

the welfare of fish in commercial fishing



Credit: National Oceanic and Atmospheric Administration/Department of Commerce.



Credit: National Oceanic and Atmospheric Administration/Department of Commerce.



Fish welfare in commercial fishing

A presentation by P Brooke & A Mood
fishcount.org.uk

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Structure of the presentation

1. Introduction
2. Fish sentience
3. Fish welfare in commercial fishing
 - a) during capture
 - b) after capture
 - c) impact on bait fish
 - d) numbers of animals involved
 - e) reducing suffering in commercial fishing.



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Introduction – animal welfare impact



Commercial fishing
causes suffering
that is both severe
and of long
duration



Introduction – numbers of animals affected



Credit: National Oceanic and Atmospheric Administration/Department of Commerce

Huge numbers
of fish are
caught each
year



Introduction – numbers of animals affected

Estimated numbers of wild caught & farmed fish:

Caught from the wild: ?

Caught to make fish meal & oil: ?

Farmed fish killed for food: ?

Estimates exclude unrecorded deaths e.g. bycatch



Introduction – numbers of animals affected

Estimated numbers of wild caught & farmed fish:

Caught from the wild: 970,000,000,000 – 2,700,000,000,000

Caught to make fish meal & oil: ?

Farmed fish killed for food: ?

Estimates exclude unrecorded deaths e.g. bycatch



Introduction – numbers of animals affected

Estimated numbers of wild caught & farmed fish:

Caught from the wild: 970,000,000,000 – 2,700,000,000,000

Caught to make fish meal & oil: 450,000,000,000 – 1,000,000,000,000

Farmed fish killed for food: ?

Estimates exclude unrecorded deaths e.g. bycatch



Introduction – numbers of animals affected

Estimated numbers of wild caught & farmed fish:

Caught from the wild: 970,000,000,000 – 2,700,000,000,000

Caught to make fish meal & oil: 450,000,000,000 – 1,000,000,000,000

Farmed fish killed for food: 37,000,000,000 – 120,000,000,000

Estimates exclude unrecorded deaths e.g. bycatch



Introduction – fish sentience



“**pain, fear and stress** are likely to be experienced by **fish** in **similar ways** as in **tetrapods** [amphibians, reptiles, birds and mammals]”
(Chandroo et al, 2004)



Introduction – magnitude of welfare problem

Suffering is caused to fishes:

- during capture
- after landing and during processing.

Suffering is also caused to:

- fish used as live bait
- fish and other animals caught as bycatch.

Welfare issue = duration \times severity \times numbers
= a major animal welfare problem



Introduction – improving welfare



Suffering could be reduced by:

- reductions in fishing activity (catching fewer fish)
- measures to make fishing less inhumane.



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Fish sentience – the goldfish who remembers

This Youtube clip is available from

<http://www.youtube.com/v/15Xi-IUKj7A&start=126>

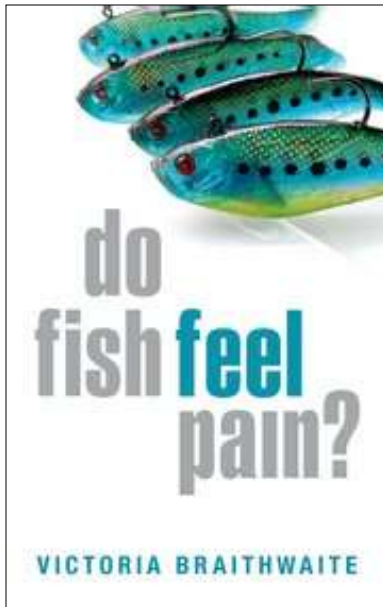
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Fish sentience – *Do fish feel pain?* (2010) Victoria Braithwaite



In her book, Dr Braithwaite

- makes the science accessible to non-scientists
- describes the different evidence
- concludes that fish *“have the mental capacity to feel pain”*.



Fish sentience

Evidence that fish feel pain and distress includes

- presence of nociceptors (pain receptors) in fish
- activation of these nociceptors with noxious stimuli e.g. heat
- activity in the brain during nociception
- long lasting changes in behaviour following nociception
- alteration to normal fear response by nociception
- effect of analgesics (pain killers) on behavioural response to nociception
- impressive mental abilities (spatial learning, logical deduction, cooperative hunting).



Fish sentience – Eel and grouper



Groupers and moray eels are predatory fish that hunt smaller coral reef fish.

Groupers hunt in open water. In contrast, moray eels slither through crevices to corner their prey in holes.

Fish avoid grouper predation by hiding in crevices and avoid eel predation by swimming into open water.



Fish sentience – Eel and grouper



These two species of fish have developed a way of communicating with one another to hunt together.

When a grouper chases a prey fish, its quarry may seek refuge in a small hole on the reef. The grouper cannot follow it into crevices. Instead it asks an eel for help!



Fish sentience – Eel and grouper

The grouper searches for an eel as a hunting partner.

In this clip we see a grouper approach an eel resting in its crevice and signal, with headshaking movements, close to the eel's head.

This Youtube clip is available from
<http://www.youtube.com/v/YSG0PG1HySw>



Fish sentience – Eel and grouper

In this clip, a grouper leads an eel off to hunt.

This Youtube clip is available from
<http://www.youtube.com/v/88NEcdUmUDE>



Fish sentience – Eel and grouper

In this clip a grouper shows an eel (out of view) where the prey fish was last seen by performing a headstand accompanied by head shaking.

This Youtube clip is available from
<http://www.youtube.com/v/fOEZoeQo3tA>



Fish sentience – Eel and grouper

In this clip, an eel responds to the headstand with head shaking signal by exploring the area.

This Youtube clip is available from
<http://www.youtube.com/v/CvEK4rt2CBM>



Fish sentience – Eel and grouper



Credit: Klaus Stiefel

The moray eel and the grouper represent an example of a...

“sophisticated, complex behaviour that requires the hunting partners to communicate and recognise each other’s intentions”.

Victoria Braithwaite



Fish sentience – crustaceans



Scientists at Queens University, Belfast have found evidence that crustaceans feel pain.

Crabs and prawns were shown to react to painful situations.

Professor Elwood of Queens University argues for more humane ways of handling and killing them.



Fish sentience – cephalopods



Cephalopods (including octopus and squid) are the invertebrates with the most complex brains.

They can solve maze puzzles and remember the solutions. They appear to show strong emotions signaled by changes in colour.

UK legislation on animals in scientific research includes the common octopus.



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Welfare during capture

Catching fish causes suffering
e.g. when they are...



Welfare during capture



.....crushed under the weight of other fish in trawl nets



Welfare during capture



Credit: Alaska Fisheries Science Center, Marine Observer Program

...raised from deep water and suffer decompression effects



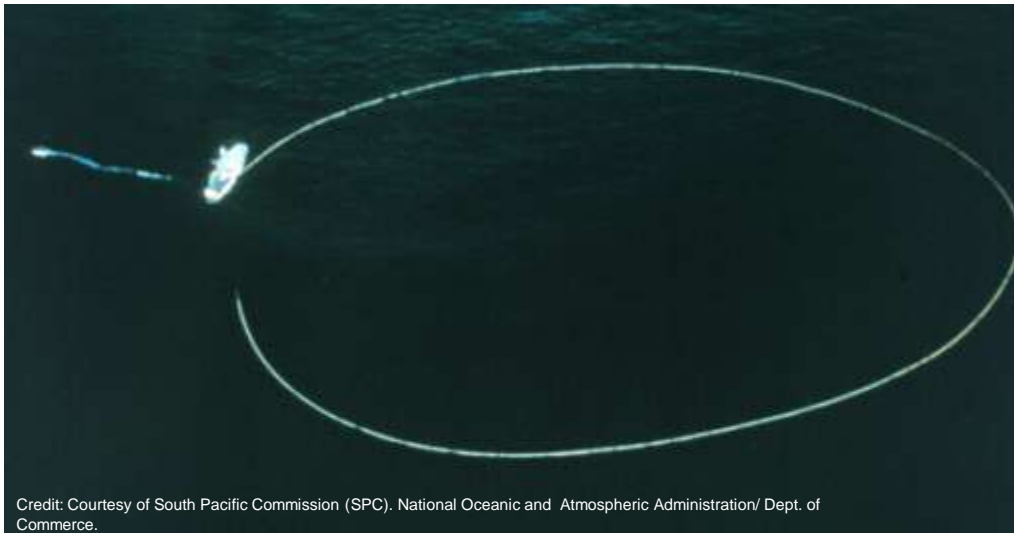
Welfare during capture



...snared in gill nets



Welfare during capture



...confined in
constricted seine
nets



Welfare during capture



...confined in
constricted seine
nets



Welfare during capture



... spiked with
hooks (gaffed) to
bring them aboard

Credit: Courtesy of United Nations Food and Agriculture Organization.



Welfare during capture



.....caught on hooks.

They can remain on hooks or in nets for many hours or days.



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Welfare after capture

Most fish landed live
die from suffocation in
air...



Welfare after capture

...or from a combination of suffocation and live gutting.



Welfare after capture



Credit: National Oceanic and Atmospheric Administration/ Dept. of Commerce. Photographer: Joel Prado

Fish may be chilled as they suffocate.

This may increase and prolong suffering.



Welfare after capture

Processing of fish after capture includes

- storage in air
- live gutting/filleting
- freezing alive
- chilling or cooling in ice or ice/water.



Welfare after capture

Dutch study of commercial fishing (1996) found

- majority of most species were alive and conscious when landed
- time to loss of consciousness was long.



Welfare after capture

Dutch study of commercial fishing (1996) found

Time to loss of consciousness

(for herring, cod, whiting, sole, dab and plaice)

Asphyxiation alone:

Asphyxiation with live gutting:



Welfare after capture

Dutch study of commercial fishing (1996) found

Time to loss of consciousness

(for herring, cod, whiting, sole, dab and plaice)

Asphyxiation alone: **55–250 minutes**

Asphyxiation with live gutting:



Welfare after capture

Dutch study of commercial fishing (1996) found

Time to loss of consciousness

(for herring, cod, whiting, sole, dab and plaice)

Asphyxiation alone: **55–250 minutes**

Asphyxiation with live gutting: **25–65 minutes**



Welfare after capture



Credit: Saspotato

Flatfish, such as sole, are adapted to low-oxygen conditions and can take an especially long time to time to die after capture.



Welfare after capture

In a new study of commercial fishing (2012):

Trawl-caught cod and haddock were conscious at least **2 hrs** after landing and storage in air.

They developed a prototype “dry stunner” to humanely stun the fish.

Recommended fish be stunned and killed as soon as possible after landing.

Lambooij et al. [Effects of on-board storage and electrical stunning of wild cod \(*Gadus morhua*\) and haddock \(*Melanogrammus aeglefinus*\) on brain and heart activity](#)



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Welfare impact on bait fish

Pole-and-line fishing – “chumming” with bait fish



National Oceanic and Atmospheric Administration /Dept. of Commerce.
Photographer: Jose Cort.

Fish are fed live to tuna.

Fishers create a feeding frenzy by throwing small bait fish, usually live, from the ship.



Welfare impact on bait fish

Pole-and-line fishing – landing the fish

For the tuna,
capture is
fast...

but after
landing them,
the tuna are left
to suffocate

This clip is available on Youtube from
<http://www.youtube.com/v/eWw2o9zgm-o>



Welfare impact on bait fish



Live fish are impaled on hooks a live bait



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Huge numbers of animals are involved

An estimated **970 to 2,700** billion fish caught each year suggests that **in the order of 1 trillion** are caught

based on FAO data for **1999–2007** and estimated average fish weights.



Huge numbers of animals are involved



...for example
Atlantic wolffish

Average annual capture reported by FAO : **33,000 tonnes**
Estimated mean weight : **15 pounds, or 6,800 g**
Estimated numbers : **5 million**



Huge numbers of animals are involved



Credit: National Oceanic and Atmospheric Administration/Department of Commerce.

...and
yellowtail snapper

Average annual capture reported by FAO : **6,000 tonnes**

Estimated mean weight : **750-2000 g**

Estimated numbers : **3–9 million**



Huge numbers of animals are involved



Credit: National Oceanic and Atmospheric Administration/Department of Commerce.

...and
Chilean jack
mackerel

Average annual capture reported by FAO : **2,000,000 tonnes**
Estimated mean weight : **200-1,000 g**
Estimated numbers : **2-9 billion**



Huge numbers of animals are involved

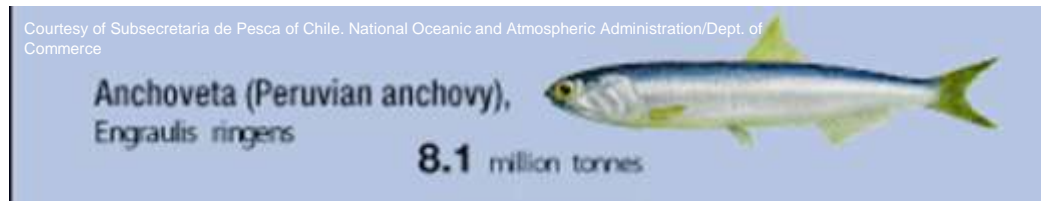
...and anchoveta (Peruvian anchovy)



Average annual capture reported by FAO : 9,000,000 tonnes
Estimated mean weight : 10-30 g
Estimated numbers : **300–900 billion**



catching feed fish multiplies suffering



1. It takes **2.3–4.9 kg** of wild fish to produce **1 kg** of farmed salmon.
2. It takes roughly **14 Kg** wild-caught fish to feed one **4 kg** farmed salmon.
3. It takes **14–1400** wild-caught fish to produce one salmon.
4. the inhumane killing of a **20g** Peruvian anchovy produces just **6g** of farmed salmon.



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Reducing suffering in commercial fishing



Credit: National Oceanic and Atmospheric Administration/Department of Commerce.

Solutions:

- reduce numbers caught
- reduce distress of capture
- humane slaughter methods.

How can suffering be reduced?



Reducing numbers of fish caught

1. reduce bycatch and illegal fishing
2. catch fewer fish and let them grow larger
3. reduce fishing for fishmeal and bait
4. marine reserves
5. develop alternatives to eating fish.



Reducing suffering in commercial fishing

1. avoid using live bait fish



Reducing suffering in commercial fishing

2. reduce the duration of capture



Reducing suffering in commercial fishing

2. reduce the duration of capture

3. reduce the stress and injury during capture



Reducing suffering in commercial fishing

4. develop methods of landing fish without injury



Reducing suffering in commercial fishing



5. reduce bycatch



Credits: National Oceanic and Atmospheric Administration/ Dept of Commerce. Photographer: William B. Folsom, NMFS



Reducing suffering in commercial fishing

1. avoid use of live bait fish
2. reduce the duration of capture
3. reduce the stress and injury during capture
4. develop methods of landing fish that reduce stress and injury
5. reduce bycatch.



Humane slaughter for wild fish

Two traditional methods exist:

- percussive stunning (followed by bleeding)
- spiking the brain (*ike jime*).



Humane slaughter for wild fish

For larger fishing operations – humane slaughter technology needs to be adapted from aquaculture:

- automated percussive stunning
- electrical stunning
- food grade anaesthetics.



Humane slaughter for wild fish

Some commercial fishermen have experimented with humane slaughter technology

This Youtube clip is available from
<http://www.youtube.com/v/FzL9ufPvqyg&start=53&end=102>



Summary

1. **recognise** it's a huge animal welfare problem
2. **reduce** numbers of fish caught
3. **reduce industrial fishing** for animal feed
4. **reduce suffering** during capture
5. **humane slaughter** for wild-caught fish
6. **replace** fish in diet.



For more information, including references for the data in this presentation, please see:



- Fishcount report: *Worse things happen at sea: the welfare of wild-caught fish* (2010) available from <http://fishcount.org.uk/publications>.
- Fishcount study: [Estimating the number of fish caught in global fishing each year](#) (2010).
- Fishcount study: [Estimating the number of fish killed in global aquaculture each year](#) (2012).

