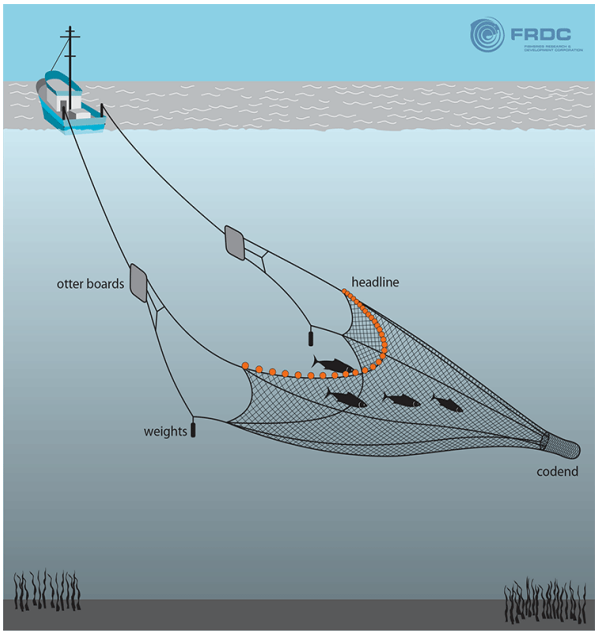
Midwater Trawling



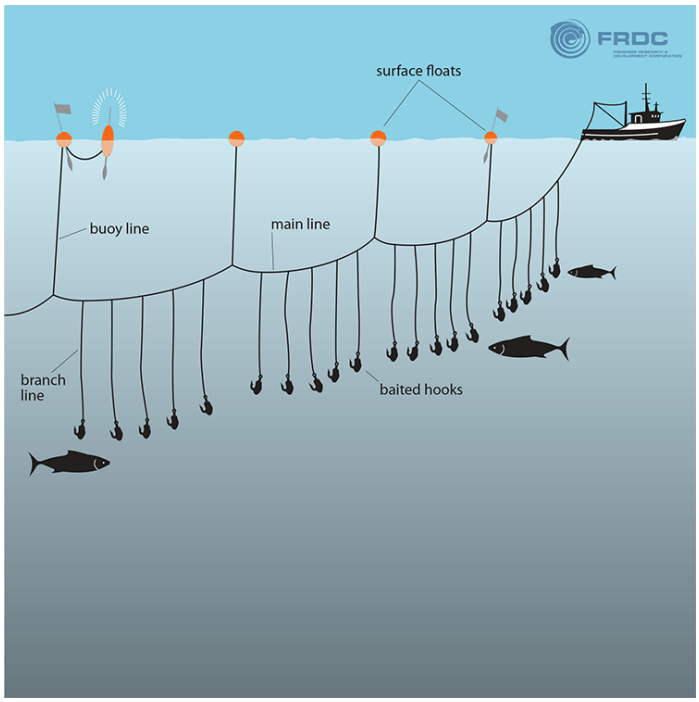
Description:
Midwater trawling is a fishing technique used to target pelagic fish species, such as tuna and mackerel, swimming in the open ocean. Specialised nets, lighter in construction and equipped with a wide mouth, are towed by fishing vessels. The trawl boards and a long bridle maintain the net's horizontal spread, while flotation devices on the headline and weighted footropes ensure its vertical positioning. Skilled fishers control the net's depth by adjusting the length of the warp and vessel speed. This method is vital for the commercial fishing industry in NSW, contributing to the capture of pelagic fish species that are highly sought after in the region.

Energy footprint:
This method, while essential for seafood supply, carries an energy footprint due to the use of fishing vessels powered by fossil fuels. These vessels tow nets across considerable distances, resulting in greenhouse gas emissions. However, many vessels are transitioning to cleaner and more energy-efficient technologies, lessening their environmental impact. The ongoing evolution of this method towards greater sustainability highlights the industry's efforts to balance its impact on the environment with the necessity of feeding communities with high-quality seafood.

Habitat footprint:
Midwater trawling in NSW, which exclusively targets fish in the water column, does not have a direct impact on the ocean floor or benthic habitats. This method primarily focuses on pelagic species in open water, which helps to preserve the seafloor and benthic environments, making it a habitat-friendly fishing technique.

Bycatch footprint:
Midwater trawling in NSW can unintentionally capture non-target species. While the primary focus is on pelagic fish in the water column, this method can result in the capture of some non-targeted species. However, proactive efforts are in place to minimise bycatch. These efforts include the use of improved fishing gear and better sorting techniques on board, ensuring that as much bycatch as possible is returned to the ocean alive. These initiatives aim to reduce the ecological impact and biodiversity loss associated with midwater trawling, promoting a more sustainable and responsible approach to fishing in the region.

Drifting Longlining



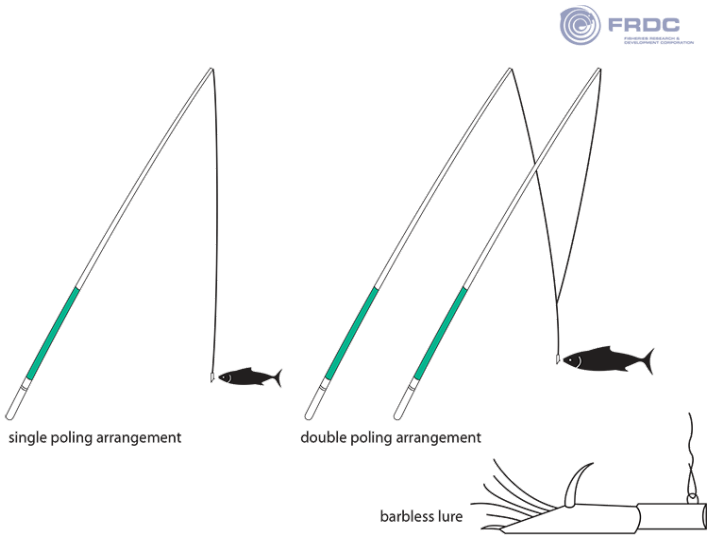
Description:
Drifting longlining is a fishing method where a main fishing line, often several miles long, is set suspended horizontally out in the water with smaller lines (branch lines) attached to it at intervals. Each branch line has a baited hook designed to catch a specific species of fish. Longlining is commonly used to target high-value species, like tuna, Marlin or Swordfish.

Energy Footprint: Drifting longline fishing carries a moderate energy footprint. It involves vessels deploying longlines with baited hooks that drift along the ocean surface. Although less energy-intensive than some other methods, the process still relies on fuel-powered boats. These vessels need to cover extensive areas of open water, contributing to energy consumption and associated emissions.

Habitat footprint: Longlining has minimal direct impact on marine habitats since the lines are typically suspended in the water column and don't make contact with the seabed. However, every now and then lost or abandoned longlines can become 'ghost gear,' leading to unintended ecological consequences. However, technological advances allowed for satellite tracking to monitor gear in real time and improve its traceability or employ biodegradable materials in gear design that can contribute to mitigation efforts if gear is lost.

Bycatch footprint: In the past, drifting longlining was associated with significant bycatch issues, unintentionally capturing non-target species. However, recent advancements in fisheries technology have revolutionised the industry. Innovations such as circle hooks, bird-scaring lines, hook timers, GPS, and sonar integration, and other bycatch avoidance devices have significantly reduced bycatch rates. These measures are promoting a more sustainable approach to drifting longline fishing, mitigating the ecological impact on non-target species.

Pole-and-Line Fishing



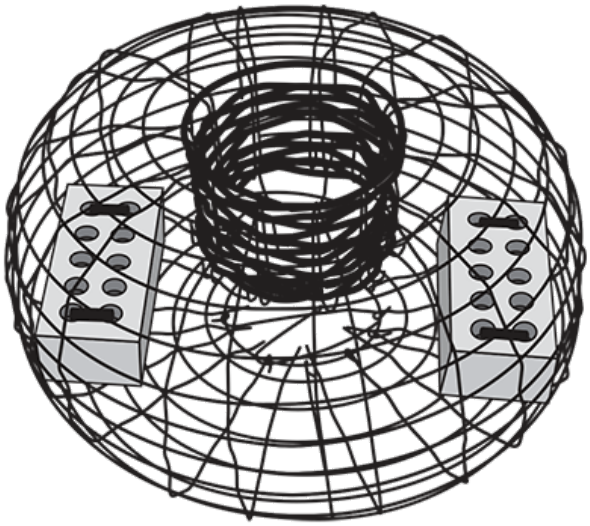
Description: Pole-and-line fishing is a selective method of fishing where individual fish are caught using a hook attached to a pole. The technique is often used to catch surface-swimming species like tuna and mackerel. Fishers usually use live bait to attract the target species to the surface and then manually hook them. This method is highly labour-intensive. As fish are hooked on the lure, they are hauled over the fisher's shoulder onto the deck. Larger fish are taken using a double poling arrangement, operated by two fishers.

Energy footprint: Pole and line fishing boats generally have a lower energy footprint compared to larger commercial vessels. They use manual labour to catch fish one at a time, reducing fuel consumption and emissions. This eco-friendly approach results in a smaller carbon footprint, making pole and line fishing an energy-efficient method of catching fish.

Habitat footprint: Pole and line fishing has a minimal ecological impact on the water column habitat as it involves selective, targeted fishing.

Bycatch Impact: Pole and line fishing typically has a low bycatch footprint, primarily due to its selective nature. This method involves targeting specific species, minimising the unintentional capture of non-targeted marine life. As a result, the bycatch, or incidental catch of non-targeted species, is relatively low. In addition, fishers can quickly release non-target species back into the ocean, usually unharmed.

Trap or Pot Fishing



Description:
Trap or pot fishing is a fishing method that involves using baited traps or pots to catch target species. These traps are usually made from wire or wood and are designed to allow fish or crustaceans to enter but not to escape. The method is commonly used to catch species like crab, lobster, long finned eel and certain types of fish. The traps are placed on the seabed and are marked by buoys for easy retrieval.

FRDC Image: Beehive pot trap.

Energy Impact: Trap or pot fishing vessels, often used for lobster fishing, generally have a moderate energy footprint. These vessels use energy for propulsion and hauling traps, but the impact is less compared to larger, more mechanised fishing operations. The pots or traps are set and retrieved manually or with minimal mechanical assistance, resulting in relatively lower energy consumption and emissions.

Impact on Habitat:
Trap or pot fishing has minimal impact on marine habitats. The traps are designed to be placed on the seabed and are usually retrieved carefully, ensuring that the surrounding ecosystem is not disturbed. This method is considered to have a very low impact on the benthic environment.

Bycatch Impact:
Bycatch is typically low in trap or pot fishing. The traps are specifically designed and baited for the target species, reducing the likelihood of catching non-target species. Even if bycatch occurs, the animal can often be released unharmed.

Oyster farming

Description: Oyster farming is the cultivation of oysters in controlled aquatic environments. Oyster larvae are typically raised in hatcheries, then transferred to designated growing areas, often in estuaries or coastal waters. They grow on racks, bags, or trays, suspended in the water to protect them from predators. Oysters filter feed on plankton, improving water quality. The farming process involves regular maintenance, monitoring of water conditions, and periodic harvesting of mature oysters. Oyster farming is a sustainable aquaculture practice, contributing to seafood production and enhancing the ecological health of the water bodies in which it occurs.

Energy footprint: Oyster farming practices generally have a low energy footprint. These operations primarily rely on natural environmental conditions, such as tidal flows and nutrient availability, to cultivate oysters. There is some mechanical equipment that uses fuel, like small boats for maintenance and harvest and heavy machinery to transport equipment. Energy consumption is also used for hatchery operations, water quality monitoring, and transportation. Overall, the energy footprint of oyster farming is relatively low, making it an environmentally efficient and sustainable method of aquaculture.

Habitat footprint: Oyster farming typically has a positive habitat impact. Oyster reefs created by these farms provide habitat for various marine species and help improve water quality through oyster filtration. Oysters filter and stabilise sediments, enhancing benthic habitats. While some localised environmental effects, such as changes in sediment composition, can occur, well-managed farms often promote biodiversity and contribute to overall habitat restoration and ecosystem health in coastal areas.

Bycatch Impact: Bycatch is generally not a concern in oyster farming as the species are intentionally cultivated.

Environmental Impacts from food production

	BEEF 	CHICKEN 	PORK 	SOY 	CAPTURE FISH 
WATER	high	high	high	high	none
PESTICIDES	high	high	high	high	none
ANTIBIOTICS	high	high	high	none	none
SOIL EROSION	high	high	high	high	none
CARBON	high	some	some	low	variable
BIODIVERSITY LOSS	high	high	high	high	low

Data from: Ray Hillborn presentation,Seafood Directions 2022