



Managing Barotrauma of Released West Coast Rockfish

Increasing the Survival and
Enhancing the Rebuilding of
Yelloweye Rockfish

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Pacific Fishery
Management Council

Pacific Council Objectives

Better Estimates of Total Fishing-Related Mortality in the Recreational Fishery Where There are Regulatory Discards

- Evidence of Discarded Rockfish Survival
- Survival Credits Applied to Relieve Some of the Constraints to Fishing Opportunity
- Improve Rockfish Stock Assessments

Modify State Recreational Catch and Effort Surveys to Collect Depth of Capture of Released Rockfish

Establish Best Fishing Practices

- Avoid Areas With High Catch Rates of Prohibited Species
- Enhance Survival by Descending Discarded Rockfish



Surface Release Discard Mortality Rates

Determined from Disposition of Discarded Species by Depth of Capture as Recorded by At-Sea Observers on Recreational Charter Vessels

Discard Mortality Rates Vary by Species

- Yellowtail Rockfish Exhibit Little Barotrauma and Survive Well Without Assistance
- Blue Rockfish Exhibit Severe Barotrauma and Poor Survival

Discard Mortality Rates Vary by Depth of Capture

Higher Discard Mortality Rates Also Correlated with Thermal Shock and Greater Handling Time



Discard Mortality Rates When Using Descending Devices

Applied to Discards of 3 Constraining Stocks (All Overfished When Decision was Made)

- Canary Rockfish (Rebuilt in 2015)



- Cowcod South of 40°10' N lat. (Rebuilt This Year)

- Yelloweye Rockfish (Still Rebuilding)



Determined from Species-Specific Research Studies Indicating Survival Based on Depth of Capture

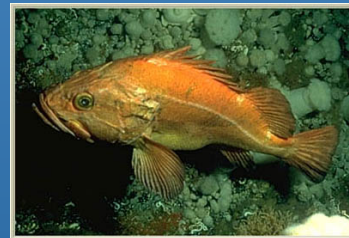
Research Informing Discard Mortality Rates For Descended Rockfish

Short Term Survival (3-4 days)

- Hyperbaric Chamber Studies Provide Species-Specific Barotrauma Effects and Recovery Rates after Recompression
- Cage Studies with Drop Cameras

Longer Term Survival (> 10 days)

- Acoustic-tagged Fish Released in a Hydrophone Array Indicated No Mortality within 4 Months



Modeling Key Uncertainties

Not all Species of Interest Were Observed in Each Depth Bin in the Analysis

- **Use of Proxy Species Based on Similar Life Histories and Anatomies**

Little Information Available at the Time to Better Understand Long-Term Mortality

Confidence Interval Estimation Methods Account for the Variance in Results between Proxy Species and Studies Contributing Data

Uncertainty Estimated Using a Bayesian Hierarchical Model to Estimate Variability in Research Results within Each Species and between Species

Discard Mortality Rates by Depth Bin for Yelloweye Rockfish Released at the Surface and with Descending Devices

Depth (fm)	Surface Mort. Rate	Mort. w/ Descending Devices	60% CI	75% CI	90% CI	95% CI
0-10	22%	22%	22%	22%	22%	22%
10-20	39%	22%	23%	24%	26%	27%
20-30	56%	22%	23%	24%	26%	27%
30-50	100%	23%	24%	25%	27%	28%
50-100	100%	35%	39%	45%	57%	65%
>100	100%	100%	100%	100%	100%	100%

Implementing Survival Credits

Survival Credits Based on Estimates of Discards by Species in Angler Creel Surveys

All Creel Surveys Were Modified to Better Estimate Species Discarded and Depth of Capture and Release

Survival Credits Were Implemented Retrospectively in Cases Where That Information Was Recorded

State Recreational Fishing Regulations

CA

Descending devices are encouraged to be used

OR

Descending devices are required to be used on all rockfish released in waters deeper than 30 fm

WA

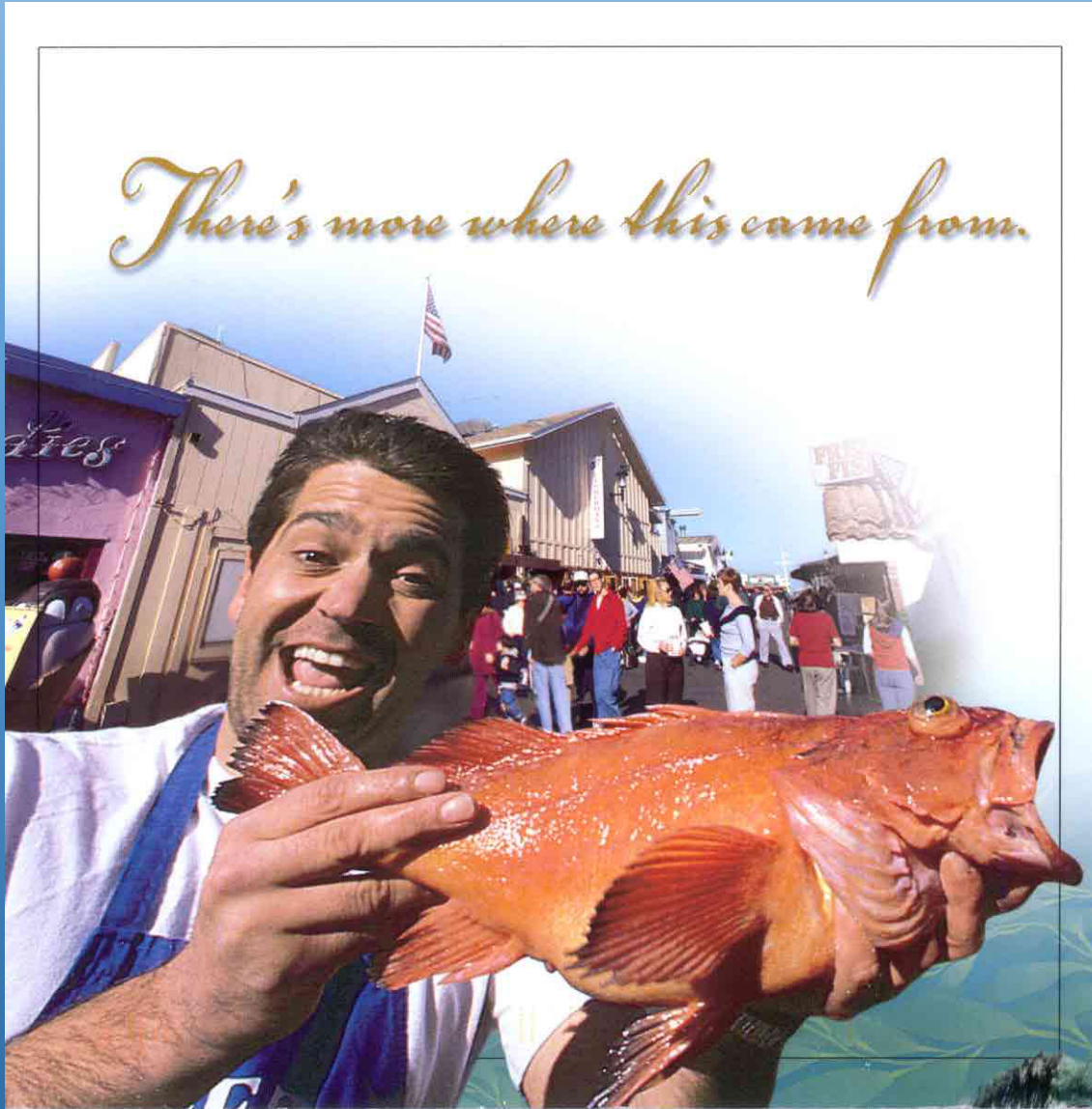
Descending devices are required to be onboard and rigged for immediate use when fishing for or possessing halibut or bottom fish

More Recent Research Results

AK Yelloweye Mark-Recapture Study (Blain and Sutton 2016)

- Yelloweye Caught Between 19 and 74 m and Released at Depth had 98.8% Survival
- No Differences Observed Based on Depth of Capture
- Recaptures 1-2 years Later Indicated No Compromise in Reproductive Function
- Some Yelloweye Females were Caught and Released More than Once with No Apparent Loss of Reproductive Function

Questions?



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