

*Science, Service, Stewardship*



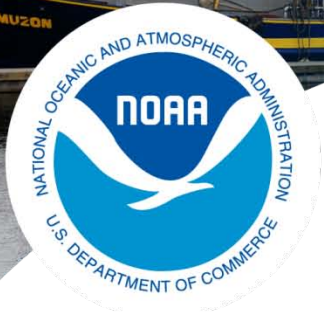
# ELECTRONIC MONITORING IN THE NORTH PACIFIC

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FISHERIES  
SERVICE**

AFSC-FMA



# Overview



Observer Program  
Responsibilities



Audit  
Versus  
Estimation



Council  
Objectives



How 2013 Data  
Informs Council  
Objectives



EM Innovations



Strategic Plan



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# Monitoring Objectives for NP Observers

Current Monitoring Activities of Observers on Hook and Line Vessels	Observer	EM as it is currently available	Industry self report	Notes	Purpose
<b>Birds</b>					
Monitor and report take of short-tailed albatrosses	Yes	No	No		ESA Biop
Document all observations of short-tailed albatrosses	Yes	No	No		ESA Biop
Identify and count all other seabirds within samples	Yes	No	No		ESA Biop
Dead short-tailed albatrosses must be frozen and surrendered to the NMFS or the USFWS.	Yes	No	Maybe	Physical specimens	ESA Biop



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# Observer Program Responsibilities

Current Monitoring Activities of Observers on Hook and Line Vessels	Observer	EM as it is currently available	Industry self report	Notes	Purpose
<b>Mammals</b>					
Record marine mammal sightings	Yes	Maybe	Maybe		MMPA
Record marine mammal interactions including deterrence, entanglements, lethal removals, ship strikes, and predation on fishing gear by sea lions, sperm whales and killer whales.	Yes	Maybe	No		MMPA
Collect marine mammal parts (snouts, etc)	Yes	No	No	Physical specimens	MMPA



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# Observer Program Responsibilities

Current Monitoring Activities of Observers on Hook and Line Vessels	Observer	EM as it is currently available	Industry self report	Notes	Purpose
<b>Fish</b>					
Catch composition by species in number and weight to incorporate into the CAS for total catch accounting.	Yes, with some species limitations.	No	No		MSA – catch accounting and management under ACL's
Disposition of the catch (retained or discarded) by weight.	Yes	No	No		MSA management
Viability of halibut released	Yes	No	No		IPHC and MSA management
Sexed length frequency data for target and bycatch species	Yes	No	No		Stock Assess and Council analyses
Sexed length and weight for salmon, crab.	Yes	No	No		Stock Assessments and Council analyses
Misc biological collections (maturity, genetics, scales)	Yes	No	No	Physical specimens	Stock Assess and Council analyses



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# Observer Program Responsibilities

<b>Current Monitoring Activities of Observers on Hook and Line Vessels</b>	<b>Observer</b>	<b>EM as it is currently available</b>	<b>Industry self report</b>	<b>Notes</b>	<b>Purpose</b>
<b>Miscellaneous/Invertebrates</b>					
Numbers, weights and identifications of	Maybe	No	No		Habitat,
<b>All Species</b>					
Tag recoveries	Yes	No	Maybe	Physical	Stock
Collection of voucher specimens	Yes	No	Maybe	Physical specimens	Training and verification



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# Observer Program Responsibilities

Current Monitoring Activities of Observers on Hook and Line Vessels	Observer	EM as it is currently available	Industry self report	Notes	Purpose
<b>Fishing, gear characteristics, and management program identifications</b>					
Set/ retrieval dates, times, and	Yes	Yes	Yes		Stock
Location of non-fishing days.	Yes	Yes	Yes		Council
Quantity of gear deployed in each set.	Yes	Yes	Yes		Effort
Quantity of gear retrieved.	Yes	Yes	Yes		Stock
Hook Counts and spacing measurements of specific set segments (sablefish only).	Yes	No	No	Hook and line-sablefish only	Stock Assess Catch Account
Gear performance, including instances of predation.	Yes	No	Maybe		Catch and MMPA
Beginning and end Depth	Yes	Maybe, w/sensor integration	Yes		Stock Assess and Council Analyses
IFQ- Yes or no	No	No	Yes		Catch Management
CDQ group number if applicable	No	No	Yes		Catch Management



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# Observer Program Responsibilities

Current Monitoring Activities of Observers on Hook and Line Vessels	Observer	EM as it is currently available	Industry self report	Notes	Purpose
<b>Regulatory Compliance</b>					
Compliance with careful release	Yes	Yes		Hook and	Regulatory
Ensure rehabilitation of injured short-tailed albatross	Yes	No		Physical handling required	Regulatory Compliance
Compliance with seabird avoidance	Yes	No			Regulatory
Compliance with time area closures	Yes	Yes, with GPS integration			Regulatory Compliance
Real time position monitoring	Yes	Yes, with GPS integration			Regulatory Compliance
Witness flow scale testing and record test weights and results	Yes	Maybe		Flow scale vessels only	Regulatory Compliance





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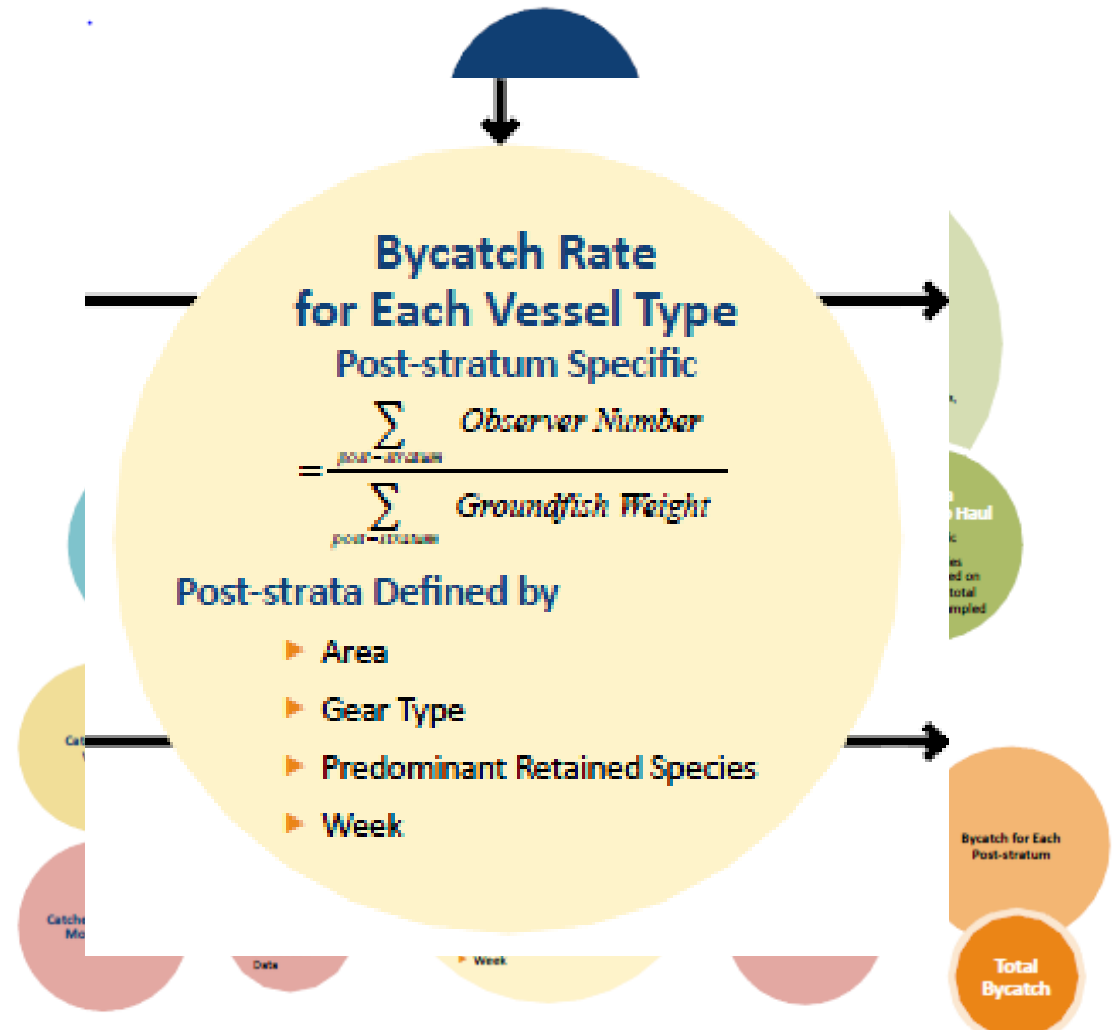
## Current EM in a Compliance Monitoring capacity in Alaska

1. Amendment 80 to the Bering Sea Aleutian Island non-pollock trawl fishery requires video recording of sorting activity in bins (or an alternative measure) to prevent pre-sorting of the catch before the observer has an opportunity to sample the catch;
2. Amendment 91 to the Bering Sea Aleutian Island pollock trawl fishery requires video monitoring of all locations where salmon bycatch is sorted by the crew and the location where the salmon are stored until sampling by an observer.
3. Starting in 2013, freezer longliners with endorsements to catch and process Pacific cod with hook and line gear in the BSAI have additional equipment and operation requirements. If vessels are using motion-compensated scales to weigh Pacific cod, they are required to maintain a video system to monitor sorting and flow of fish over the scale.



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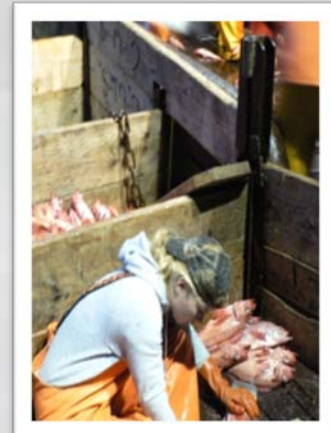
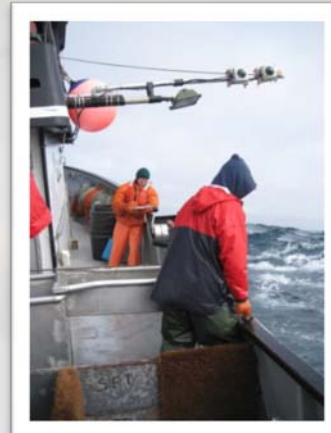
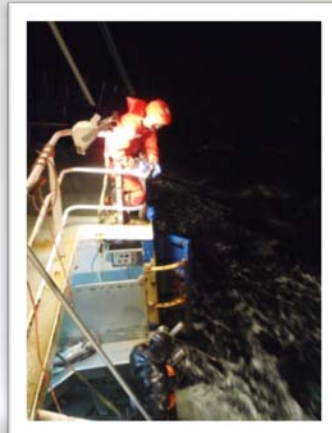
# Observer Data Supports AK Catch Accounting System





# Questions?

Changes to support sustainable fisheries



# Compliance Monitoring (Audit) for Self Reported Catch in Canada



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**Table 2.** Components of the GHLCMP showing programme elements, monitoring objectives, and coverage level.

Element	Objective	Coverage (%)
Hails	Confirm valid fishing trips	100
Logbooks	Create complete record of fishing operations	100
EM sensor	Collect complete sensor record of trip	100
	Verify logbooks	100
	Confirm valid fishing locations	100
EM imagery	Collect complete image record of catch retrieval operations	100
	Random review to audit logbook catch record	10
Dockside monitoring	Verify record of species and weights of landed catch	100
	Individual counts by species of landed catch	30 – 40 (volume)

Hails refer to the hail-in and hail-out by harvesters as they provide notification of intent to leave for a fishing trip and return to unload from a fishing trip, respectively. EM refers to the EM component of the programme.



# Compliance Monitoring (Audit) for Self Reported Catch in Canada



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The basis of the Audit program is to enable fishers' logbook data to be validated by comparing with video interpreted data.

- Discard - based on logbook (verified through 10% EM audit/rockfish scoring approach)
- Retained - Fish tickets provide official record of landings verified by dockside monitors
- Dockside monitors - Collect biological specimens and verify sorting requirements and retained piece counts
- Substantial Penalty \$\$\$\$– On vessel operator if Audit is not within 5% of video review



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## An alternative approach – sampling using video similar to what we do with observers?

**Currently no operational video monitoring programs in NMFS-managed fisheries where data extracted from video are used for science or management purposes.**

Why not?

- Inability to accurately identify species
- Cannot obtain weights of discarded fish
- Length of time required to obtain and review video and extract all requisite information
- Cannot collect biological samples



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## Audit versus Estimation

Required Elements	Audit based <sup>1</sup>	Estimation based
Logbook	Y	Y
EM sensors	Y	Y
Video imagery	Y	Y
Species weight	Y	Y
Hails	Y	N
Dockside monitoring	Y	N
Port Sampling	Y	N
Complex Scoring/Audit	Y	N
Catch based on self reported data	Y	N

*Source:* <sup>1</sup>Stanley et.al. 2011

# Audit versus Estimation



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General Considerations	Audit based	Estimation based
Scalability is a function of	Ports/Fisheries/Season	Rate/Fishery/Season
Coverage flexibility	Difficult	Easy
Dependence on compliance	High	Low
Species ID limits	Species on audit scoring list	Any identifiable species
Industry support and training	3 years	1 year
Potential cost controls	Audit rate/Scoring list	Sampling rate
Precision	Unknown-Self Reported	Depends on Sample intensity and rarity
CAS integration difficulty	High	Low
Discard spp. weight required	Yes	Yes
Limited Port of landing	Yes	No
Start up costs	High	Low
Monitoring costs	3.33% <sup>1</sup>	1.25% <sup>2</sup>

Source: <sup>1</sup>Stanley 2010 personal communication with NEFSC; and <sup>2</sup> current Observer Program's cost recovery rate





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## Audit versus Estimation

Regulatory Considerations	Audit based <sup>1</sup>	Estimation based
Retention Requirements	Y	N
Data confidentiality and control	Y	Y
Industry responsibilities	High	Low
Enforcement action and penalties	High	Low
Port hail requirements	Y	N
Dockside monitoring requirements	Y	N
System component requirements	Same	Same
Maintain logbook	Y	Y
Logbook Audit requirements	Y	N
Species ID requirements	Scoring list	Maybe some

Source: <sup>1</sup>Stanley et.al. Personal communication



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# Why Consider using Video Data to Estimate Catch?

Estimation potential where the catch is brought on board and discarded individually (pot, gillnet, longline, and jig), and each specimen can be identified and total counts at varying taxonomic levels can be made

Much less complicated to implement and cost effective compared to an audit based approach to establish discard rates

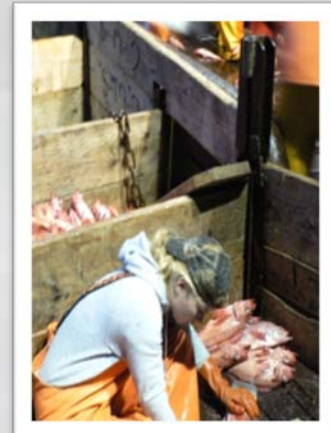
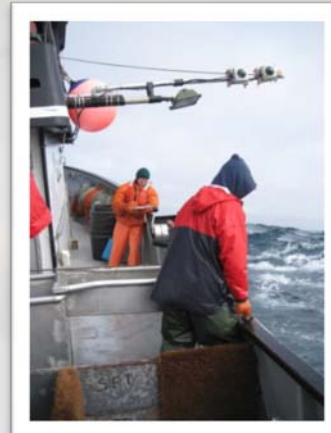
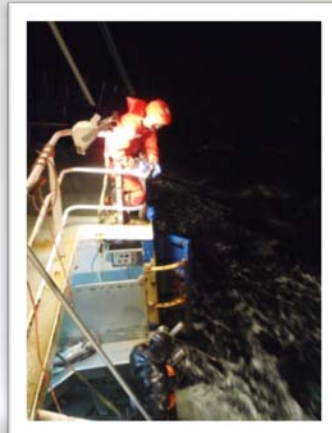
Is more responsive to fluctuations in cost and cost recovery (scalability).

Technology can greatly improve EM data and post processing; an estimation approach is more adaptable to upgrade (system requirement regulations)



# Questions?

Changes to support sustainable fisheries





## Council Objectives

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### **October 2012 motion:**

“The Council requests that NMFS provide a strategic planning document for electronic monitoring (EM) that identifies the Council’s EM management objective of collecting at-sea discard estimates from the 40’ – 57.5’ IFQ fleet, and the timeline and vision for how the EM pilot project in 2013 and future years’ projects will serve to meet this objective, including funding.”

### **This motion also forwarded an AP recommendation to:**

“Recommend that NMFS report to the Council on other EM options that may be appropriate to replace or supplement human observers.”



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## Steps to inform Council Objectives

1. Use observer data to inform Council on potential concerns/solutions (2013 ADP Performance Review)
2. Provide evaluation of the potential and limitations of EM and ER
3. Evaluate possible solutions to data gaps
4. Define associated cost structure



## Use Observer Data to inform Council



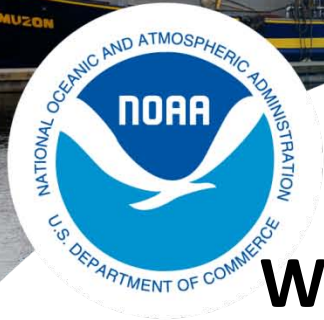
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**What questions will the 2013 ADP Performance Review help answer?**

- Are there potential conservation concerns?
- Are there specific fleets, areas or time periods where discard (PSC and Non-PSC) is relatively high compared to others?
- Are sampling rates sufficient?
  - Performance indicators (post strata)
  - What is the minimum observer coverage needed gain confidence in catch estimation?
  - What is the minimum observer coverage needed to obtain necessary biological data for stock assessment?
  - What is the minimum observer coverage to address ESA, protected resources, etc?



# Provide Evaluation of the the potential and limitations of EM/ER



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## What questions will the 2013 study help answer?

- Which species can we identify that are part of current Observer requirements? DSR? Skates?
- Are there specific data concerns that can be addressed with EM?
- What potential regulations may be required?
  - Requirements and limitations
- How can we verify the EM/ER data?
  - Observer data, Sensors, elogs and GPS, VMS



# Develop Standards 2013



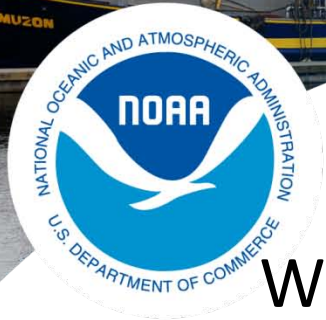
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- Performance standards
  - Hardware specification
  - Image definition
  - Species identification
  - Maintenance protocols
  - System Reliability
- Vessel Monitoring Plans (standardized templates)
  - Define operator responsibilities and standards
  - Catch handling procedures (control points)
  - Develop equipment maintenance procedures
  - Vessel Integration





# Evaluate Possible Solutions



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What questions will the 2013 study help answer?

- Are there solutions to data gaps?
  - Species weight estimates
    - Crew assisted
    - Stereo cameras
  - Biological samples
    - Crew assisted
  - Species identification
    - High definition cameras and discard control points



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## Define Cost Structure

- Hardware
  - Monitoring Equipment
  - Maintenance
  - Installation
- Associated costs
  - Personnel
  - Data Storage/Post Processing video
  - Travel
- Regulatory
  - Agency
  - Industry
- Evaluate potential cost benefit Ratios



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# Steps to Inform Council Objectives

**Use Observer Data to Inform Council (2013 ADP Perform. Review)**

Conservation , estimation, sampling or discard concerns?



**What Species Are Reliably Identifiable in Video Data?**

Roundfish

Rockfish

Flatfish



**How do we Conduct Biological Sampling for EM Vessels?**

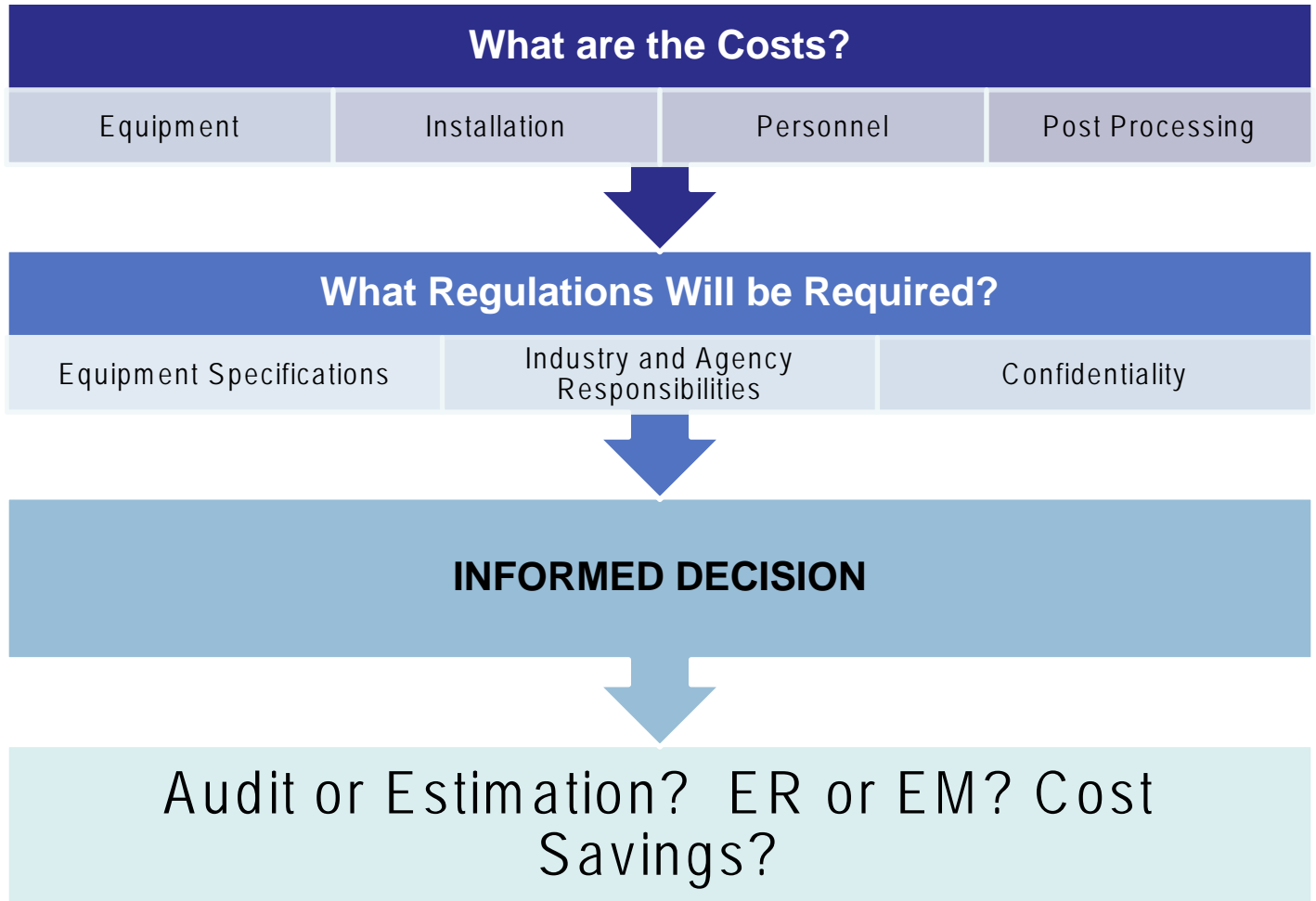
Weight-Length

Ageing



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# Steps to Inform Council Objectives?





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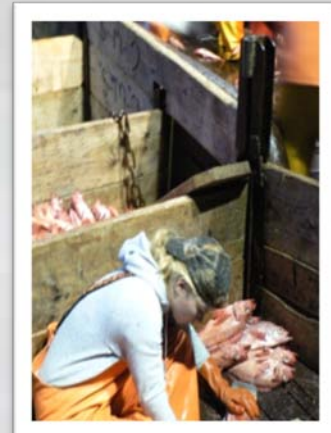
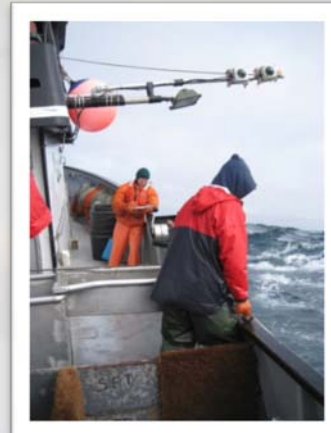
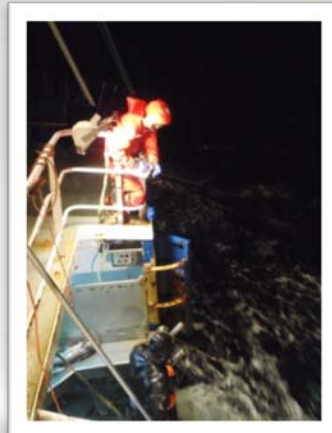
# Informed Discussion On

- Purpose? (Management, Audit, Estimation)
- What are the appropriate EM/ER tools?
- What are the components?
- Regulations to support EM/ER?
- Who pays for what (purchase or lease)?
- How will the data be handled/stored/accessed?
- Post Processing (who, how and how fast)?
- How will the data be used for CAS?
  - What level of Precision? Which Species?
- What can we verify and not verify?
- Costs? Depends on how you answer the questions above.



# Questions?

Changes to support sustainable fisheries





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# Why are Innovations Important?

Could dramatically change the cost-benefit ratios by:

- Automating image acquisition of catch events
  - Reduce post processing and data storage costs
- Enhance Species Recognition
  - Automate Species Identification
- Automate length sampling
  - Infer weight



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## Innovations 2013-2015

Electronic reporting of Effort and catch (Largely Funding Dependent)

- Expanding Elog
- EM Light fishing effort position verified (GPS and Sensors)
- Automated data download in near real time
- Possible alternative to VMS?

Stereo Camera System Prototype (PSMFC)

- Length composition







# Potential of future Technologies



Kresimir Williams et.al.

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# ELECTRONIC MONITORING STRATEGIC PLANNING DOCUMENT

DRAFT

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# Why is the Strategic Plan Important?

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**IT IS ABOUT THE PLANNING PROCESS TO:**

Resolve policy, technical, budgetary, enforcement, regulatory impediments to a way-forward on EM.

Re-examine monitoring requirements in the context of all methodologies that can achieve a more cost-effective and sustainable program.

Realign regulatory framework that matches management with technical and fiscal constraints on monitoring.

**Gain agreement on direction.**

**Choosing a EM strategy has long-term implications for data quality, data timeliness, policy, regulatory burden and costs.**



# Definitions



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**Goals** – Our goals describe how the future world will be different. They do not describe what we will do. Goals address: “How will the world be different” and should not change over time.

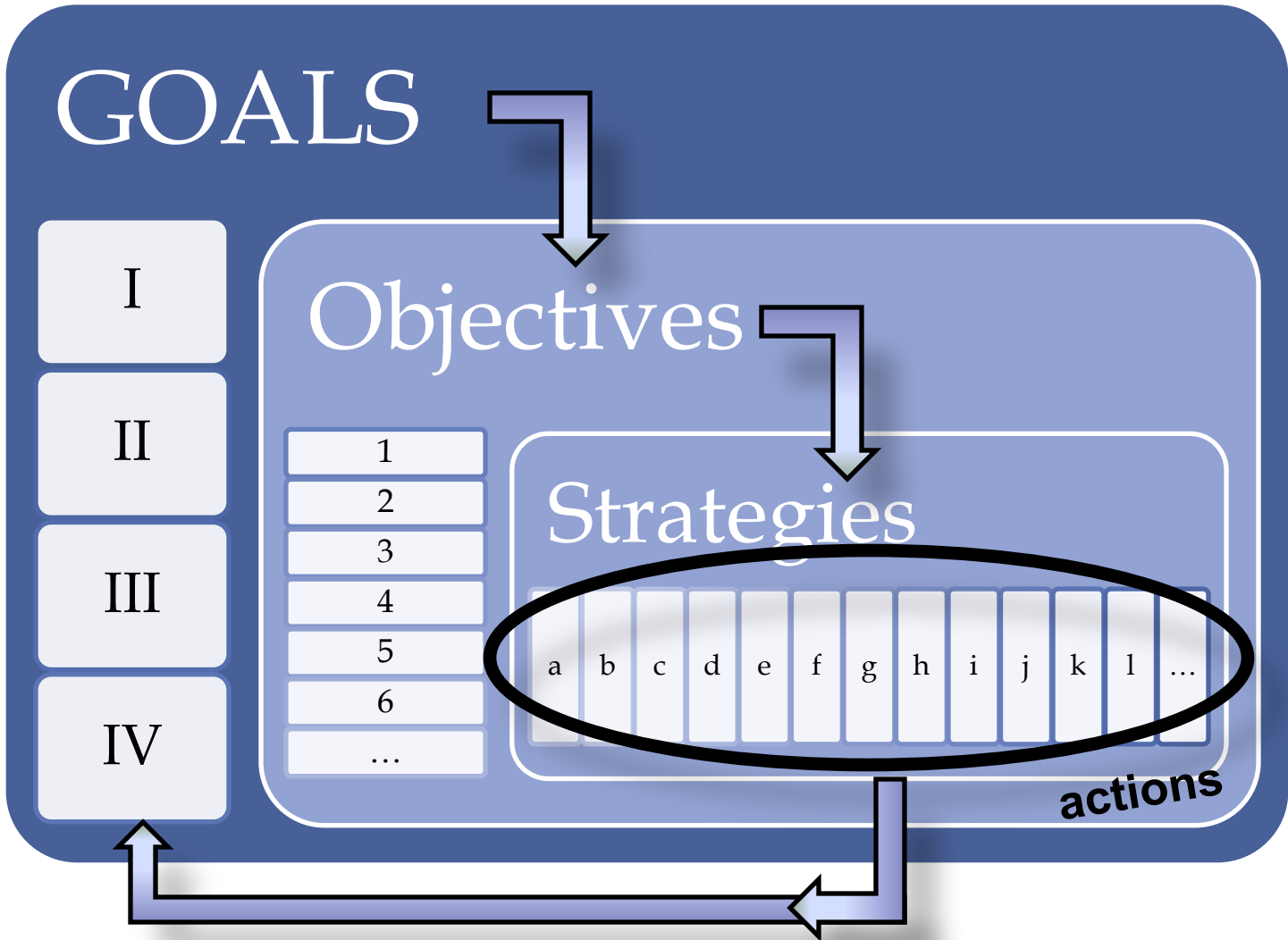
**Objectives** – Measureable , attainable milestones that we want to achieve on the way to meeting the goals.

**Strategies** – How we organize our resources and actions to maximize our effectiveness and efficiency to meet the Objective (examples will be provided to illustrate).

**Actions** – Concrete and sometimes completed steps implementing the strategies.



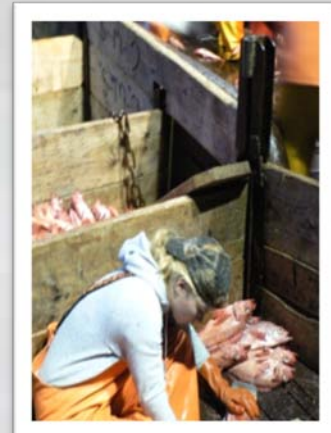
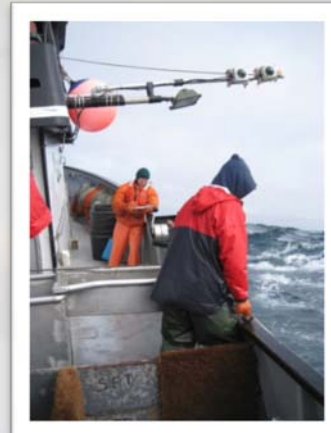
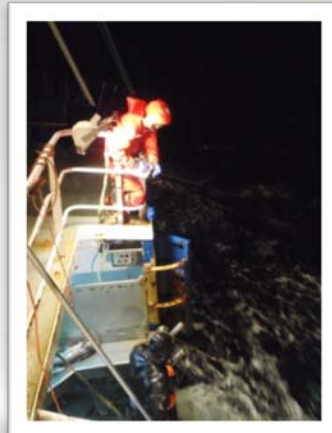
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# 2013 Observer Program

Changes to support sustainable fisheries





# What will we present at the June Council Meeting?



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## **A. 2013 ADP Performance Review**

It is intended that this review will inform the Council and the public of how well various aspects of the program are working, and consequently lead to recommendations for improvement.

*Not a complete Performance Review (only 3 months of data)*

Specifically,

- (1) Collect the data necessary to manage the groundfish and halibut fisheries;
- (2) Maintain the scientific goals of unbiased data collection; and
- (3) Accomplish the most effective and efficient use of the funds collected through the observer fee.

Source: Page 2 of the NMFS 2013 ADP

## **B. Draft Strategic Plan for Electronic Monitoring**

Update Video deployment, ID problems  
Funding- NPRB, Agency and Other?



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# 2013 Partial Annual Review Outline

## DOCKSIDE- 2013 POLLOCK A SEASON

Review of assumptions behind sampling design.

Sampling rate (deliveries) and efficiency-

Days and dollars to completely observe these offloads.

## AT-SEA

### **Stratum 1- 100% FLEET**

#### Voluntary Portion

Fleet summary (e.g. number of vessels, size distribution)

Sampling rate and efficiency- landings with an observer vs. those that should have carried one.

#### Mandatory Portion

Fleet summary

Sampling rate and efficiency- landings with an observer vs. those that should have carried one.





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# 2013 Partial Annual Review Outline

AT-SEA (continued)

## **Stratum 2- Trip-selection partial coverage**

Fleet summary

ODDS performance issues (selection probabilities).

Sampling rate and efficiency- landings with an observer  
vs. those that should have carried one.

Cost trajectories.

## **Stratum 3- Vessel selection partial coverage**

Fleet summary

Sampling rate and efficiency- landings with an observer  
vs. those that should have carried one.

Cost trajectories.

# Alternative Deployment Strategy?



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- We need to analyze 1<sup>st</sup> years deployment to make informed decisions on potential improvements.
- Two research studies include Cotter et.al. 2002, Allen et.al 2000.
  - Simulations to inform Deployment would be based on historical catch and effort may not be accurately representative the year of deployment.
  - Deployment based on PPS may not be an improvement to over a simpler equal probability method (our current design) to justify the greater complexity in implementing PPS.
- Would require addition of additional strata and difficulty implementing in CAS.