DISTRIBUTION PATTERNS FOR INTERTIDAL BIVALVES IN KENAI FJORDS AND LAKE CLARK NATIONAL PARKS

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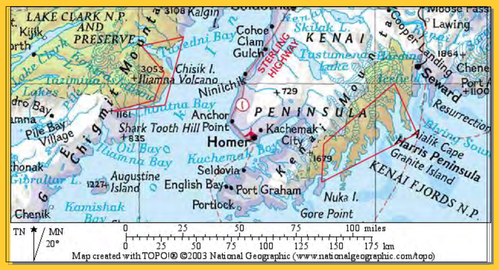
ABSTRACT

Soft sediments on beaches in Kenai Fjords National Park (KEFJ) and Lake Clark National Park and Preserve (LACL) were examined using 0.25 m^2 excavations, infaunal core samples, and visual assessment to assess species composition and distribution of the infauna, especially bivalves used as prey by important predators such as brown bears, sea otters, black oystercatchers, and diving ducks in the Southwest Alaska Network (SWAN). Fifty-six and 21 sites were examined, respectively, in KEFJ and LACL. Samples were collected at 39 and 9 sites in KEFJ and LACL, respectively. Sample analysis has been completed for sediment and excavation samples and some preliminary results are available.

Habitats differ substantially between KEFJ and LACL. Soft intertidal habitats in KEFJ are dominated by gravel with substantial quantities of sand or silt whereas the habitats in LACL are dominated by sand or mud. Generally, beaches in KEFJ appear to be considerably younger than those in LACL. Many of the KEFJ beaches near the heads of the fjords have become exposed only within the last century as glaciers retreated.

The bivalve fauna also differs substantially between KEFJ and LACL. In KEFJ, potential target species included five suspension feeders (*Mytilus trossulus, Protothaca staminea, Mya* spp., and *Saxidomus gigantea*) and two deposit feeders (*Macoma balthica* and *Macoma* spp.) In LACL, potential targets included three suspension feeders (*Siliqua patula, Mactromeris polynyma*, and *Mya* spp.) and one deposit feeder (*Macoma balthica*). Generally, the biomass of bivalves is higher on the types of beaches sampled in LACL except at the heads of bays where the freshwater influence is great.

Plans for 2005 are to conduct a similar survey in the Katmai National Park and Preserve, complete sample analysis, and prepare a report describing the findings.



OBJECTIVES

In preparation for developing a long-term monitoring program for the parks within SWAN, the objectives of this program are to:

1. Determine the composition and distribution of intertidal invertebrate species inhabiting soft-sediment flats in the SWAN parks.
2. Characterize abiotic factors that influence occurrence, distribution and relative abundance of intertidal infaunal organisms, such as sediment properties, exposure, and tidal inundation.
3. Identify candidate target species for long-term monitoring based on: distribution, abundance, sensitivity to habitat change, ecological importance, and ease of sampling.

LAKE CLARK NP SEDIMENTS

Sediments are fine, with most sites characterized as sand or silt. Very low concentrations and C:N ratios of the organics in sediments suggest that bacteria are the primary source or nutrition for infaunal animals.

LAKE CLARK BIVALVE ASSEMBLAGES

The only three species of clams were collected in excavation samples in LACL were pink Baltic macomas, softshell clams, and razor clams. Baltic macomas, a small clam, were common to abundant in brackish protected muddy habitats. Larger softshell clams were commonly observed in similar habitats. Large razor clams were collected in exposed sandy habitats but were far less common than macomas or softshell clams. Two other large species (surf clams and cockles), although observed in the sandy habitats, were too uncommon to appear in our samples.

KENAI FJORDS SEDIMENTS

Sediments are relatively coarse at nearly all sites. Ninety-two % were characterized as sand or coarser and 76% as sandy gravel or gravelly sand. Concentrations of organic matter in sediments were low.

KENAI FJORDS BIVALVE ASSEMBLAGES

Twenty-four species of clams were collected in excavation samples in KEFJ. Dominant species in terms of abundance and frequency of occurrence included: blue mussels, pink Baltic macomas, Arctic nestling clams, butter and littleneck clams. Dense mussel beds were common in gravel/cobble habitat bathed by tidal currents, especially in McCarty Fjord. Arctic nestling clams occurred in stable gravel with varying amounts of sand and silt. Butter and littleneck clams were most common in silty sand with varying amounts of gravel. All species seemed to thrive in areas with moderate currents and salinity.

Bivalve assemblages varied markedly among the four regions surveyed. McCarty Fjord was richest in terms of abundance and numbers of species and Aialik Bay was poorest. Nearly every taxon exhibited highest abundance in McCarty Fjord. Nevertheless, it is likely that clam resources in each region have been undersampled and are better represented than current data indicate.

Distribution of Bivalves in 0.25 m^2 Excavation Samples from Kenai Fjords Sampling Locations

Sampling Regions, Arranged West to East (No. of Sampling Sites										
North & West Arms, Nuka Bay (13)	424	42	190	0.7	1	20	7	2044	157	9
McCarty Fjord (9)	1771	144	194	15	8	22	42	6611	735	15
Northwestern Fjord (7)	22	64	31	12	0.3	3	6	423	60	9
Aialik Bay (8)	17	21	0.3	23	0.3	4	10	239	30	10

Distribution of Bivalves in 0.25 m^2 Excavation Samples from Lake Clark Sampling Locations

Stations, from North to South							
S21			3	3	2	Exposed	Sand
W22	215			215	1	Protected	Gravelly Mud
W8A	20			20	1	Protected	Mud
S8	357	6		363	2	Protected	Mud
M7			1	1	1	Exposed	Sand
SG2			1	1	1	Exposed	Sand
M2					0	Mod. Exposed	Sand
SG1	8		1	9	2	Exposed	Sand
W1	96			96	1	Protected	Muddy Sand
Grand Total	696	6	6	708	3		

Number of Bivalve Individuals and Species in 0.25 m^2 Excavation Samples from Kenai Fjords Regions and Sampling Locations

Region/ Station			Region/ Station		
North & West Arms, Nuka Bay			McCarty Fjord		
W50	20	2	SG122	1999	4
W49	1203	3	W42	73	9
W51	236	6	SG121	430	7
W46	29	4	W39	515	4
SG31	0	0	SG115	1583	3
W47	168	1	S24	0	0
W38	4	2	S24SG	14	2
W48A	162	2	W36A	1717	7
SG111A	122	5	W36B	280	11
SG153	45	3			
SG146	0	0			
W53	2	2			
SG145	53	5			
Region Average	157.2	2.7	Region Average	734.6	5.2
Northwestern Fjord			Aialik Bay		
M2A	6	1	W10	0	0
SG43	23	1	SG31	16	4
S11	87	8	SG30	14	4
M2	52	4	G1	32	4
W15	0	0	G1A	93	8
M5	239	5	W9	2	2
W26	16	3	SG11	67	4
			SG3	15	4
Region Average	60.4	3.1	Region Average	34.1	4.3
Grand Totals	9317	24	Overall Averages	252	3.6

DISCUSSION

1. Bivalve assemblages and sediments differ considerably between Lake Clark NP (LACL) and Kenai Fjords NP (KEFJ).
2. Sediments are considerably more coarse in KEFJ.
2. Bivalve assemblages are generally more varied among beaches in KEFJ (~24 species) than in LACL (3-5 species).
3. Bivalves are generally more abundant in KEFJ, largely because of mussel beds.
4. Mussel beds are well developed and widespread on stable gravelly beaches in KEFJ but absent in LACL.
5. Pink Baltic macomas and softshell clams (*Mya* spp.)are abundant in protected fine sediments in LACL but common at only a few locations in KEFJ.
6. Razor clams are widely distributed and abundant on exposed sandy beaches in LACL but were not encountered in KEFJ.
7. Both KEFJ and LACL have populations of long-lived bivalves that are sufficiently abundant and widespread to provide excellent candidates for a long-term monitoring program.
8. It is likely that clam resources in KEFJ have been undersampled and are better represented than current data indicate.

PLANNED WORK IN 2005

In preparation for developing a long-term monitoring program for the parks within SWAN, the objectives of this program are to:

1. Plan and implement similar survey of soft beaches in Katmai National Park.
2) Complete analysis of samples from KEFJ, LACL, and Katmai.
3) Prepare Final Report describing findings.

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