

Institute of Polar Studies
Report No. 15

Ecological Observations in the Muir Inlet Area, Glacier Bay National Monument, Alaska

by

Roy A. Welch
Institute of Polar Studies

March, 1965



The Ohio State University
Research Foundation
Columbus, Ohio 43212

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ABSTRACT

From observations conducted during the summer of 1962 concerning the habitat, species, and general successional stages of the plant and animal life in the area surrounding Muir Inlet (58°54' N. Lat., 136°05' W. Long.), it was apparent that the general increase in species southward, i.e., away from the retreating ice fronts, was largely related to the rate of glacial retreat.

Vegetation graded from mosses and lichens near the glaciers to well-developed Sitka spruce (Picea sitchensis) in areas three to five miles or further from the nearest ice front. Although birds were plentiful throughout the area, mammals generally were found only in the more densely vegetated areas. Marine life was limited, and no large carnivores were observed.

As both vegetation and wildlife appear to be rapidly migrating northward, further ecological observations in this area should yield valuable information on:

1. the rate of vegetative growth in deglaciated areas;
2. the rate at which wildlife migrates into these areas;
3. the relationships between ice, vegetation, and wildlife.

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ROY A. WELCH
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The Ohio State University

INTRODUCTION

In 1962, twelve weeks, from mid-June to the first week in September, were spent studying the glacial geomorphology in the area surrounding Muir Inlet (Fig. 1). Also, observations were made and recorded concerning the vegetation and wildlife of as much of this area as possible.

MUIR INLET

Muir Inlet ($58^{\circ}54'$ N. Lat., $136^{\circ}05'$ W. Long.), the northern arm of Glacier Bay (Fig. 2), is located approximately 90 miles northwest of Juneau, Alaska. It is 27 miles long, varies in width from one to four miles, and is more than 600 feet deep. Outlying peaks of the St. Elias Range surround Muir Inlet and reach elevations of over 6,000 feet. Some of the larger glaciers in Alaska are associated with these mountains, notably Muir Glacier (Fig. 3).

ECOLOGY

Both the plant and animal life in the area surrounding Muir Inlet are in early stages of succession. As the distance away from the glaciers is increased in a southward direction, the number of species also increases. Considering that the glaciers have retreated northward in the last 80 years, from near Mt. Wright (5,054 feet) to their present position, it appears logical to assume that the rapidity at which vegetation covers bare areas and wildlife begins to appear is related to the rate of ice retreat.

Vegetation (Table 1)

Bare rock, till and gravel outwash are common because of the recent and continuing deglaciation of this area. Vegetation is well-developed only in places where soils have had a chance to form.

Close to the glacier, lichens and mosses (species unknown) have started to develop. In outwash areas between two and five miles from the glaciers, alders (Alnus sp.), willows (Salix sp.), and occasional Sitka spruce (Picea sitchensis) seedlings are prominent (Fig. 4). Common smaller plants found near stream courses and small ponds include fire-weed (Epilobium angustifolium), horsetail (Equisetum sp.), and various species of grasses (Fig. 5).

South of the Idaho Ridge and in the Klotz Hills, alder, willow, Sitka spruce, and black cottonwood (Populus trichocarpa) are well established. The spruce reach an estimated height of 15 feet in the Klotz Hills which has been free of glacial ice since the late 1890's. In many areas interlacing alders only six to ten feet in height make foot travel extremely difficult. Bands of alder mark stream courses across alluvial fans and outwash areas.

Altitude is also a factor that influences vegetative growth. The tree line in Muir Inlet varies from approximately 2,500 to 3,000 feet, roughly coinciding with the summer snow line. Above the tree line, shrubs, grasses, lichens and an occasional patch of alder are the predominant forms of vegetation.

Mammals (Table 2)

The mammal life in and around Muir Inlet is limited. The Pacific harbor seal (Phoca richardii) is very common throughout Muir, Wachusett, and Adams Inlets, becoming particularly numerous near the sea-ending ice fronts of Muir and Riggs Glaciers where the water is cold and ice floes are numerous. Late in the summer, young seals accompanied by adults were seen sunning themselves on the ice floes in Muir Inlet. The only other sea-mammal observed was the Pacific harbor porpoise (Phocoena phocoena) which was often seen in pairs in Muir and Adams Inlets.

The most commonly observed land mammal was the white footed mouse (Peromyscus maniculatus). Correspondingly, the southward range of the coyotes (Canus latrans) from points near the ice fronts, apparently is related to the abundance of mice and small birds. Another carnivore observed was a solitary weasel (Mustela erminea) in a rock-crevice den on the south side of the Klotz Hills (Fig. 6). Judging from the number of bones strewn in front of its den, it was living on the numerous shore-bird life along the north shore of Adams Inlet.

In early August several groups of mountain goats (Oreamnos kennedyi), including several kids, were observed grazing above the tree line on the west side of Snow Dome (4,070 feet). Apparently goats are not always sure-footed, for the remains of one were found in a meltwater channel adjacent to Snow Dome (Fig. 7). Tracks observed on the eskers and kames in front of Casement Glacier indicate that goats do at times cross the outwash areas.

Near the end of August a group of land otters (Lutra canadensis), consisting of two adults and three young, were observed playing in a small lagoon near camp. It seemed unusual to find otter this close to the ice fronts, for fish do not seem to be abundant, although at low tide numerous types of shellfish were often found in the lagoon.

Tracks of animals not observed included a well-preserved, but old, set of black bear (Euarctos sp.) prints in the sandy outwash near Casement Glacier, and scattered wolf (Canus lupus) tracks along the north shore of Adams Inlet. Large tracks belonging to a member of the cat family were once observed in the sand and gravel eskers in front of the Casement Glacier.

The greatest abundance of animal life during the period of observation was south of the Klotz Hills. This is as expected, although evidence seems to point to a gradual northward expansion.

Birds (Table 3)

The bird life is numerous, varied, and seasonal. Many of the species observed in the Muir Inlet area were nesting at some time during the summer. The semipalmated plovers (Charadrius semipalmatus), Canada geese (Branta canadensis), black oyster catchers (Haematopus bachmani), arctic terns (Sterna paradisea), and gulls (Larus sp.) were numerous along the beaches (Fig. 8). In the bare outwash areas near the glacier, snow buntings (Plectrophenex nivalis) and nesting gulls (Larus sp.) were common. Both plovers and gulls would react when nests were approached to closely. The adult plovers would pretend to be crippled and would attempt to lead the predator away from the nest; the gulls would swoop as if to attack.

In the semivegetated areas rock ptarmigans (Lagopus mutus), willow ptarmigans (Lagopus lagopus), least sandpipers (Erolia minutilla), parasitic jaegers (Stercorarius parasiticus), and gray-crowned rosy finches (Leucosticte tephrocotis) were the predominant nesting species. Of particular interest were the ptarmigans which are well established in most of this region, if the numerous young seen in July were an indication.

Along the thickly vegetated stream courses, common redpolls (Acanthis flammea), savannah sparrows (Passerculus sandwichensis), fox sparrows (Passerella iliaca), Wilson's warblers (Wilsonia pusilla), and yellow warblers (Dendroica petechia) were common. Loons (Gavia sp.), mallards (Anas platyrhynchos), yellowlegs (Totanus sp.), and sandpipers (Erolia sp.) preferred the fresh-water ponds that dot the area. In mid-July rufous hummingbirds (Selasphorus rufus) became a common sight near the streams and ponds. They were attracted by bright objects, particularly red clothing. Ravens (Corvus corax) and barn swallows (Hirundo rustica) frequent the Klotz Hills; and gulls also use as a nesting area the rock cliff that forms the southern edge of the Hills. A bald eagle (Haliaeetus leucocephalus) observed on this cliff in mid-August was the only bird of the hawk-eagle group encountered north of Adams Inlet.

Among the sea birds, scoters (Melanitta sp.), pigeon guillemots (Cepphus columba), harlequins (Histrionicus histrionicus), and cormorants (Phalacrocorax sp.) were very common. Large rafts of scoters (mixed white wing and surf) remained in Muir Inlet throughout the summer. These were breeding flocks, for many young scoters were observed towards the end of July. The young scoters, apparently hatching later than the other birds, were not able to fly until mid-August. In general, however, most of the young birds began to learn to fly during the first week in July and were in the air two weeks later.

In early and middle August several different species were observed, particularly along the shoreline. These included lesser yellow legs (Tetanus flavipes), western sandpipers (Ereunetes mauri), canvasbacks (Aythya valisineria), and gadwalls (Anas strepera). Several Say's phoebes (Sayornis saya) were observed in the old meltwater channels at this time. All apparently were migrant species on their way south.

The migrant pattern of many of the local species was quite well defined. In late June most of the species indicated in Table 3 were present; however, towards the end of July the finches and semipalmated plovers were flocking up and beginning to move south. During the middle part of August the Canada geese, so numerous in Adams Inlet, also began to leave the area as did the yellow warblers, scoters, various sandpipers, and shorebirds.

Fish

Young Dolly Varden trout (Salvelinus malma) up to six inches long are to be found in most of the small fresh-water streams emptying into Muir and Adams Inlets. As the Dolly Varden is anadromous, it is reasonable to assume that the parent fish have made their way up Muir Inlet and have entered the streams at high tide, when most streams have increased their depths from a few inches to several feet for a considerable distance back from the beach. The deeper water, of course, permits the larger fish to swim upstream with a minimum of effort.

CONCLUSION

The Muir Inlet area is undergoing rapid successional changes from south to north which apparently are related directly to the rate of ice retreat. As the vegetation increases, the number of species of birds and small mammals also increases. The small carnivores appear where there is an ample supply of both.

Since vegetation and wildlife have followed the slowly retreating glaciers during the past 80 years, it probably will continue to do so in the future. Therefore, it is probable that in the next few years the

Muir Inlet area, particularly that part north of Adams Inlet, will have not only an increase in the smaller forms of life, but also the introduction of larger predator and carnivore species within both the animal and bird kingdoms. Correspondingly, barring climatic changes, Sitka spruce will continue to develop further north.

On this basis then, it would seem that the Muir Inlet area offers excellent promise for the ecologist who wishes to study the progress of rapid successional changes within a period of a few years.

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TABLE 1. MAJOR TREES AND SHRUBS

Scientific Name	Common Name	Remarks
<u>Alnus sinuata</u>	Sitka alder	Predominant alder around water
<u>Picea sitchensis</u>	Sitka spruce	Well established in Klotz Hills, 10 - 20 years old, 5' - 20' height
<u>Populus trichocarpa</u>	Black cottonwood	Well established throughout area
<u>Salix alaxensis</u>	Felt leaf willow	Most prominent of willows
<u>Salix bebbiana</u>	Bebb's willow	
<u>Salix scouleriana</u>	Scouler's willow	
<u>Salix sitchensis</u>	Sitka willow	

Willows are along lower areas, along the beaches, in stream gullies, etc. Tree line about 2,500 - 3,000 feet; snow line about 3,000 feet.

TABLE 2. MAMMALS

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Canus latrans</u>	Coyote	7- 2-62	
<u>Lutra canadensis</u>	Otter	8-28-62	Two adults and three young feeding in lagoon behind bar
<u>Mustela erminea</u>	Weasel	8-13-62	On south rock cliff of Klotz Hills
<u>Oreamnos kennedyi</u>	Mountain goat	8-10-62	Goats observed on Snow Dome at 3,000 feet, several kids
<u>Peromyscus maniculatus</u>	White-footed mouse		Numerous but not seen often, likes the twilight hour
<u>Phoca richardii</u>	Pacific harbor seal	6-20-62	Numerous in Adams and Muir Inlets, became more numerous toward Muir Glacier; likes the ice floes.
<u>Phocoena phocoena</u>	Pacific harbor porpoise	7- 2-62	Seen occasionally in both Adams and Muir Inlets... Dorsal fins

TABLE 3. BIRDS*

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Gavia immer</u>	Common loon	6-28-62	Only two pairs seen
<u>Gavia stellata</u>	Red-throated loon	6-25-62	One pair seen in fresh-water pond
<u>Phalacrocorax pelagicus</u>	Pelagic cormorant	7- 4-62	Quite common in upper Muir Inlet
<u>Ardea herodias</u>	Great blue heron	8-28-62	Only one seen, landed on beach in evening
<u>Branta canadensis</u>	Canada goose	6-21-62	Very few in Muir Inlet until end of summer. They nest in Adams Inlet by hundreds. Flock up in the middle of August. Also become more common in Muir Inlet.
<u>Anas platyrhynchos</u>	Mallard	6-29-62	Common, particularly near upper Adams Inlet
<u>Anas strepera</u>	Gadwall	8-23-62	Apparently transitory, feeding in lagoon
<u>Aythya valisineria</u>	Canvasback	8-25-62	A few small flocks
<u>Histrionicus histrionicus</u>	Harlequin duck	6-30-62	Common throughout upper Muir Inlet
<u>Melanitta deglandi</u>	White-winged scoter	6-30-62	Common throughout upper Muir Inlet, seen in rafts with surf scoters
<u>Melanitta perspicillata</u>	Surf scoter	6-30-62	Very common throughout upper Muir Inlet, many rafts

TABLE 3 (continued)

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Oidemia nigra</u>	Common scoter	7- 4-62	Only a few seen, mixed in with a raft of surf and white-winged scoters
<u>Mergus merganser</u>	Common merganser	6-30-62	Usually seen in pairs
<u>Mergus serrator</u>	Red-breasted merganser	6-30-62	Usually seen in pairs
<u>Haliaeetus leucocephalus</u>	Bald eagle	8-13-62	Only bird of Hawk-eagle group
<u>Lagopus lagopus</u>	Willow ptarmigan	7-17-62	Seen quite often in alders
<u>Lagopus mutus</u>	Rock ptarmigan	7- 3-62	Ptarmigan seen as early as June 22, but this was first positive identification. Pair seen had young chicks that were unable to fly. In semivegetated area.
<u>Haematopus bachmani</u>	Black oyster catcher	6-20-62	Very common, seen feeding on marine life on beach. Flocks observed in middle of August.
<u>Charadrius semipalmatus</u>	Semipalmated plover	6-20-62	Very common, nesting on beach, pretend to be crippled. Most are gone by August 1st.
<u>Actitis macularia</u>	Spotted sandpiper	6-26-62	Quite common, usually in lightly vegetated areas near fresh-water

TABLE 3 (continued)

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Totanus melanoleucus</u>	Greater yellow-legs	7- 3-62	Quite common in fresh-water kettles near Adams Inlet
<u>Totanus flavipes</u>	Lesser yellowlegs	8-10-62	Common on beach along Muir Inlet at this time
<u>Erolia minutilla</u>	Least sandpiper	6-25-62	Very common near fresh-water
<u>Ereunetes mauri</u>	Western sandpiper	8-13-62	Feeding in shoals
<u>Stercorarius parasiticus</u>	Parasitic jaeger	6-25-62	Common, particularly dark phase. Young seen flying in early August.
<u>Larus glaucescens</u>	Glaucous-winged gull	6-22-62	Seen along beach
<u>Larus argentatus</u>	Herring gull	6-25-62	Nest in rocky outwash areas
<u>Sterna paradisaea</u>	Arctic tern	6-28-62	Appears to nest in upper part of Adams Inlet
<u>Uria aalge</u>	Common murre	6-20-62	Occasionally seen
<u>Cephus columba</u>	Pigeon guillemot	6-20-62	Widespread throughout Muir Inlet
<u>Ptychoramphus aleutica</u>	Cassin's auklet	8-13-62	One observed in middle of Adams Inlet
<u>Selasphorus rufus</u>	Rufous hummingbird	7-15-62	Became common in alders along fresh-water streams, attracted by red objects (clothing, etc.)

TABLE 3 (continued)

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Megaceryle alcyon</u>	Belted king-fisher	8- 7-62	Only one seen in pond near Snow Dome
<u>Sayornis saya</u>	Say's phoebe	8-22-62	First time observed, apparently a transient
<u>Tachycineta thalassima</u>	Violet-green swallow	6-25-62	Apparently likes the large rocky kames and eskers at the edge of meltwater streams. Seen near Casement Glacier.
<u>Hirundo rustica</u>	Barn swallow	7-14-62	Around rock cliffs of Klotz Hills
<u>Corvus corax</u>	Raven	7- 5-62	Common around Klotz Hills
<u>Dendroica petechia</u>	Yellow warbler	6-20-62	Usually seen in alders along fresh-water streams
<u>Wilsonia pusilla</u>	Wilson's warbler	7- 3-62	Seen occasionally in alders throughout area in front of Casement Glacier
<u>Leucosticte tephrocotis</u>	Gray-crowned rosy finch	6-23-62	Very common, particularly Hepburn's Form. Flock up and disappear about end of July.
<u>Acanthis flammea</u>	Common redpoll	6-28-62	Very common, likes vegetated areas, alders
<u>Passerculus sandwichensis</u>	Savannah sparrow	6-23-62	Live and nest in alders along fresh-water streams

TABLE 3 (continued)

Scientific Name	Common Name	Date of First Observation	Remarks
<u>Passerella iliaca</u>	Fox sparrow	6-23-62	Both rusty and dusky-brown forms observed. Nest in vegetation.
<u>Melospiza melodia</u>	Song sparrow	7- 3-62	Common in alders and thick growth
<u>Junco</u> sp.	Junco	7- 3-62	Definitely a Junco (male), probably a hybrid; black head, white undersides, gray back, white outer tail feathers

*Follows: The A.O.U. Check-List of North American Birds. 1957. Amer. Ornith. Union 5th Ed. :1-691.

TABLE 4. WEATHER AND TEMPERATURE

Date (1962)		Weather	Maximum Temperature	Minimum Temperature
June	29	Sunny	54	40
	30	Sunny	63	36
July	1	Rainy	62	49
	2	Cloudy	53	42
	3	Cloudy bright	54	41
	4	Sunny	58	38
	5	Sunny	61	41
	6	Sunny	66	41
	7	Sunny	64	42
	8	Cloudy	66	44
	9	Cloudy	56	44
	10	Rainy	56	42
	11	Rainy	53	42
	12	Cloudy	56	40
	13	Cloudy	no record	no record
	14	Rainy	55	41
	15	Cloudy bright	54	42
	16	Sunny	60	37
	17	Sunny	65	39
	18	Cloudy bright	63	42
	19	Rainy	63	44
	20	Rainy	67	42
	21	Rainy	57	42
	22	Rainy	56	43
	23	Sunny	56	43
	24	Sunny	60	44
	25	Cloudy bright	64	42
	26	Sunny	56	44
	27	Sunny	65	40
	28	Sunny	68	44
	29	Sunny	66	44
	30	Sunny	63	42
	31	Sunny	64	41

TABLE 4 (continued)

Date (1962)	Weather	Maximum Temperature	Minimum Temperature	
August	1	Cloudy	65	45
	2	Sunny	60	42
	3	Sunny	66	42
	4	Rainy	66	44
	5	Sunny	58	43
	6	Sunny	62	42
	7	Cloudy	60	40
	8	Rainy	52	42
	9	Rainy	51	42
	10	Cloudy	53	42
	11	Cloudy bright	56	41
	12	Cloudy bright	62	41
	13	Rainy	59	39
	14	Cloudy bright	54	40
	15	Rainy	57	41
	16	Cloudy	60	43
	17	Rainy	59	43
	18	Cloudy bright	49	42
	19	Cloudy	56	38
	20	Rainy	61	44
	21	Cloudy	57	44
	22	Cloudy bright	60	43
	23	Rainy	61	43
	24	Cloudy bright	61	44
	25	Sunny	59	44
	26	Sunny	58	44
	27	Sunny	50	42
	28	Readings discontinued		

Ice conditions were best at the end of July, whereas the worst periods were the end of June and the middle of August

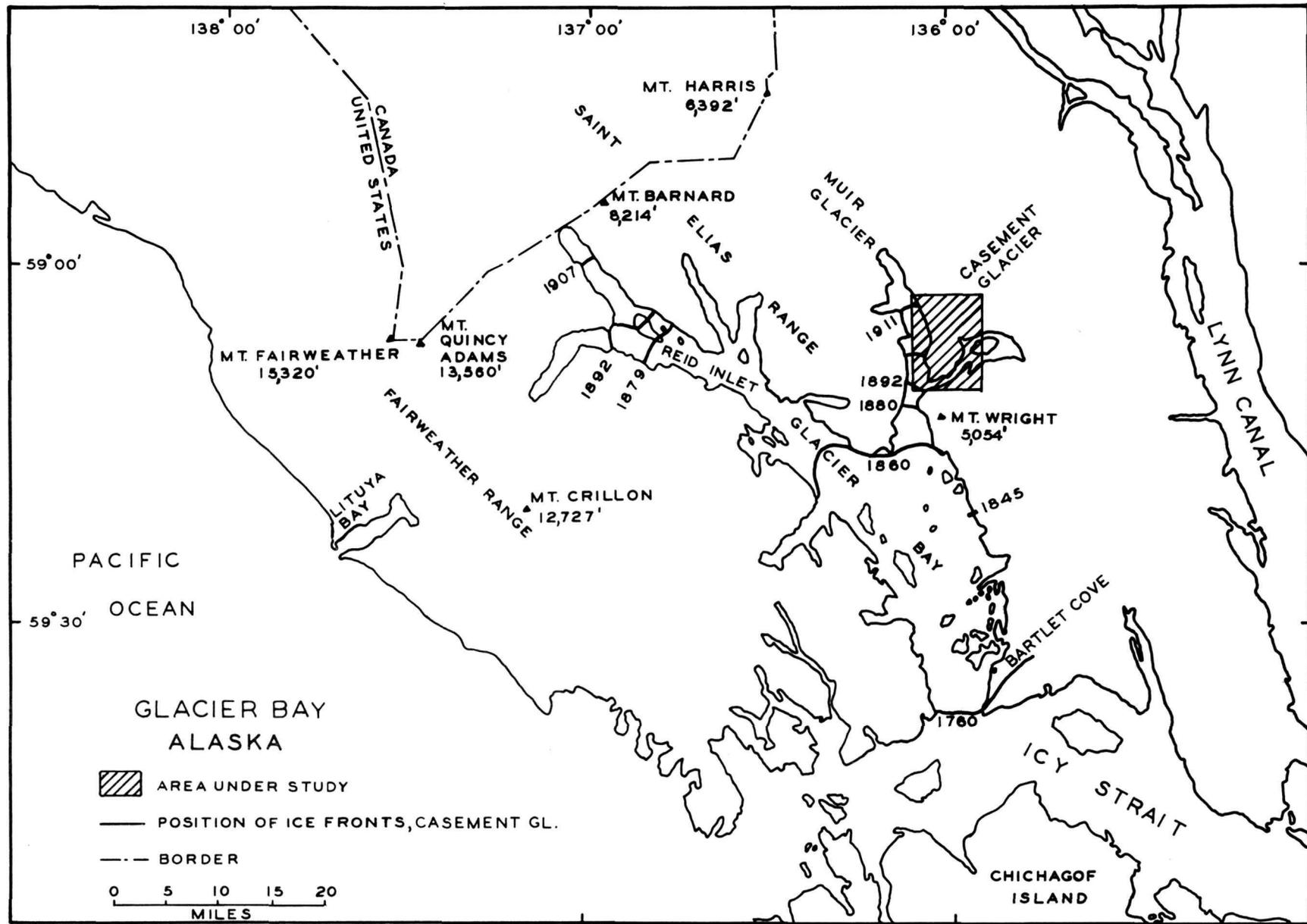


Fig. 1 - Muir Inlet - 1962



Fig. 2 - Upper Muir Inlet

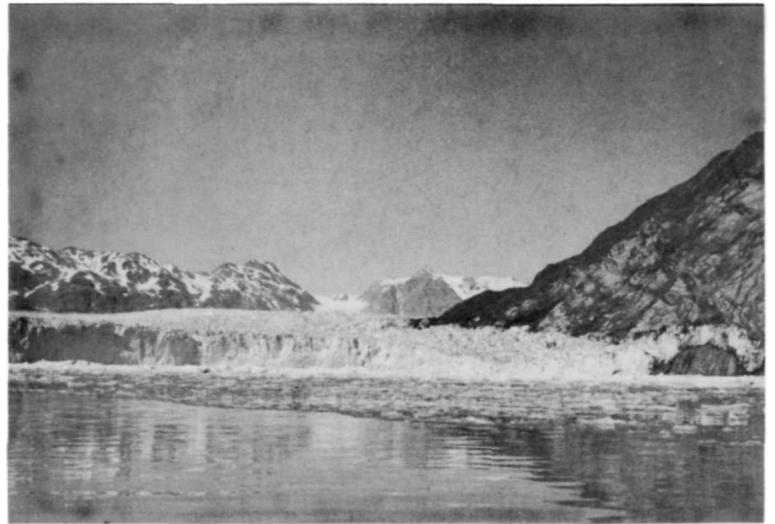


Fig. 3 - Muir Glacier



Fig. 4 - Alnus sp. and Salix sp. form a dense undergrowth approximately three miles south of Casement Glacier



Fig. 5 - Small pond in front of Casement Glacier.
Alnus sp., Salix sp. and Equisetum sp.
are common



Fig. 6 - Mustela erminea



Fig. 7 - Meltwater stream flows between Casement Glacier (L) and Snow Dome (4,070 feet)



Fig. 8 - Gravel outwash fan near camp at low tide. North slope of Klotz Hills in right foreground. Note: bands of alder across fan mark stream course

