



# Evaluation of Monitoring and Reporting Needs for Groundfish Sectors in New England

Howard McElderry  
Bruce Turris  
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## Outline

- BC Groundfish Fishery Overview
- BC Monitoring System Overview
- BC Monitoring System Cost Analysis
- NE Groundfish Overview
- NE Monitoring System Overview
- NE Monitoring System Cost Analysis
- Next Steps



# BC Groundfish Fishery Overview

	Groundfish Fisheries				Total Groundfish
	Hook and Line	Offshore Trawl	Inshore Trawl	Hake (m/w trawl)	
<b>Fishery Profile</b>					
Vessels	244	48	9	34	301
Trips	1,607	789	364	760	3,520
Seadays	12,000	4,752	839	2,115	19,706
Offload Hrs	4,300	7,100	450	4,750	16,600
Lbs. Landed	28,459,120	81,101,245	299,451	120,600,121	230,459,937
\$/Lb	\$3.00	\$0.50	\$2.50	\$0.10	\$0.60
Total Value	\$85,377,360	\$40,550,623	\$748,628	\$12,060,012	\$138,736,622
<b>Monitoring System Components</b>					
BDC	100%	100%	100%	100%	
DMP	100%	100%	100%	100%	
ASOP		100%			
EMP	100%		100%	100%**	

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# BC Monitoring Systems - 1

- Service Delivery
  - Contracted to Independent 3<sup>rd</sup> Party Service Providers
  - Usually Single Service Provider for a Fishery
  - Industry Funds All or Part of Monitoring Programs
  - Industry Participates in Contractor Selection
  - Service Providers Regulated by Fisheries Act, CGSB Certification, and Contract Law
  - Most Programs are, Full Service Standalone Monitoring Services



## BC Monitoring Systems - 2

- Baseline Data Collection
  - Collect Baseline Data
    - Vessel Harvest Logs (same as Vessel Trip Report)
    - Sales Slips (same as Dealer Reports)
    - Hail System
  - Centralized Data Processing
    - Data Entry
    - Consolidation, Audit, Analysis and Reporting



## BC Monitoring Systems - 3

- Dockside Monitoring Programs
  - 100% Validation of All Offloads
  - Verification of Weights and Species Sorting
  - Collection of Harvest Logs
  - Product Marking (Halibut)
  - Biological Sampling
  - Collection of Tagged Fish
  - Data Consolidation, Analysis and Reporting



## BC Monitoring Systems - 4

- At-Sea Monitoring
  - 100% At-Sea Monitoring (except some Hake)
  - At-Sea Observer Program (ASOP) for Offshore Trawl
  - Electronic Monitoring Program (EMP) for Hook and Line, Inshore Trawl and Northern Hake)



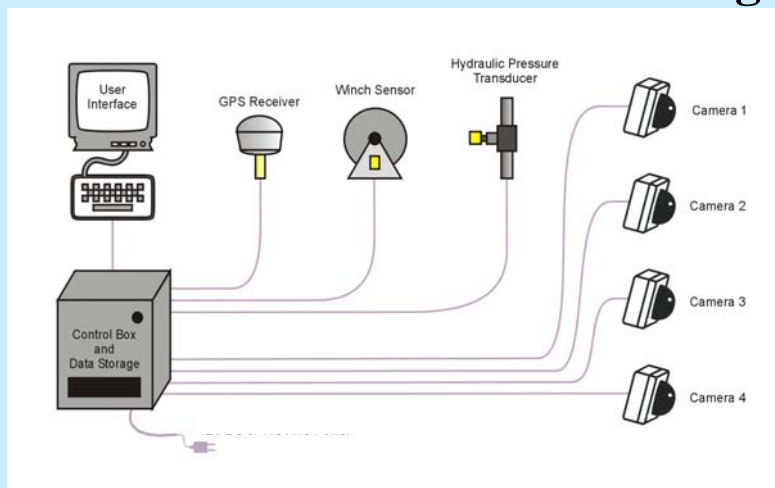
## BC Monitoring Systems - 5

- Observer Program (ASOP)
  - ~60 Certified Observers, ~5,000 Seadays, and ~50 vessels
  - Observer Duties:
    - Catch (including discards) at area for ~60 TAC managed stocks (>100 species)
    - Biological Sampling
    - Compliance Monitoring
  - Data Consolidation, Analysis and Reporting (most products completed within 24hrs of landing)

## BC Monitoring Systems - 6

- Electronic Monitoring Program (EMP)
  - ~200 EM Systems, ~13,000 Seadays, and ~230 vessels
  - ~25 EM Field Technicians, ~15 EM Data Processors
  - Monitoring Objectives:
    - Audit Fishermen Reported Catch Data
    - Compliance Monitoring
  - Program Components:
    - Equipment supply
    - Field Technician Services
    - Data Interpretation, Consolidation, Audit, Analysis and Reporting (most products completed within 7 days of landing)

## What Is Electronic Monitoring?



# EM Control Box



# Sensors



Hydraulic Pressure



Winch Rotation



GPS

## CCTV Cameras

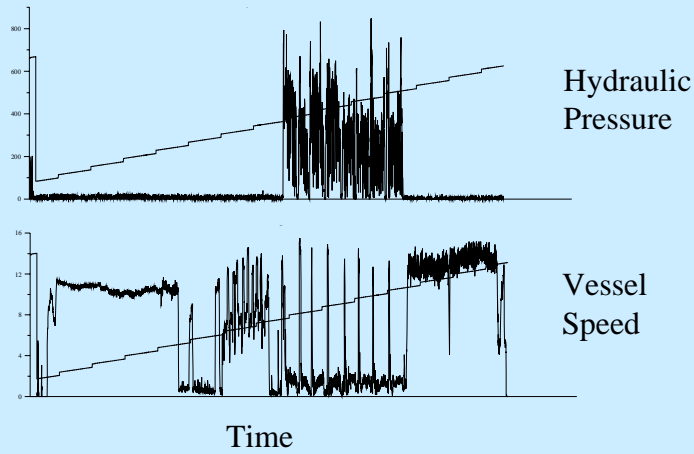


## EM Data Analysis

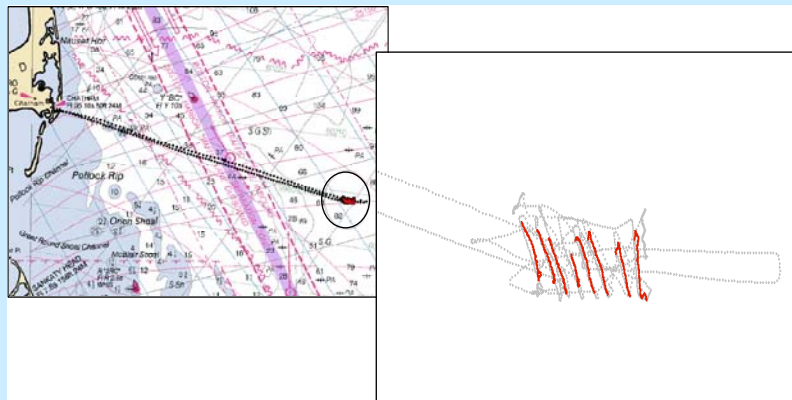
- Sensor Data Interpretation
- Image Data Interpretation
- Reconciliation, Analysis and Reporting



## Sensor Data – Time Series



## Sensor Data – Cruise Track





## Image Interpretation- Fixed Gear

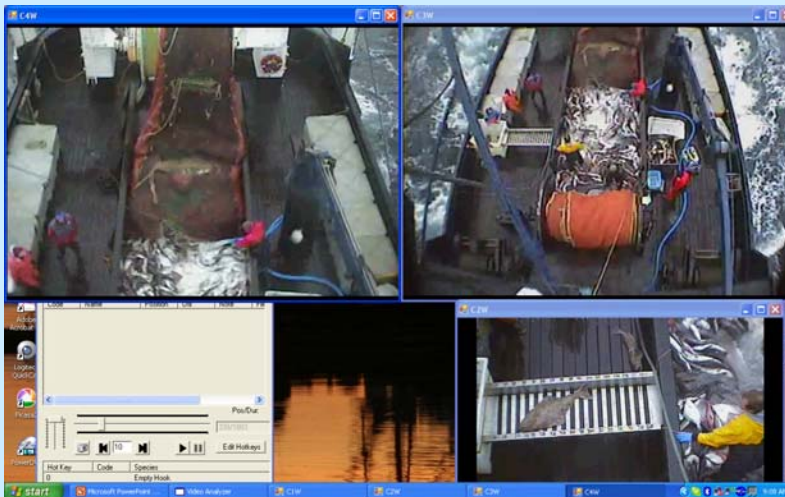


BC Longline

NZ Set Net



## Image Interpretation- Trawl Gear



# Audit-Based Monitoring



Dockside  
Monitoring

+

Fishing  
Log

Electronic Monitoring

Official  
Trip  
Record



# Fishing Log Example

Set		Pieces	
		Kept	Released
1	Rockfish	45	1
	Halibut	65	6
	Sablefish	0	14
2	Rockfish	50	0
	Halibut	62	27
	Sablefish	0	50
3	Rockfish	54	3
	Halibut	102	56
	Sablefish	0	10
...20	Rockfish	22	1
	Halibut	32	6
	Sablefish	0	10



# Fishing Log to EM Comparison

Set 2	Kept		Released	
	Flog	Video	Flog	Video
Rockfish	50	49	0	0
Halibut	62	62	27	27
Sablefish	0	0	50	64

Set 19	Kept		Released	
	Flog	Video	Flog	Video
Rockfish	20	20	0	0
Halibut	0	0	34	35
Sablefish	0	0	15	50



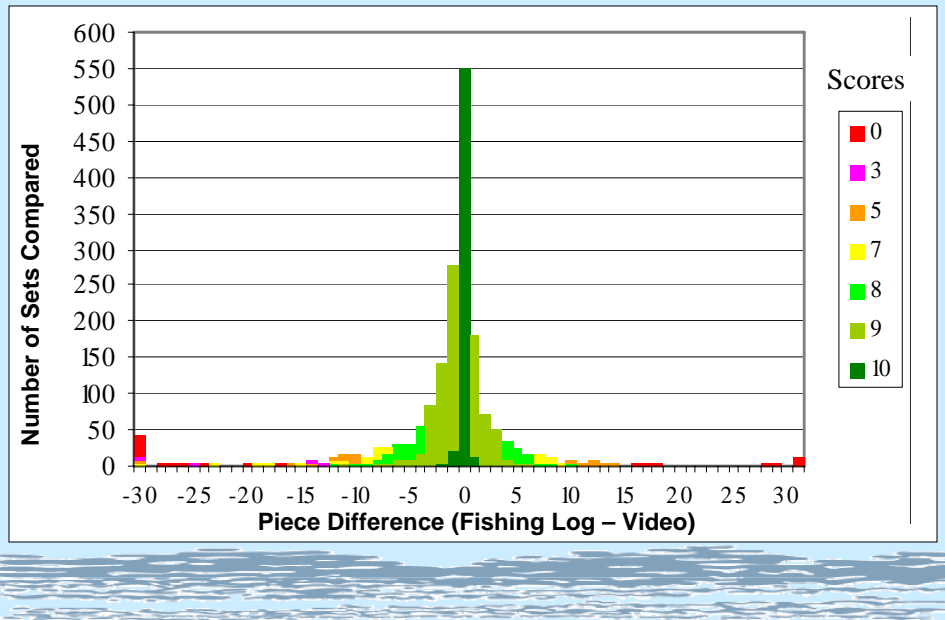
# Applying the Scores

Set 2	Kept			Released		
	Flog	Video	Score	Flog	Video	Score
Rockfish	50	49	10	0	0	
Halibut	62	62	10	27	27	10
Sablefish	0	0		50	64	7

Set 19	Kept			Released		
	Flog	Video	Score	Flog	Video	Score
Rockfish	20	20	10	0	0	
Halibut	0	0		34	35	9
Sablefish	0	0		15	50	0



# Score Distribution



# BC Monitoring System Costs

	BC Groundfish Fishery				Total Fishery
	Hook & Line	Offshore Trawl	Inshore Trawl	Hake m/w Trawl	
<b>Average Cost per Unit</b>					
per Vessel	\$10,655	\$64,058	\$16,505	\$13,173	\$20,834
per Trip	\$1,618	\$3,897	\$408	\$589	\$1,782
DMP per Trip	\$425	\$490	\$66	\$340	\$384
ASOP per Seaday		\$558			
EMP per Seaday	\$154		\$145	\$107	
<b>Average Cost Per Landed Pound</b>					
BDC	\$0.0023	\$0.0005	\$0.0080	\$0.0002	\$0.0006
DMP	\$0.0240	\$0.0048	\$0.0806	\$0.0021	\$0.0059
ASOP		\$0.0327			\$0.0115
EM	\$0.0650		\$0.4075	\$0.0014	\$0.0093
<b>Total</b>	<b>\$0.0914</b>	<b>\$0.0379</b>	<b>\$0.4961</b>	<b>\$0.0037</b>	<b>\$0.0272</b>
<b>% Fishery Value</b>	<b>3.05%</b>	<b>7.58%</b>	<b>19.84%</b>	<b>3.71%</b>	<b>4.52%</b>

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# NE Groundfish Fishery Overview

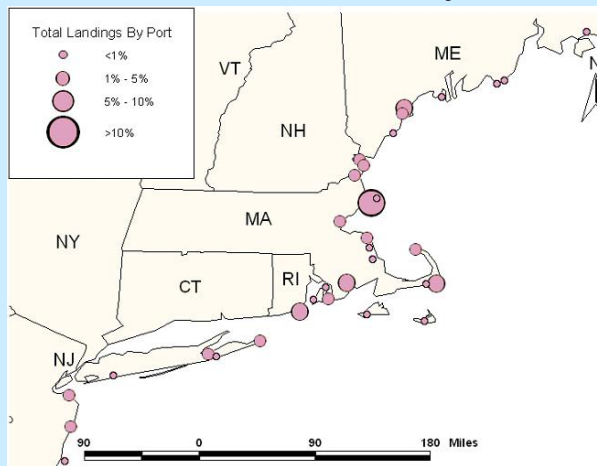
	Bottom Trawl	Dredges	Gillnet	Gear Type			Unknown	Grand Total
				Hand Line	Long Line	Other		
Vessels	420	61	200	70	72	52	26	643*
Trips	10,379	194	6,617	398	883	129	142	18,742
DAS	23,418	623	6,885	398	1,177	136	0	32,636
Lbs Landed	35,037,931	906,768	9,671,489	245,910	1,154,586	147,745	851,933	48,016,362
Catch Value	\$56,018,625	\$1,471,602	\$10,920,962	\$454,340	\$2,454,527	\$240,090	\$1,464,901	\$73,025,047
DAS per Trip	2.26	3.21	1.04	1.00	1.33	1.05	0.00	1.74
Lbs per Trip	3,376	4,674	1,462	618	1,308	1,145	6,000	2,562
Catch Value per Trip	\$5,397	\$7,586	\$1,650	\$1,142	\$2,780	\$1,861	\$10,316	\$3,896
Catch Value per Lb	\$1.60	\$1.62	\$1.13	\$1.85	\$2.13	\$1.63	\$1.72	\$1.52

\* Many vessels fish multiple gears

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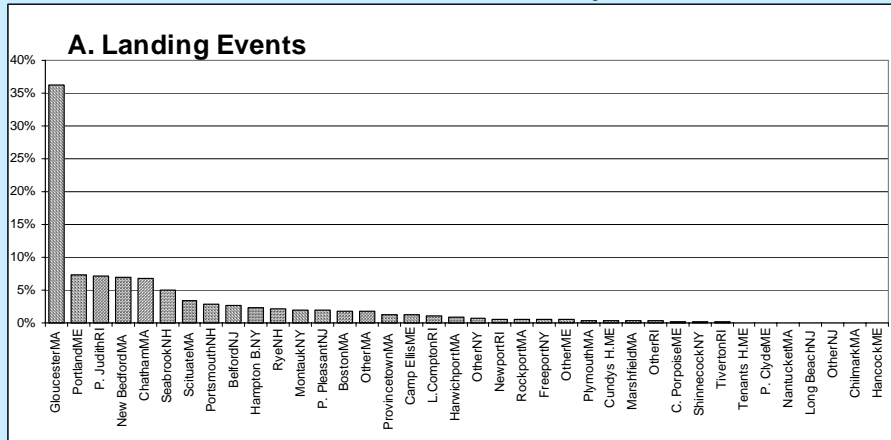
# NE Groundfish Fishery Overview



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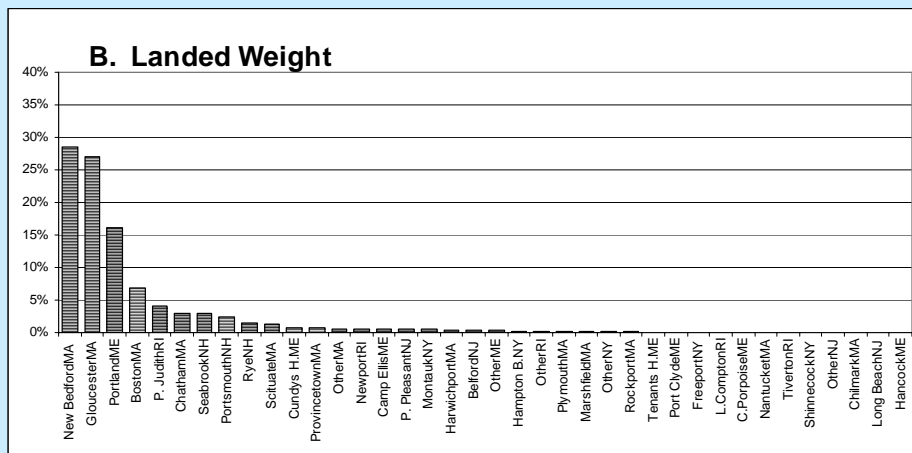
# NE Groundfish Fishery Overview



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# NE Groundfish Fishery Overview



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# Comparison of BC and NE Groundfish Fisheries

	British Columbia				New England		
	Trawl	Hake	Fixed	All Gear	Trawl	Fixed	All Gear
Vessels	57	34	244	301	420	200	643
Trips	1,153	760	1,607	3,520	10,379	8,363	18,742
DAS	5,591	2,115	12,000	19,706	23,418	9,219	32,636
Landing Ports	30	5	30	30	70	70	70
Lbs Landed	81,400,696	120,600,121	28,459,120	230,459,937	35,037,931	12,978,431	48,016,362
Catch Value	\$41,299,249	\$12,060,012	\$85,377,360	\$138,736,622	\$56,018,625	\$17,006,422	\$73,025,047
DAS per Trip	4.85	2.78	7.47	5.60	2.26	1.10	1.74
Lbs per Trip	70,599	158,684	17,709	65,472	3,376	1,552	2,562
Catch Value per Trip	\$35,819	\$15,868	\$53,128	\$39,414	\$5,397	\$2,034	\$3,896
Catch Value per Lb	\$0.51	\$0.10	\$3.00	\$0.60	\$1.60	\$1.31	\$1.52

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## NE Monitoring Systems - 1

- Service Delivery
  - Contracted to Independent 3<sup>rd</sup> Party Service Provider
  - Standalone, Fully Integrated Monitoring Service
  - 5 Year Contracted Term
  - Government (NOAA, ASFC, other?) Conducts Contractor Selection
  - Industry Participates in Program Funding





## NE Monitoring Systems - 2

- Baseline Data Collection
  - Applies to Sector and Common Pool fishery
  - Collect Baseline Data
    - Vessel Trip Reports
    - Dealer Reports
    - Hail System
  - Centralized Data System
    - Data entry
    - Consolidation, Audit, Analysis and Reporting



## NE Monitoring Systems - 3

- Dockside Monitoring Programs
  - Same as BC except:
    - 2 Coverage Level Options:
      - <100% Monitoring
      - 100% Monitoring
    - Most Validation Occurs at Plants or Auctions
    - Roving Monitor Presence for Remote Ports



## NE Monitoring Systems - 4

- At-Sea Monitoring
  - Three coverage Level Options:
    - <100% for both ASOP and EMP
    - <100% for ASOP and 100% EMP
    - 100% for both ASOP and EMP
  - At-Sea Observer Program (ASOP) for Multi-area Trawl
  - Electronic Monitoring Program (EMP) for Fixed Gear and Single Area Trawl (fishing under mandatory retention)



## NE Monitoring Systems - 5

- Observer Program (ASOP)
  - Observers Should be Certified by NMFS
  - Monitoring Objectives:
    - Catch (including discards) at area for ~19 TAC managed stocks
    - Compliance Monitoring
    - (Biological Sampling?)
  - Data Consolidation, Analysis and Reporting



## NE Monitoring Systems - 6

- Electronic Monitoring Program (EMP)
  - Monitoring Objectives:
    - Audit Fishermen Reported Catch Data
    - Compliance Monitoring
  - Program Components (same as BC)
  - If <100% Coverage Use EM for Multiple Trips



## NE Monitoring Systems Sector Fleet Projections

	Active Vessels	Trips (Landings)	Seadays
<b>Sector Fishery</b>			
Trawl (single area)	130	6,992	14,000
Trawl (multi area)	75	1,520	8,400
Fixed Gear	240	6,688	5,600
Sector Total	325	15,200	28,000
<b>Common Pool</b>	325	3,800	7,000
<b>Total Fishery</b>	<b>650</b>	<b>19,000</b>	<b>35,000</b>

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# NE Monitoring

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## System Cost Analysis - 1

	Active Vessels	Trips (Landings)	Seadays	Cost per Unit		Total Cost	
				Low	High	Low	High
<b>Option 1 - Baseline Data Collection</b>							
Sector	325	15,200	28,000	\$25	\$45	\$380,000	\$684,000
Common Pool	325	3,800	7,000	\$25	\$45	\$95,000	\$171,000
						\$475,000	\$855,000
<b>Option 2 - Dockside Monitoring Program</b>							
2a - 50% DMP	325	7,600	14,000	\$60	\$80	\$456,000	\$608,000
2b 100% DMP	325	15,200	28,000	\$50	\$70	\$760,000	\$1,064,000
Surcharge for EM Based Monitoring							
2b w/ 50% EM	325	5,928	14,000	\$25	\$35	\$148,200	\$207,480
2b w/ 100%EM	325	11,856	28,000	\$25	\$35	\$296,400	\$414,960
<b>Option 3 - At-Sea Monitoring (ASOP and EM)</b>							
3a - 50% ASOP	75	760	4,200	\$800	\$1,000	\$3,360,000	\$4,200,000
3a - 50% EM	250	6,840	9,800	\$180	\$200	\$1,764,000	\$1,960,000
3a Total						\$5,124,000	\$6,160,000
3b - 50% ASOP	75	760	4,200	\$800	\$1,000	\$3,360,000	\$4,200,000
3b - 100% EM	245	13,680	19,600	\$150	\$170	\$2,940,000	\$3,332,000
3b Total						\$6,300,000	\$7,532,000
3c - 100% ASOP	75	1,520	8,400	\$600	\$800	\$5,040,000	\$6,720,000
3c - 100% EM	245	13,680	19,600	\$150	\$170	\$2,940,000	\$3,332,000
3c Total						\$7,980,000	\$10,052,000

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# NE Monitoring

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## System Cost Analysis - 2

	Option 1	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c
<b>Low Estimate</b>						
1	\$475,000	\$475,000	\$475,000	\$475,000	\$475,000	\$475,000
2a		\$456,000				
2b			\$760,000			
2b w/ 50% EM				\$908,200		
2b w/ 100% EM					\$1,056,400	\$1,056,400
3a				\$5,124,000		
3b					\$6,300,000	
3c						\$7,980,000
<b>Total Low Estimate</b>	<b>\$475,000</b>	<b>\$931,000</b>	<b>\$1,235,000</b>	<b>\$6,507,200</b>	<b>\$7,831,400</b>	<b>\$9,511,400</b>
<b>High Estimate</b>						
	<b>\$855,000</b>	<b>\$1,463,000</b>	<b>\$1,919,000</b>	<b>\$8,286,480</b>	<b>\$9,747,400</b>	<b>\$12,267,400</b>
<b>Cost/Lb</b>						
Low	\$0.0124	\$0.0242	\$0.0322	\$0.1694	\$0.2039	\$0.2476
High	\$0.0223	\$0.0381	\$0.0500	\$0.2157	\$0.2538	\$0.3194
<b>% Fishery Value</b>						
Low	0.81%	1.59%	2.11%	11.14%	13.41%	16.28%
High	1.46%	2.50%	3.28%	14.18%	16.69%	21.00%

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## NE Monitoring

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# System - Cost Sensitivities

- Fishery Activity and Landing Patterns
- Fleet Coverage Requirements (coverage levels, ASOP versus EMP coverage)
- Program Specifications (reporting requirements, timelines, audit levels)
- Labor Strategies (staffing levels, call-up requirements)
- Equipment Strategies (ownership versus renting)
- Cost Recovery Method



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## Next Steps

- We hope that this work will advance the discussion on Sector-based management and monitoring options
- To enable further monitoring program Sector stakeholders need to develop detailed program specifications
- To enable implementation Sector stakeholders need to determine program delivery model, decide program oversight and establish funding arrangements.



## For Further Information:

Howard McElderry  
([howardm@archipelago.ca](mailto:howardm@archipelago.ca))  
Archipelago Marine Research, Ltd.  
525 Head Street, Victoria, BC V9A 5S1 Canada  
Telephone: (250) 383-4535 Fax: (250) 383-0103  
[www.archipelago.ca](http://www.archipelago.ca)