned in the Kvichak River of Bristol Bay. Measurements and stomach contents of collected specimens are presented in Table 1. When sufficient specimens become available, analysis of stomach content, reproductive organs, movements and numbers will be reported. Collections are again planned in 1966.

A comprehensive report on belugas in Alaska by Ed Klinkhart was completed and submitted for publication as a P-R report.

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Federal Aid Coordinator

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