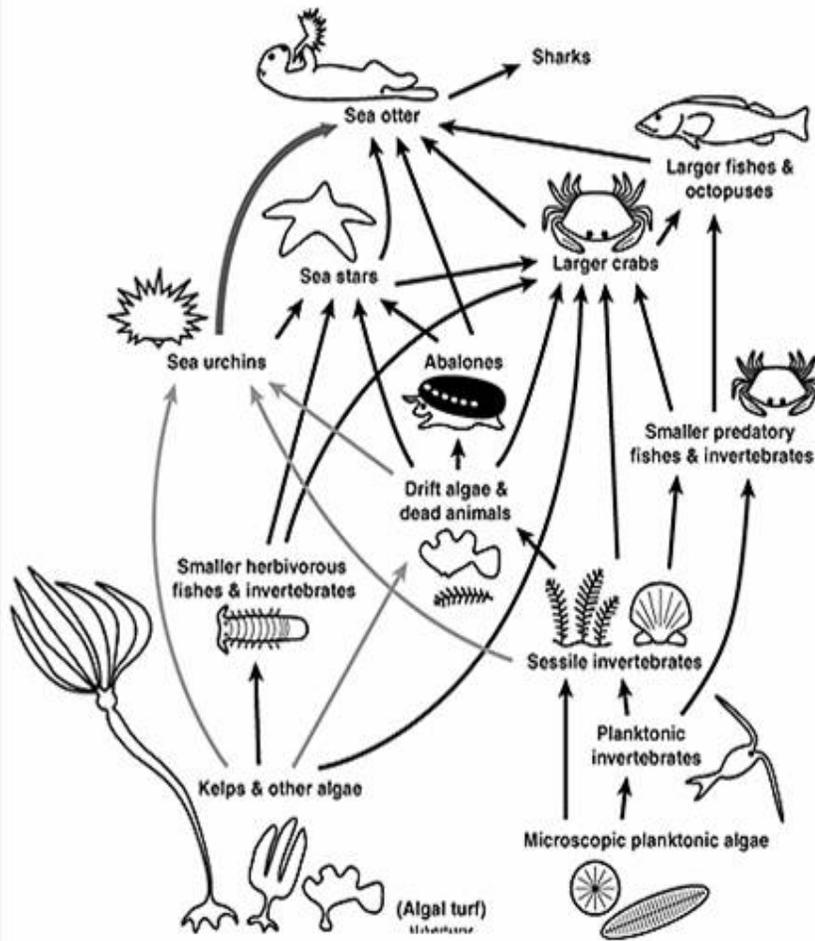


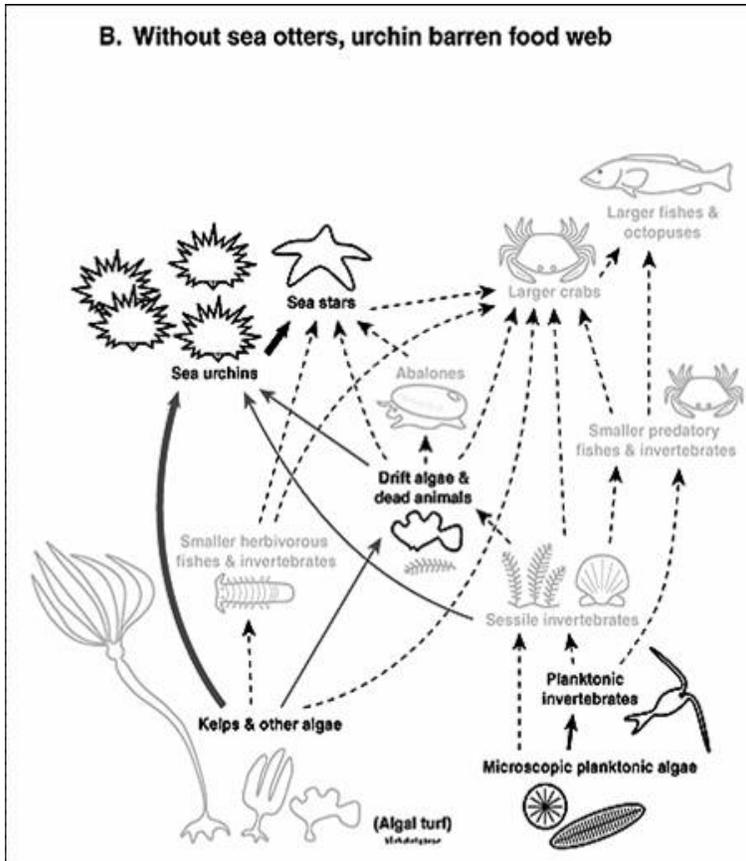
## Student Resource 2: Keystone Predators of Glacier Bay

A. With sea otters, kelp forest food web



Sea otters are well documented as *keystone predators* in nearshore rocky marine communities. The prey of sea otters includes a variety of clams, sea urchins, crabs, and other underwater animals living in the soft-bottom sediments. When sea otters are present in healthy numbers, the ecosystem is said to be "kelp-dominated." Sea otter predation keeps sea urchin populations in check. With grazing by these animals limited, attached kelps dominate primary production. A "kelp-dominated" ecosystem is characterized by high diversity and biomass of red and

brown kelps that provide structure in the water column and habitat for invertebrates and fishes that, in turn, support higher levels on the food chain, such as other fishes, birds and mammals.



Once sea otters are removed from the kelp-dominated system, sea urchin populations explode, increasing in density, mean size and total biomass. Expanding urchin populations exert increasing grazing pressure on the kelp forests. These aquatic herbivores chew off the attachments keeping attached kelp such as bull kelp in place causing them to die and float away. This decimates kelp beds and sets off a chain reaction that depletes the food supply for other marine animals and in turn causes their decline. Such an ecosystem, often referred to as an “urchin barren” is characterized by abundant and large sea urchin populations, a lack of attached kelps and the

habitat structure they provide, and reduced abundances of kelp-dependent invertebrates, fishes and some higher trophic level fishes, birds and mammals.

Adapted from the following resources:

Alaska Science Center:

[http://www.absc.usgs.gov/research/sea\\_otters/pdf\\_files/GLBA\\_ANN\\_RPT\\_2002\\_final.pdf](http://www.absc.usgs.gov/research/sea_otters/pdf_files/GLBA_ANN_RPT_2002_final.pdf)

Counting Calories for Sea Otters <http://www.seaotters.org/theraft/index.cfm?DocID=122>

Oceaninfo Sea otters, *Enhydra lutris*.htm (on powerpoint CD)

Otternet: Species Profile – Sea Otter <http://www.otternet.com/species/seaotter.htm>

Sea Otters <http://www.peninsulaclarion.com/kids/seaotter.shtml>

Washington Department of Fish and Wildlife: Species Concern – Final Washington State Sea Otter Recovery Plan <http://wdfw.wa.gov/wlm/diversty/soc/recovery/seaotter/>