INTERNATIONAL PACIFIC HALIBUT COMMISSION

ALASKA PACIFIC UNIVERSITY

Improving Discard Mortality Rate estimates of Pacific halibut (*Hippoglossus stenolepis*) in the directed longline fishery

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NOAA FISHERIES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

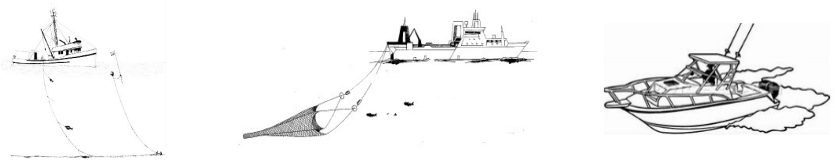
Saltonstall – Kennedy Grant NA17NMF4270240

Directed Longline Fishery: Discard Mortality

- Sublegal (<32”) Pacific halibut must be discarded with minimal injury.
- Acceptable releases include careful shake, hook straightening, or cutting the gangion.
- Survival ultimately depends upon handling.
- Discard mortality rates (DMRs) are an estimate of the fish that are expected to die after release.
- DMRs are calculated from viability data collected by at sea observers.
- The mortality associated with discarding Pacific halibut in both the directed and non-directed fisheries is estimated annually and incorporated into Pacific halibut assessment and management.

Discard Mortality of Pacific halibut

- DMRs and their uncertainty contribute to uncertainty in total mortality estimates and translate into *a priori* adjustments to expected mortality in the upcoming year, and thereby to the catch limits that are assigned to each harvest sector.



- Individual variability in terms of post release mortality is expected depending on injuries and stresses incurred as well as on the basal physiological condition of the fish.
- This project looks to improve DMR estimates and better understand their physiological underpinnings, while providing strategies to improve the survival of released fish.

Study Objectives

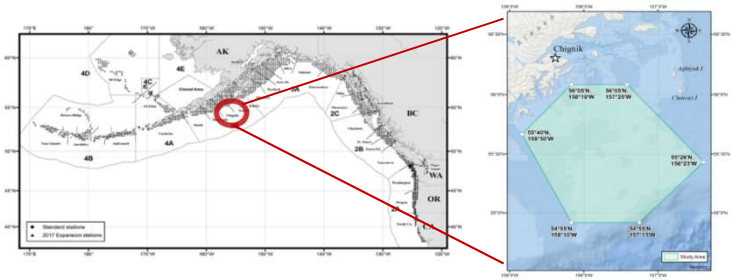
A. Develop injury profiles for different hook release techniques (careful shake, hook straightening, gangion cutting, hook stripper) and associate injury profiles to physiological condition.

B. Investigate influences of injury level and physiological condition on post-release survival.

C. Test the application of electronic monitoring (EM) in associating hook release techniques to survival on vessels without observer coverage

Study Methods

- Vessel
  - F/V Kema Sue (80’ longliner)
  - Internal ramp to slide fish to work area
  - EM System aboard (3 cameras, same configuration as the current EM EFP in AK, installed by AMR, reviewed by PSMFC)
- Area
  - southeast of Chignik, AK



Study Methods

- Study design
  - Three sets (8 skates/set) per day, total of 36 sets
  - Hook release techniques (randomly assigned per skate):
    - Hook straighten (dropped during trial sets, sublegals do not have enough weight for this technique to work)
    - Careful shake (x 5 skates)
    - Gangion cut (x 1 skates)
    - Hook stripper (occasional miss at the roller) (x 2 skates)

Study Methods

- Fish Sampling (all sizes)
  - Weight
  - Fork length
  - Hooking injury

Severity	Code	Description
Minor	**NO**	No apparent injury.
	CO	Cheek only (not through skin).
	JO	Jaw only (but not clear through the jaw).
	TL	Torn lip (skin covering external portion of jaw), cheek not punctured.
	TC	Torn cheek, small hole through cheek only.
Moderate	**TJ**	Torn jaw, either side. Little or no tearing in cheek.
	CJ	Cheek and jaw. Tear in cheek extending through jaw.
	EY	Hook penetrated eye.
Severe	**TF**	Torn face. Torn though cheek and jaw, like above, but large flap of side of head is ripped/missing.
	SJ	Split jaw. Lower jaw is split laterally.
	JB	Jig body. Fish snagged by hook somewhere on body other than head.
	JH	Jig head. Fish snagged by hook in the head (not through mouth).
	TS	Torn snout. Upper jaw is split laterally, usually tearing through the snout as well.
Unknown	**UN**	Injury unknown or unrecorded.

Study Methods

- Fish Sampling: <33” (84cm)
  - Fat content determination
  - Blood sample (stress hormones, metabolites, ions)
  - Fin clip (genetic sexing)
  - Vitality (minor, moderate, poor, dead)
  - Wire tagged (long term survival) and released.
  - 80 minor injury fish (<32”) randomly targeted for sPAT (near term survival 96 days)

Study Methods

- Other parameters tracked
  - Water temperature (bottom and surface)
  - Air temperature
  - Fish temperature
  - Time on deck
  - Soak time
  - Depth
  - Sea state

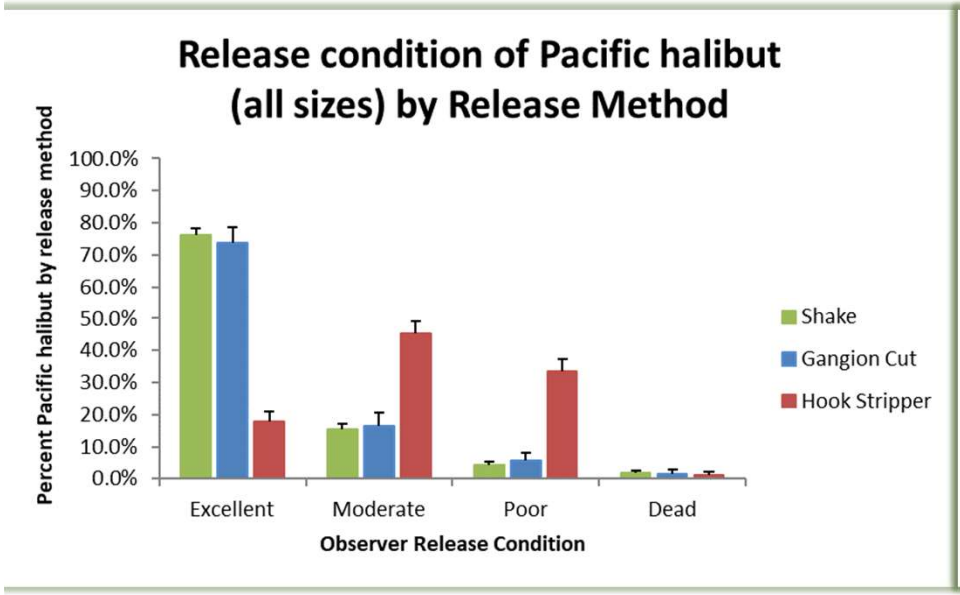
Results:

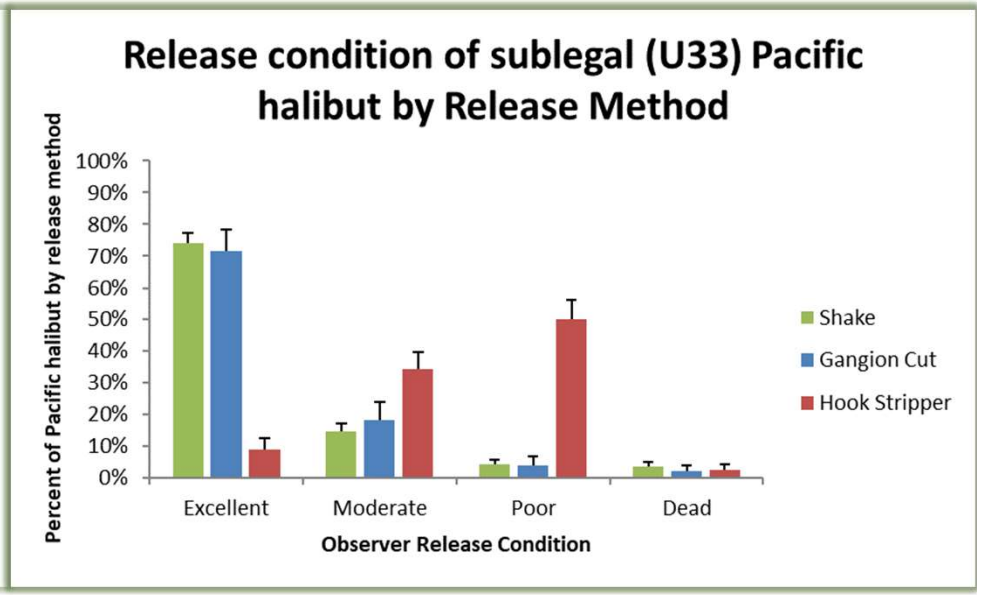
A) *Relationship between handling practices and injury levels*

- Physical injuries (profile) associated with release techniques (careful shake, gangion cut, hook stripping).

Results:

A) *Relationship between handling practices and injury levels*





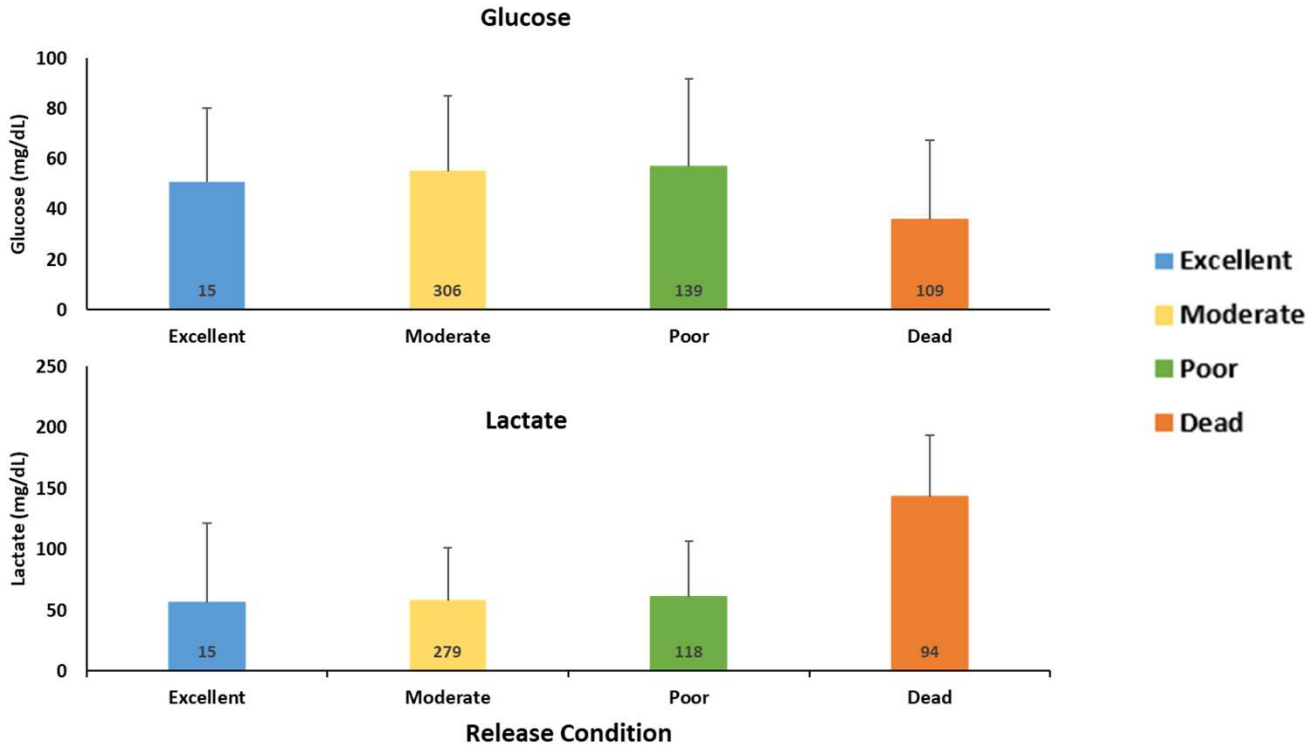
Results:

A) Relationship between handling practices and injury levels and physiological condition of released Pacific halibut

- *Physiological condition* of released fish
  - Condition factor indices
  - Fat content
  - **Blood stress**

Results:

- **Blood parameters by release condition**



Results:

- **Blood parameters by injury code**

Code	Description
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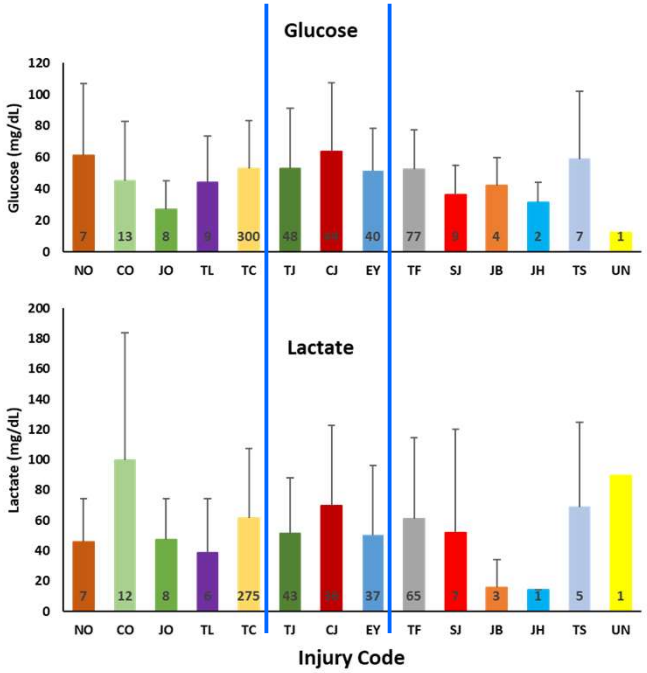
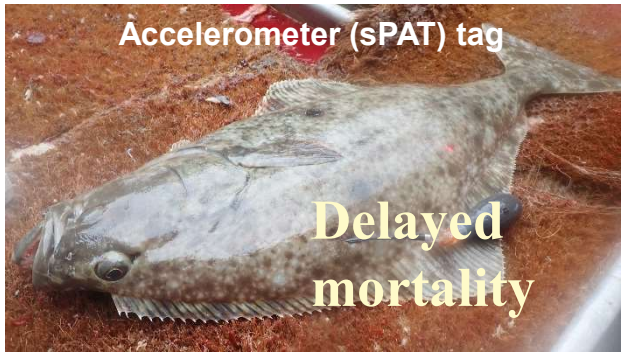


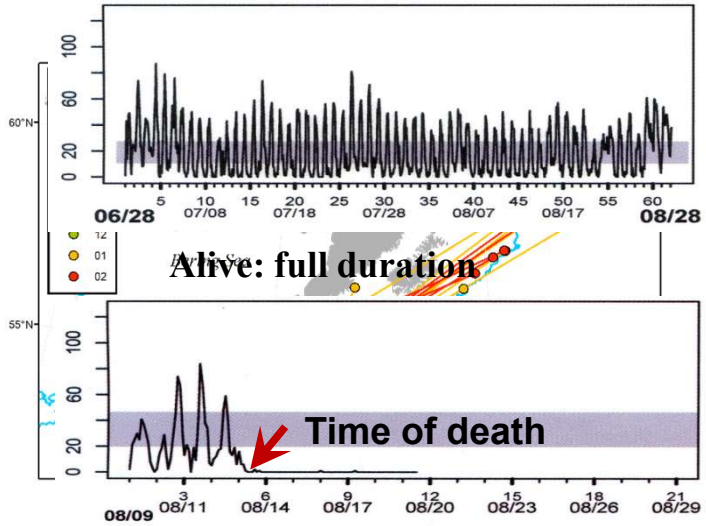
Results:

B) Relationship between physiological condition post-capture and survival post-release as assessed by tagging

- Accelerometer tags or sPATs (n=79): only fish in excellent condition
- Wire tags (n=1,048): including all handling practices and release conditions



Results: 4% mortality



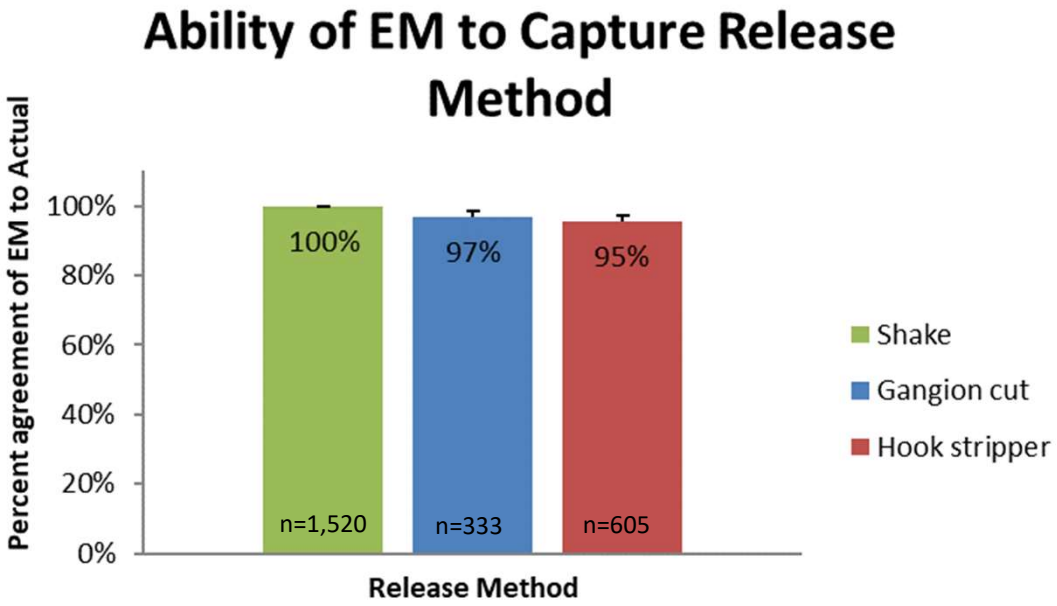
Results:

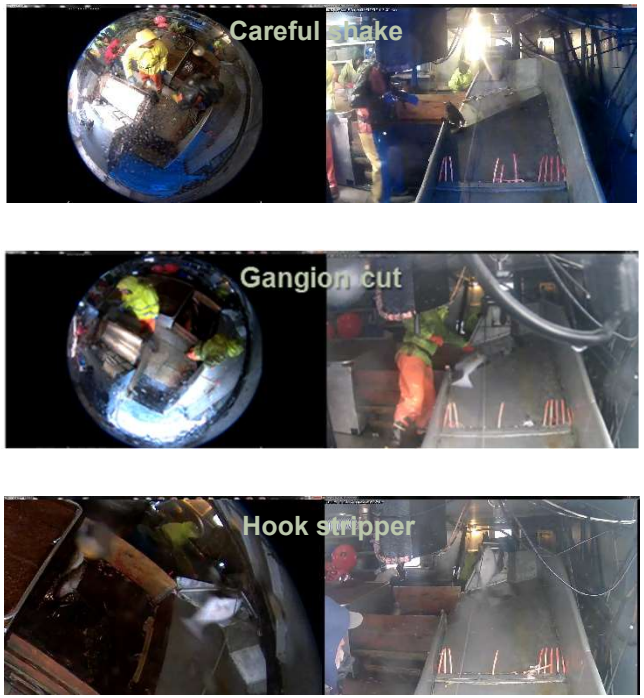
C) Applicability of electronic monitoring (EM) in DMR estimation

- Deployed EM system on a longline vessel
- Video recorded fish handling events during capture
- This will allow us to determine injury profile by release method

Results:

C) Applicability of electronic monitoring (EM) in DMR estimation





Conclusions:

- Injury profile by each hook release method established.
- Physiological profile post-capture being established.
- Initial survival post-release affirmed as 4% for Pacific halibut in excellent condition.
- Capability of EM for determination of release method demonstrated.
  - Injury profile will enable algorithms for estimating DMR on vessels with EM.
- Develop guidelines for best release practices
  - Build on these results
  - Survival of larger fish (non-directed longline fleets)
  - Different hook sizes (bycatch mortality in other fleets)

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- IPHC office and field staff



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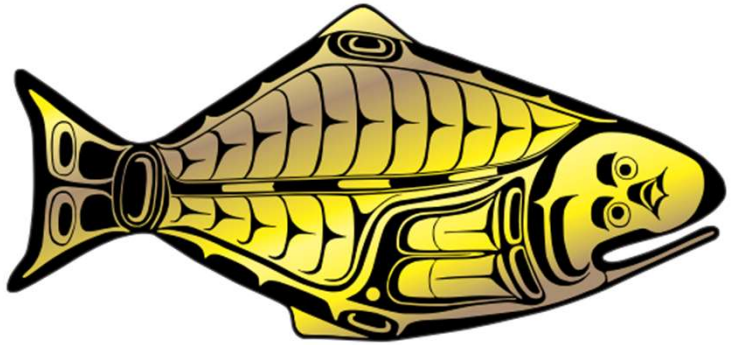

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