

36. MARINE HABITATS

36.1 Introduction

Marine nearshore habitats in the Cook Inlet study area were studied to provide the physical context for descriptions of the biological conditions observed. The study area for the marine nearshore-habitat characterization included all marine waters and shorelines in Iliamna and Iniskin bays (except inner Cottonwood Bay and inner Iniskin Bay) and shorelines along the bight between the bays (see Figure 1-4 in Chapter 1 for these landmarks, but note that the study area specific to this chapter is not the Cook Inlet study area depicted on that figure).

The study of marine nearshore habitats was designed to characterize nearshore habitats in the Iniskin/Iliamna Estuary and included the following elements:

- A thorough search of literature related to the natural environment of Cook Inlet, with emphasis on the lower west side of the inlet.
- Personal experience of the investigators in the Iniskin/Iliamna Estuary and Cook Inlet dating back to the mid-1970's.
- Observations made during marine biological field work conducted from 2004 through 2008 in the Iniskin/Iliamna Estuary.

36.2 Results and Discussion

The shorelines of the Iniskin/Iliamna Estuary are composed of a diversity of habitats, including steep rocky cliffs, cobble/pebble beaches, and extensive sand/mud flats. Wave and surge energy is high at the headlands and along the outer portions of the bays during high tides. Swells are dampened considerably in the inner bays by reefs and islets at the bay entrances and by mudflats. Subtidal habitat is similarly varied, ranging from mud and sand in central portions of the bays to a variety of gravel, boulder, and rock substrates in channel bottoms swept by strong currents. These ranges of substrate types, slope, and exposure create a diversity of ecological niches that provide habitat for a variety of marine biota. The following descriptions summarize the major habitat features in the Iniskin/Iliamna Estuary.

36.2.1 Iniskin Bay

Iniskin, Vert, and Scott islands are the largest of several islands and shoals guarding the center and east side of the entrance to Iniskin Bay (Figure 1-3c in Chapter 1). Iniskin and Vert are smaller islands south of Scott Island and are surrounded by flat to gently sloping reefs. Iniskin Island is the larger and more offshore of the two. The sheltered reef to the north and west of the island is well vegetated with a variety of kelp and red algae. Vert Island is slightly smaller than Iniskin Island, but includes several nearby islets and shoals. The reef surrounding Vert Island is flatter than that around Iniskin Island and, during spring 2008, was well vegetated, especially

with red algae (*Palmaria* spp.). Scott Island is heavily wooded and is mostly surrounded by steep cliffs that extend down to the intertidal zone. The island's shorelines are mostly conglomerate bedrock, although small pockets of cobble/gravel beach are present.

The entrance to Iniskin Bay is bordered by rocky cliffs and sand/pebble beaches, sloping conglomerate rock, and an intertidal rocky point extending to Blackie Reef. To the south lies a broad, silty sand flat that at times supports patches of eelgrass (*Zostera marina*); laminarian kelp and other algae are found farther offshore. North of Blackie Reef, Iniskin Bay is generally shallow and slopes up to a steeper upper beach. The shallow east-central part of the bay is divided by a large flat reef, called Fossil Reef, which extends approximately a quarter of the way across the bay. The lower intertidal shoreline and subtidal bottom of the bay are predominantly mud and sand with occasional bedrock reefs or glacial erratic boulders. Long pebble beaches cover much of the upper shoreline north to Right Arm. A broad mudflat characterizes the northern part of Iniskin Bay through which a drainage channel conveys the Iniskin River and other drainages during low tide.

The transition from rubble to mudflat occurs at the lower intertidal zone at a reference site located approximately a half mile north of the west entrance to the bay. The upper beach at this site is a rock cliff, with steep slopes ascending to the east side of Knoll Head; however, the toe of the cliff is in the upper-to-middle tide range, and a rocky/shingle beach extends down to the mudflat at the lower tide zone. Cobble- and boulder-sized rocks on the upper beach are angular, indicating relatively little movement by waves. To the south, another reference site (called Port Site 1) has a similar composition of rock and sediment substrate, while the upper shoreline is a nearly vertical cliff. Limited diving along the southwest shoreline of Iniskin Bay showed that the substrate was composed of sand, silt, and gravel.

36.2.2 Knoll Head to North Head

Between Iniskin Bay and Iliamna Bay the shoreline consists of a series of fairly steep pebble/cobble beaches delineated by rocky outcrops and offshore rock reefs and sea stacks. The wave-exposed beaches are composed of rounded pebbles and cobbles and are backed by nearly vertical rock cliffs. Numerous natural arches are present, along with several waterfalls that flow during periods of snowmelt or rainfall. Sampling Station MPS1A lies along this complex rocky shore east of the entrance to a small rock-bound lagoon at the opening to the large valley known as the Y Valley (Figure 1-3c in Chapter 1). At MPS1A, the terrain above the cliff is much more gentle to the west leading into the east side of the Y Valley than the steeper slopes above the sea cliffs to the east toward Knoll Head. Sediment, when found in pocket beaches, is composed of predominantly coarse sand and angular gravel or cobbles recently broken or eroded from the cliffs or slopes above. The Y Valley lagoon is well protected from waves and swells by its narrow and sea-stack-studded entrance. Because of this sheltering, the lagoon has areas of mixed-soft sediment: a mix of sand and cobbles in a silt matrix. These mixed-soft beaches are interspersed with rocky reefs.

West and south of the Y Valley lagoon, the primary stream draining the Y Valley enters the marine environment after passing through a perched semi-tidal lagoon. Otherwise, the shoreline to the southwest is much the same as that to the east: a mix of nearly vertical rock, offshore

reefs and shoals, and an occasional cobble pocket beach. Biota on these rock faces is much impoverished compared to other areas of comparable substrate and elevation and is composed of early successional species over large portions of the shoreline. It is presumed that this reflects the abrasive effects of ice scour. The generally steep, rocky shoreline extends around a rocky point under North Head and into the east side of Iliamna Bay. Shallow subtidal diving surveys conducted in the early 1980s off Knoll Head (Y Valley lagoon) revealed smooth bedrock and boulders sloping gently from the mid-intertidal range to a depth 22 feet below mean lower low water, where rock was replaced by gravel. Below this zone the substrate consisted of mixed sand and silt over gravel.

36.2.3 Iliamna Bay

White Gull Island is situated just inside of the entrance to Iliamna Bay (Figure 1-3c in Chapter 1) and has rocky shorelines with pockets of coarse cobble and pebbles along the shorelines. On the west side of the island, the intertidal zone is composed of moderately sloping gravel beaches and sheer rock faces. On the wave-exposed east side of the island a bedrock shelf extends from the intertidal range to 5 feet below mean lower low water. On the west side of the small peninsula (North Head) at the east entrance to Iliamna Bay, the upper beach is a mix of bedrock and broken rock rubble. To the north, an arcuate pocket beach of pebble-sized gravel is contained to the west by a rocky outcrop. The lower beach sediment is a mix of cobbles and boulders in a sand matrix. Subtidal surveys revealed a series of large boulders below 8 feet below mean lower low water with increasing amounts of sand bottom down to 20 feet below mean lower low water.

The entire eastern shore of Iliamna Bay, except for the area near AC Point, midway up the bay, lies at the foot of steep mountainsides. The upper beach consists of broken boulders and cobbles fallen from the mountains (coarse colluvium) or steep rock cliffs. Northwest of Diamond Point, at the north entrance to Cottonwood Bay, the middle to lower beach consists of a sand/mud flat that broadens to the north; below mean lower low water the bottom becomes increasingly muddy.

AC Point is a spit that has formed a relatively broad, flat gravel bar or bench with approximately 6.5 acres at elevations above the extreme high-water line. A shallow pebble/sand channel leads to a small tidal lagoon within the elevated gravel bench of AC Point. This shallow/brackish lagoon (AC Point Lagoon) is a unique habitat feature that supports sparse but widespread eelgrass, several species of algae, and seasonally abundant fish. North of a line from AC Point to Diamond Point, a mudflat extends across the entire bay except for a central drainage channel, occasional offshore rocks and reefs, and two rocky islands.

Twin rocky points considerably narrow Iliamna Bay just southeast of Williamsport. North of the western rocky point, a channel has been dredged through the mudflat to improve navigable access to the beach at Williamsport. This channel and beach constitute the only man-made alterations to the shorelines of the study area. Limited amounts of eelgrass are present around an island just southwest of the Williamsport entrance channel. Northeast of Williamsport, the inner bay is shallow and strewn with boulders.

The west side of Iliamna Bay consists of angular rubble or rocky upper beaches transitioning to mudflats at middle tidal elevations. A rock buttress projects into the intertidal zone from the base of a high cliff at the face of Diamond Point (at the north entrance to Cottonwood Bay). At the base of this rocky habitat, a sand/mud flat extends to the west into Cottonwood Bay and to the north into Iliamna Bay. Substantial patches of eelgrass were identified on the Cottonwood Bay side of Diamond Point.

Overall the habitats in the Iniskin/Iliamna Estuary study area are summarized as follows:

- The entrances of the bays consist of well-vegetated wave-exposed islands and shoals.
- Protected inner areas of the bays contain large sand/mud flats and subtidal accumulations of fine sediments.
- Shorelines above these flats are largely dominated by bedrock and cobble beaches.
- The Iniskin/Iliamna Estuary provides a wide range of habitat types resulting in a rich mosaic of biological assemblages.

Marine Habitats—Cook Inlet



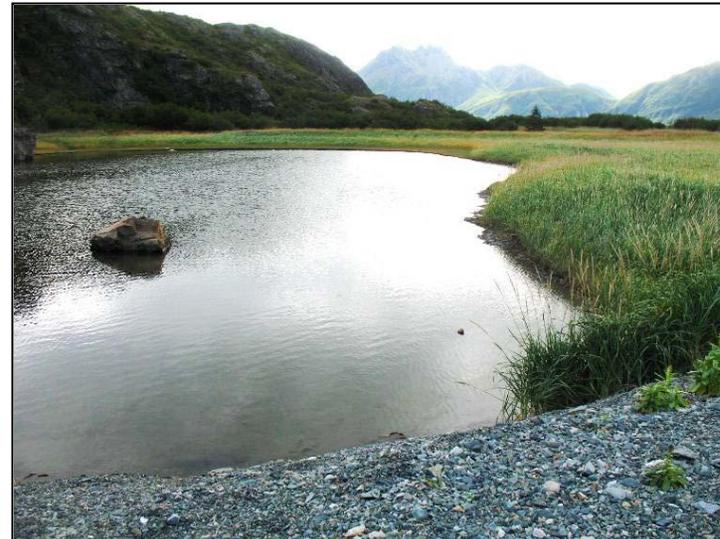
Mudflat near the head of Iniskin Bay, September 8, 2007.



Wave-exposed boulder field at Knoll Head, May 6, 2008.



Cobble beach at AC Point, May 26, 2010.



Protected AC Point Lagoon with adjacent meadow, September 6, 2007.