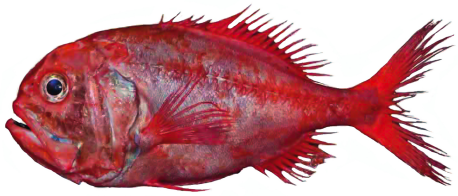


SUSTAINABLE FISHING: ORANGE ROUGHY

Orange Roughy Ecology & Fishing:

Classification and name

Orange Roughy belong to the Trachichthydae family. Orange Roughy were originally known by the name 'Slimehead' but were renamed Orange Roughy as this was thought to be a more marketable name. Can you imagine ordering 'Slimehead' at a fancy restaurant?



Scientific name: *Hoplostethus atlanticus*

Common name: Orange Roughy

Other name(s): Slimehead, Deep Sea Perch, Red Roughy

Habitat and Distribution

Orange Roughy are found deep in oceans around the world. They like to live in water over steep continental slopes and ocean ridges [beyond the continental shelf]. Orange Roughy can be found at depths of 750 to 1200 metres right around Aotearoa New Zealand, although the largest fisheries are south of the middle of the North Island. In Australia, Orange Roughy are found deep in in depths of 700 – 1400 metres around the bottom half of the country.

Characteristics

Orange Roughy are typically 30 – 50cm in length but can grow to 75cm in length. They typically weigh 0.8kg up to 3.5kg, although have been known to be as heavy as 7kg.

Life cycle

Orange Roughy are slow growing. In Aotearoa New Zealand Orange Roughy are thought to start reproducing at 23 to 31 years of age. In Australia, it is thought to be

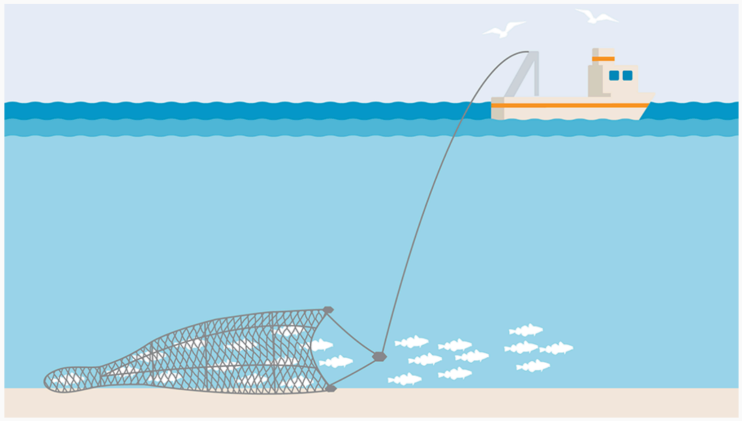
27-32 years of age. Orange Roughy reproduce by spawning. Females spawn [release eggs] into the water over the period of about a week. Males spawn for a 1-2 week period. In Aoteaora New Zealand spawning happens between June and August and in Australia spawning occurs in July and August.

Food web

Orange Roughy prey on squid, viperfish, lanternfish, whiptails, crustaceans, amphipods and mysids – all of which are either bentho-pelagic [moving between the seafloor and upper water column] and meso-pelagic [mid-water] creatures. Predators of Orange Roughy include sharks and toothed whales. In Australia Orange Roughy are known to be eaten by oilfish and large basketwork eels.

Fishing method

Orange Roughy are caught by bottom trawling.



Bottom Trawling

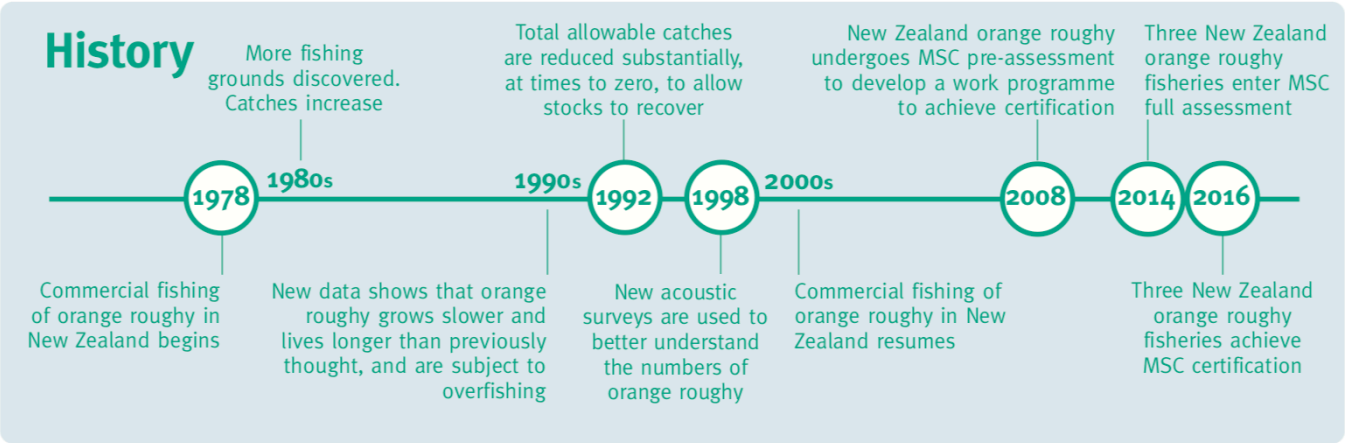
Cooking Orange Roughy

Orange Roughy has a mild flavour and flesh holds together well when cooking. Orange Roughy are popular as they can be cooked using a variety of methods. Orange Roughy are deep-skinned to remove a layer of oily wax under the skin.

Fishery Management

In the 1980s and 1990s Orange Roughy were overfished – to the point that the fishery collapsed! Australian Orange Roughy stocks are still rebuilding. In Aotearoa New Zealand, Orange Roughy stocks have rebuilt to the point that 60% of Aotearoa New Zealand's Orange Roughy catch has been certified by the Marine Stewardship

Council. The timeline below shows the history of Orange Roughy fisheries in Aotearoa New Zealand.



Environmental considerations

Orange Roughy are susceptible to overfishing due to the length of time that it takes for them to reach a reproductive age. For this reason bycatch of small and juvenile fish needs to be limited. Orange Roughy are caught using the 'Bottom Trawling' method that can impact on special habitats and species such as deepwater corals and sponges.

More reading for the experts

- Check out the Southern Fried Science article called 'A slimehead by any other name should never be on your plate'
- Marine Stewardship Council description of Bottom Trawling
- Deepwater Group paper by Cordue, P. L. called The Story of New Zealand Orange Roughy
- Marine Stewardship Council Track a Fishery: New Zealand Orange Roughy



Orange Roughy Ecology: OBSERVATION WORKSHEET

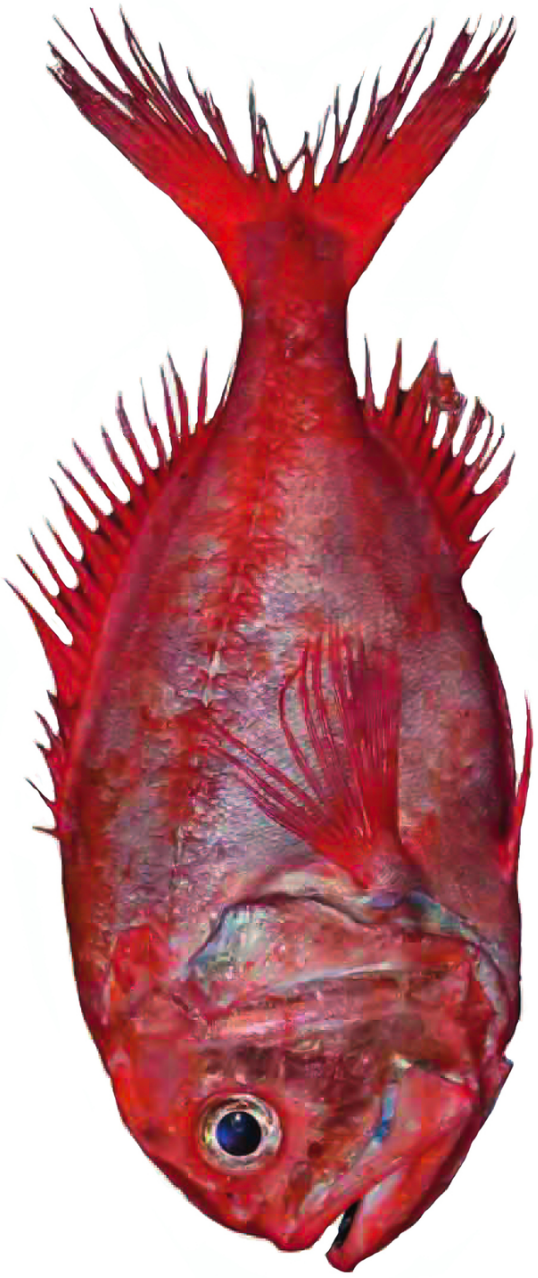
Decode the orange roughy: How well do you observe?

(a) Look at the orange roughy picture on the next page. Use 2.5 Scientific keys fish adaptations and see what you can determine about this fish. Add your notes in the box below titled Observed Adaptations.

Observed Adaptations

(b) Draw your own picture (or use the picture on the next page). Add the following labels:

- ☐ Eye
- ☐ Mouth
- ☐ Gill
- ☐ Caudal or tail fin
- ☐ Dorsal fin
- ☐ Lateral line
- ☐ Pectoral fins
- ☐ Anal fin
- ☐ Pelvic fin





Orange Roughy Ecology: WORKSHEET

How well did you read?

(1) Classification and name: Which of the following is not another name for Orange Roughy?

a. Slime head
b. *Hoplostethus atlanticus*
c. Deep Sea Perch
d. Blue Roughy

(2) Habitat and Distribution: Orange Roughy can be found at depths of 750 to 1200 metres right around _____.

a. Aotearoa New Zealand
b. The South Island only
c. Great Britain
d. Australia

(3) Life cycle: Orange Roughy are _____ growing.

a. fast
b. slow
c. very fast
d. quick

(4) Life cycle: Orange Roughy reproduce by _____.

a. Giving birth to live young
b. Spawning

(5) Food web: _____ of Orange Roughy include sharks and toothed whales.

a. Parents
b. Prey
c. Predators
d. Producers

(6) Fishing method: Orange Roughy are caught by _____.

a. Purse Seining
b. Long lining
c. Drift netting
d. Bottom Trawling

(7) Fishery Management: In the 1980s and 1990s Orange Roughy were _____.

a. Under-fished
b. Overfished
c. Sustainably fished



Orange Roughy Ecology: EXPERT WORKSHEET

Conduct your own research to answer the questions below. These webpages are a starting point:

- Seafood New Zealand webpage: Orange Roughy
- Fisheries New Zealand webpage: Orange Roughy
- Australian Fisheries Management Authority webpage: Orange Roughy
- Marine Stewardship Council webpage: New Zealand Orange Roughy

QUESTIONS

(a) What is the scientific name of Orange Roughy?

(b) What fish family does orange roughy belong to?

(c) How fast do Orange Roughy grow and how long does Orange Roughy live for?

(d) How deep and where around the country are Orange Roughy found?

(e) How do Orange Roughy reproduce? How old are Orange roughy when they reproduce?

(f) Prey: What do Orange Roughy eat? Predators: What eats Orange Roughy?

(g) What fishing method is used to fish for Orange Roughy?

(h) What happened to Orange Roughy fisheries in the 1980s and 1990s?

(i) What happened to three New Zealand Orange Roughy fisheries in 2016?

(j) What bycatch or environmental impacts exist for Orange Roughy fisheries?

(k) How are Orange Roughy cooked and eaten?

(l) How might lack of understanding about the life and reproductive cycles of Orange Roughy contribute to the fisheries collapse in the 1980s and 1990s?

(m) How has the sustainability status of Orange Roughy changed over time?



TEACHER ANSWERS & NOTES

Orange Roughy Ecology: WORKSHEET ANSWERS

How well did you read? Answers:

(1) d
(2) a
(3) b
(4) b
(5) c
(6) d
(7) b

Orange Roughy Ecology: EXPERT WORKSHEET ANSWERS

(a) What is the scientific name of Orange Roughy? *Hoplostethus atlanticus*

(b) What fish family does orange roughy belong to? *Trachichthyidae family (roughies)*

(c) How fast do Orange Roughy grow and how long does Orange Roughy live for? *Orange Roughy grow slowly and live for 130 years (although the oldest one discovered is estimated at 149 years)*

(d) How deep and where around the country are Orange Roughy found? *Found at depths of 750 – 1200 metres in Aotearoa New Zealand on the Chatham Rise, off the coast of Gisborne to Kaikoura, off South Westland and on parts of the Challenger Plateau off the West Coast. Around the lower parts of Australia at depths of 700 – 1400 metres.*

(e) How do Orange Roughy reproduce? *Spawning [fish congregate and eggs / sperm are released over a one to two week period]* How old are Orange roughy when they reproduce? *Orange Roughy are slow growing. In Aotearoa*



New Zealand Orange Roughy are thought to start reproducing at 23 to 31 years of age. In Australia its thought to be 27-32 years of age.

(f) Prey: What do Orange Roughy eat? *Orange Roughy prey on squid, viperfish, lanternfish, whiptails, crustaceans, amphipods and mysids – all of which are either bentho-pelagic [moving between the seafloor and upper water column] and meso-pelagic [mid water] creatures.* Predators: What eats Orange Roughy? *Predators of Orange Roughy include sharks and toothed whales. In Australia Orange Roughy are known to be eaten by oilfish and large basketwork eels.*

(g) What fishing method is used to fish for Orange Roughy? *Bottom Trawling*

(h) What happened to Orange Roughy fisheries in the 1980s and 1990s? *The fishery was overfished and collapsed.*

(i) What happened to three New Zealand Orange Roughy fisheries in 2016? *Were certified as sustainable by the Marine Stewardship Council.*

(j) What overfishing, bycatch or environmental impacts [if any] are associated with Orange Roughy? *Because they are slow growing Orange Roughy have shown themselves to be susceptible to overfishing and for this reason it is important that bycatch does not impact small and juvenile fish. Vulnerable habitats and species such as deepwater corals and sponges on the seafloor can be impacted by bottom trawling.*

(k) How are Orange Roughy best cooked and eaten? *Orange Roughy are popular as they can be cooked using a variety of methods.*

(l) What were Orange Roughy previously known as and why did their name change? *Orange Roughy were previously known as 'Slime head'. Their name changed to they would sound nicer on the menu.*



(m) Think about the life cycle and reproduction of Orange Roughy. How do you think a lack of understanding about their life and reproductive cycles may have contributed to the fisheries collapse in the 1980s and 1990s? *The fact that Orange Roughy are so slow growing and so slow to reproduce means that if too many fish are taken then it takes a long time for fish populations to rebuild.*

EXTENSION IDEAS

NOTE: Orange Roughy are explored further in Topic 3 – looking at the role of Science in determining sustainable levels for fish harvest

1. Make a poster using the worksheet headings as a guide.
2. What else would you still like to know about Orange Roughy. Research it!
3. Investigate one or more fish species amongst those certified by the MSC in your country / region and complete the following:

   (a) Go to the MSC website and search your country name. Find the name of a fishery from your country that the MSC has been working with. (If there aren't any fisheries from your country then pick a neighbouring country.)

   (b) Look at pictures of the fish (or a real fish from the supermarket). Complete an observation activity like the one completed here to determine likely habitat and look at characteristics and adaptations of the fish.

   (c) Research the story of this fishery using the Orange Roughy Worksheet headings as a guide.