

Radiocarbon value as an indicator of carbon sources during breeding of Japanese chum salmon (*Oncorhynchus keta*)

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There has been increasing interest in understanding the responses of Pacific salmon to marine climate variation. Chum salmon (*Oncorhynchus keta*) is the second most abundant salmonid in the North Pacific Ocean, and important for the fisheries in the northern Japan (especially Hokkaido and Iwate). For migrating animals like salmon, breeding strategy would be one of key factors for their sensitivity to changing environments. Do they prepare their eggs from recently ingested nutrients during/after migration to Japan ('income' breeders) or from body stores which are mainly produced in the Bering Sea ('capital' breeders)? Here, to address this important ecological question, we propose radiocarbon analysis as a new useful method to locate oceanic regions where Japanese chum salmon obtained their carbon resource. To our knowledge, this study is the first study to utilize radiocarbon ($\Delta^{14}\text{C}$) value as an indicator of salmon ecology in the ocean. We determined bulk $\Delta^{14}\text{C}$, $\delta^{13}\text{C}$, and $\delta^{15}\text{N}$ values of muscle and gonad (eggs) samples from female chum salmon collected during October-December 2015 at Otsuchi Bay, Japan. We also analyzed bulk $\Delta^{14}\text{C}$ values of plankton net samples collected in the Bering Sea, to constrain the $\Delta^{14}\text{C}$ values of salmon's diets in the Bering Sea. The gonad samples generally showed lower $\Delta^{14}\text{C}$ values, which overlap with the range of the plankton net samples in the Bering Sea. On the other hand, the muscle samples generally showed higher $\Delta^{14}\text{C}$ values, which overlap with the range of fishes collected around Sanriku area, Japan. These results suggest that Japanese chum salmon (at least individuals from Otsuchi Bay) produce eggs mainly using the carbon resource obtained in the Bering Sea before migration to Japan (i.e., capital breeders), while their muscle tissues are affected by feeding around Japan.

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