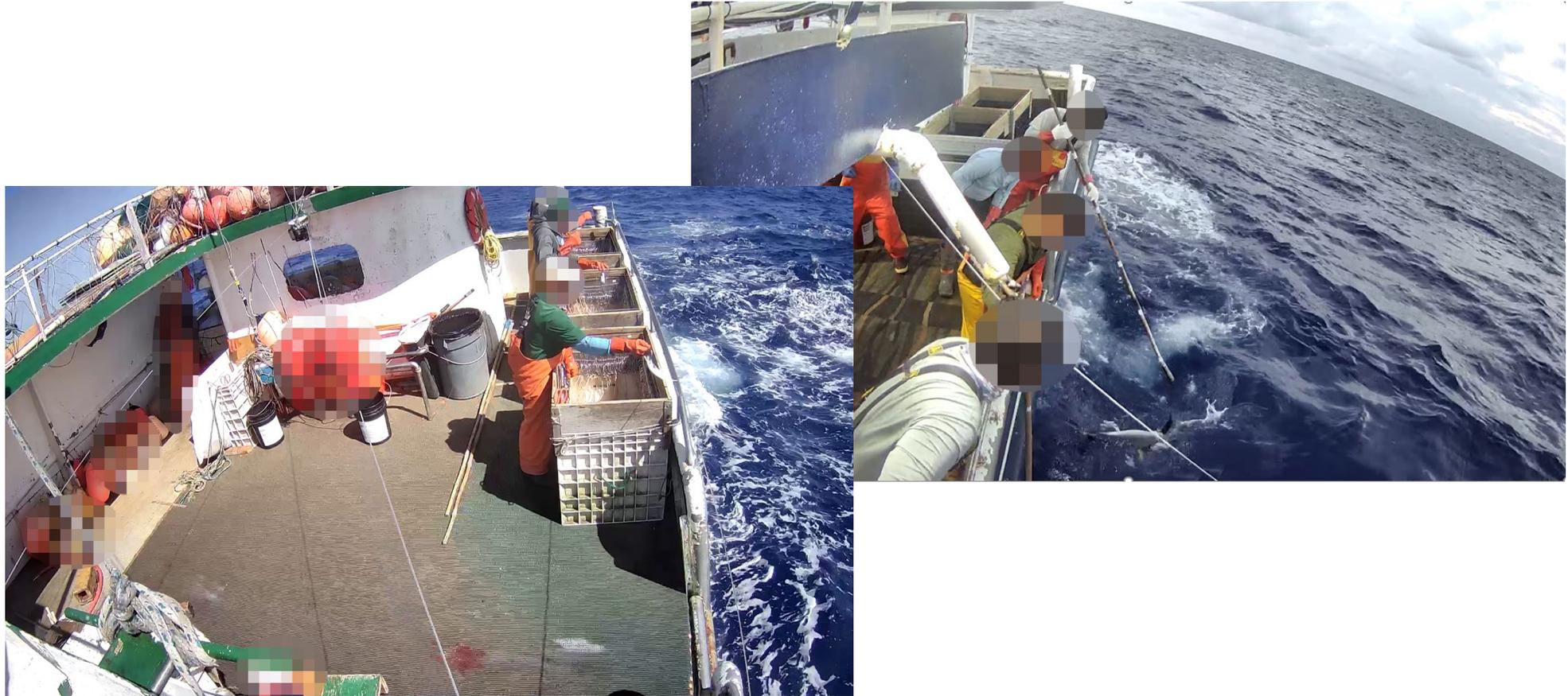




Barry Thom  
Executive Director

Caren Braby  
Senior Program  
Manager

# Electronic Monitoring



Annual Meeting, Boise ID  
September 8, 2025

# Fisheries Reporting & Monitoring

- **Federal and state laws require fisheries reporting & monitoring**
  - Document **fishing activity** (logs, tickets, VMS, creel)
    - Track quotas, caps, economics, compliance
  - Document **targeted fish** (fish numbers, size, age, location)
    - Stock assessment, harvest allowances, sustainability
  - Document interactions with **prohibited species**
    - Fish, mammals, turtles, birds
- **Challenges of traditional fisheries monitoring**
  - Availability (type, location) and cost of human samplers
    - Target coverage, extrapolations
  - Safety and remote oversight of human samplers (especially on long trips)
  - Data delay from time of collection to data availability

# Electronic Reporting (ER) vs. Electronic Monitoring (EM)

- **Electronic Reporting (by industry)**
  - eTickets, eLogbooks
- **Electronic Monitoring (independent)**
  - Video of fishing operations, catch
  - Vessel location
- **ER/EM can complement or replace traditional methods**
  - Biological samples\*\*\*
  - Species (comp, bycatch)
  - Compliance

VESSEL NAME <u>LAURA MARIE</u>		COAST GUARD DOCUMENT NO. OR STATE MARINE BOARD NO. (e.g. WN1234AB) <u>1234567</u>		LANDING RECEIPT NUMBERS FOR THIS TRIP											
CAPTAIN'S NAME <u>JOHN DOE</u>		ARRIVAL PORT <u>ILWACO</u> PORT LANDED <u>ILWACO</u>		<u>Z123456</u>											
DEPARTURE PORT <u>NEWPORT</u>		ARRIVAL DATE <u>8 / 2 / 1999</u> (MM / DD / YYYY)		TOTAL POUNDS LANDED FROM TRIP <u>43,507</u>											
DEPARTURE DATE <u>7 / 4 / 1999</u> (MM / DD / YYYY)		TROLL <input checked="" type="checkbox"/> POLE & LINE <input type="checkbox"/> ROD & REEL <input type="checkbox"/>													
DATE	FISHING CODE	LATITUDE			LONGITUDE			TARGET CATCH			HRS FISHED	BYCATCH			COMMENTS (No. gill net vessels in area, % gill net marked fish, amount of bait and birds in area, at-sea transshipments, etc.)
MM / DD / YYYY		DEG	MIN	N/S	DEG	MIN	EW	SPECIES NAME	No. KEPT	No. DISCARD		SPECIES	No. KEPT	No. DISCARD	
7 / 4 / 1999	1 IN PORT 2 TRANSIT 3 FISHING	44	40	N	126	22	W	A) ALBACORE B) YELLOWFIN C) BLUEFIN D)	0	0	0		0	0	LEFT AT 10:00 AM
7 / 5 / 1999	1 IN PORT 2 TRANSIT 3 FISHING	44	52	N	138	15	W	A) ALBACORE B) YELLOWFIN C) BLUEFIN D)	0	0	15				RUNNING TO OFFSHORE AREA
7 / 6 / 1999	1 IN PORT 2 TRANSIT 3 FISHING	45	03	N	142	16	W	A) ALBACORE B) YELLOWFIN C) BLUEFIN D)	15	3	15				3 PEANUTS DUMPED
	1 IN PORT							A) ALBACORE B) YELLOWFIN							



# PSMFC EM Programs

## **Alaska**

- Fixed Gear
- Trawl (pollock)
- Gillnet (pilot)



Hawaii

## **Pacific Islands**

- Longline (pre-implementation)

## **West Coast**

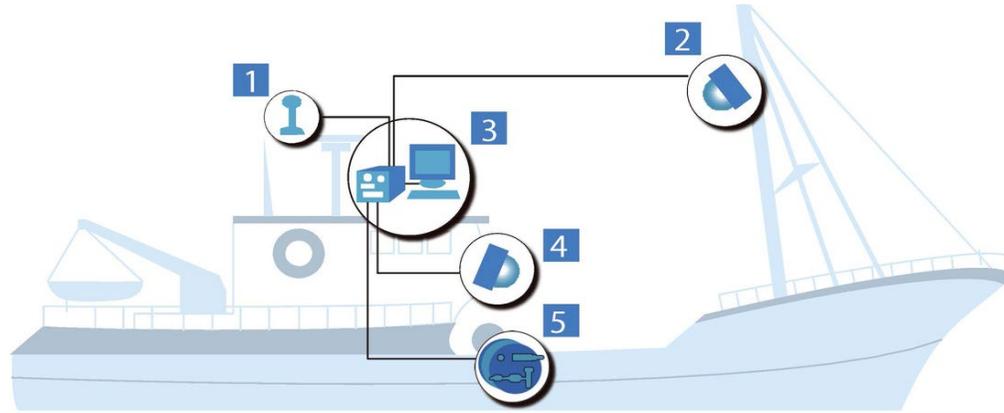
- Fixed Gear
- Trawl:
  - Midwater rockfish and whiting
  - Bottom trawl



# EM Vessel Monitoring Plan (VMP) & Video Review

- **Management needs dictate EM design**
  - Harvested species, bycatch species, fishery operations, etc.
- **VMP captures vessel-specific plan for compliance with EM**
  - How/where the equipment are installed
  - At-sea operability and maintenance requirements by crew
  - Catch handling (and presentation to cameras)
  - Submitting/transmitting video and other data
  - Bottom-line: vessel takes responsibility for successful data collection
- **Video reviewers extract metrics, submit to management agency**

# Electronic Monitoring System Components – PSMFC EM Programs



<p><b>1</b></p>  <p><b>GPS Receiver</b> Tracks vessel locations</p>	<p><b>2</b></p>  <p><b>Video Camera</b> Records and monitors fishing activity</p>	<p><b>3</b></p>  <p><b>Control Center</b> The electronic monitoring control center</p>	<p><b>4</b></p>  <p><b>Video Camera</b> Records and monitors fishing activity</p>
<p><b>5</b></p>  <p><b>Hydraulic and drum-rotation sensors</b> Tracks fishing activity</p>			

Credit: NOAA



## Sensor Data (recorded every 10 seconds), including:

- Latitude, Longitude
- Date & Time
- Vessel Speed, Heading
- Gear Sensors, including:
  - Hydraulic Pressure Sensor (PSI)
  - Drum Rotation Sensor

## Data Review:

EM sensor/video data reviewed using proprietary software (FishVue Interpret™) from Archipelago Marine Research Ltd.



## Storage:

- Raw EM sensor and video data recorded on removable 1TB hard drives
- Data is encrypted and must be decrypted prior to review



## Video Data

### Cameras:

- 2–8 cameras (depending on fishery, vessel setup, and monitoring goals)

### Recording Triggers:

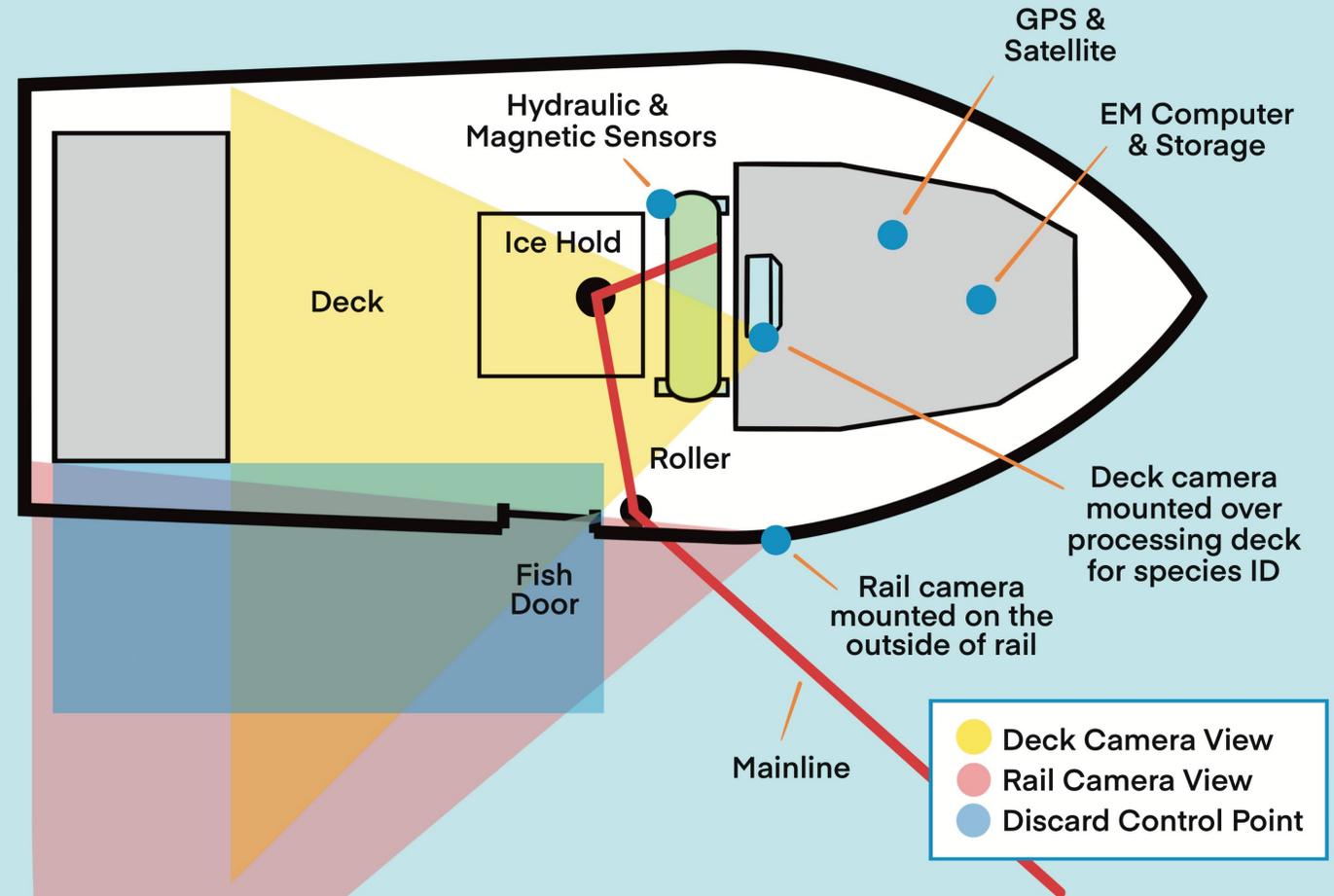
- **Sensor Thresholds:** Video recording triggered when specific gear activity thresholds are met
- **Run-On Time:** After trigger, video continues recording for a set duration (typically 2 hours)
- **Port-Area Sensors:** Recording continuously from port departure to return (varies by program)



# EM system layout schematic



## Hawai'i Longline Electronic Monitoring System Components



# Camera install locations



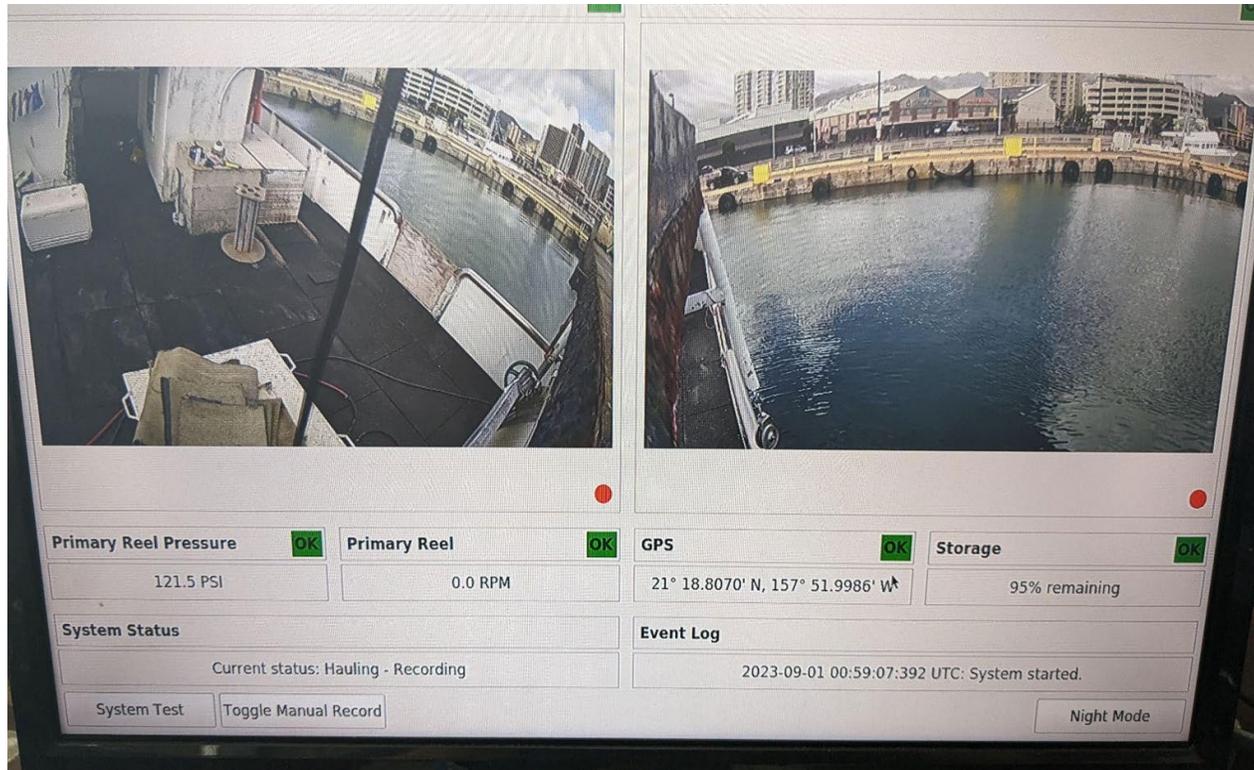
Rail camera

Deck camera



- Rugged POE security cameras or purpose-built cameras
- Stainless steel mounting bracket and hardware
- Can use existing vessel structures

# Wheelhouse EM system components



- Realtime camera feeds
- Recording status
- Remaining storage capacity
- Component status lights
- GPS location
- “Dark” mode

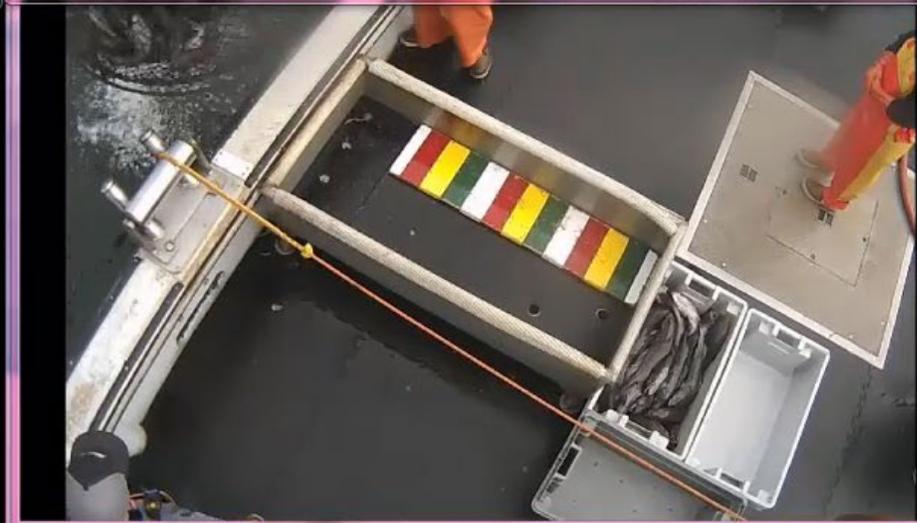


- Hot swappable hard drives
- (POE) switch powers cameras
- Rugged passively cooled
- Battery backup

# Hawai'i EM Video: Longline



# West Coast EM Video: Fixed Gear (Pot)





# Regulatory EM Programs Video Review Annotation and Log



Data Element	West Coast EM	Alaska Fixed Gear EM	Alaska Pollock Trawl EM
<b>Trip</b>	Trip start/end date, time, and location	Trip start/end date, time, and location	Trip start/end date, time, and location
<b>Fishing Activity</b>	Haul start/end date, time, and location	Haul start/end date, time, and location	Haul start/end date, time, and location
<b>Catch</b>	Species ID & weight: discarded IFQ and prohibited species catch	Species ID & count: retained and discarded catch	Species ID & weight: discarded catch
<b>Post-Review Data Delivery and Use</b>	West Coast Groundfish Observer Program (WCGOP)  IFQ compliance, discard catch accounting, logbook discard audit	Alaska Fisheries Science Center (AFSC)  In-season fishery management, catch estimation	Alaska Regional Office (AKRO)  Maximized retention & Salmon PSC compliance monitoring

# Alaska EM Video: Pot



# Where is EM heading?

- **What's working well?**

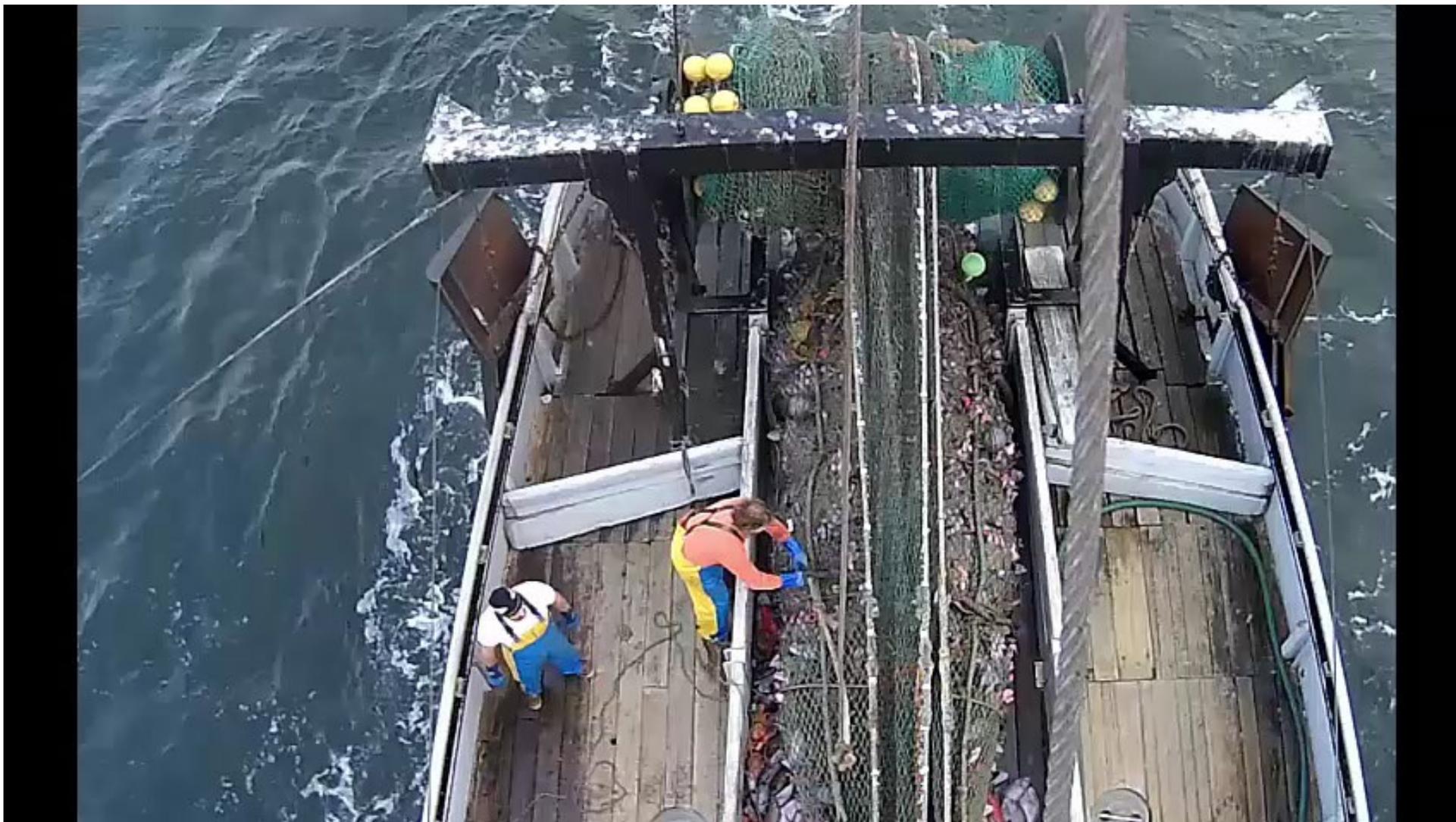
- "Cameras on boats" – CHECK
- Vessel monitoring plans process – CHECK
- Trained, efficient crews of video reviewers – CHECK

- **Concerns?**

- EM equipment systems/service costs are high
  - Identify "needs" vs. "wants"
- Video review is time-intensive
  - Streamline video review (AI cue to next "fish")



# EM Video Highlights





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# Electronic Monitoring

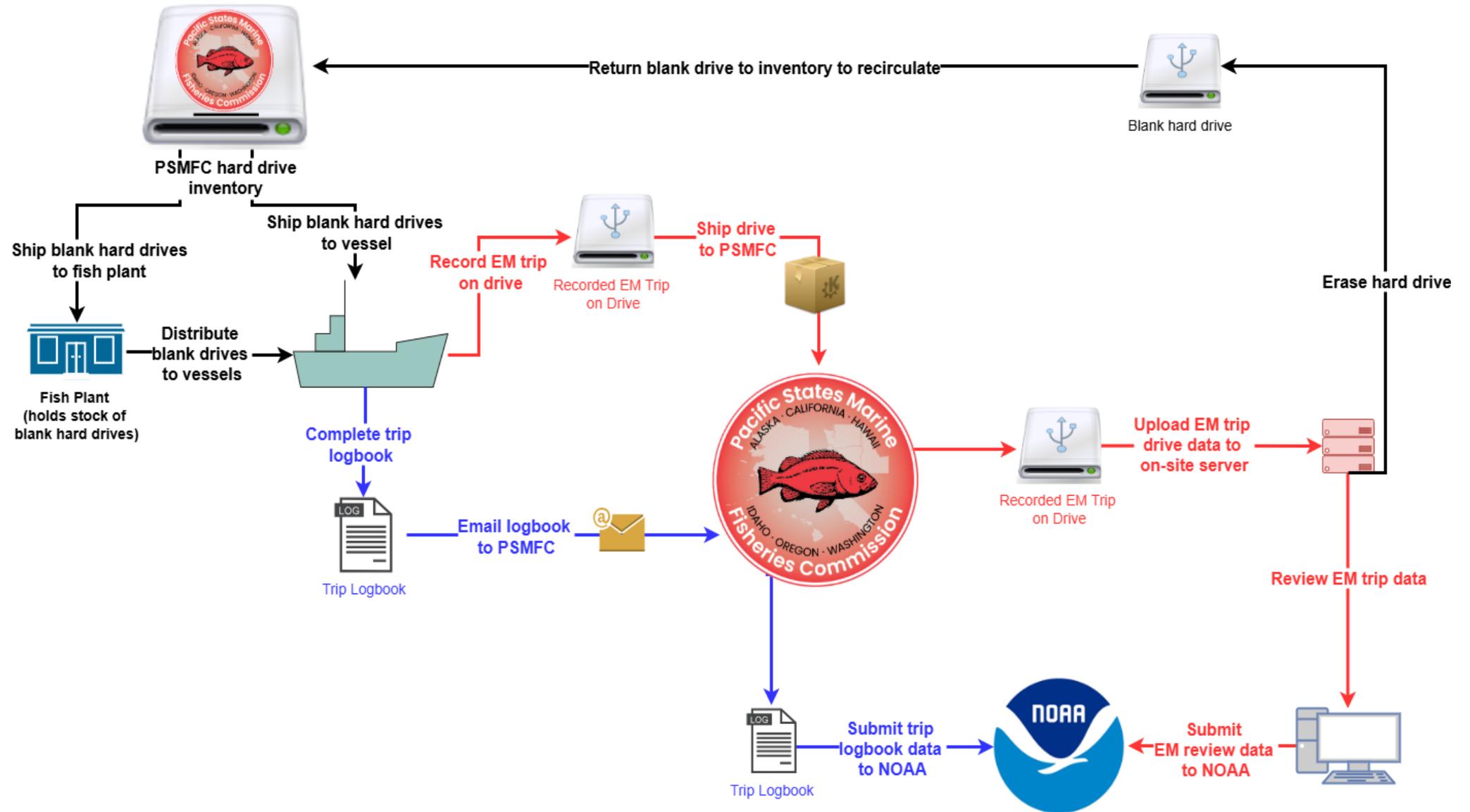
Caren Braby – [cbraby@psmfc.org](mailto:cbraby@psmfc.org)

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Joshua Tucker, PI – [jtucker@psmfc.org](mailto:jtucker@psmfc.org)

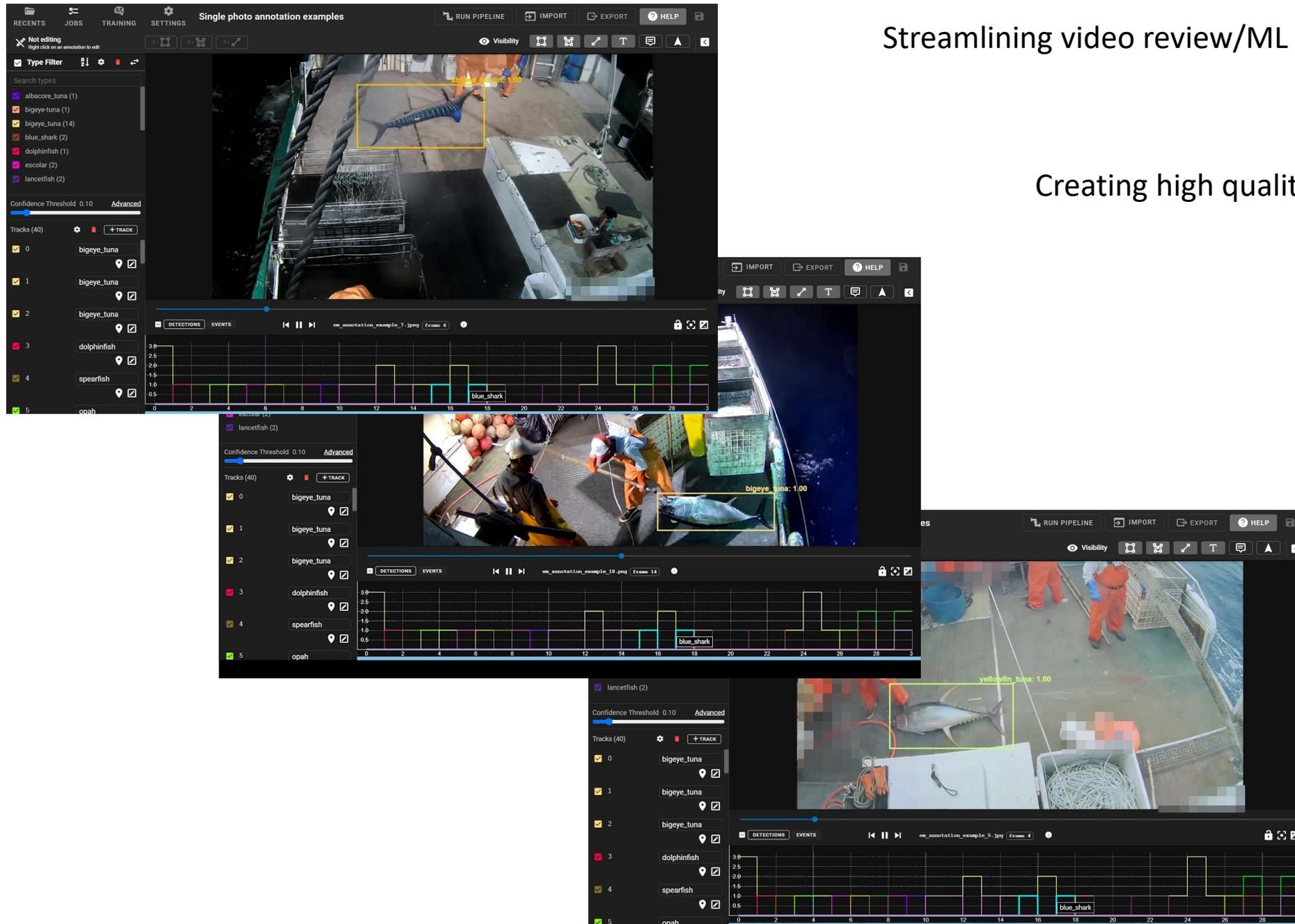
# Extra slides

# Alaska & West Coast EM Data Flow



Streamlining video review/ML development slide

Creating high quality image training dataset



# Dungeness Crab Location Logger Explorer

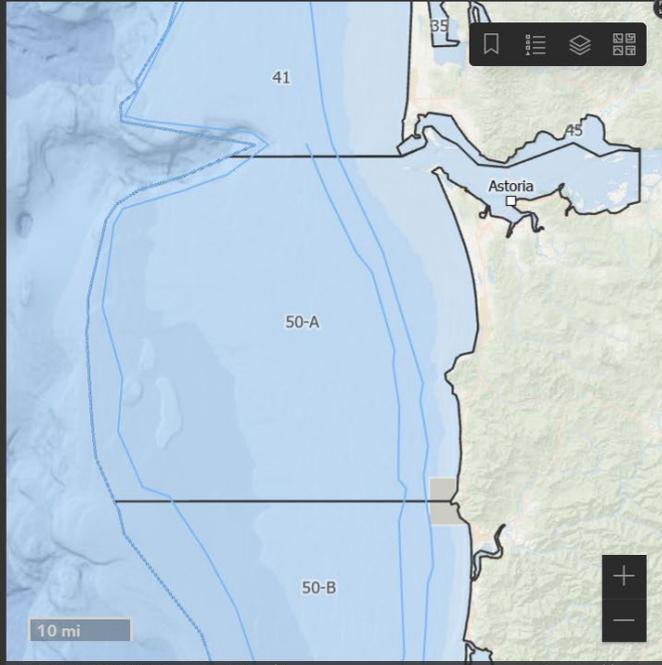
Filter by Vessel Name  
All Vessels

Filter by State  
All States WA OR CA

Filter by Date  
From: 01/14/2021  
Until: 09/08/2023

January 2021

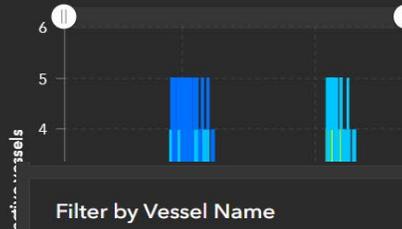
S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16



Avg. Track Speed  
**3.1 kn**

Vessels  
9

Active Vessels by Date  
(filtered by map extent)



Filter by Vessel Name  
All Vessels

Filter by State  
All States WA OR CA

Filter by Date  
From: 01/14/2021  
Until: 09/08/2023

January 2021

S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	4	5	6	7	8	9

# “SeaTracks” PSMFC Vessel Activity Dashboard

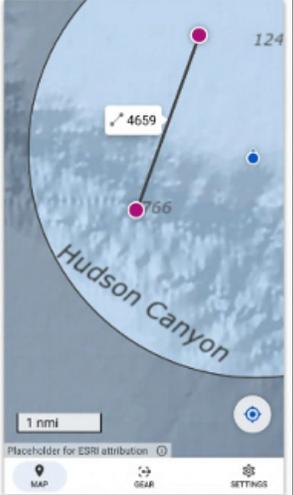




# On-Demand Gear – New Challenges

- **Many vendors making gear**
  - Each has own communications and data viewer – for their own gear
- **Managers/enforcement need to verify compliance with regs for all vendors**
  - Set/Haul
  - Gear Location
  - Gear Owner
- **Public portal is now available – 5 mi watch circle**
  - Avoid gear conflict, loss of pots
- **PSMFC building enforcement portal**
  - Bigger geography
  - Shore-based desktop computers
  - Integrated with vessel location

- **Mobile App**
  - Free to Use
  - No Login Required
  - View Gear within 5 Nautical Miles
  - Map Zoom In/Out
  - View Anonymous Gear Details
  - User Settings
- **Cloud Platform**
  - APIs for Easy Integration
  - 6 Current Manufacturers
  - rmwHub Integration
  - ~15 Manufacturers Total
  - Chart Plotter (TimeZero) Integration



*Courtesy Earth Ranger, Buoy app*