

Identifying important food sources for fish in Western Port Bay

Fish use a range of habitats for feeding, spawning and shelter from predators. To properly manage fish habitat and provide for sustainable resource use, there is a need to identify those habitats that are critical to fish populations. While it is generally known what habitats fish are seen in and around, the importance of these habitats to food production is not well known.

MAFRI undertook a study to determine which habitats within Western Port Bay were of importance in producing food for fish and of those, which were the most important producers of detritus - the decayed vegetable matter that sustains the food webs in this bay. To do this MAFRI scientists used stable isotope profiles of plants to track the transfer of organic matter through food webs.

Stable isotopes are rare forms of common elements that do not degrade (are not radioactive). Each plant type (eg seagrass, macroalgae) has a unique stable isotopic profile. When plant matter is consumed by an organism, the isotopic signals are altered in a predictable way. Analysis of the isotopic signals can tell researchers which types of vegetation were initially consumed; whether the fish directly consumed the vegetation or was an indirect consumer (eg the fish eats other organisms which in turn ate the plant) and the degree of reliance on one particular vegetation type.

MAFRI scientists used two stable isotopes, ^{13}C and ^{15}N to distinguish between all major vegetation types in Western Port Bay. Stable isotope profiles were also taken from eight fish species selected because they are either targeted by or regularly caught by recreational and commercial fishers in Western Port Bay.

MAFRI scientists identified, for the first time, that in addition to *Zostera/Heterozostera*, the seagrass *Amphibolis* makes a significant contribution to fish food webs in Western Port Bay. This result was surprising because *Amphibolis* is found only in the deeper waters at the exposed entrances of the bay. Garfish, yellow-eye mullet and sand flathead, are pelagic/benthic feeders dependent on *Amphibolis*, seagrass epiphytes, zooplankton and green algal detrital webs.

While the study confirmed that seagrass is an important food source for fish in Western Port Bay, it showed that none of the fish species examined were exclusively dependent on it. Seagrass epiphytes were identified as an equally important food source for seven of the eight species studied. King George whiting, flounder, grass whiting and rock flathead are primarily benthic feeders ultimately dependent on *Zostera/Heterozostera* and *Amphibolis*.

Algae were also found to make a significant contribution to fish food webs in Western Port Bay particularly for pelagic piscivore species such as Australian salmon.

The smallest contributions to fish food webs in Western Port Bay were made by mangroves and saltmarsh.

The results of the study highlight the importance of the seagrass and algal complexes within Western Port Bay for fish production.

The study was funded by Fisheries Victoria and arose from the priority research directions specified by Fisheries Victoria's Fish Habitat Assessment for Western Port Bay.