



Is there an adequate burrowing shrimp population to support seasonal feeding by the green sturgeon?



Green sturgeon spend the summer in Washington state coastal estuaries such as Willapa Bay. This is the Southern DPS population listed as a threatened species under the Endangered Species Act.



Green sturgeon feed on burrowing shrimp in Willapa Bay. These shrimp are commercially harvested on state owned aquatic lands.



Seining for burrowing shrimp is labor intensive and brought AAMT staff to remote locations in the nearshore.

During the winter and spring months green sturgeon (*Acipenser medirostris*) spend time off the coast in the sub-littoral zone (<100 meter depth). In the summer, they move into Washington state coastal estuaries and are dependent on state owned aquatic lands because their primary food source is burrowing shrimp (*Neotrypaea californiensis*).

In Willapa Bay, WDNR leases some state owned aquatic land for commercial harvest of burrowing shrimp. The shrimp population is also managed by shellfish growers to improve conditions for clam farming by actively applying coarser substrate and pesticides (such as Carbaryl and Imidacloprid) to reduce burrowing shrimp numbers. These practices have raised concerns regarding the food supply for green sturgeon. In April 2014 WDNR suspended commercial harvest of burrowing shrimp. Carbaryl is no longer registered for use on commercial shellfish beds in Washington. The permit for this use was terminated in May 2015. A water quality permit was issued for use of Imidacloprid in Willapa Bay and Grays Harbor in April 2015. This permit was withdrawn in May 2015 at shellfish growers request in response to public concerns.

To estimate the standing stock of burrowing shrimp in Willapa Bay, and the biomass of shrimp consumed by green sturgeon, AAMT developed a three pronged approach. This included beach surveys to sample shrimp biomass; surveys of sturgeon feeding pits to estimate shrimp consumption by sturgeon; and development of a bioenergetics model to estimate how many burrowing shrimp would supply the calories required to meet green sturgeon energy needs. The surveys were conducted over the summers of 2015 and 2016, and the model completed in autumn 2016. Results indicate a standing stock biomass of burrowing shrimp ranging from $2.39 - 7.56 \times 10^6$ kg of shrimp in Willapa Bay with approximately 0.5×10^6 kg consumed annually by green sturgeon. **This would suggest that currently 10,700 green sturgeon are supported by the existing biomass and a maximum of 48,000 could be supported, if shrimp were consumed solely by green sturgeon, and a sustainable population of burrowing shrimp remained.**