Halibut Fishery Incidental Catch Estimation (HFICE)

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Why are we here again?

- Three years post-observer restructuring
- How do the estimates from HFICE compare?
- Can HFICE be used to reconstruct catch history?

What we are doing here

- History Lesson
- Refresher on HFICE
- Update with data through 2015

History Lesson

Problem:

- The Pacific halibut IFQ fleet was not subject to observer coverage prior to the 2013 restructuring of the observer program.
- Not a problem for retained species, captured in CAS
- Discards were not estimated because no observer data
- Potentially significant source of discards for some non-retained species which needed to be accounted for

History Lesson

Solutions: many have tried

Three Eras of Estimation

History Lesson

Three Eras of Estimation

2003/2005: IPHC provided estimated catches for skate assessment, based on survey catch rates (Gaichas et al. 2003 & 2005)

2006: Similar method used with depth strata incorporated (Courtney et al. 2006)

2008: ADF&G developed method using ratio of weight of species to halibut for Yellow Eye (Brylinsky et al. 2008)

History Lesson

Three Eras of Estimation

2009

Sept: Document presented to JPT examining two methods of using IPHC survey data and logbook/fishticket data (Tribuzio, Ormseth and Rodgveller, 2009). PT made some suggestions, including adding RO staff to project.

Nov: Presented updated estimates with responses to Sept PT comments, Appendix to Shark SAFE (Tribuzio et al., 2009)

Dec: SSC reviewed, provided comments and recommendations

History Lesson

Three Eras of Estimation

2010

Mar-Aug: Interagency working group formed, met many times, examined many things

Sept: Three data filters and two estimation methods presented, PT provided comments/recommendations

Nov: Stand alone document with updated estimates presented, PT endorsed

(http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/1110IFQbycatch.pdf)

History Lesson

Three Eras of Estimation

2011 - 2012

2011 Feb: SSC reviewed, accepted author recommended methods

2011 Oct: Working group provided catch estimates through 2010 for "Supplemental catch data" appendices

2012 Oct: Catch estimates were updated through 2011 for all species, but not included in most assessments (off-year for GOA too)

Then we waited.....

(and put all the gory details and a few tables into a tech memo: http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-265.pdf)

History Lesson

Three Eras of Estimation

2013 - Today

2013: Beginning of restructured observer program, providing discard data from halibut IFQ vessels

2015 – Nov: GOA PT requested HFICE be re-run to compare with restructured observer program

2016 – Sept: It RAN! Here we are

History Lesson

Three Eras of Estimation

Why the history lesson.....

You've already seen all this

The SSC has already seen all this

Both bodies approved the approach

Refresher on HFICE

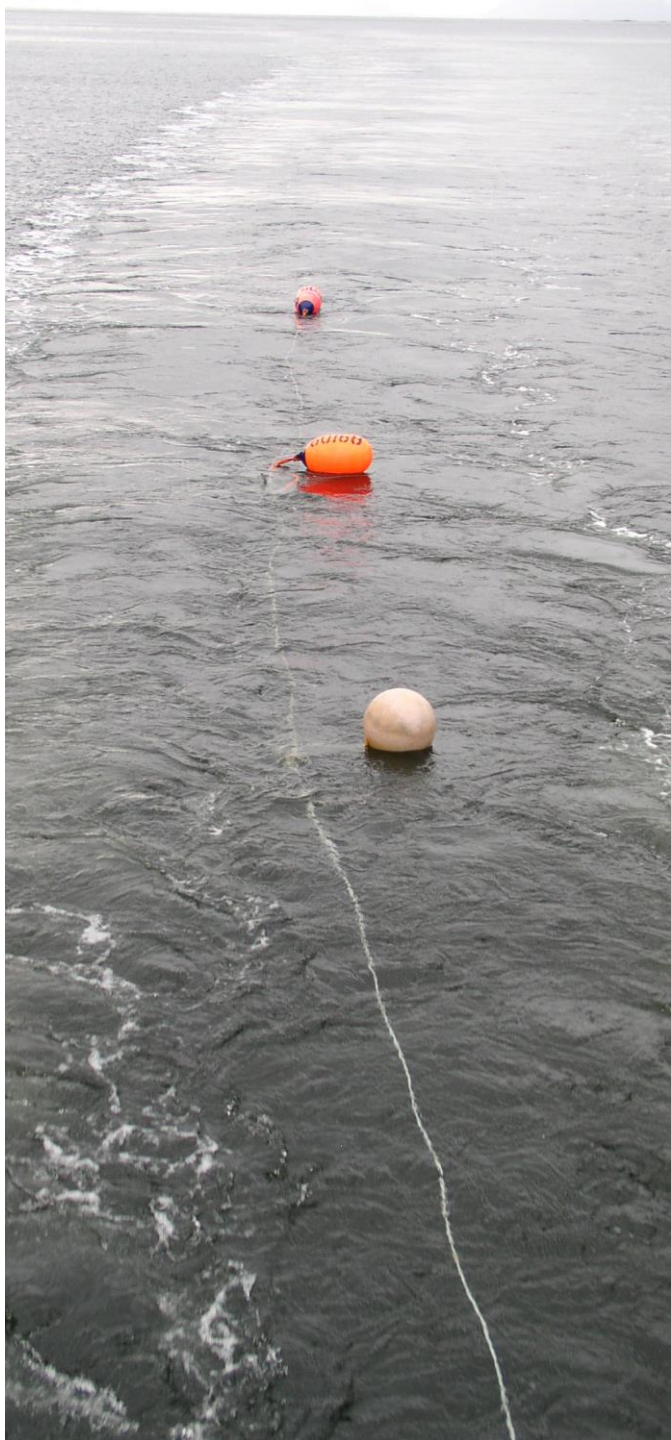
HFICE is a method to estimate unobserved bycatch by the halibut IFQ fleet

Uses IPHC longline survey data as a proxy for fishery catch rates (CPUE)

Applies proxy CPUE to commercial effort (effective hooks fished) to estimate total numbers

Numbers are converted to weight by an average weight

Initially, 4 example species were examined (see Tech Memo), but for this exercise:
Longnose Skate
Pacific Cod
Pacific Sleeper Shark
Sablefish
Spiny Dogfish

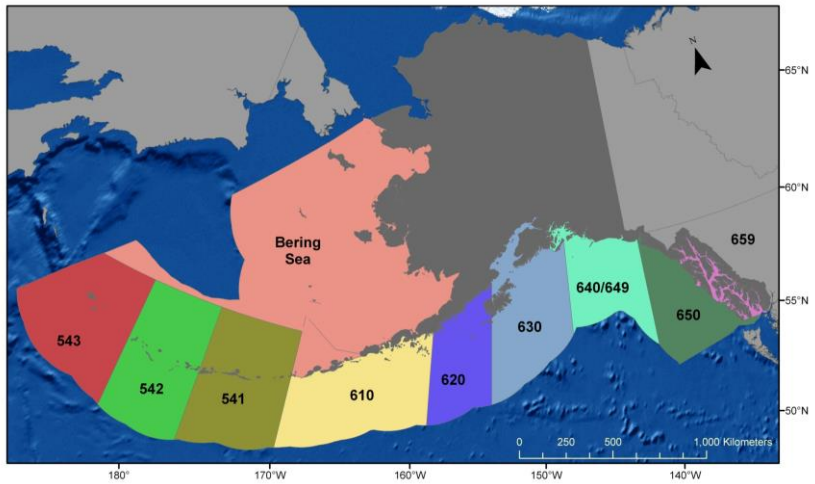


Data Sources

- Fishery dependent data:
  - Commercial effort and landings
    - IPHC fish tickets
    - IPHC logbooks
    - IFQ landings by ADF&G area
  - Average Weight
- Fishery independent data:
  - Annual IPHC longline survey
  - Average Weight

Fishery Dependent Data

- Fish Tickets:
  - 2001-2015 total landings by area
    - GOA NMFS areas (610, 620, 630, 640/649, 650, 659)
    - All Bering Sea areas combined
      - (508, 509, 512, 513, 514, 516, 517, 518, 519, 521, 523, 524, 530)
    - AI NMFS areas (541, 542, 543)

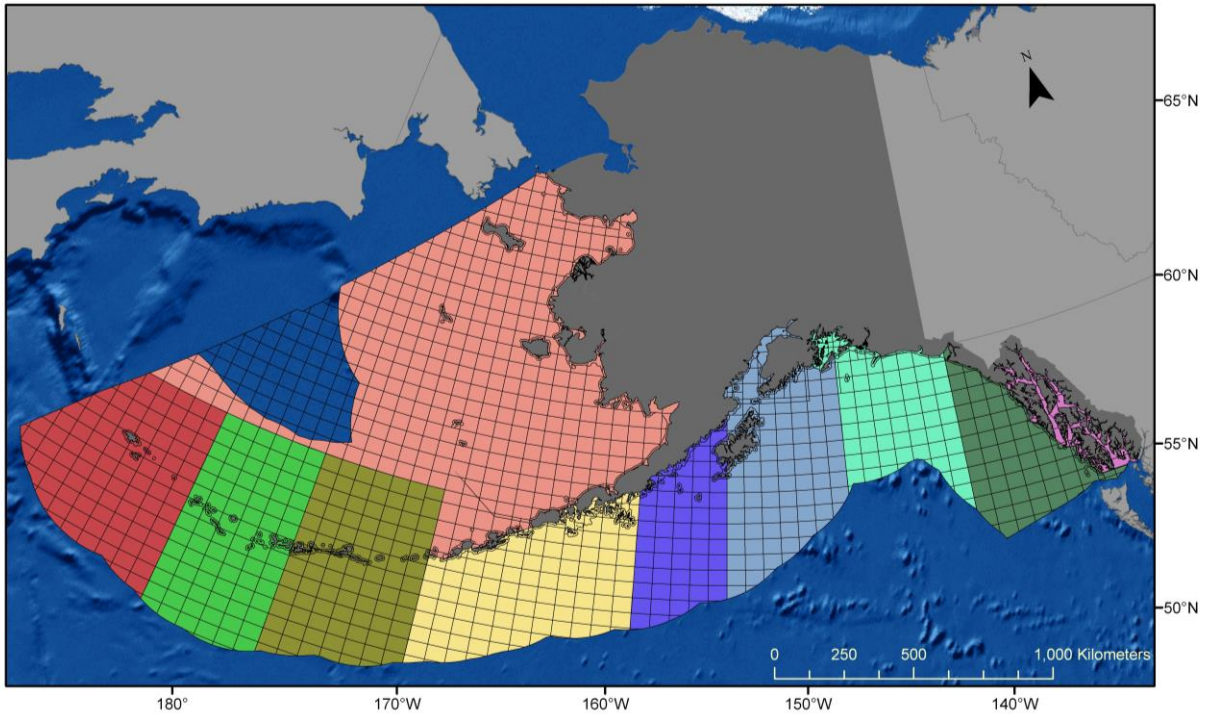


Fishery Dependent Data

- Logbook:
  - Depth bins (0-99, 100-199, 200+ fathoms)
  - Effective skates retrieved
    - Converted to effective hooks by assuming standardized 100 hooks per skate
  - Used to partition total effort/landings (fish tickets) into depth bins
- Fish ticket and logbook data is delayed by one year

Fishery Dependent Data

- IFQ landings by ADF&G area
  - Smallest spatial resolution possible
  - Used to partition landings within larger NMFS area (discussed later)

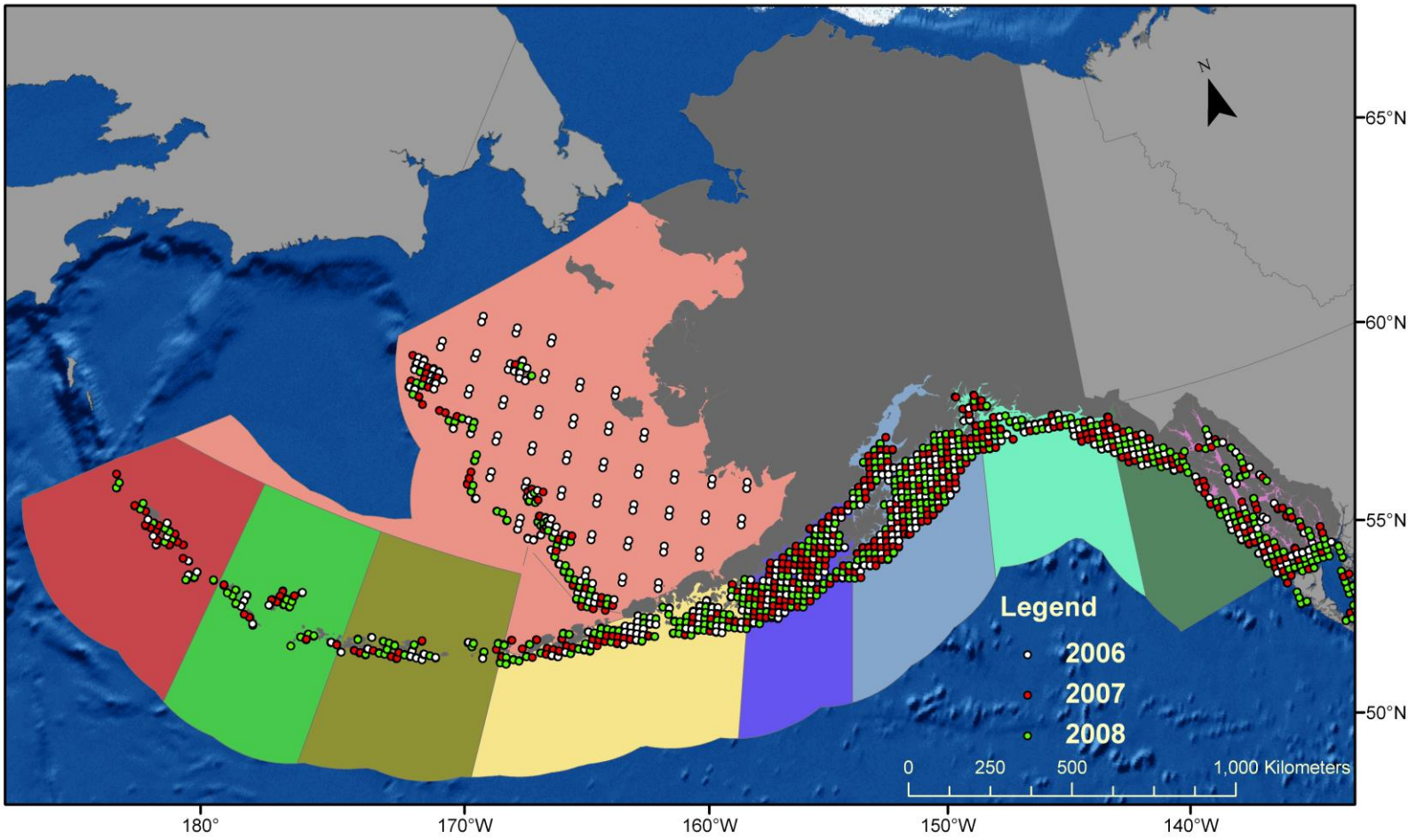


Fishery In/Dependent Data

- Species specific average weight is necessary for converting numbers to weight of catch
- The larger issue not tackled by this working group

Fishery Independent Data

- IPHC annual longline survey
- Extensive coverage in GOA and BSAI



Fishery Independent Data

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- Gear:
  - 100 hooks per skate
  - Number of skates per station varies, but generally about 5 skates

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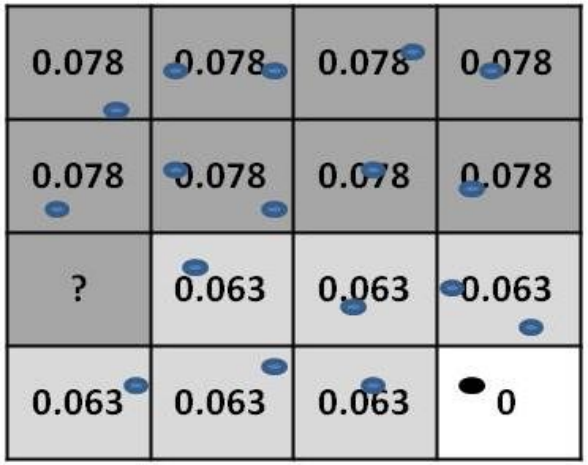
- IPHC annual longline survey
- Extensive coverage in GOA and BSAI
- Gear:
  - 100 hooks per skate
  - Number of skates per station varies, but generally about 5 skates
- Considerations:
  - Non-random sub-sampling
    - First 20 hooks on each skate counted
  - Survey catch rates (non-targets) are based on sub-sample
  - No analytical method to estimate variance on catch rates

Methods

3 Step Process

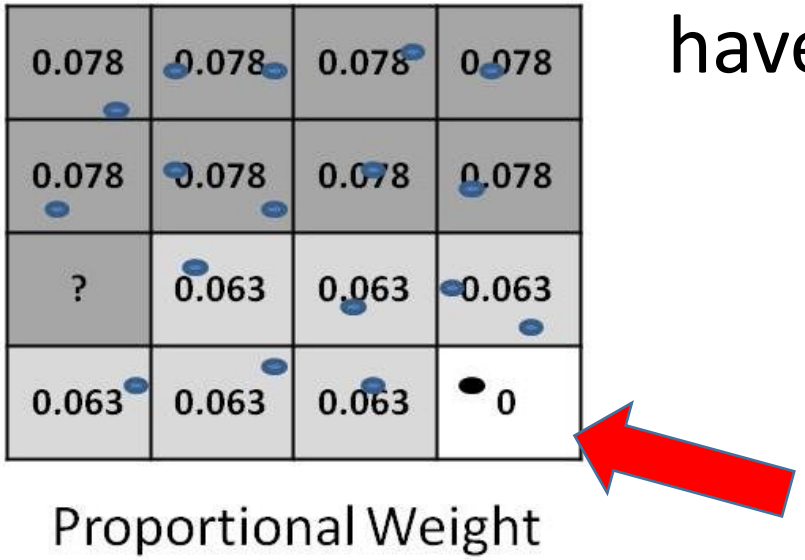
1. Proportionally weight survey stations
2. Estimate stratum CPUE and confidence intervals
3. Calculation of total estimated catch of non-target species in halibut IFQ fishery

Proportional Weighting



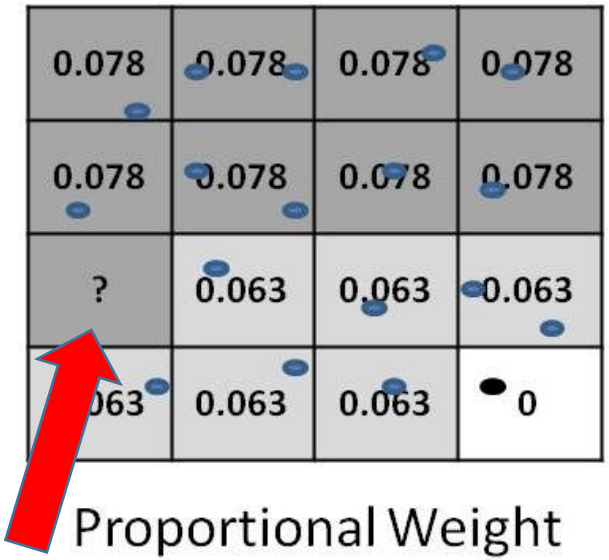
- IFQ landings by year and ADF&G area are used to partition landings within the larger NMFS area
- Allows for the smallest spatial resolution possible
- Renormalized so that surveyed areas w/o catch = 0
- Proportional Weight=P_i

Proportional Weighting

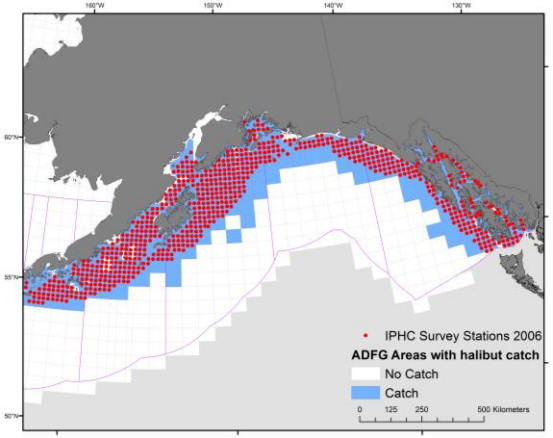


- Not all areas with survey stations have catch

Proportional Weighting



- Not all areas with survey stations have catch
- Not all areas that have catch are surveyed
  - <10% of the quota comes from these areas



Stratum CPUE

- Stratum = Year, NMFS Area, Depth Bin
- Species specific CPUE for each station (*i*) in a stratum (x):

$$CPUE_{i,x}^{Species} = \frac{n_{i,x}^{species}}{n_{i,x}^{effhks}}$$

- Weighted mean stratum CPUE

$$CPUE_{x}^{species} = \frac{\sum_{i=1}^{i} CPUE_{i}^{species} * P_i}{\sum_{i=1}^{i} P_i}$$

Catch Estimates

- Catch (in numbers):

From fish ticket and logbooks

$$C_{x,\#}^{species} = CPUE_{x}^{species} * n_{x}^{effhks}$$

- Catch (in metric tons):

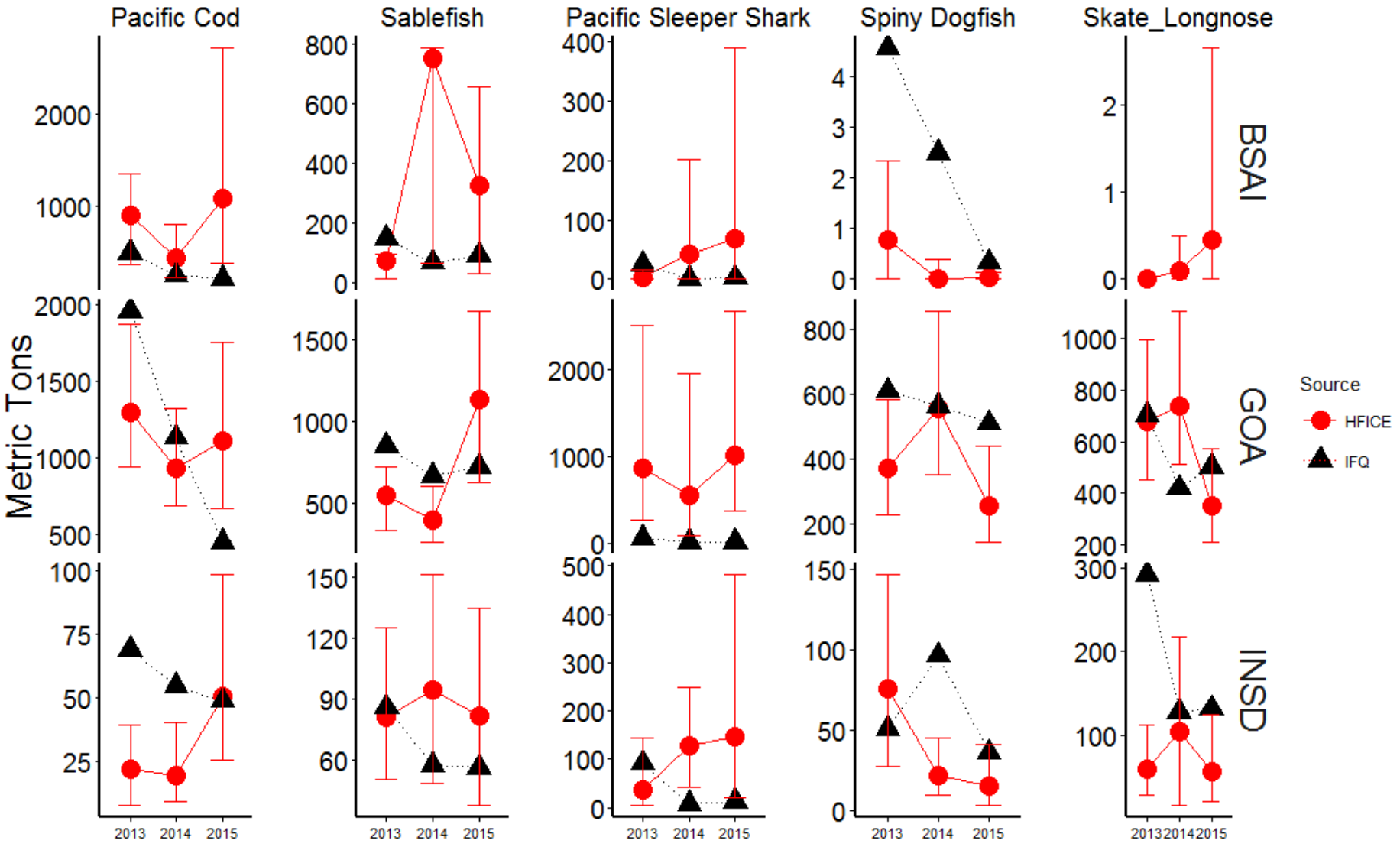
$$C_{x,t}^{species} = C_{x,\#}^{species} * \bar{W}^{species}$$

Species specific average weight in kg

Important Stuff

- Estimates are total bycatch (retained and discarded)
- Delayed by one year
- Average weight is problematic and not investigated here
- The potential issue for double counting could not be resolved, however, it is likely small
- Historical estimates only go back to 2001

Comparing HFICE to CAS – Post Observer Restructuring



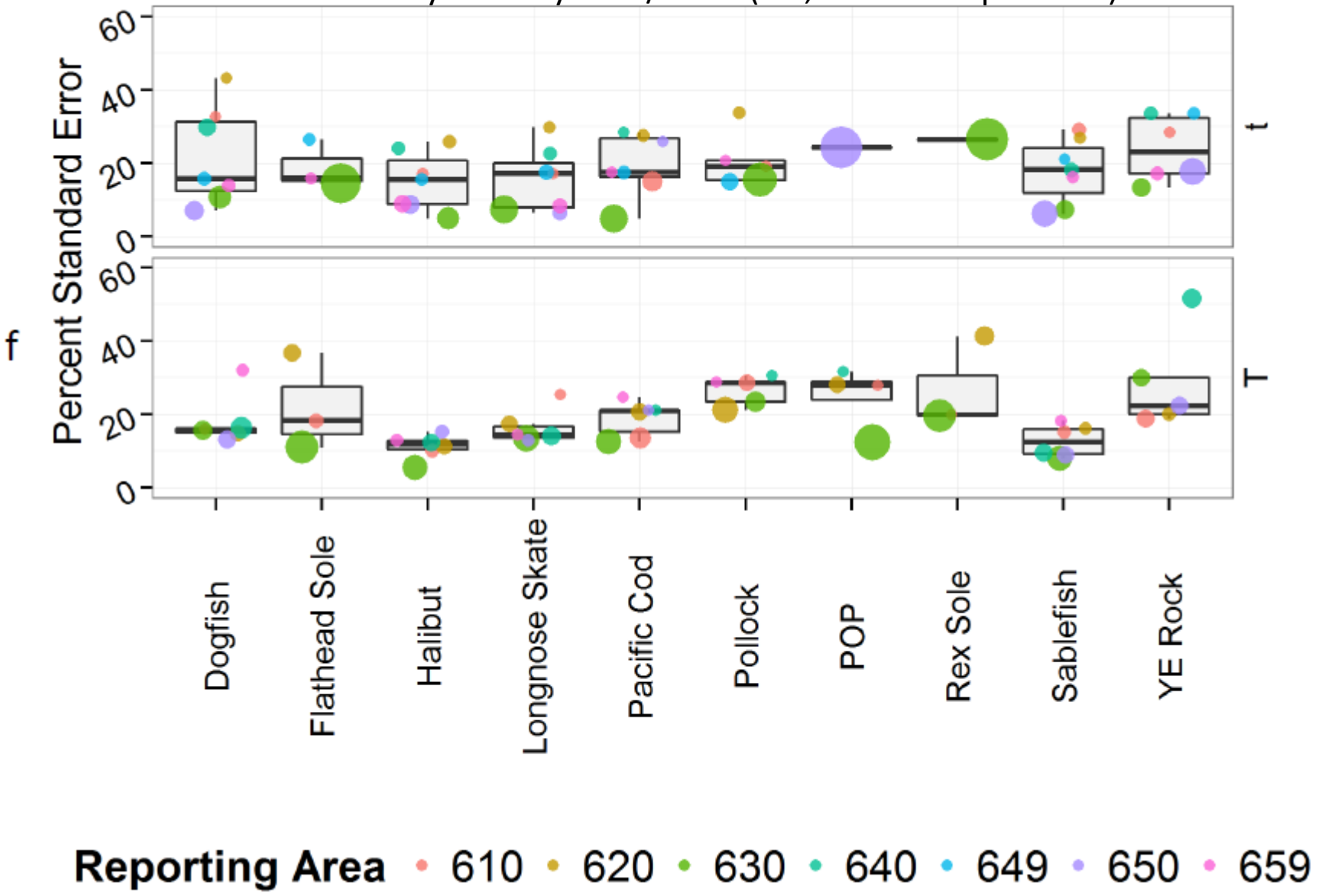
Closing thoughts

- HFICE index is driven by IPHC survey CPUE, trends in the survey, may not mirror trends in the fishery
- IPHC survey is summer only, fishery much longer. There could be seasonal influence to fishery catch
- HFICE and CAS estimates of catch by the IFQ fleet do not track together and HFICE is likely not a good tool for building pre-observer restructuring catch history

Are the estimates IFQ fishery catch estimates coming out of CAS improved over HFICE?

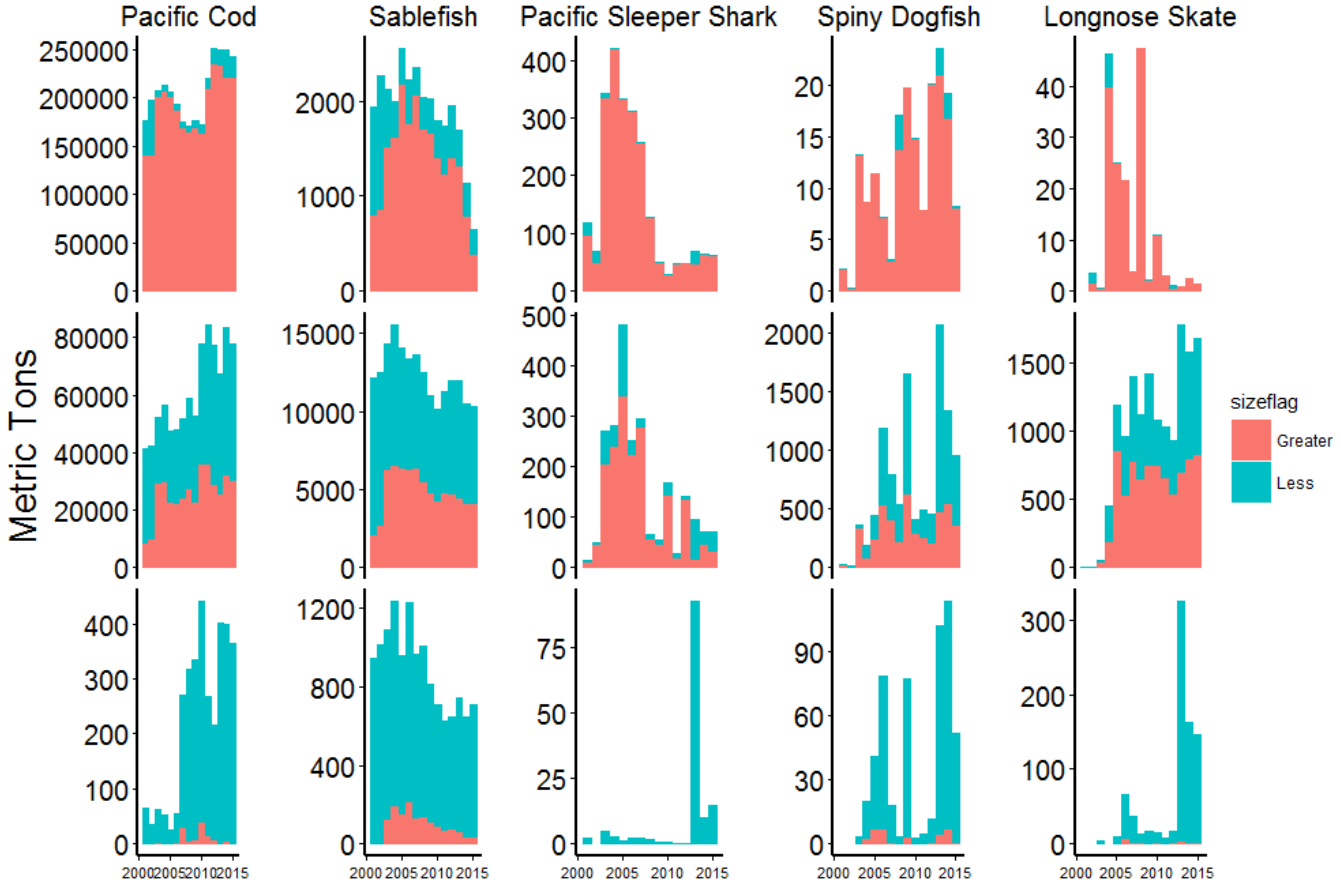
- CAS estimates are based on observer data, so yes
- How about coverage?
  - Vessels <40ft or in the EM program are not included in CAS estimates
- Still difficult to deal with weights on large animals (mostly a sleeper shark problem)
- *PRELIMINARY* CVs – generally low (see FMA/RO presentation from June council meeting)

Preliminary work by FMA/RO…..(i.e., I'm not responsible)



Are the estimates IFQ fishery catch estimates coming out of CAS improved over HFICE?

- How has catch by vessels <60ft changed as a result of observer restructuring?



In Summary

- HFICE does not track with CAS estimates of IFQ catch, not a good tool for building catch history
- The restructured observer program provides crucial data for assessment of species which are primarily discarded and needs to be supported
- Are there other options for rebuilding catch history?