

# Marine Capture Fisheries: Best Practices for Aquatic Animal Welfare

Second Edition

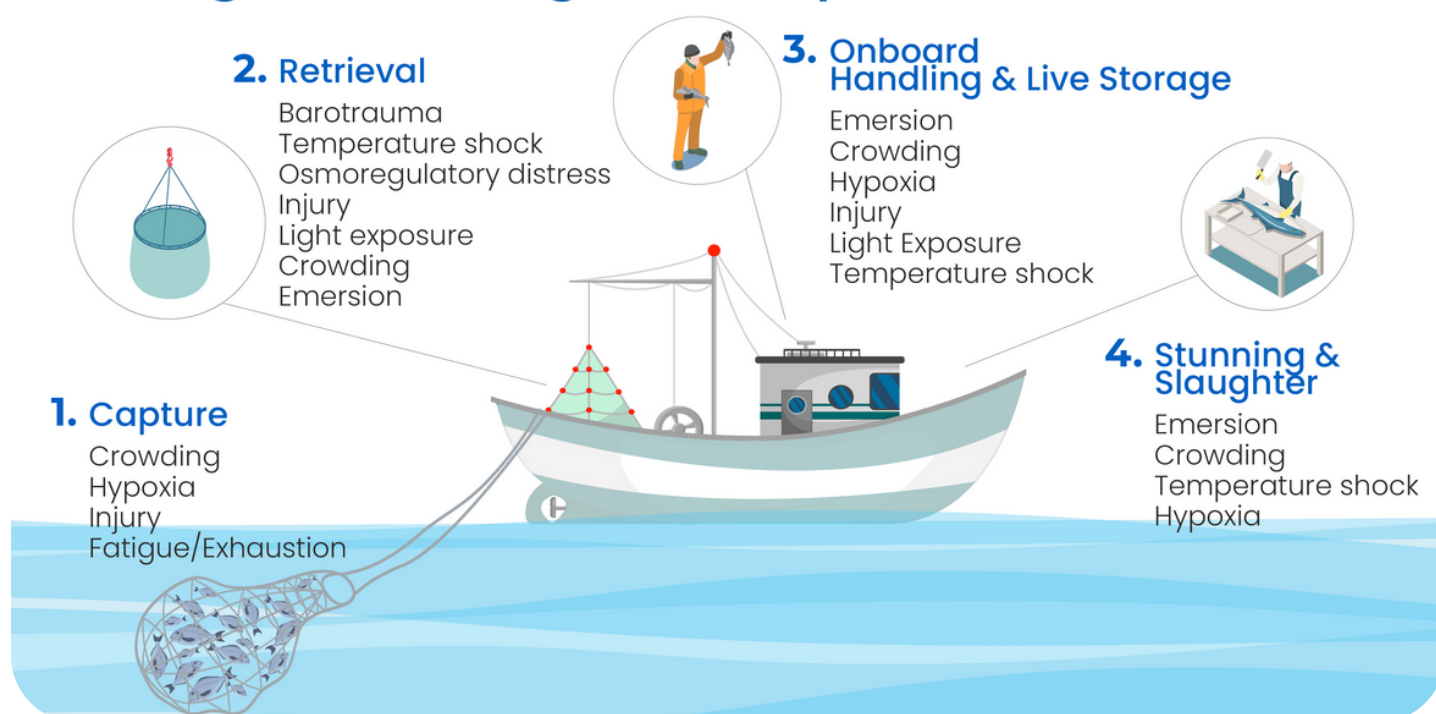


AQUATIC LIFE  
—INSTITUTE—

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Each year, 2 to 3 *trillion* aquatic animals are caught and killed primarily for human consumption; this is 35 times higher than all farmed land animals *combined*. Yet, unlike other food-producing sectors, animal welfare in capture fisheries is largely not legally protected. While animal welfare issues in the fisheries sector are significant and prevalent, good actors do exist. This report highlights best practices by fishing vessels, companies and research institutes that are leading the transition towards more humane capture fisheries. We strongly recommend the widespread adoption of these practices along with policy regulations to protect aquatic animals.

## Stages of suffering in wild capture fisheries



Adapted from Davis (2002), Broadhurst et al. (2006), Breen and Catchpole (2020)

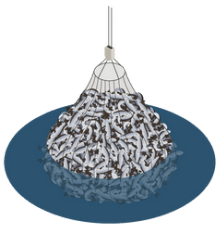


# 1. Capture

Humane catch and retrieval methods are key to improved animal welfare *and* better product quality. By limiting catch volumes through shorter fishing duration and smaller nets, target animals are exposed to less stress during capture and have a greater chance of survival. This reduced stress also leads to lower levels of lactic acid in the body, resulting in better flesh quality and longer shelflife.

## Best practice examples:

Company / Fishing Vessel (FV)	Gear / Species	Technique	Photo	Benefits
Bristol Bay Native Corporation / FV Blue North	Longline / Pacific cod	<ul style="list-style-type: none"> <li>Fish are individually hooked and retrieved.</li> <li>Uses a 'Moon Pool' to set lines and haul catch one by one inside the vessel.</li> <li>Onboard electrical stunning and once frozen fillet.</li> </ul>		<ul style="list-style-type: none"> <li>Shorter fishing time reduces stress and injury to target species.</li> <li>Reduced likelihood of catching non-target species.</li> <li>'Moon Pool' improves crew safety through minimizing exposure to the elements.</li> <li>Stunning + once frozen fillet commands a higher price per pound than traditional non-humane harvest, once or twice frozen fillet.</li> </ul>
Spencer Gulf & West Coast Prawn Fisherman's Association Inc.	Demersal otter trawl / King Prawns, Slipper Lobster, Southern Calamari	<ul style="list-style-type: none"> <li>'Hopper system' provides a wet well for animals caught in the codend where water is kept oxygenated.</li> <li>'Crab bags' inside the codend separate bycatch from target species.</li> <li>Average trawl duration is 30-60 minutes.</li> </ul>		<ul style="list-style-type: none"> <li>Designed to separate bycatch and improve prawn quality.</li> <li>Safe and quick process to return non-target species to the ocean.</li> <li>Short trawl durations reduce mortality, crushing injury, stress and suffocation. It also allows the vessel to move to other locations if bycatch levels are too high.</li> </ul>
North Star Fishing Co. / FV North Star	Demersal trawl / Bearing Sea cod, flatfish, rockfish	Trawl gear has been modified to use sweeps raised off the seafloor to reduce the effect of fishing on the seafloor and its habitat.		<ul style="list-style-type: none"> <li>Research by NMFS scientists has shown that the use of elevated sweeps dramatically reduces the effects of fishing on seafloor habitats and the associated species, such as crab and structure-forming animals called epifauna.</li> </ul>
Precision Seafood Harvesting Co.	Mid-water trawl / Various species	Developed a Modular Harvesting System (MHS) to replace traditional mesh: <ul style="list-style-type: none"> <li>Uses a large flexible PVC liner to provide a low turbulence environment which allows the fish to regain control and swim comfortably.</li> <li>Allows small &amp; unwanted fish to escape unharmed and free from exhaustion.</li> </ul>		<ul style="list-style-type: none"> <li>Efficiency gains from increased catch selectivity (species &amp; size).</li> <li>Environmental benefits such as increased survivability of bycatch and reduced interactions with seabirds and protected species.</li> <li>Higher quality catch from less damage, bruising and blood spots.</li> </ul>
Nofima	Purse seine / Various species	Nofima recommends using knotless netting, keeping hauling time as short as possible, and not exceeding 5-7 tons in catch volume. The Norwegian purse seine fleet in fact limits catch duration to about 1 hour and pumps the catch onboard.		<ul style="list-style-type: none"> <li>Reducing catch volume helps reduce injury and stress during capture.</li> <li>Knotless netting increases the chance of survival of escaped fish.</li> <li>Reducing catch duration and pumping fish onboard significantly reduces stress in animals.</li> </ul>
Norwegian Institute of Marine Research	Purse seine / Pelagic species (e.g. mackerel, tuna, etc.)	Developed a 'Catch Monitoring Probe' which gives fishers insight on the crowding density of fish inside their nets, oxygen availability, temperature and depth via 360° cameras, an oxygen and depth meter, and other instruments.		<ul style="list-style-type: none"> <li>Allows fishers to monitor fish welfare and quality early in the capture process when it is still legal to release fish.</li> <li>Provides a simplified and cost-effective method to accurately identify species, fish size and behavior of the catch underwater inside the purse seine net.</li> </ul>



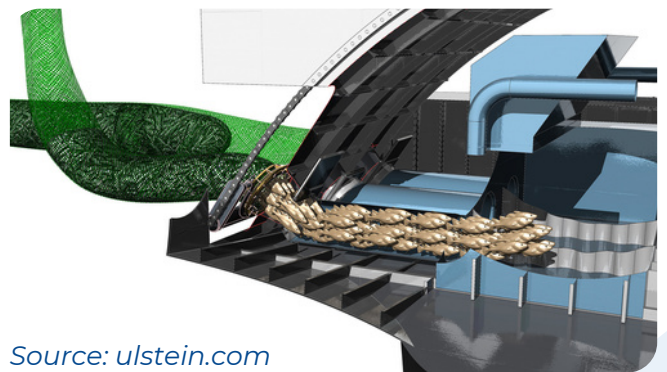
## 2. Retrieval

The retrieval phase of the capture process, during which aquatic animals are hauled on board, causes significant suffering and injury to aquatic animals. Depending on the gear, traditional retrieval methods such as lifting over-crowded nets into the air can result in crushing injuries and death by suffocation.

### Best practice examples:

Shipbuilding company Ulstein designed a factory trawler, ECOFIVE, which won the 2022 Innovation Award at Nor-Fishing. This vessel retrieves the fish via an in-water electrical pump stunner (by Ace Aquatec) so that fish are pumped into the vessel while being stunned along the way for humane slaughter. This way, the catch never leaves the water and is not exposed to the same physical stress as when fish is hauled onto the deck above the trawl slip, improving animal welfare and quality of catch.

The vessel also has a hybrid fuel-efficient propulsion system with two propellers, combining batteries with diesel-electric and diesel-mechanical propulsion, reducing its carbon footprint.



Source: [ulstein.com](http://ulstein.com)



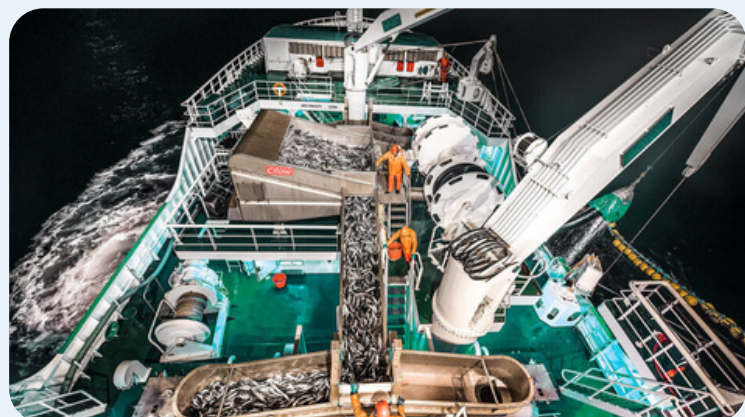
## 3. Onboard Handling

For fisheries where the catch is kept alive after capture, the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima) developed an online course on gentle capture and live storage for improved animal welfare and product quality.

- 1. Keep the fish alive until slaughter:** The fish should be brought on board as quickly as possible, preferably by means of pumping, before being transferred to tanks made for holding live fish.
- 2. Live storage:** Only undamaged fish should be stored alive, and the storage compartments or tanks must have a flat bottom with a sufficient oxygen supply which is calibrated to the quantities of fish being loaded and stored. As sufficient oxygen levels are particularly vital during loading of live fish, the oxygen levels must be monitored closely and continuously adjusted both when loading and keeping the fish in storage.



Live haddock onboard the fishing vessel's tank.  
Source: Nofima





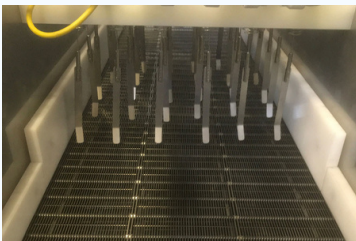


CFlow's onboard storage equipment.  
Source: CFlow



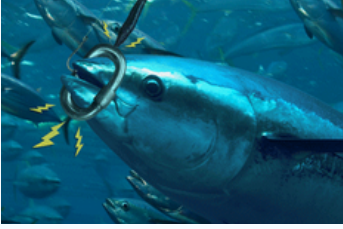
# 4. Stunning and Slaughter

Stunning technology exists today for the majority of species caught by commercial fishing vessels, and should be mandated by legislation to ensure broad adoption. Key advantages of stunning before slaughter includes not only improved animal welfare, but also better crew safety, higher product quality, and longer shelflife. Stunning techniques include: 1) Electrical stunning (e.g. Dry/semi-dry, in-water) and 2) Mechanical stunning (e.g. percussive, spiking).

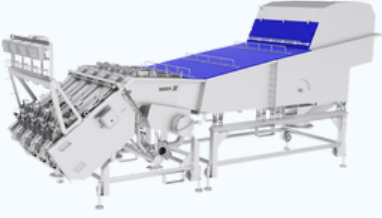

## Best practice examples:

Company	Species	Method	Photo	Benefits
<b>Dry/semi-dry Electrical Stunning</b>				
Norwegian Institute of Marine Research (IMR) & Nofima	Mackerel	Researchers have validated an electrical stunning technique for mackerel (via Optimar stunning machine) that can be used on fishing vessels with a combination of electrical stunning and chilling.		<ul style="list-style-type: none"> <li>Effective at stunning mackerel consistently within 0.5 seconds without negative impacts on product quality.</li> </ul>
Optimar	All	Norwegian company Optimar has a dry electrical stunning machine that can be adjusted for all vessels sizes and species. Their semi-dry machine is for shrimps only.		<ul style="list-style-type: none"> <li>Several species have been tested for full unconsciousness using EEG, adhering to EU and Norwegian laws. Additional testing of crustaceans planned.</li> <li>Costs between 43,000€ to 67,000€ depending on size &amp; capacity/hour.</li> </ul>
Polar Systems	Crustaceans (Crab)	The electrical stunning unit is designed to apply a suitable current through the body of the crustacean, on an earthed belt using only saline spray and an associated array of independent flexible contactors charged with electricity.		<ul style="list-style-type: none"> <li>The system is simple, compact and economically designed, offering users easy control, cleaning, maintenance and reliable use, without a large number of consumable and wearing parts. Batch systems range from 100kg/hr.</li> </ul>
<b>In-water Electrical Stunning</b>				
Ace Aquatec	All	<p>Scottish company Ace Aquatec has an in-water electrical pump stunner that can be applied to most fishing vessels. It stuns fish fully unconscious in less than one second while still in the water.</p> <p>In March 2023, it developed a portable stunner that can be applied for wild-caught shrimp and prawns.</p>	 	<ul style="list-style-type: none"> <li>Fishes remain in water, thereby reducing stress and improving product quality.</li> <li>Academically-proven via EEG tests for unconsciousness (adheres to EU &amp; Norwegian law).</li> <li>Effective and efficient solution for achieving humane retrieval, handling and slaughter.</li> <li>Standard full-scale stunners cost between 90,000€ and 160,000€ depending on the model.</li> </ul>
Askvik Aqua	All	Norwegian company Askvik Aqua has an in-water electrical pump stunner that can be applied to any fishing vessel of any size.		<ul style="list-style-type: none"> <li>Fishes never leave water, thereby reducing stress.</li> <li>Undergoes EEG testing in both test and production facilities by 3rd parties to verify rapid anesthesia according to EU and Norwegian laws.</li> <li>Price ranges from stunners for small-capacity vessels starting at 30,000€ and &gt;100,000€ for high capacity vessels.</li> </ul>

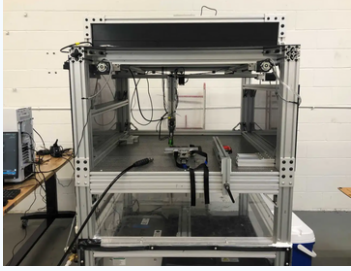
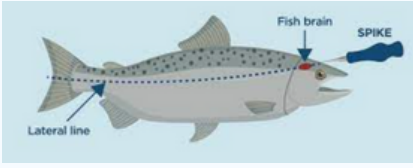
## In-water Electrical Stunning

Company	Species	Method	Photo	Benefits
Efectos Navales del Atlántico	Large pelagics (e.g. sharks, tunas)	<p>Spanish company has an in-water electrical stunning machine for big eye tuna and mako shark for artisanal fishing vessels.</p> <p>Currently working with researchers to verify if full unconsciousness is achieved.</p> <p>Can be complemented by the use of circle hooks.</p>		<ul style="list-style-type: none"> <li>For big eye tuna, stunning reduces stress, thereby reducing accumulation of lactic acid. This produces a more valuable product which can be classified as "sashimi grade."</li> <li>Immobilizing large fish in artisanal fisheries allows for easier and safer retrieval, handling and slaughter by crew.</li> <li>Costs 3,000€ for each machine.</li> </ul>

## Mechanical Stunning: Percussive

Baader	Salmon	<p>German company Baader has a BAADER 101 Harvesting System, using a combination system of percussive stunning and bleeding.</p>		<ul style="list-style-type: none"> <li>Induces immediate insensibility by administering a severe blow to the skull of the fish. As a result, the fish remains unconscious until death.</li> <li>Costs between 400,000€ and 750,000€ (for salmon, depending on processing capacity).</li> </ul>
Mitchell & Cooper	Crustaceans (Lobster, crayfish and crab)	<p>Crustastun is a humane and swift method of stunning crustaceans for individual use. Compared to boiling, which can take up to three minutes to kill even a small lobster, Crustastun renders the animal unconscious within half a second.</p>		<ul style="list-style-type: none"> <li>Crustastun is recognized by a the RSPCA as a humane method of stunning crustaceans ready for cooking.</li> <li>Costs 3,686€ per unit.</li> </ul>

## Mechanical Stunning: Spiking

Shinkei Systems	Finfish	<p>US company Shinkei Systems has developed an automated ike jime (manual spiking) system using computer-vision to process the fish, recognizing different sizes and species.</p>		<ul style="list-style-type: none"> <li>The automated system helps avoid human error and ensures precision spiking every time.</li> <li>Commands a price premium due to better quality, taste and longer shelf life.</li> <li>Machines can be leased annually; discounted pricing plan available for pilot partners.</li> </ul>
Various	Various	<p>Ike jime is a traditional Japanese slaughter technique that involves instantaneously euthanizing a fish by inserting a spike into its brain cavity. The fish is then thoroughly bled and undergoes spinal cord destruction before getting iced down.</p>		<ul style="list-style-type: none"> <li>Apart from being a more humane method of slaughter, ike jime produces better flavor of the fillet by avoiding stressing the fish, which leads to lactic acid and cortisol build up in the body.</li> <li>The product stays fresh for longer.</li> <li>Produces sashimi-grade fish for a price premium.</li> </ul>

# Signatories

Aquatic Life Institute  
Ace Aquatec  
Action for Protection of Animals Africa  
Action For Dolphins  
Advocating Wild  
AEL Advocacy  
Africa Network for Animal Welfare USA  
African Marine Mammal Conservation Organization  
Alexandria Turtle And Wildlife Rescue  
Alianima  
Anima International  
Anima Naturalis  
ANIMAL  
Animal Advocacy Africa  
Animal Advocates International  
Animal Aid  
Animal Empathy Philippines  
Animal Equality  
Animal Friends Croatia  
Animal Justice Canada  
Animal Interfaith Alliance  
Animal Kingdom Foundation  
Animal Law Italia  
Animal Nepal  
Animal Rights Center Japan  
Animal Society e.V.  
Animals Aotearoa  
Animals Don't Speak Human  
Animal Welfare Advocates Association the Gambia  
Animal Welfare Concern  
Animals Australia  
Animals Now  
Apon Welfare  
ARAF-PLATEAU DOGON  
ARBA  
Arusha Society for the Protection of Animals  
Askvik Aqua  
Aware  
BC SPCA  
Bradley Soule  
Catholic Concern for Animals  
Coalition of African Animal Welfare Organisations  
Compassion in World Farming  
Conservative Animal Welfare Foundation  
Crustacean compassion  
The Dark Hobby  
Deutscher Tierschutzbund  
Dharma Voices for Animals  
Dieren Bescherming  
Djurens Rätt  
Dyrenes Alliance  
Education for African Animals Welfare  
Essere Animali  
Estonian Union for the Protection of Animals (MTÜ Eestimaa Loomakaitse Liit)  
Ethical Farming Ireland  
FAADA  
Factory Farming Awareness Coalition  
Feedback Global  
Fish Welfare Initiative  
F.R.E.E.

Fórum Animal  
Friends of Phillip  
Ghana Animal Welfare Society  
Humane Africa Trust  
Humánný pokrok  
In Defense of Animals  
Institute of Animal Law Asia  
Invisible Animals (Nevidimi Zhivotni)  
Kafessiz Türkiye  
Kitwe Animal Welfare Society  
Kurdistan Organization for Animal Rights Protection L214  
Lady Freethinker  
Lilongwe Society for Protection and Care of Animals  
National Council of SPCAs  
Nepal Animal Welfare and Research Center (NAWRC)  
Nurture Imvelo Trust  
Oikeutta eläimille  
OIPA - International Organization for Animal Protection  
ONG Sante Animale Afrique (SAA)  
Optimar  
Plataforma ALTO  
Planet For All  
Protección Animal Ecuador (PAE)  
Proyecto ALA  
PAZ  
RENECTAS  
Rwanda Animal Welfare Organization (RAWO)  
SAFCEI  
SAFE  
Samayu  
Sea First  
Sentient Media  
Shellfish Network  
Shinkei Systems  
Shrimp Welfare Project  
Sibanye Animal Welfare and Conservancy Trust  
Sinergia Animal  
Sống Thuận Chay  
SPCA Montreal  
SPCA New Zealand  
SPCA Selangor  
Tanzania Animals Protection Organization  
Tanzania Animal Welfare Society (TAWESO)  
The Dorsal Effect  
The Humane Global Network  
The Humane League  
The Oceans Need Us  
Tikobane Trust  
Tourists Against Trophy Hunting  
University of Guilan  
Utunzi Animal Welfare Organization  
Vegetarianos Hoy  
Vissenbescherming  
Voices for Animals  
Voters for animals rights  
We Animals  
Welfare Footprint Project (Center for Welfare Metrics)  
Welfarm  
West Africa Centre for the Protection of Animal Welfare (WACPAW)  
WTS