the welfare of fish in commercial fishing
Fish welfare in commercial fishing

A presentation by P Brooke & A Mood

fishcount.org.uk

August 2013
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

Credit: OAR/National Undersea Research Program (NURP)
Huge numbers of fish are caught each year

Credit: National Oceanic and Atmospheric Administration, Department of Commerce.
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: \(970,000,000,000 \text{ – } 2,700,000,000,000\)
Caught to make fish meal & oil: \(450,000,000,000 \text{ – } 1,000,000,000,000\)
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
“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 × severity × 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.

Credit: Nemo’s great uncle.

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towards more humane commercial fishing
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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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If you are viewing this presentation pdf online, then use the browser back arrow to return to the presentation after viewing the YouTube clip.

If you are viewing a downloaded copy of this presentation, it is recommended you close all browser windows before doing so. Clicking the above link will then open a new browser window for viewing the YouTube clip. After viewing, close the browser window to return to the presentation.
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).
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.
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
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
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.
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

...raised from deep water and suffer decompression effects
Welfare during capture

...snared in gill nets

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

...confined in constricted seine nets

Credit: Courtesy of South Pacific Commission (SPC), National Oceanic and Atmospheric Administration/ Dept. of Commerce.
Welfare during capture

...confined in constricted seine nets

Credit: National Oceanic and Atmospheric Administration Department of Commerce
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.

Credit: © Greenpeace / Jeremy Sutton-Hibbert
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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

Fish may be chilled as they suffocate. This may increase and prolong suffering.

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

Asphyxiatiion 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

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

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

Credit: Saspotato

fishcount.org.uk towards more humane commercial fishing
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

Fish are fed live to tuna.

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

Credit: National Oceanic and Atmospheric Administration/Dept. of Commerce. Photographer: Etienne Ithurria
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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

...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

...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

Solutions:

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

How can suffering be reduced?

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