RESEARCH ACROSS AN INTERNATIONAL BORDER: PARTNERING TO ASSESS A SHARED AT-RISK SPECIES

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AT-RISK ROCKFISH IN THE PUGET SOUND/GEORGIA BASIN

Bocaccio – 2002, Threatened under Canada's Species At Risk Act (SARA). 2013, Endangered. Coast-wide concern.

Yelloweye – "Inside waters" Special Concern, 2008; Threatened, 2020

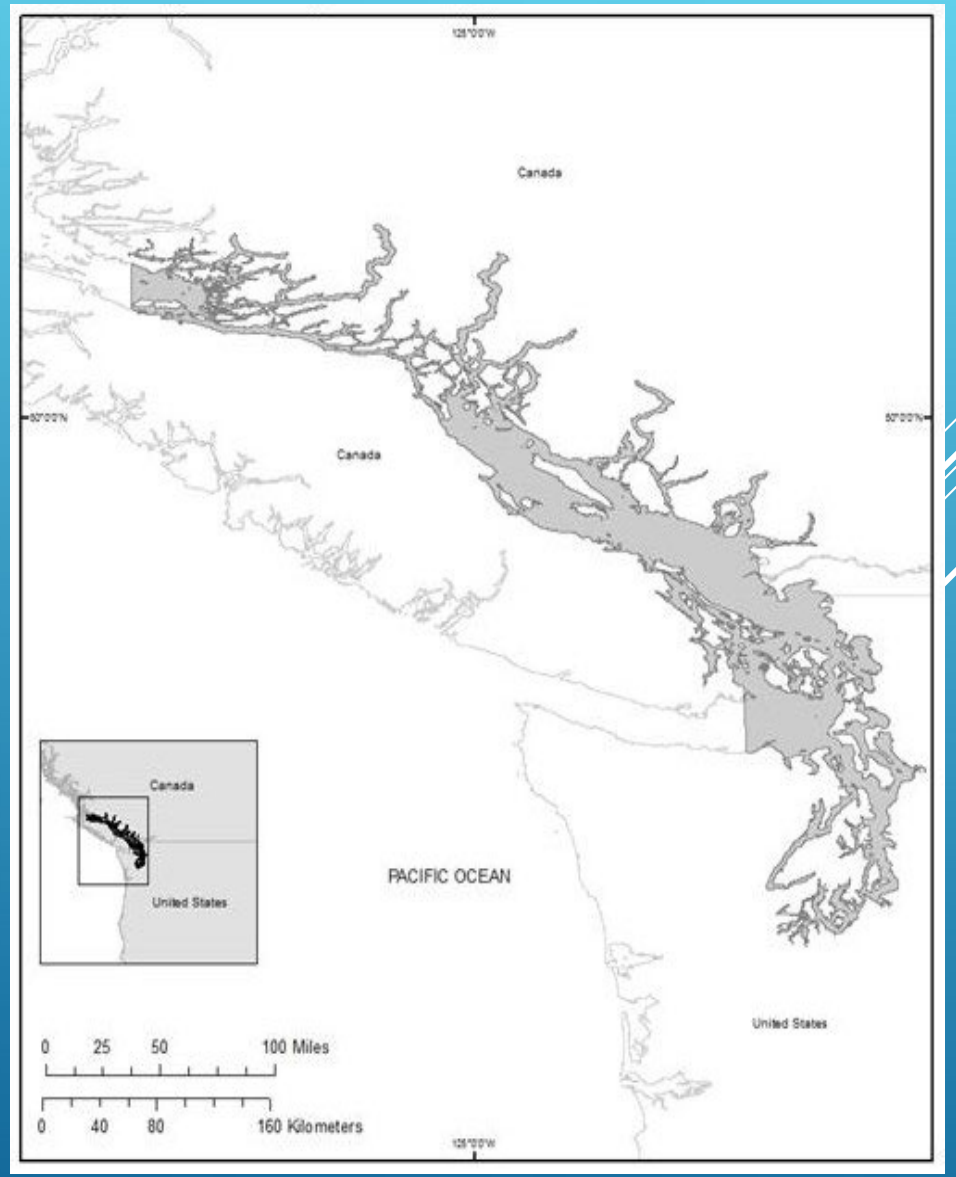
2010 – Both species listed under US Endangered Species Act

Distinct Population Segments (DPSs) span US-Canada border

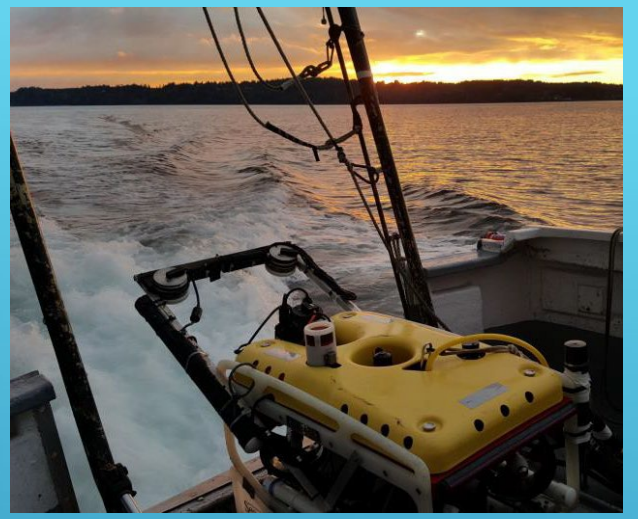
- ~80% of YEYE DPS in Canadian waters

AN INTERNATIONAL DATA DILEMMA

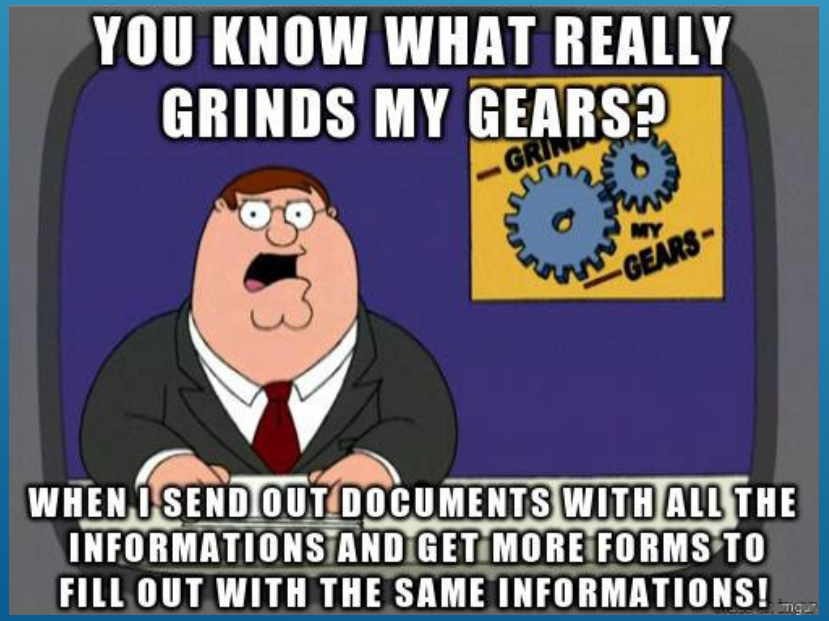
- US recovery plan requires population information throughout DPS
- Multiple assessments in US waters with different survey designs since 2004
- No recent ROV surveys in Canada - annual longline surveys
- **How do we effectively assess fish populations that don't respect international borders?**



US-CANADA HISTORY



- WDFW and DFW marine fish programs with a long history of communication/collaboration
- Both agencies with ROV programs – focus on rockfish and their habitat
  - WDFW with partial NOAA funding
  - DFO – inactive due to understaffing, now rebounding



- 2017 – initiated a formal partnership agreement to allow US staff and equipment to survey at-risk rockfish in Canadian portion of the DPS
- **Many** bureaucratic hoops: timeline slipped to 2018

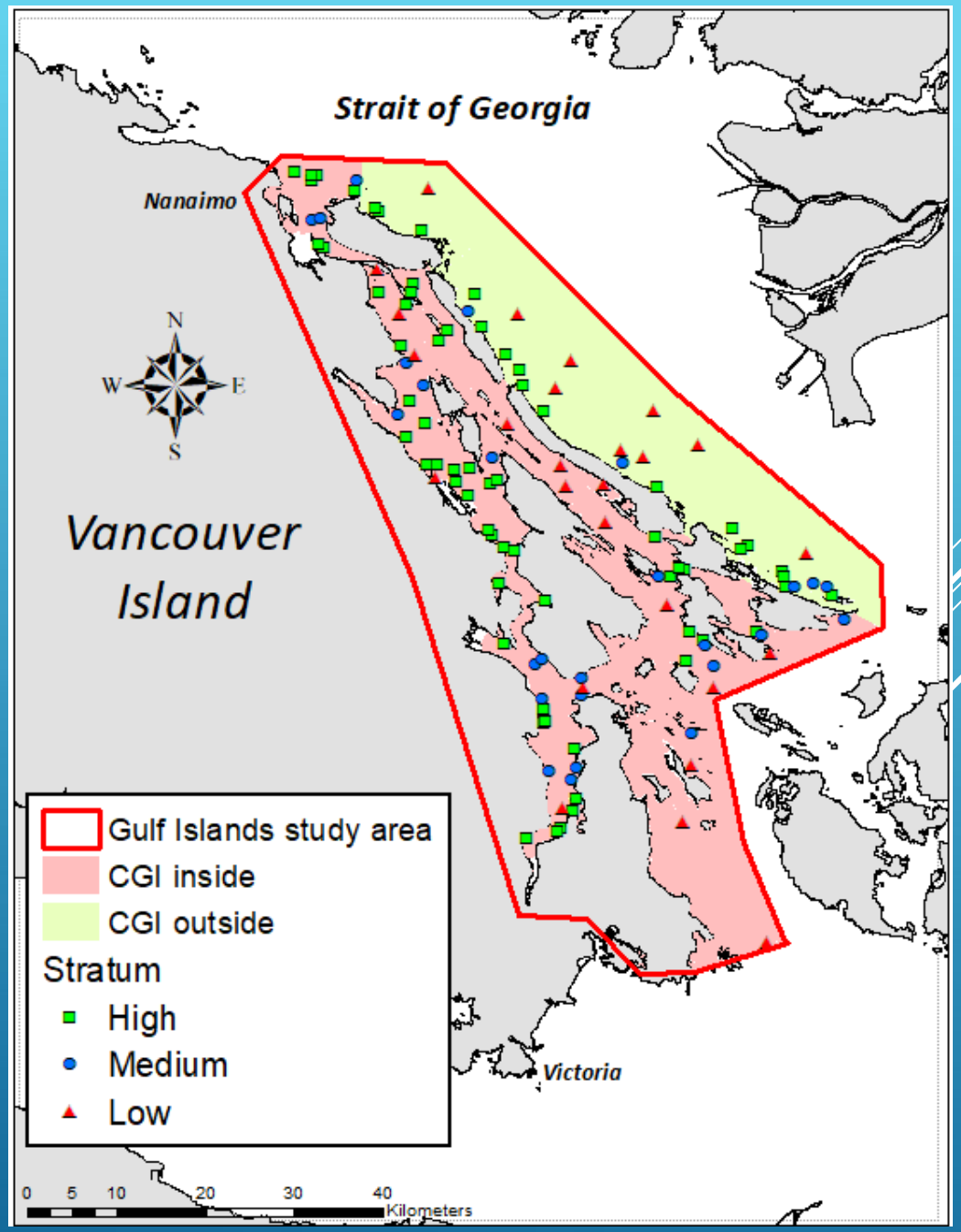
GULF ISLANDS SURVEY

- Yelloweye Rockfish focus driven by ESA-related data need
- WDFW vessel and ROV, WDFW and DFO staff
- 3-week survey; paired with survey of US San Juan Islands
- Maxent species distribution model
  - Spatial data & seafloor bathymetry from DFO and Canadian Hydrographic Service
- Survey area split into 'inside' and 'outside' waters
- 3 probability strata – randomly placed stations; 48 High, 16 Medium, 5 Low

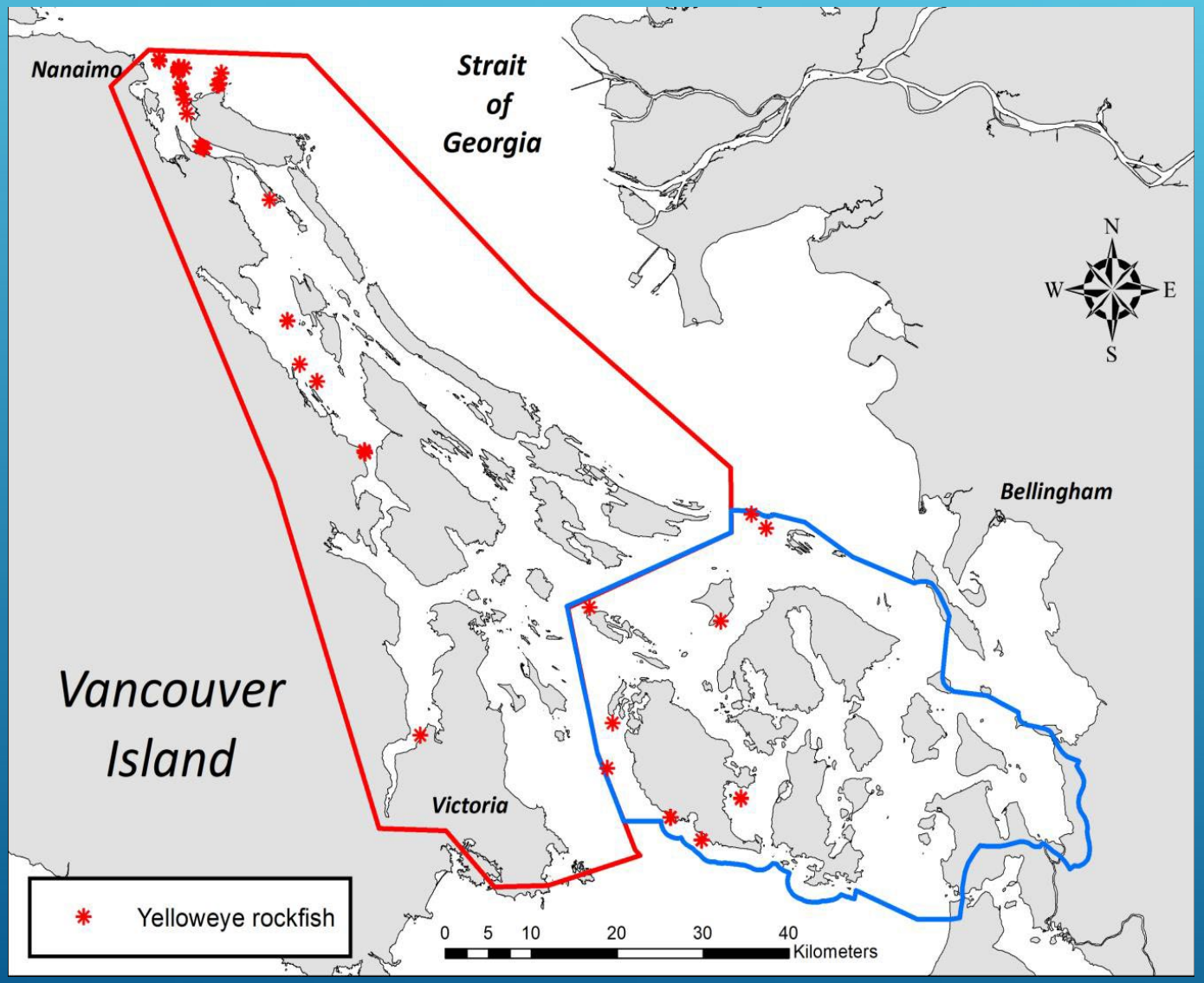
WDFW R/V Molluscan
11 m special-purpose research vessel
AIS (Class B) MMSI 338141592; "Molluscan"

GULF ISLANDS SURVEY

- March 2018 – bad weather in Week 1 – drop 'outside' stations, stations added to 'inside'
- 69 transects (41 H, 17 M, 11 L)
- 12 species of rockfish
- 76 Yelloweye Rockfish
- Several Yelloweye observed in same locations as fish seen in 2009-11 DFO surveys – some may be the same fish!



GULF ISLAND SURVEY DATA ANALYSIS



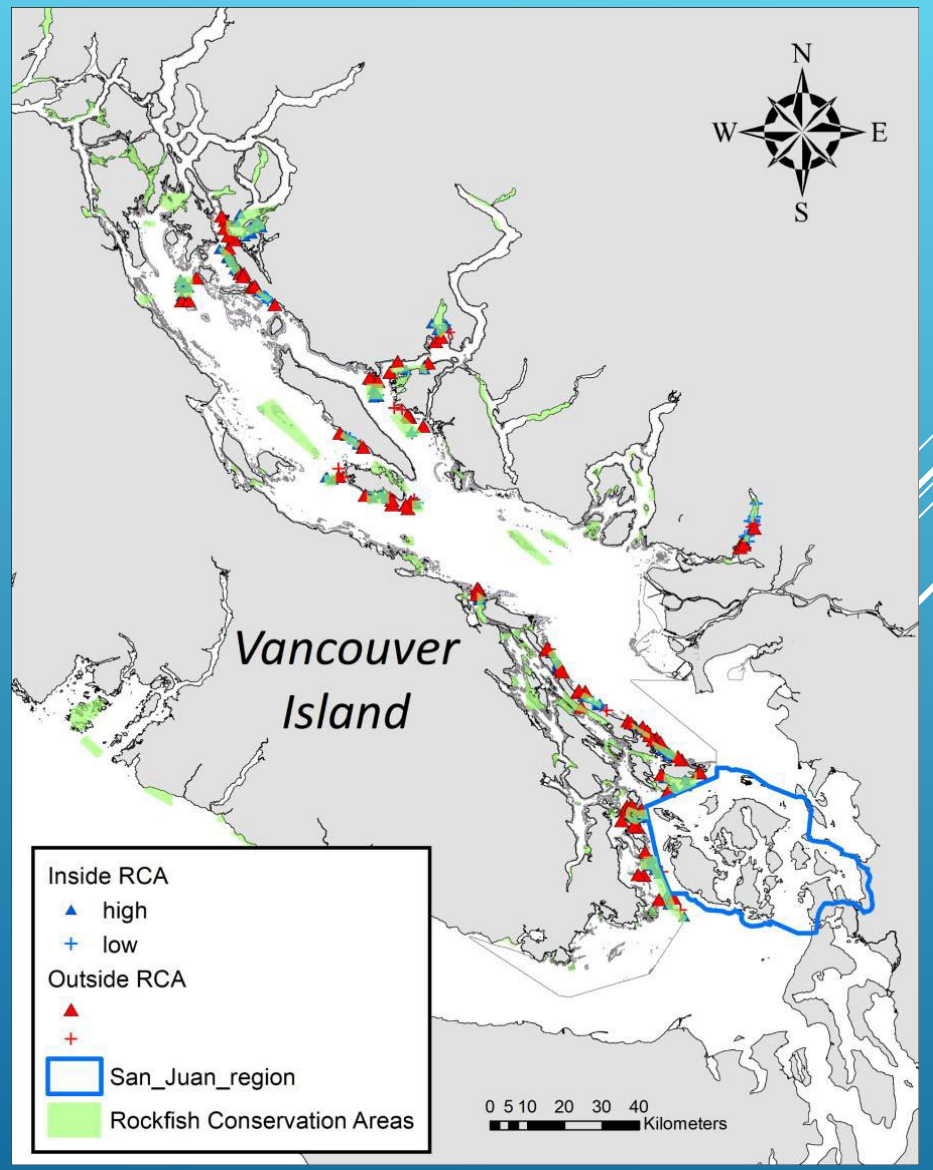
- Results compared to 2018 US San Juan Islands
  - Same model - higher resolution bathymetry in Canada (20 m vs 30 m)
  - Same vessel, methods, equipment
  - Yelloweye densities 3X greater in CGI despite similar transect encounter rates in both surveys

BIGGER WATER AND WEATHER? YOU'RE GONNA NEED A BIGGER BOAT

- DFO secured time on CCGS *Vector* (40 m) – not anticipated at time of CGI survey – short planning window
- Evaluate rockfish densities and habitat inside/outside Rockfish Conservation Areas (RCAs)
- WDFW ROV: no paperwork!
- DFO, WDFW, and NOAA staff
- Stunning scenery!

STRAIT OF GEORGIA SURVEY

- Maxent model for DFO 'inshore rockfish' (includes Yelloweye) – more complex that CGI and SJI models
- Probability strata: High, Low (@50%)
- Random station placement except for select areas outside RCAs where no habitat existed to match RCA – these were hand placed
- October 2018 - 14 days of sampling
  - 79 High, 1 Low (others were too deep)



STRAIT OF GEORGIA SURVEY


Yelloweye Rockfish

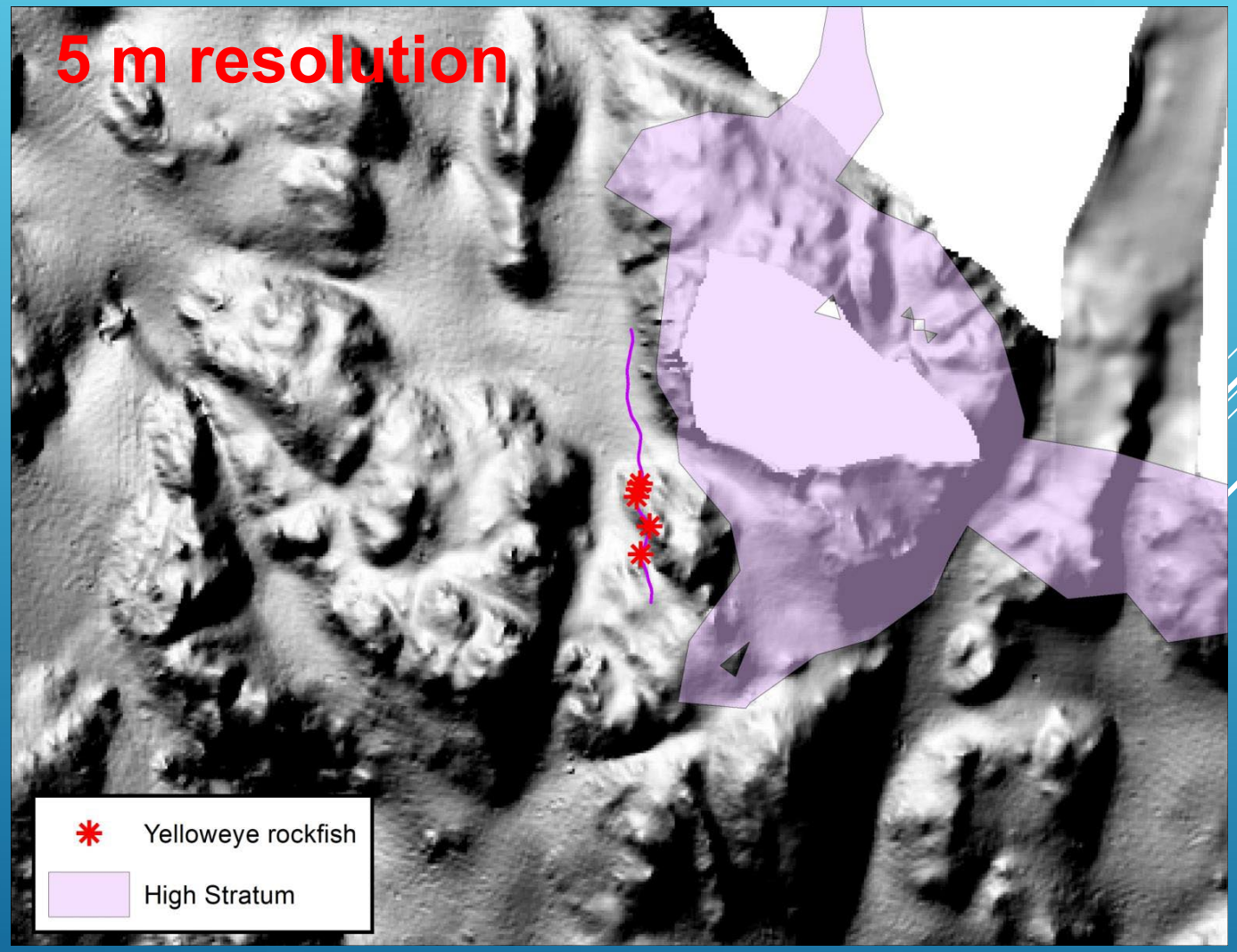

Tiger Rockfish

- Habitat different from CGI and SJI
  - deeper; dominated by sponges
- 206 Yelloweye Rockfish ☺
- 0 Bocaccio ☹
- Spatio-temporal model to define a 'good' control site
- Stereo imagery for fish length; calibration issues delaying data generation/analysis ☹

Stereo-camera

STRAIT OF GEORGIA SURVEY

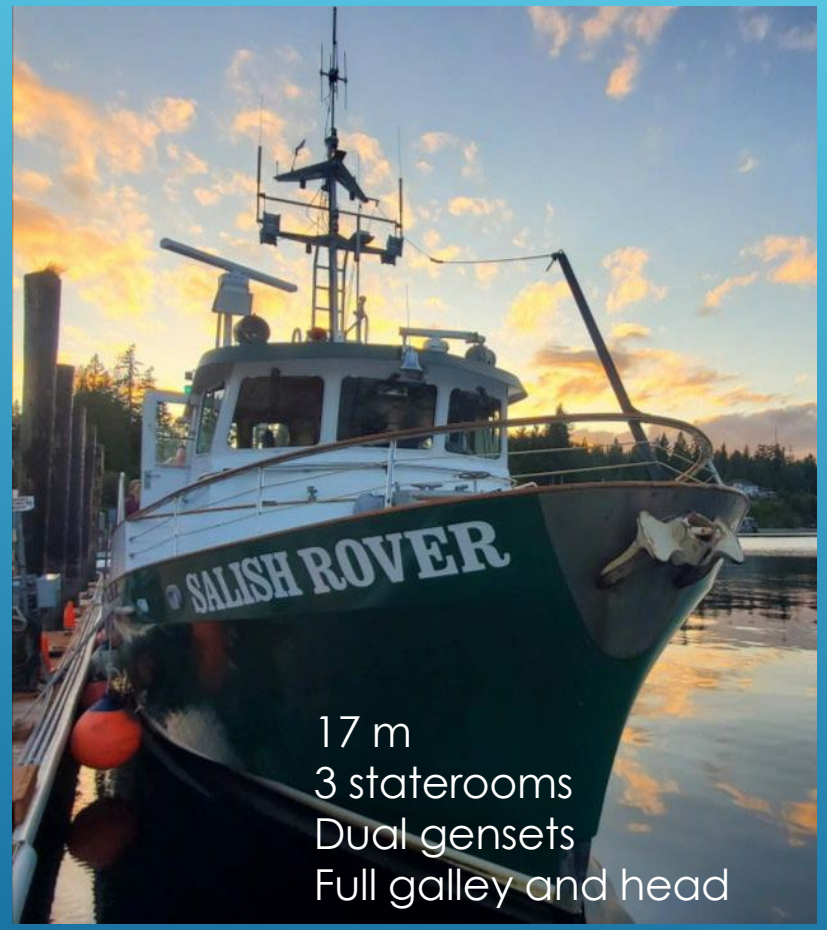
- Stark contrast between 5m and 20m bathymetry
  - modeled habitat vastly underestimated at low-res
- High-res data does not exist for entire DPS – how can model be improved with current resolution?
  - Change cutoffs?
  - Develop new variables?
  - Add buffers?
  - New model (GLMM, Random Forest, etc.)?



PARTNERSHIP SUCCESSES

- Critically needed data acquired for use by all agencies
  - Extensive model ground-truthing – insight into model improvement
  - Yelloweye observations will be used to update current model and/or create new model(s)
  - Improved understanding of habitat differences between US and Canadian waters – MUCH different between areas!
  - Greater insight into why YEYE densities are higher in Canada
- Expedited data exchange between WDFW and DFO
- Real-time in-the-field knowledge transfer
  - WDFW uses different transect technique (parallel vs. perpendicular) and tether management system
  - Experimented with multiple camera setups – improve species IDs and detection of small fish(<10 cm)
  - WDFW gained valuable experience operating from a larger vessel

PARTNERSHIP SUCCESSES



- Nearly identical survey designs in CGI and SJI with the same equipment allows for more direct comparisons of an at-risk resource between separately managed waters
- 2020-21: WDFW purchased and outfitted a larger support vessel, R/V *Salish Rover;* upgraded to fiberoptic ROV system

- DFO reactivating ROV program on a similar-sized vessel, CCGS *Manyberries;* waiting on bid for new ROV

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- **NOAA** – Kelly Andrews, Dan Tonnes