IMPACTS OF SEDIMENT ON TUNA SHORTFIN EEL

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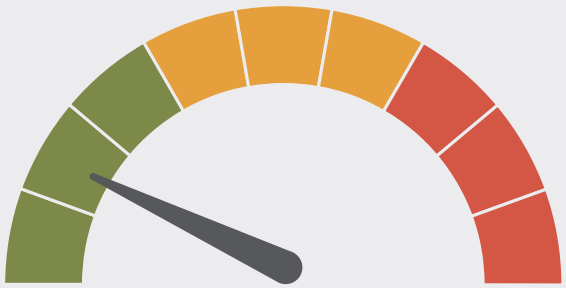
Sediment can affect māhinga kai by influencing habitat, behaviour, feeding, growth and survival.

Background on tuna shortfin eel (*Anguilla australis*)

Tuna shortfin eels are widely distributed in rivers, lakes, wetlands and estuaries throughout Aotearoa New Zealand[1]. However, they are found mostly in the lowlands and don't penetrate as far upstream as longfin eels[2]. Shortfin eels often occur in dense concentrations and usually considerably outnumber longfin eels in the same area[3]. Shortfin eels are also found in eastern Australia, Tasmania and throughout the South Pacific[4]. Male shortfin eels mature after around 15 years[5]. Larger, heavier shortfin eels are typically females, which don't mature until around 30 years of age[6]. Like longfin eels, mature shortfin eels migrate to somewhere near the western subtropical Pacific islands to spawn[7]. Shortfin eels only reproduce once before they die, so any eels in freshwater have never spawned[8].

Tuna shortfin eel (*Anguilla australis*)

Tuna shortfin eel sensitivity to elevated sediment



Why? Few, if any, negative effects on habitat suitability, feeding or growth.

Low Medium High

Prepared by Mike Hickford, Michele Melchior and Melanie Mayall-Nahi from NIWA for Our Land and Water National Science Challenge, February 2023. Image of shortfin eel by NIWA.

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Effects of suspended sediment on tuna shortfin eel	
Habitat	Shortfin eels are well adapted to cope with, or to avoid, the direct toxic effects of suspended solids. One study showed that the abundance and condition of shortfin eels was greater in a turbid lake than in a nearby clearer lake[9].
Behaviour	Shortfin glass eels migrate into very turbid waters during flood events[10]. In fact, high turbidity may provide cover for glass eels to migrate during daylight hours rather than just at night[10]. Turbid waters are unlikely to impede the migration of elvers from coastal areas into adult habitat because elvers do not avoid even extremely high turbidities in experiments[11]. In some situations, migrating elvers appear to be attracted towards turbid tributaries[12].
Feeding	Shortfin eels mainly feed at night[13, 14], using their sense of smell for general detection of food and a combination of smell, touch, taste and sight for determining the specific location of prey[15]. Smaller shortfin eels (<300 mm) feed primarily on aquatic invertebrates but they eat more fishes as they grow[16]. Larger shortfin eels (>500 mm) eat fish almost exclusively[16]. Shortfin eel feeding is not greatly dependent on sight and they can feed actively during turbid flood conditions[17]. Aquatic invertebrates are more important in their diet in turbid waters, but fishes are more important in clearer water[18].
Growth	Shortfin eels in a highly sedimented lake were in better condition than those in a nearby clearer lake[9]. This was most likely due to the increased abundance of an important prey item in the turbid lake[9]. The increased growth of shortfin eels in the turbid lake meant that they reached commercial weight (220 g) at a smaller length[9] and age[5] than eels in the clearer lake.
Survival	Direct effects unknown.

Effects of deposited sediment on tuna shortfin eel	
Habitat	Distance upstream is the most influential factor on the distribution of smaller shortfin eels (<300 mm); they are much more common in lowland areas[2]. However, the character of the riverbed is also important for smaller shortfin eels (<300 mm)[19]; the biomass of small shortfin eels is greater in areas with finer substrates[3] such as runs during the day and pools at night[13]. It is unlikely that an increase in deposited sediment will restrict the habitat of shortfin eels.
Behaviour	Direct effects unknown.
Feeding	Direct effects unknown.
Growth	Direct effects unknown.
Survival	Direct effects unknown.

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