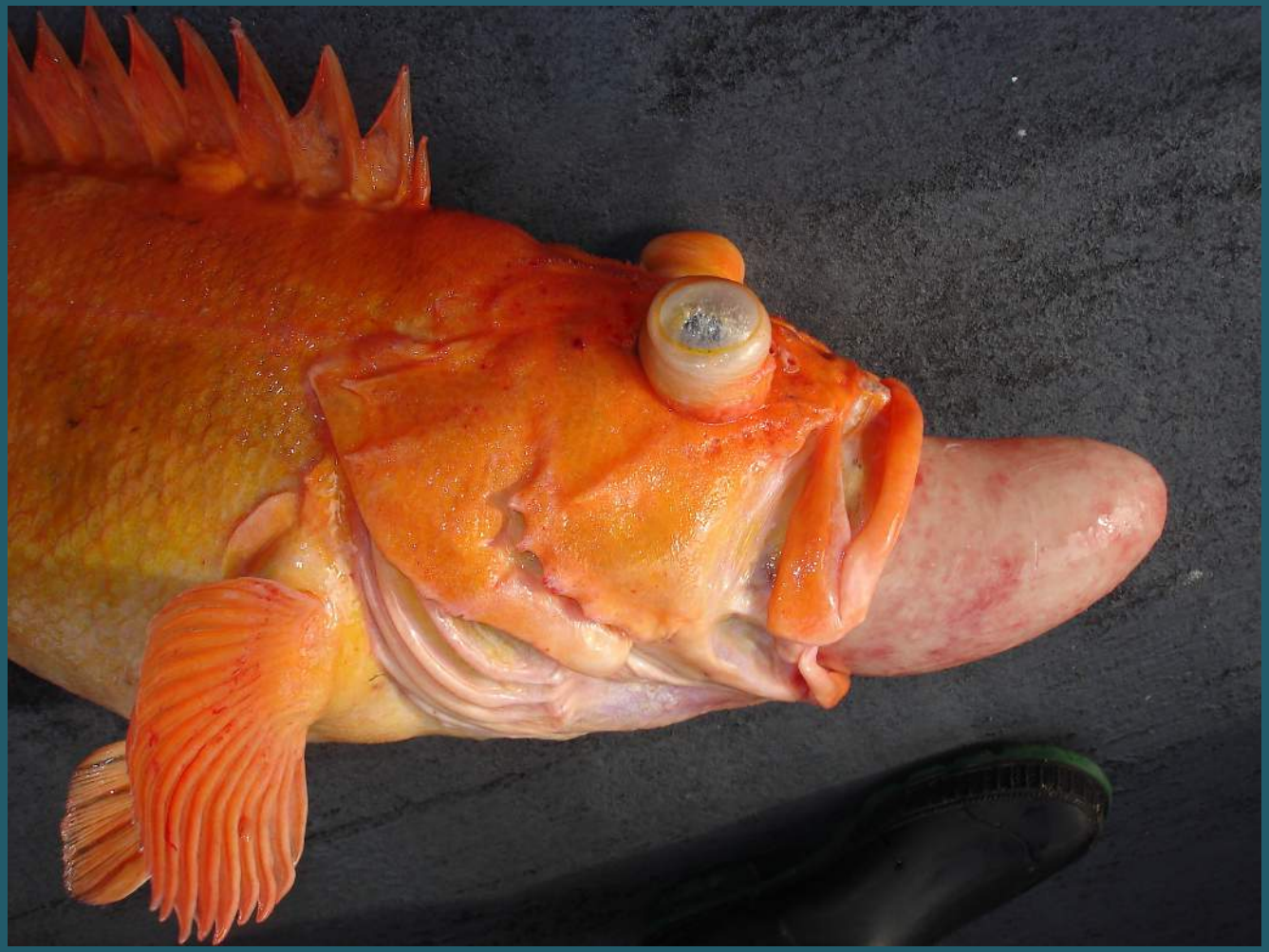
# Venting and Recompression: Techniques and Appropriate Uses



# Two Primary Release Techniques


Venting

Recompression with weights/cages

# Venting Techniques

- Hold fish gently, but firmly on side
- Insert venting tool at 45°angle, 1”-2” behind base of pectoral fin
- Only insert tool deep enough to release gases

Video from Recfishing Research, Australia

# Marine species where venting appears to work

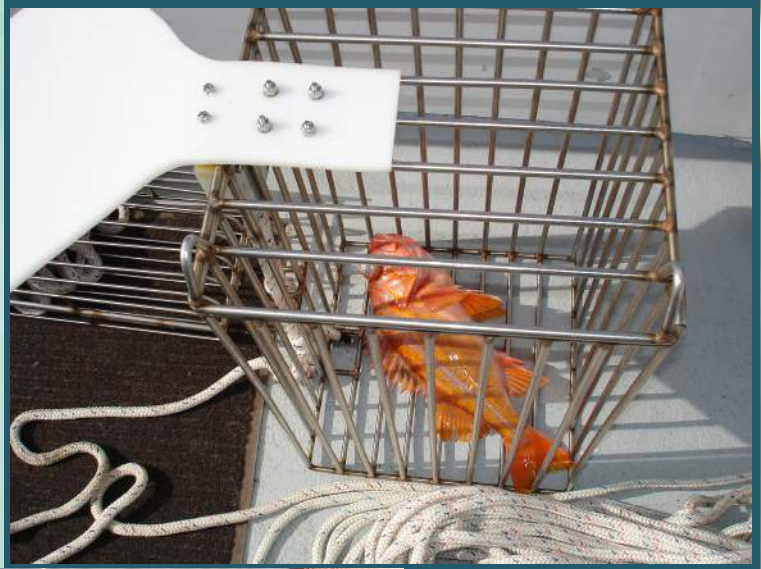
- Black sea bass, *Centropristis striata* (Collins et al. 1999)
- Gag, *Mycteroperca microlepis* (< 40 ft) (Burns et al. 2002)
- Mangrove snapper, *Lutjanus griseus* (< 100 ft) (Burns et al. 2002)
- Saddletail snapper, *Lutjanus malabaricus* (Sumpton et al. 2010, Brown et al. 2008)

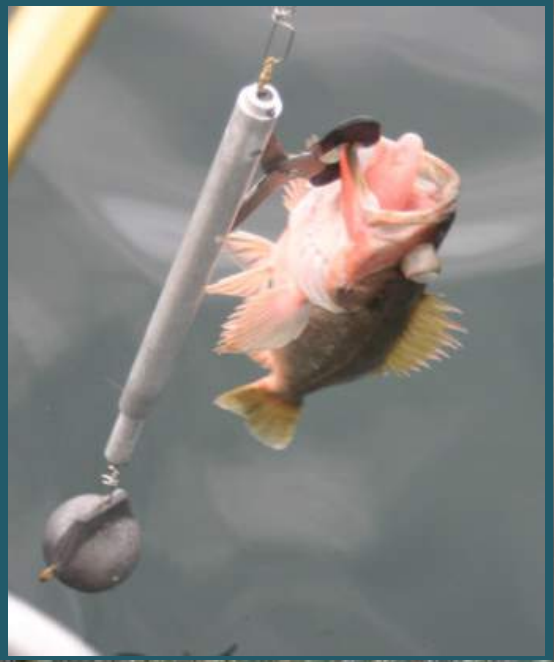
*Out of 18 marine species

# Where Venting could be Beneficial

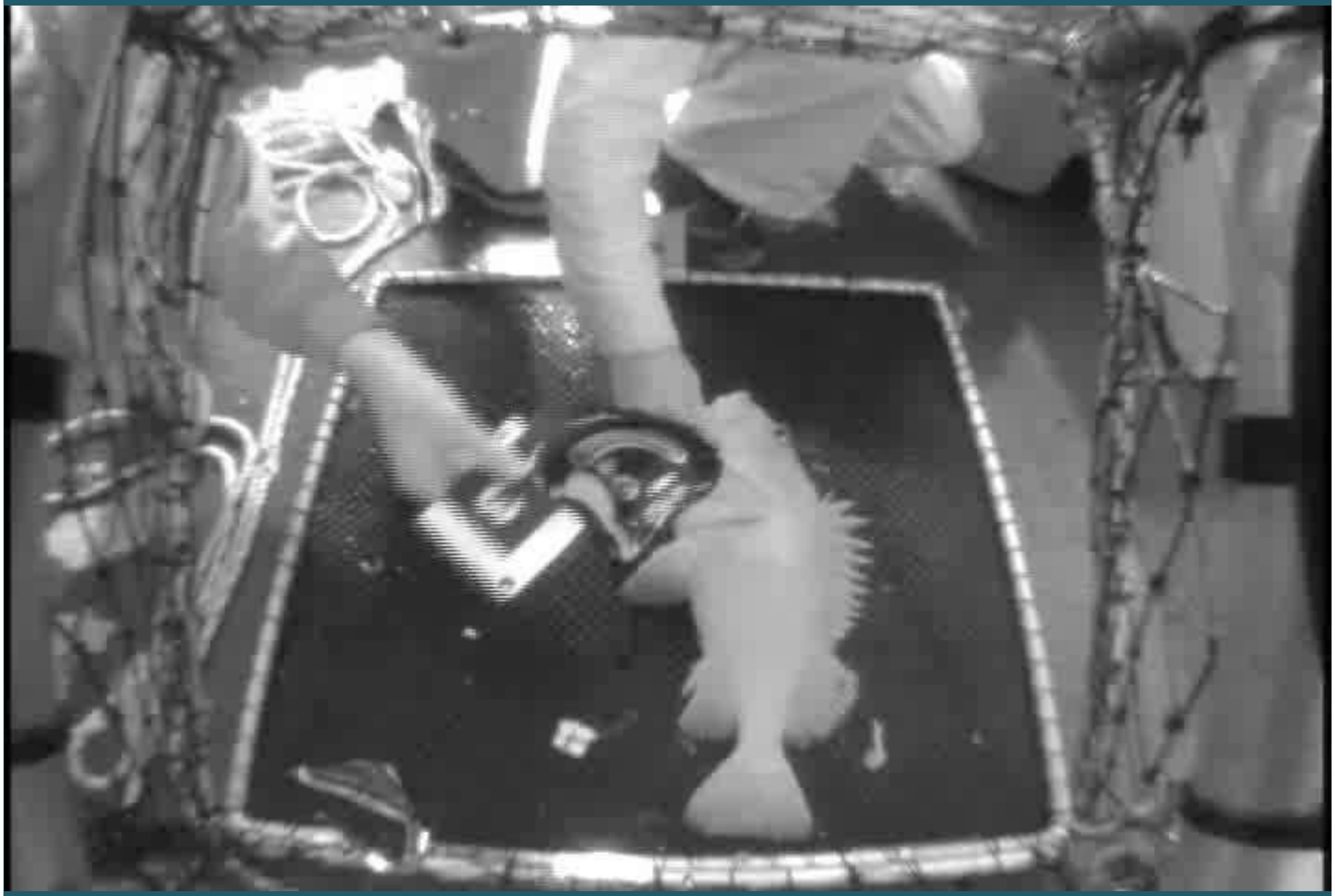
- Limited species where it is shown to work
- When a fish is unable to submerge and no other option is available to overcome buoyancy
- Non-catch and release purposes
  - aquariums, laboratory use, aquaculture, live fish markets, etc.

# Recompression Devices





# BlackTip Catch & Release Recompression Tool Wins the West Marine Green Product of the Year Award at the Miami International Boat Show



Video Courtesy of the Oregon Dept. of Fish and Wildlife, Newport

# Marine species where recompression appears to work

- Many from *Sebastes spp*: canary*, yelloweye*, quillback, copper, black, cowcod*, bocaccio*, flag, vermilion, rosy, rougheye (Hannah et al. *in prep*, P. Rankin *pers. comm*., Pribyl PhD dissertation 2010, Rogers Master's thesis 2010, Jarvis et al. 2008, Hannah and Matteson 2007, Parker et al. 2006)
- Red grouper, *Epinephelus morio* (<44 m) (Wilson and Burns 1996)
- Saddletail snapper, *Lutjanus malabaricus* (Sumpton et al. 2010)
- Australasian snapper, *Pagrus auratus* (<30 m) (Stewart 2008)

*Out of 10 marine species, not including *Sebastes spp*.

# Benefits of Recompression Devices

1) Simple and easy to use
2) Devices can be made cheaply, or purchased
3) Fish can be released quickly
4) No risk of infection from unsterile needles
5) No risk of puncturing internal organs
6) Release cages can protect fish from predation

# Factors Affecting Survival

- Fish species (Hannah et al. *in prep*, Sumpton et al. 2010, Jarvis et al. 2008, Hannah and Matteson 2007)
- Time on deck (Jarvis et al. 2008, Burns et al. 2002)
- Temperature difference (Diamond and Campbell 2009, Hannah et al. *in prep*, Jarvis et al. 2008, Feathers and Knable 1983)
- Depth of capture (some fish species)

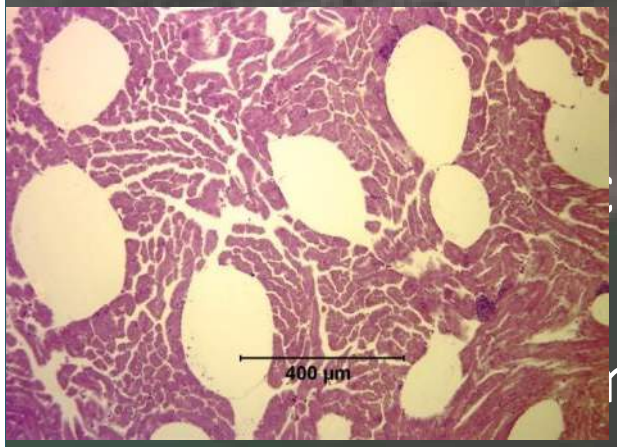
  (Campbell et al. 2009, Stewart 2008, Hannah and Matteson 2007, St.John and Syers 2005, Wilson and Burns 1996)
- Wounding (Davis and Ottmar 2006)

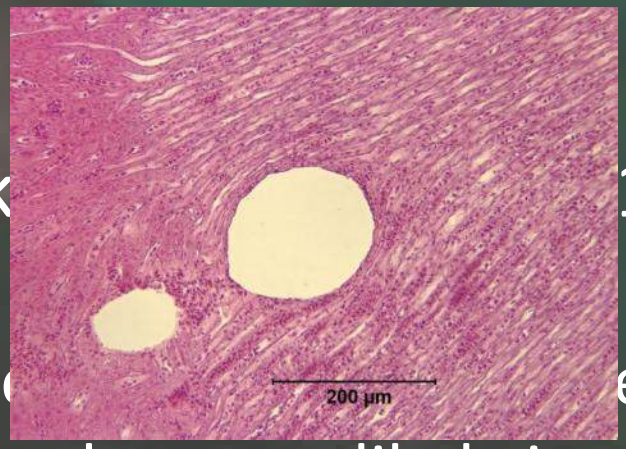
# Fish Species

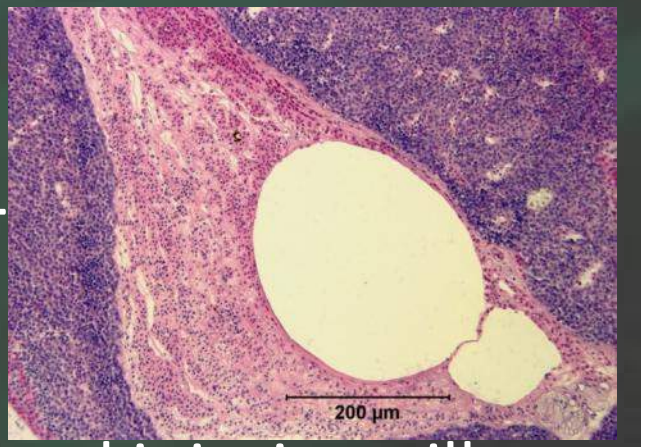
- Swimbladder morphology
  - Swimbladder thickness, elasticity
  - Size – volume of gas
  - Healing rate of swimbladder
- Life history: Pelagic or Benthi
  - Ruptured SwB will likely affect pelagic than benthic fish
- Behavioral impairment
  - Fish species that recover quickly less likely to be subject to predation

# Time on Deck

- Deck time >10 min results in high mortality (Jarvis et al. 2008)
  - Emboli can block blood flow, cause hemorrhaging, tissue injury



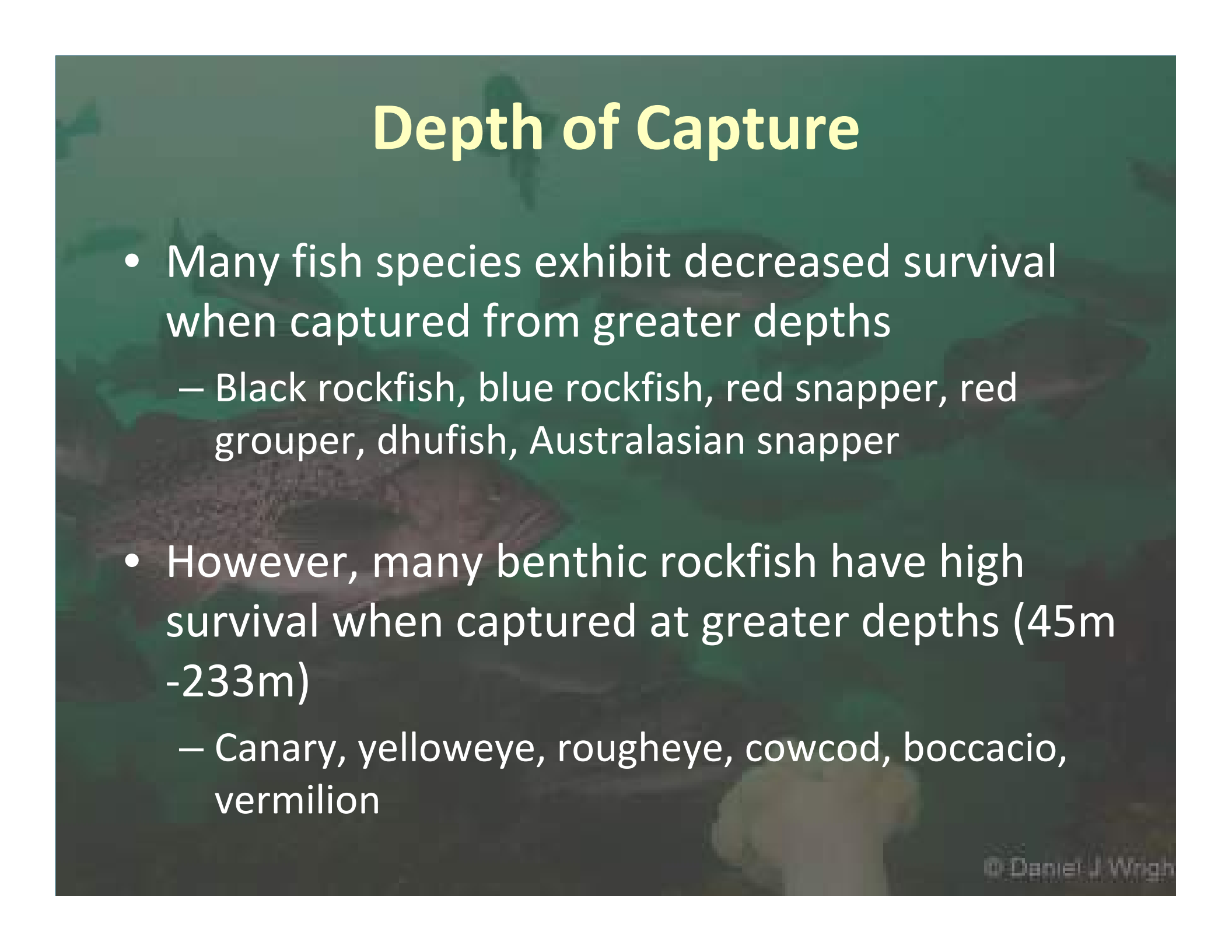




gas pressure, the more likely internal injuries will not be permanent

# Depth of Capture

- Many fish species exhibit decreased survival when captured from greater depths
  - Black rockfish, blue rockfish, red snapper, red grouper, dhufish, Australasian snapper
- However, many benthic rockfish have high survival when captured at greater depths (45m -233m)
  - Canary, yelloweye, rougheye, cowcod, boccacio, vermilion



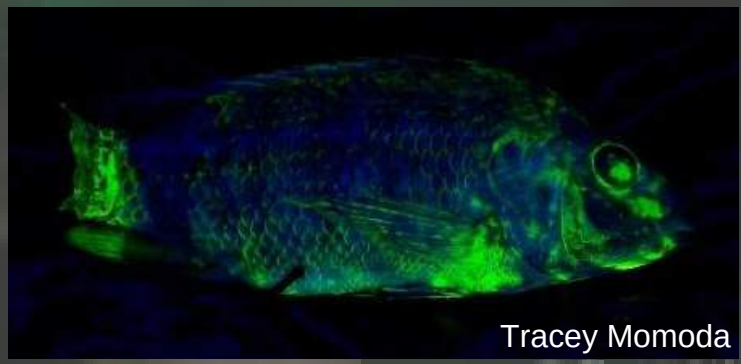
# Temperature Differential

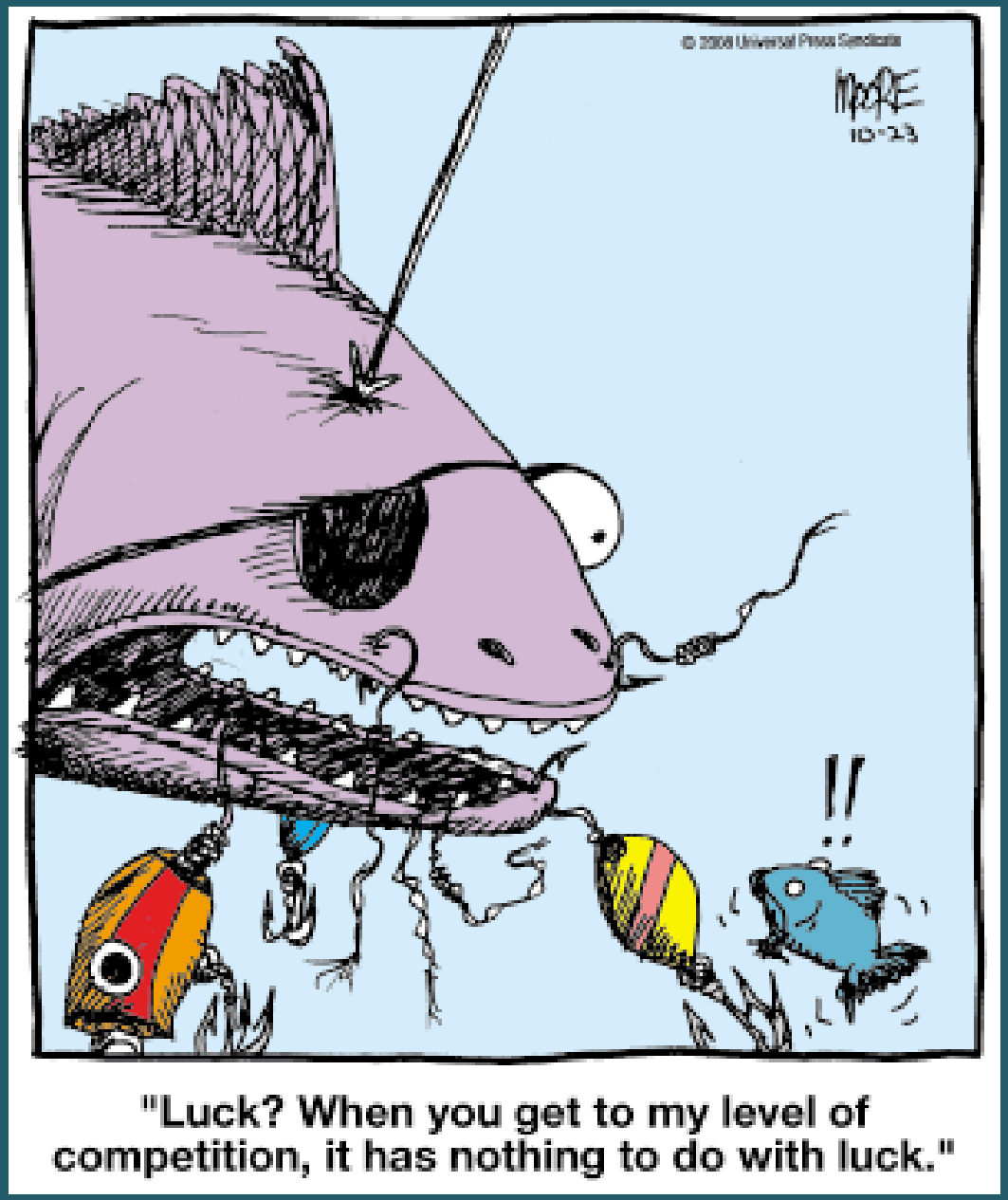
- Surface water temps may be outside of a fish's ability to acclimate , or thermal range
- Large thermal differentials can cause increased gas expansion, exacerbating barotrauma
- If large T diff, placing fish in cool water or in ice water during hook removal may help (P. Rankin, pers. comm.)

# Wounding


- Can be caused by net abrasion, rubbing against other fish, rough handling, hook removal, dropping, etc.

- Can disrupt slime coat, leaving fish susceptible to infection




"Luck? When you get to my level of competition, it has nothing to do with luck."

# Escaping the surface: the effect of depth of capture on submergence success of surface-released Pacific rockfish

Robert Hannah, Steve Parker, Keith Matteson (2008)

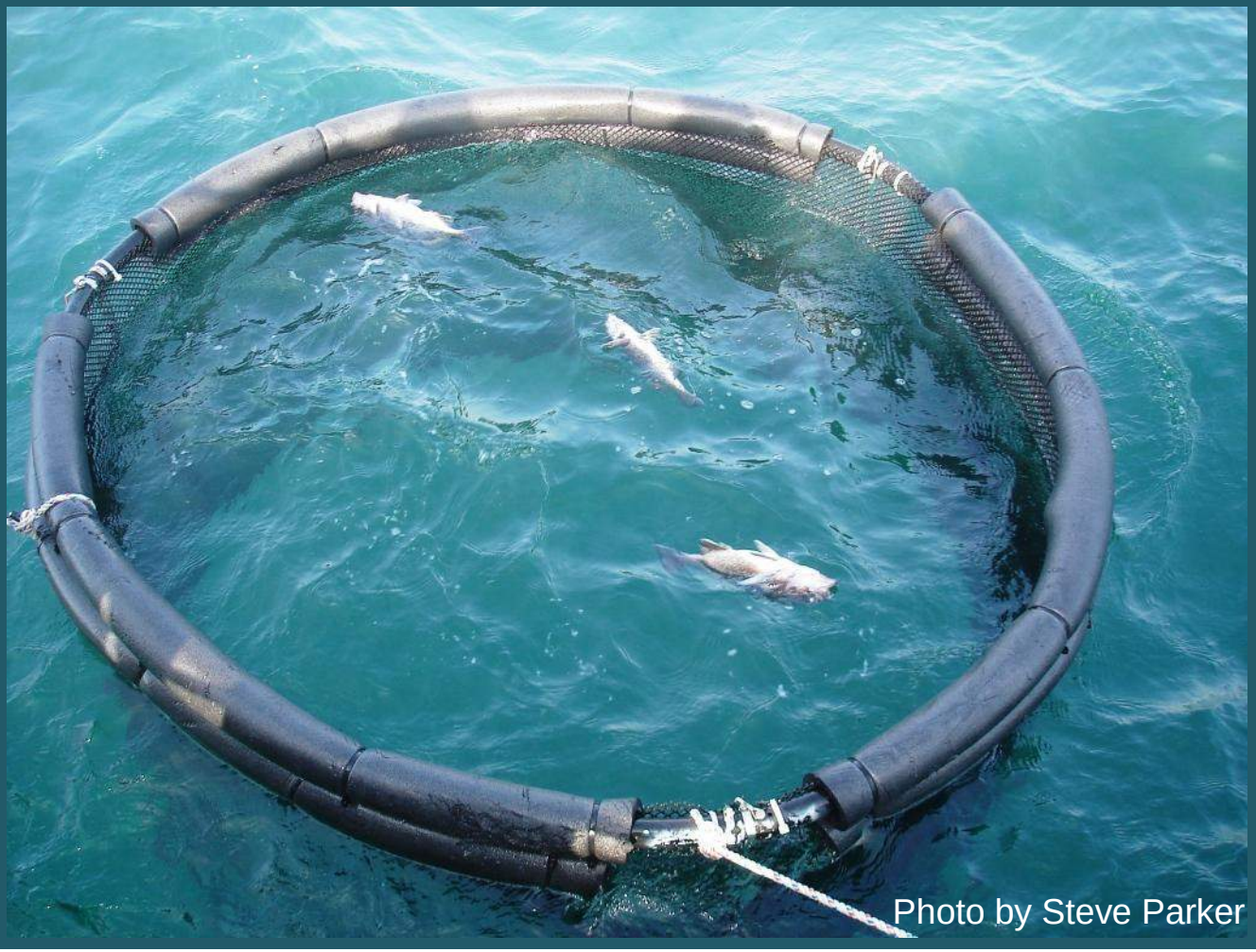
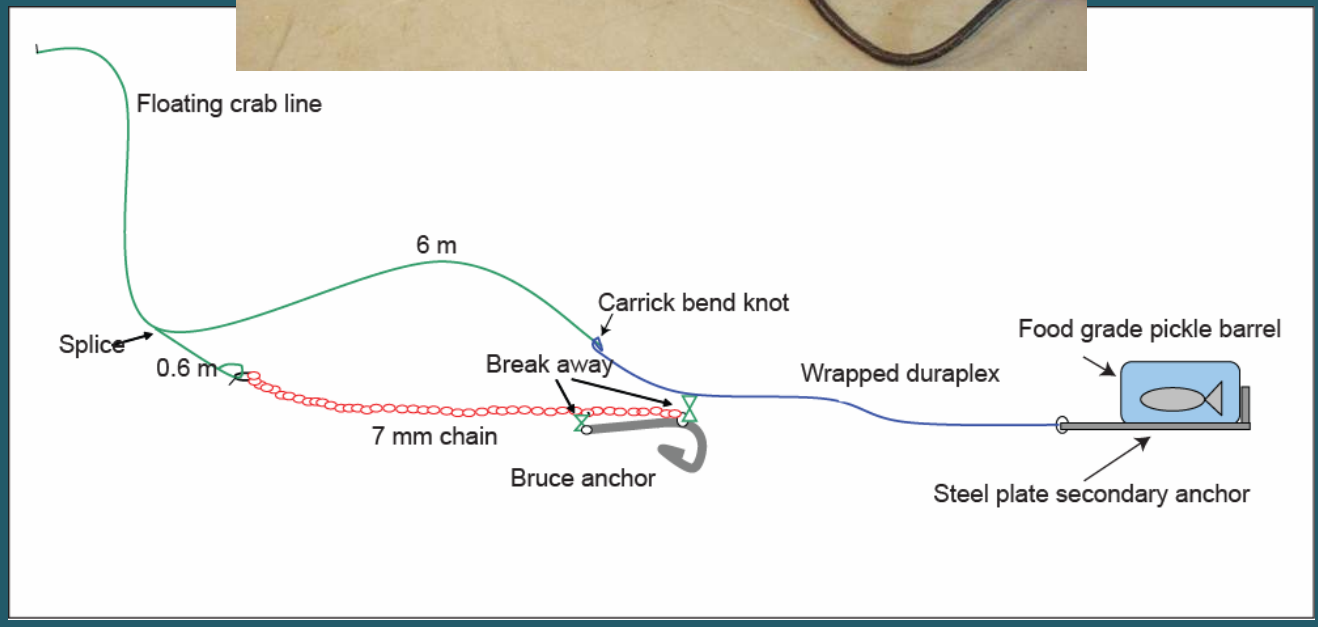


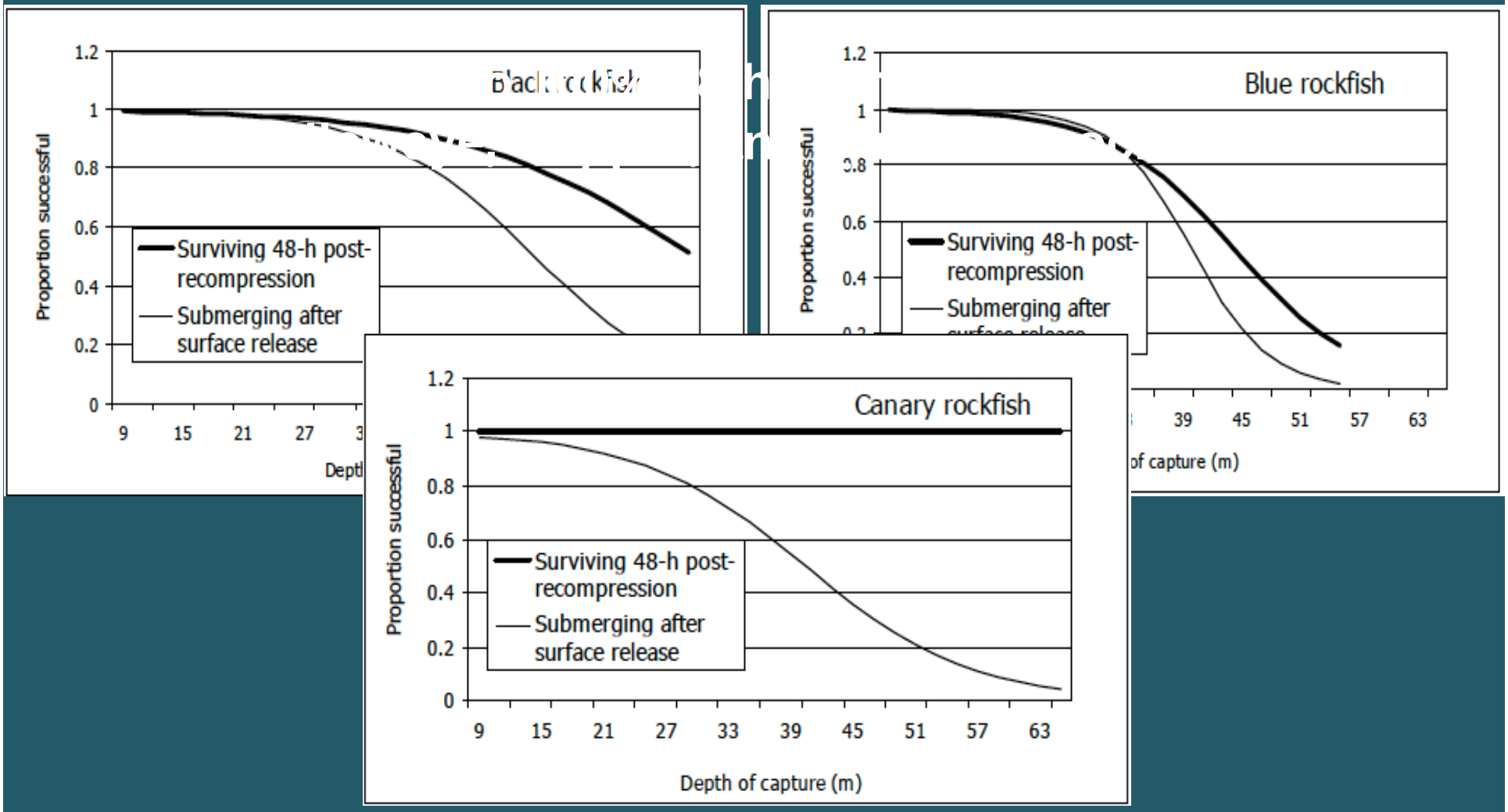
Photo by Steve Parker

# 48hr post-recompression survival in seven species of P. rockfish

Robert Hannah, Polly Rankin, Matthew Blume *(in prep)*



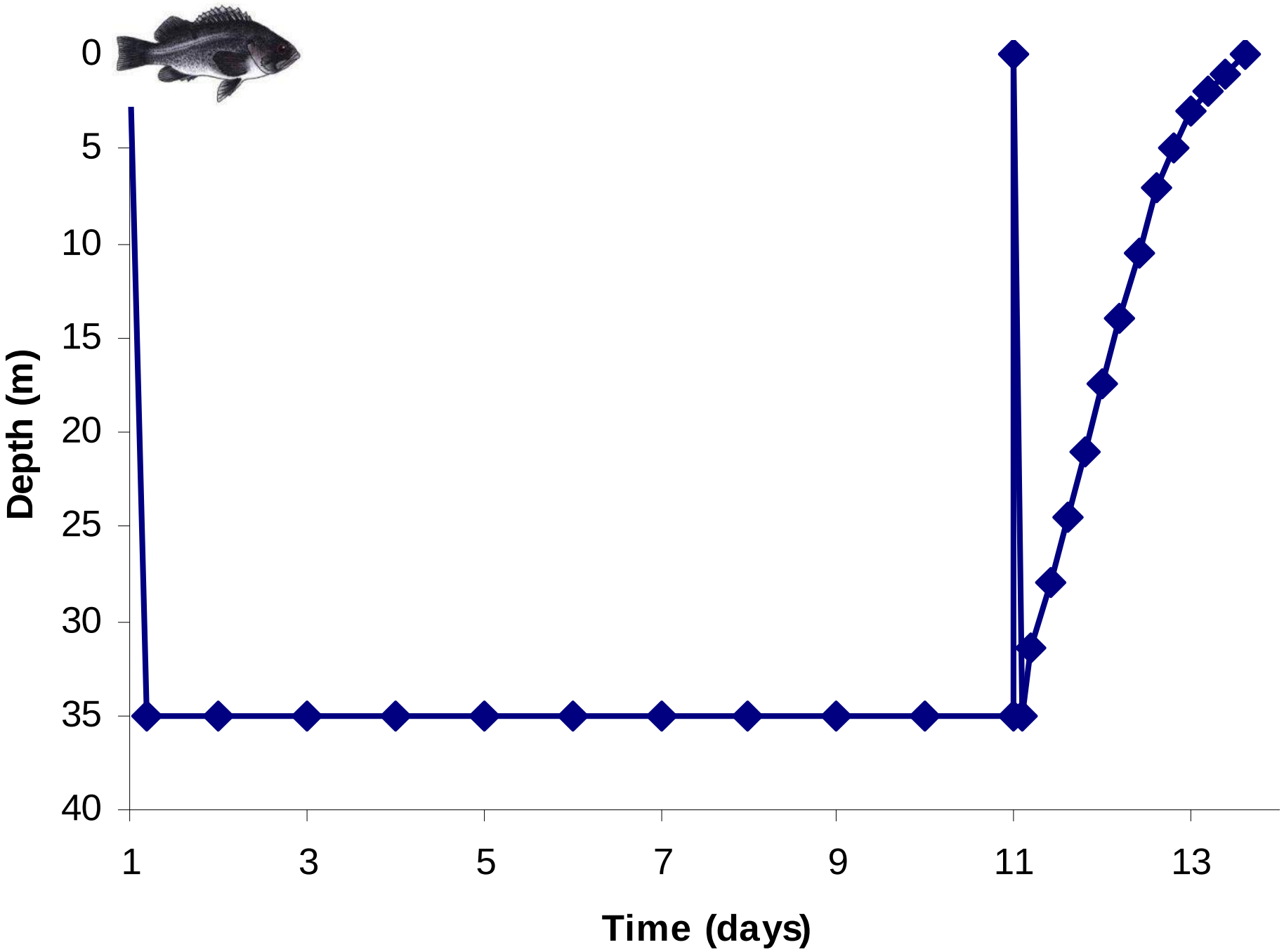
# Submergence Data combined with 48-hr Survival Data



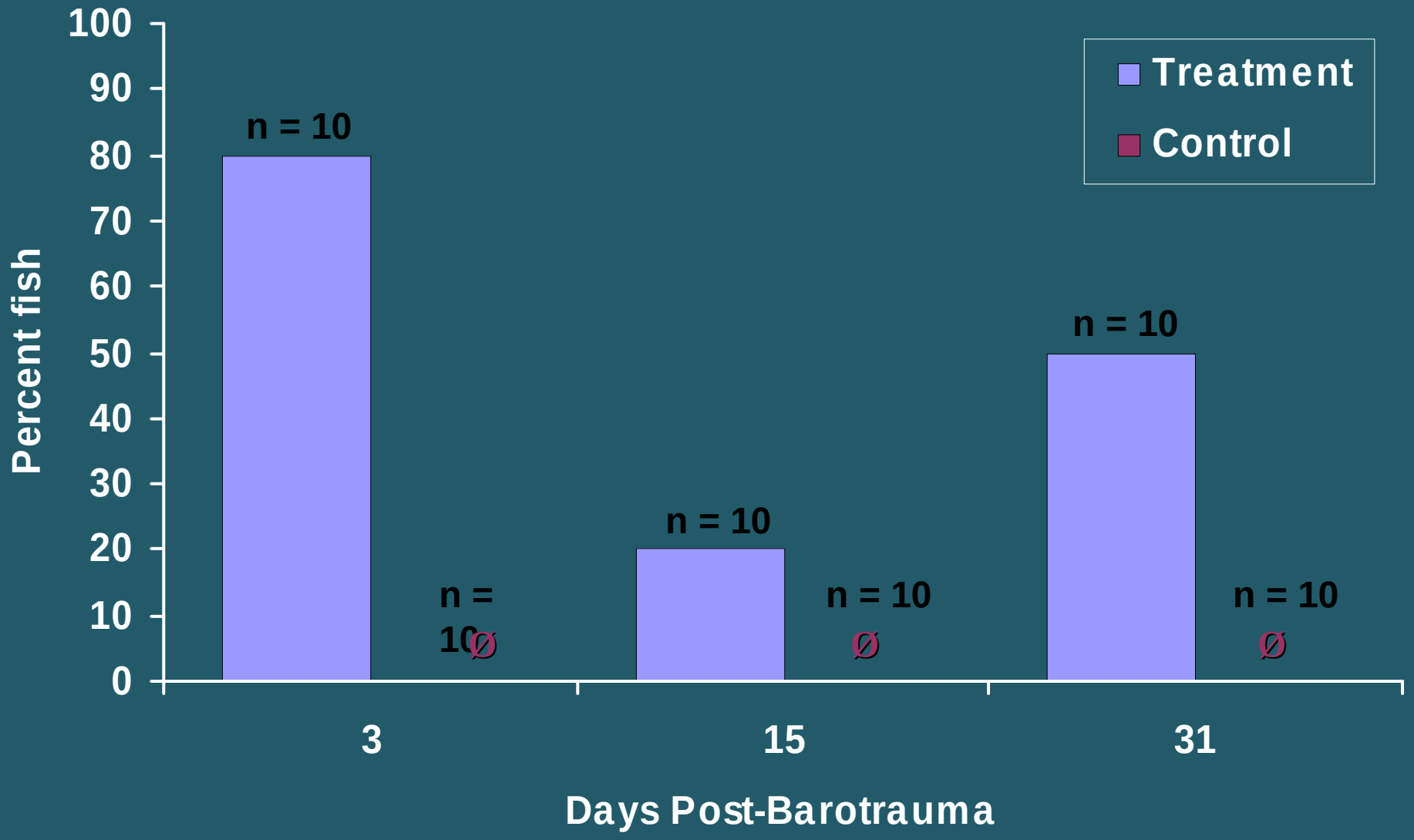

Graphs from Hannah et al. *in prep*

# Long-Term, Physiologic Recovery

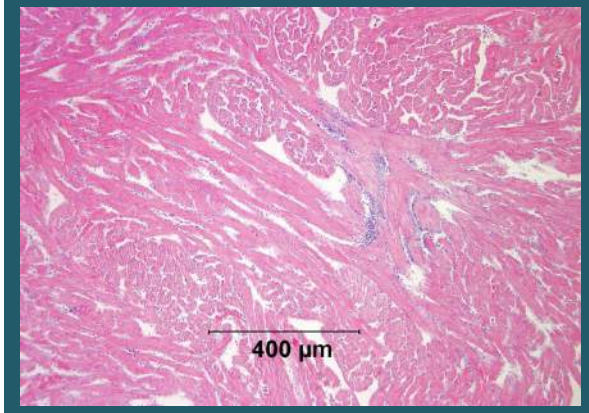
- Investigated recovery over 31 day period
  - Macro to micro: dissection, histology, blood, gene expression


0
5
10
15
20
25
30
35
40
Depth (m)
1
3
5
7
9
11
13
Time (days)

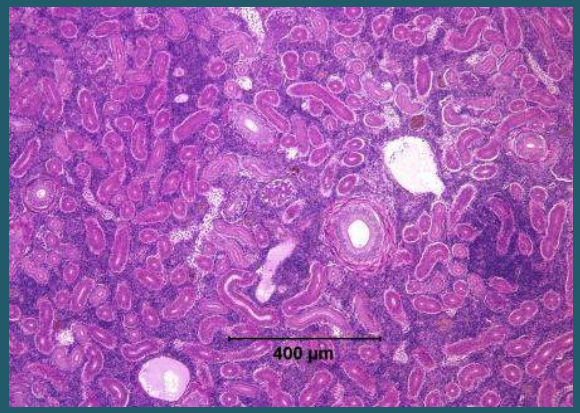
# Ruptured Swimbladder



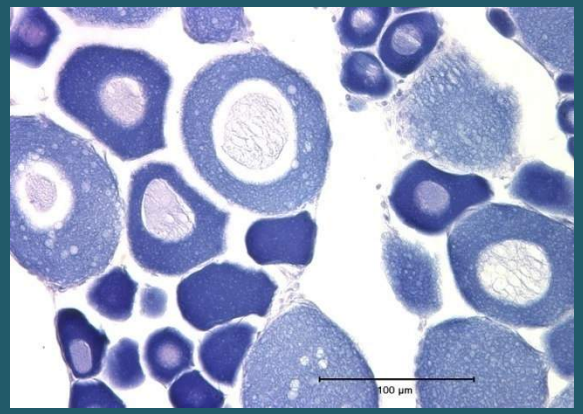
# Histological Analyses



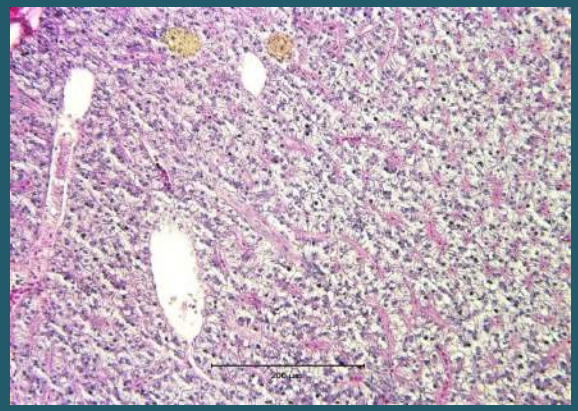

Heart ventricle



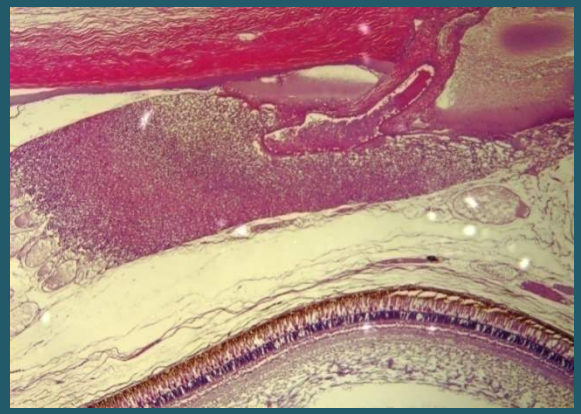

Head kidney



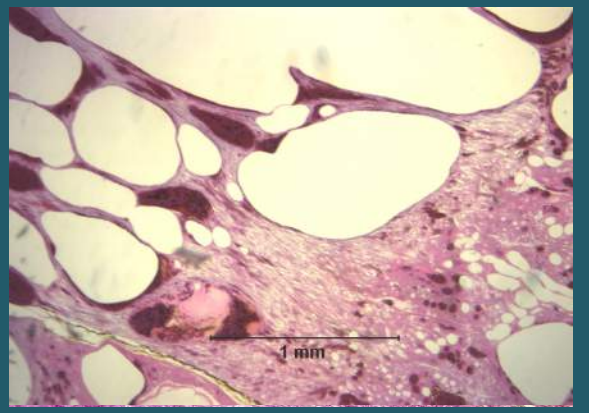

Gonad



Liver

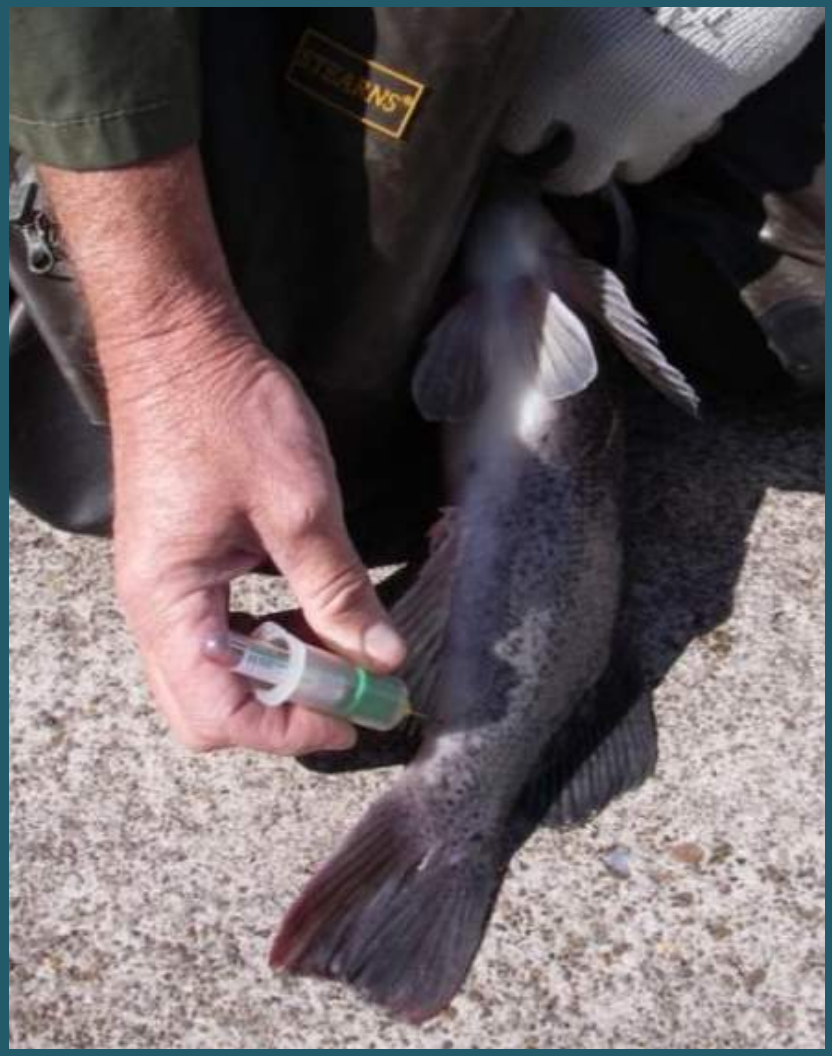


Eye




Rete mirabile

# Blood plasma analyses



# Blood Plasma Measures

- Blood plasma metabolites:

  Glucose, Na, Cl, K, Ca, and P
- Hormones:

  Insulin-like growth factor 1, Cortisol

**Result: No differences between T & C rockfish**

# Quick Results

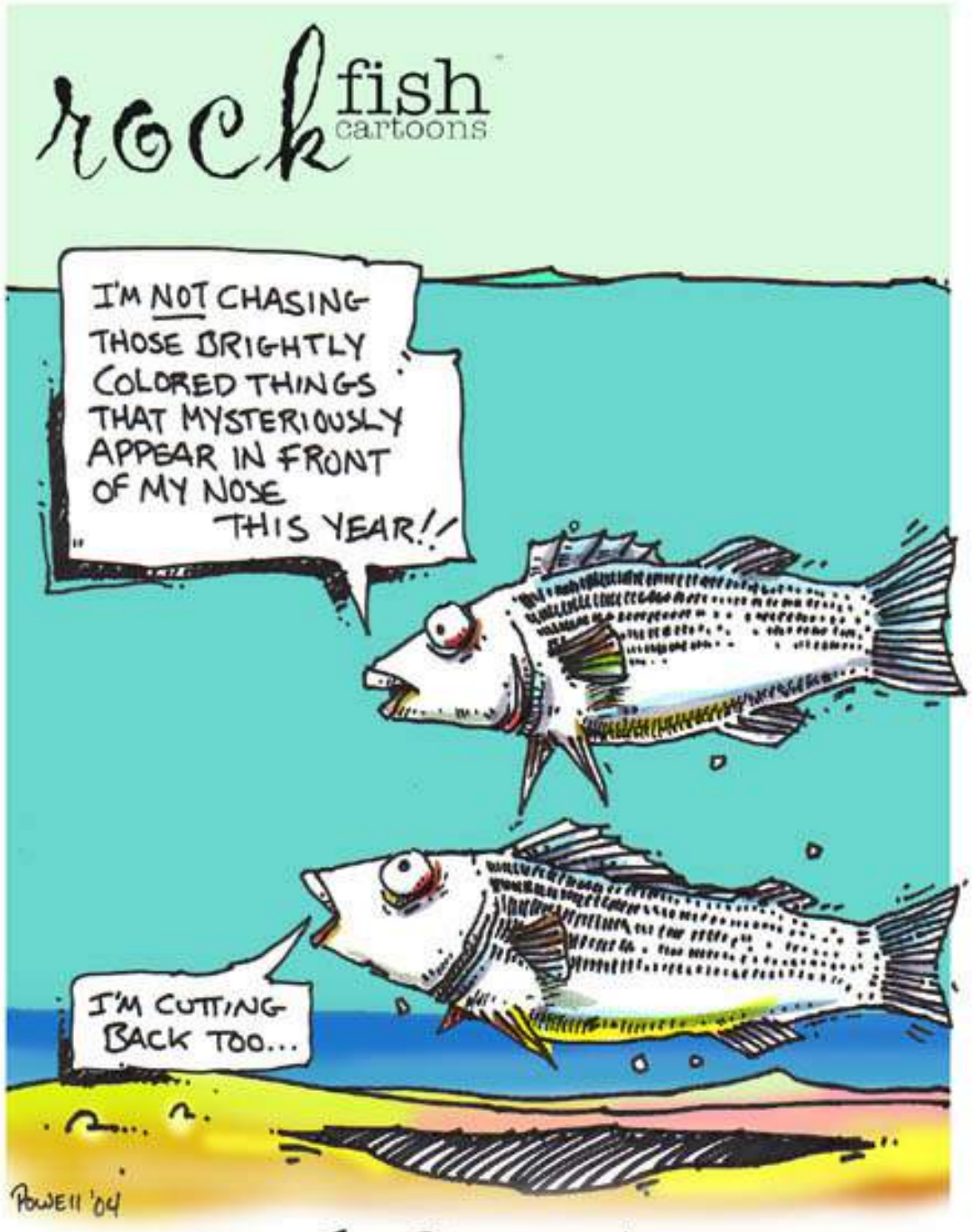
- Feeding: resumption after 31 days – indicates digestive system recovered
- Macro: ruptured swimbladder
- Histology: no injury in any tissues except rete mirabile – emboli, hemorrhaging in 2/30 fish
- Blood plasma: no diff between treatment and control fish – no addtl. stress from barotrauma
- Gene expression: 6 genes from innate immune system up-regulated day 3, no diff

# Summary of recompression studies in *Sebastes spp.*

- High 2-day survival rates, esp. for species that cannot submerge on their own (Hannah et al. *in prep*, Jarvis et al. 2008)
- Physiological recovery possible (Pribyl PhD diss. 2010)
  - Primary concern: SwB healing rates
- No visual impairment due to exophthalmia (Rogers Master's thesis)
- Tagged fish recorded up to 2 years after release (P. Rankin, personal comm.)

# Conclusions

- One size does not fit all
- Consider species-specific recommendations
- Be cognizant how factors such as time on deck, DOC, and temp differential may affect survival
- Even if fish do not recover 100%, many fish survive long enough to be re-captured again




FISH RESOLUTIONS

# Species with Recompression Studies

- Rockfish, *Sebastes spp.*
  - Very effective for some species (cage, chambers, tagging)
- Red grouper, *Epinephelus morio* (Wilson and Burns 1996)
  - Effective (85% survival in chambers, 91% survival in cages; DOC to 44 m )
- Red snapper, *Lutjanus campechanus* (Gitschlag and Renaud 1994)
  - Negligible (64% survival in cages)
- Australian reef fish: coral trout, crimson snapper, saddletail snapper, red emperor, redthroat emperor, grass emperor, dhufish, Australasian snapper (Sumpton et al 2010, Brown et al. 2010, Stewart 2008, St John and Syers 2005)
  - Effective for saddletail snapper (weights, tagging)