

KPFHP DRAFT CAP PLAN

DRAFT MARINE TARGETS - WHAT WE WANT TO CONSERVE

Target #1: Salt marsh & estuarine system (Intertidal)

Focal Target Description: Salt Marsh and Estuarine System (low supratidal to upper intertidal) exist in coastal areas near or above intertidal zone where low wave energy provides stable, elevated, well drained sediment substrate. Floral species are typically perennial vascular with high tolerance to saline soil conditions, eg sedges and grasses. Associated marine infauna and invertebrates predominate. Areas: Western Cook Inlet, Kamishack and Kachemak Bay, Chickaloon Flats.

Nested Target # 1: Forage fish

Nested Target # 2: Salmon - Juvenile rearing and emigration

Nested Target # 3: Larval and Juvenile Faunal Invertebrate

Target #2: Nearshore sediment substrates (Intertidal)

Focal Target Description: Nearshore Sediment Substrates (low supratidal to lower intertidal) six composition types are generally recognized, though substrate complexity is highly variable: 1) mud beaches, 2) fine-grained sand beaches, 3) coarse grained sand beaches, 4) mixed mud, sand and gravel beaches, 5) exposed tidal flats, and 6) sheltered tidal flats. Areas: Cook Inlet (clam beaches), Kamishack and Kachemak Bay.

Nested Target # 1: Razor clams

Nested Target # 2: Hard shell clams

Nested Target # 3: Larval and Juvenile Fish and Invertebrate Species

Target #3: Rocky nearshore (Intertidal & Subtidal)

Focal Target Description: Rocky Nearshore (intertidal through Subtidal) Four composition types are generally recognized, though substrate complexity is highly variable: 1) sheltered bedrock shores and out crops experiencing low to moderate wave energy, 2) sheltered bedrock, boulder and cobble complexes experiencing low to moderate wave energy, 3) exposed bedrock shores and out crops experiencing moderate to high wave energy, and 4) exposed bedrock, boulder and cobble complexes experiencing high to moderate wave energy. Kamishak and Kachemak Bay, outer coastal zones, tabletop reefs in Kamishak Bay.

Nested Target # 1: Spawning Herring and other Forage Fish Species

Nested Target # 2: Larval and Juvenile Fish and Invertebrate Species

Target #4: Canopy kelps (Subtidal)

Focal Target Description: Canopy Kelps (Subtidal) Kelp species occur in submerged nearshore, unconsolidated substrates. Their structure provides foundation and living substrate, microhabitat, and cover for numerous fish, invertebrate, and plankton species. Kelp beds also provide nutrient for trophic productivity through plant decay. Area: Kachemak Bay and numerous Kenai Peninsula Bays and Coves.

Nested Target # 1: Crab larvae

Nested Target # 2: Forage fish

KPFHP DRAFT CAP PLAN

Target #5: Seagrass beds (Subtidal)

Focal Target Description: Seagrass Beds (Lower Intertidal to Subtidal) Seagrass beds are predominantly found in submerged nearshore, unconsolidated substrates and provide foundation and physical structure, substrate and cover for numerous fish, invertebrate, and plankton species. Seagrass beds also provide nutrient for trophic productivity through plant decay. Areas: Kachemak Bay, Westside, Inniskin, Illmina, outer Coast.

Nested Target # 1: Forage fish

Nested Target # 2: Crab larvae

Nested Target # 3: Shrimp

Target #6: Reefs (Subtidal & Offshore)

Focal Target Description: Submerged rocky reefs (2m - 100m depth) are a predominant feature of the outer Kenai Peninsula coast. This habitat provides consolidated complexity in rock outcrops, caves and crevices. Between consolidated rock structure are unconsolidated sediment substrates. This contrasting substrate complexity fueled by off shore nutrient import provide nesting and nursery habitat to multitudes of fish and invertebrate species, algae, sea grass and kelp species. Area: Outer Coast and Kenai Peninsula Nearshore.

Nested Target # 1: Lingcod

Nested Target # 2: Rockfish (demersal shelf, pelagic shelf)

Nested Target # 3: Forage, Groundfish and Invertebrate Species at many life stages.

Target #7: Benthic habitat (Offshore - sand, mud, clay, gravel)

Focal Target Description: Benthic substrate in Southern Cook Inlet is generally a smooth bottom, ranging from relatively fine to coarse sands, gravel, cobble and boulder complex. In Northern Cook Inlet predominantly muddy silts, sand with gravel and cobble composite. Benthic substrate in Kamishak Bay ranges from mud, to sand and gravel composition. Inner Kachemak Bay is silty grading to mud and rippled sand in the outer Bay. Outer Kachemak Bay is characterized by shell debris, while the shallow subtidal area is a composite of boulder, cobble and gravel.

Area: Kachemak and Kamishak Bay. South Central Cook Inlet

Nested Target # 1: Scallop

Nested Target # 2: Shrimp

Nested Target # 3: Crabs

Nested Target # 4: Flatfish

Nested Target # 5: Slope rockfish

Target #8: Pelagic waters (Offshore)

Focal Target Description: Pelagic (Offshore 3-D) Pelagic habitat includes several layers of water with distinct characteristics in salinity, density, temperature, and light penetration. These characteristics fluctuate, influenced by weather, bathymetry, tides and currents, as well as terrestrial fresh water runoff provide soft moving substrate and nutrient availability. Area: Southern vs Northern is further discussed, though our discussion may want to focus on Southern? Area: Cook Inlet (all) and the outer coast (up to 12 miles offshore from Cook Inlet east to Cape Fairfield) remains undetermined?

Nested Target # 1: Salmon - adult & migration

Nested Target # 2: Cod & pollock - adult, spawning, juvenile

KPFHP DRAFT CAP PLAN

MARINE TARGET VIABILITY TABLE – WHAT IS THE PRESENT CONDITION OF OUR TARGETS

Conservation Targets		Landscape Context	Condition	Size	Viability Rank
	Current Rating				
1	Salt marsh & estuarine system (Intertidal)	Good	Good	Good	Good
2	Nearshore sediment substrates (Intertidal - sand, mudflats, gravel including pebble, cobble, boulder)	Good	Fair	Very Good	Good
3	Rocky nearshore (Intertidal & Subtidal)	-	Fair	Very Good	Good
4	Canopy kelps (Subtidal)	Very Good	Good	Good	Good
5	Seagrass beds (Subtidal)	Very Good	Very Good	Good	Very Good
6	Reefs (Subtidal & Offshore)	-	Good	Very Good	Very Good
7	Benthic habitat (Offshore - sand, mud, clay, gravel)	Very Good	Fair	Very Good	Good
8	Pelagic waters (Offshore)	-	Good	-	Good
Project Health Rank					Good

KPFHP DRAFT CAP PLAN

MARINE POTENTIAL THREAT TABLE – WHAT MIGHT CAUSE A CHANGE IN VIABILITY RANK IN THE NEXT 10 TO 20 YEARS?

Potential Threats Across Targets		Salt marsh & estuarine system (Intertidal)	Nearshore sediment substrates (Intertidal - sand, mudflats, gravel including pebble, cobble, boulder)	Rocky nearshore (Intertidal & Subtidal)	Canopy kelps (Subtidal)	Seagrass beds (Subtidal)	Reefs (Subtidal & Offshore)	Benthic habitat (Offshore - sand, mud, clay, gravel)	Pelagic waters (Offshore)	Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	8	
1	Tanker/nontank vessel spill	High	Medium	Low	Low	Low	Low		Low	Medium
2	Incompatible shoreline development	Medium	Low	Medium		Low				Medium
3	Beach alteration/ modifications		Medium							Low
4	Pipeline / tank farm spill	Low	Low	Low	Low	Low		Low		Low
5	Chronic contaminant/oil discharges - point sources (platforms, waste treatment)		Low	Low	Low	Low		Low	-	Low
6	Chronic oil discharges - nonpoint (e.g. boats, runoff, production platforms?)		Low	Low	Low	Low		Low		Low
7	Global emissions/ocean acidification		Low					Low	Low	Low
8	Damage from incompatible recreational use	Low				Low				Low
9	Oil spill response		Low					Low		Low
Threat Status for Targets and Project		Medium	Medium	Low	Low	Low	Low	Low	Low	Medium

- Many others noted, with a single target low rank.

KPFHP DRAFT CAP PLAN

Potential Threats to our Partnership's Geography

All of the identified conservation targets are potentially impacted by multiple threats, which act together to alter the ability of habitat to support viable sustainable fisheries. Based on our current understanding of the science, the complexity habitat types and those roles, potential threats and history of impacts, the marine science team members collectively ranked the highest critical threats as:

1. Large Scale Oil Spill - Petroleum Discharge (Oil/Gas)
2. Incompatible shoreline development
3. Beach Armoring

Oil Spill Prevention

Objective: Assist in the prevention of large scale oil spills in Cook Inlet. Ensure all available measures are currently in position and being exercised to prevent rather than respond to a large scale oil spill. In the event of a spill, assure no long-term impairment (see KEAs) of vulnerable coastal and marine habitats.

Target: All marine habitats identified here are potentially impacted by a large scale spill/discharge. However, those habitats most likely to incur the greatest or prolonged impact are 1) salt marsh and estuaries, 2) near shore sediment substrates, and 5) nearshore sea grasses and vegetation.

Nested Targets: Include but are not limited to larval and juvenile stages of anadromous, forage, ground fish and invertebrates species. Numerous species of epi-vegetation and flora, countless infaunal species as well as water quality, all of which influence marine species productivity. The more permeable substrates listed here have the capacity to absorb and retain oil in substrate, thus increasing the impact as well as influencing the ability to restore to original condition.

Key Attribute: These nearshore habitats are essentially fisheries nurseries. Large numbers of species are represented within these categories and guilds, where they spawn, rear, feed, inhabit or migrate through these marine waters and habitats types during some life history phase.

Key Potential Threat(s): Decreases in habitat complexity and loss of productivity will ultimately degrade the sustainability of many of the populations of fish and the vegetative and nutrient sources that provide the habitat complexity defining our current understanding of these areas as fisheries nurseries.

Overarching Approach: Conduct an assessment of currently existing measures to prevent and respond to oil spills from these sources in regional marine waters. Consult

KPFHP DRAFT CAP PLAN

with regional expertise (Agencies, NGOS, Operators) to receive briefings and come to a better understanding of current needs and approaches in this discussion. Identify, more clearly who/what entities are responsible for identifying what oil production and transportation infrastructure are currently in operation or non- operational.

In currently active operations such as platforms, vessels and pipelines, learn what are the currently existing organizations, mechanisms and planning processes established to prevent and respond to large scale oil spills, discharges or near misses. On inactive operations, platforms and pipelines, learn what existing organizations are already established to monitor the condition of currently non-operating infrastructure.

Incompatible Shoreline Development

Objective: To assure no long-term impairment of vulnerable coastal habitats from incompatible shoreline development. Low impact near shore development is achievable when marine ecosystem processes and associated floral and faunal populations are considered in the early design of projects. Alterations to current and tidal regimes and influences on nearshore substrates and associated populations can be minimized in marine nearshore processes. Properly designed development can minimize long term impacts when implemented with marine ecosystem services and processes in mind.

Target: Intertidal marine habitats most likely to incur the greatest or prolonged impact from large scale development actions described here are, 1) salt marsh and estuaries, 2) near shore sediment substrates, and 3) nearshore sea grasses and vegetation beds.

Nested Targets: Of greatest concern are the intertidal and nearshore habitat containing sea grass and eel grass beds. These vegetative substrates are inhabited by countless larval and juvenile stages of anadromous, forage, ground fish and invertebrate species.

Vegetation and associated unconsolidated substrates are sensitive to alterations in intertidal and current regimes, and changes in water quality and characteristics.

Key Attribute: As previously mentioned in the marine discussion, these nearshore habitats are fisheries nurseries supporting large numbers of larval and juvenile and fish and invertebrate species who at some life history stage inhabit, rear, feed, or migrate through these intertidal waters.

Key Potential Threat(s): Depending on the development action, altering natural nearshore marine processes or degradation and fragmentation of marine habitats known to support fisheries population diversity.

Overarching Approach: Lay the scientific foundation for good decision making related to large shoreline infrastructure decisions (e.g. ports). Make the science information available to decision makers and other interested parties while bringing the Cook Inlet marine side into the larger development discussion.

KPFHP DRAFT CAP PLAN

Beach Alteration Strategies

Objective: Protect and maintain productive razor and hard shell clam habitat, especially where those habitat zones have been identified and already facilitate sustainable populations for commercial or non-commercial use.

Ensure all available measures are currently being exercised to prevent further degradation and alteration to these unconsolidated substrates. Assure no long-term impairment (see KEAs) of vulnerable coastal and marine habitats.

Target: Numerous combinations of substrate components/composition provide marine habitat for clam species in Cook Inlet and Kachemak Bay. Those habitat types most likely to incur the greatest or prolonged impact from human influenced shoreline development-disturbances are 1) salt marsh and estuaries, 2) near shore sediment substrates, and 3) nearshore sea grasses and vegetation.

Nested Targets: Razor and hard shell clam species, also include but are not limited to larval and juvenile stages of some fish and invertebrates species. Numerous species of flora, vegetation and numerous faunal species (infauna and epifauna).

Key Attribute: Intertidal unconsolidated sediment substrates.

Key Potential Threat(s): Beach alteration, disruption of larval transport, settling, feeding, and mobility. Incompatible structures and activities along the beach can disrupt sediment and nutrient transport, composition, distribution and quality thereby minimizing and degrading habitat values due to fragmentation. Clams, especially larval and juvenile stages are sensitive and subject to impacts when sediment substrates are altered or become impenetrable. Incompatible activities and/or structures can alter larval transport and settling to beaches. Sedimentation can suffocate clams. The identified strategies will be supported by the partnership and could be funded in whole by the partnership.

Overarching Approach –In response to incompatible structures and activities we need to gain a more thorough understanding of factors that impact clam populations including: larval transport and circulation patterns within and between Cook Inlet and Kachemak Bay, spawning, larval settling, juvenile survival and growth. Update and/or develop management plans to address structures and activities that are incompatible with razor clam habitats. Develop an outreach program that communicates the conservation and protections measures required for maintaining clam habitat. .