

New Management Challenge in Alaska – Octopus!

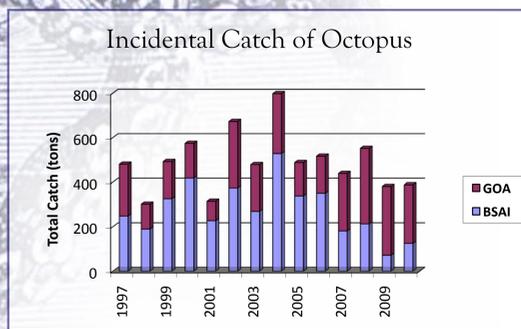


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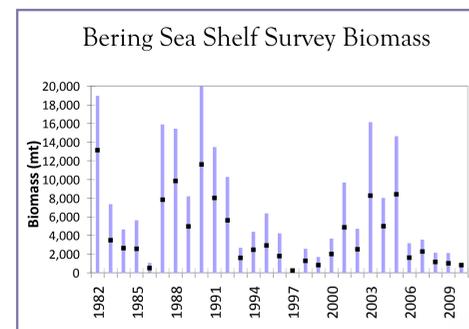
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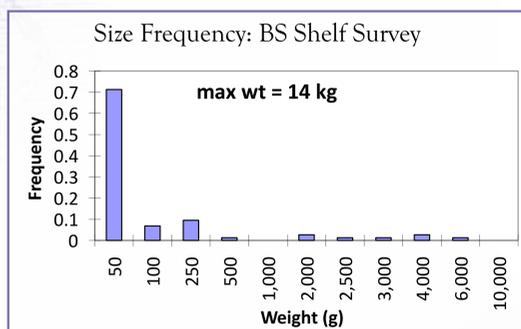
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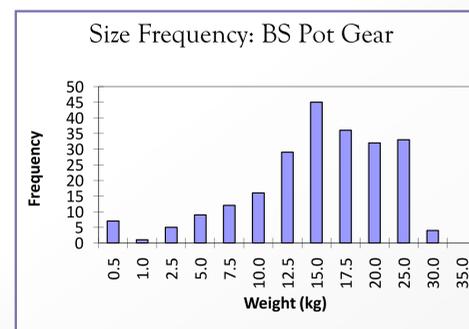
a) Incidental catch of octopus in federal fisheries in Alaska (all species).



b) Bering Sea shelf bottom-trawl survey estimates of octopus biomass (all species), with standard error bars.



c) Size frequency (by weight) of octopus from the 2008 - 2010 AFSC Bering Sea Shelf surveys.



d) Size frequency (by weight) of octopus taken by pot gear in Bering Sea groundfish fisheries.



Developing Methods for Octopus Management:

A review of available information indicates that octopus will have to be assessed by methods different from those used for groundfish. Research is currently being conducted on an octopus-specific fishing gear for index surveys, alternative methods for modeling population production, and reproductive physiology and seasonality in Alaskan waters. A method for tagging octopus with Visible Implant Elastomer (VIE) tags has been developed, and is being used to examine seasonal movements, local abundance, and natural mortality rates. Assessment scientists are looking at the use of food-web models to estimate the natural mortality of octopus populations.



AFSC Kodiak biologist Christina Conrath wrestles a giant Pacific octopus into weighing basket. (photo by Dave Kubiak)



Ovary of mature female octopus (photo by Christina Conrath)



A female octopus guards eggs in a den (photo by Reid Brewer)

Octopus in Alaskan Fisheries:

With increasing emphasis on ecosystem management, federal regulation of fisheries in Alaska has expanded to include assessment and regulation of catch of non-target species. Beginning in 2011 in the Bering Sea, there will be separate catch limits for several groups in federal fisheries, including octopus (all species). There is no directed fishery for octopus at present, but octopus are taken as incidental catch in a number of different groundfish fisheries, especially the Pacific cod pot fishery (see charts). Octopus are often retained for use or sale as bait, and there is an increasing international market for food octopus. Because of the unique physiology and life history of cephalopods, it is very difficult to assess octopus and squid stocks with usual groundfish models. Most groundfish are assessed using age-structured models calibrated to fishery-independent survey estimates of biomass, but much of the information needed to build such a model is not available for octopus. AFSC scientists are working to develop alternative methods to determine suitable management and catch limits for an octopus species assemblage. Catch limits for octopus are currently based on historical rates of incidental catch. There is concern that low octopus catch limits from this method may constrain federal Pacific cod fisheries.

Challenges for Octopus Stock Assessment

- Multiple species:** there are at least eight species of octopus found in Alaskan waters, with very different life histories. Commercial catch is primarily giant Pacific octopus (*Enteroctopus dofleini*), but several smaller poorly-documented species are also present.
- Physiology:** octopus have short life spans, (<5 yrs) and rapid growth. All adults die shortly after spawning and egg incubation.
- Aging and Growth:** as yet no method exists for aging giant Pacific octopus. Growth is believed to be highly plastic, depending on temperatures and food supply. There is no equivalent to an age-length or age-weight relationship.
- Seasonality:** The reproductive seasons of octopus in Alaskan waters are unknown. Giant Pacific octopus in Japan show a seasonal, depth-based migration pattern, but whether this occurs in Alaska is unknown. Seasonal movement may cross borders of state and federal regulation areas.
- Poor Estimates of Abundance and other stock assessment model parameters:** Routine bottom-trawl surveys do not sample octopus effectively, and are highly size-selective for smaller animals. Groundfish pots, which take the majority of the catch, select for much larger individuals (see charts). Survey biomass estimates are available, but have very high variance. There is little information from which to estimate parameters such as natural mortality, growth, age at maturity, or stock-recruit relationship.



Getting ready to launch octopus pots. (photo by Liz Conners)



Close up of octopus with VIE tag. (photo by Reid Brewer)



A smaller pot full of a large octopus. (photo by Christina Conrath)



Crewman Don Dumm prepares to launch an octopus habitat pot. (photo by Liz Conners)