

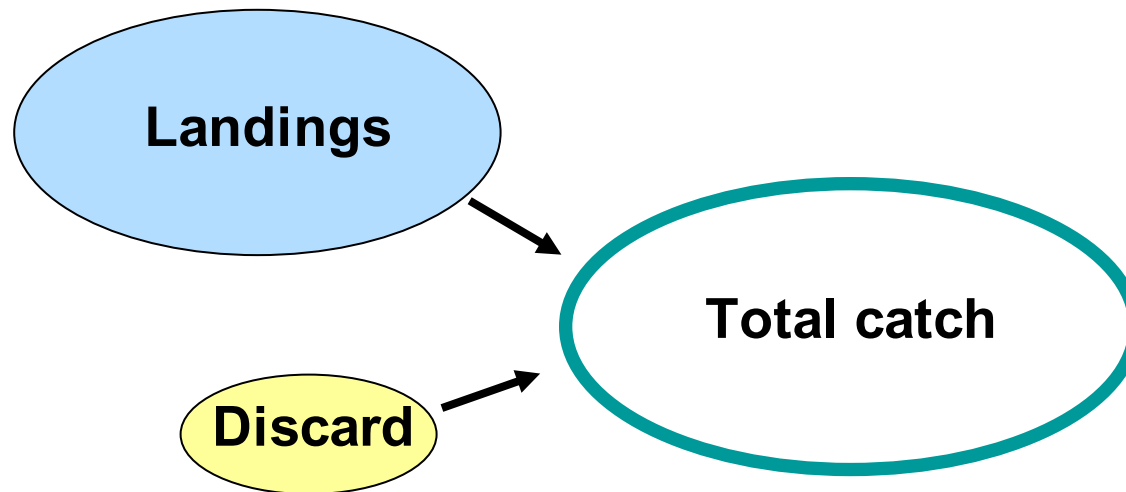


**NOAA**  
**FISHERIES**

# Preparing fishery- dependent data for stock assessment models

**FISH 576, Week 3**

# Categories of catch



# Ways to incorporate discard data in the assessment model

2017  
yelloweye  
model

2019 widow  
model

## Option 1:

Discard added to landings within the same fleet

- Discard amounts are estimated by year for the entire modeling period *outside the model*.
- Discard amounts are added to landings in the same fleet.
- No discard length composition data added.
- Selectivity for the entire fleet estimated based on landings length compositions.

## Option 2:

Discard included as a separate fleet

- Discard amounts by year are estimated *outside the model*.
- Discard amount by year are included as a separate (from landings) fleet.
- Discard length compositions added to the model.
- Separate selectivity curve is estimated for discard fleet based on discard length composition data.

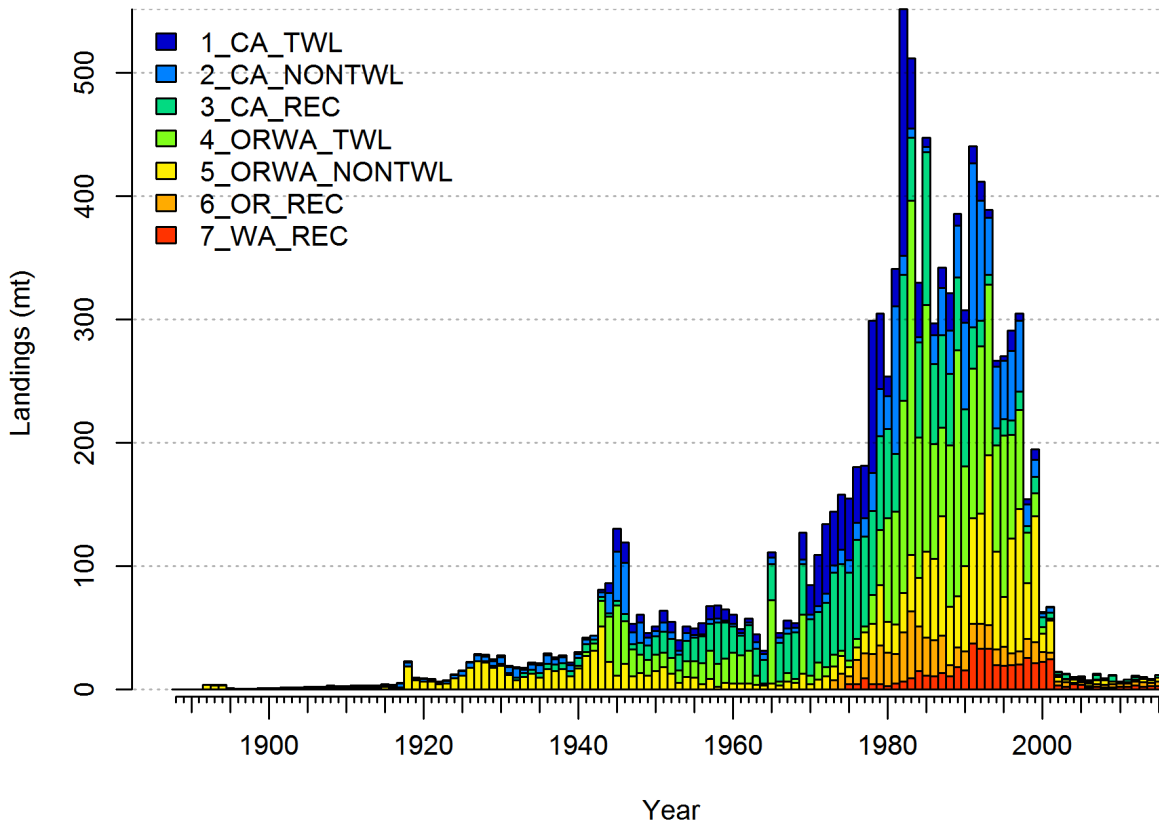
## Option 3:

Discard estimated internally

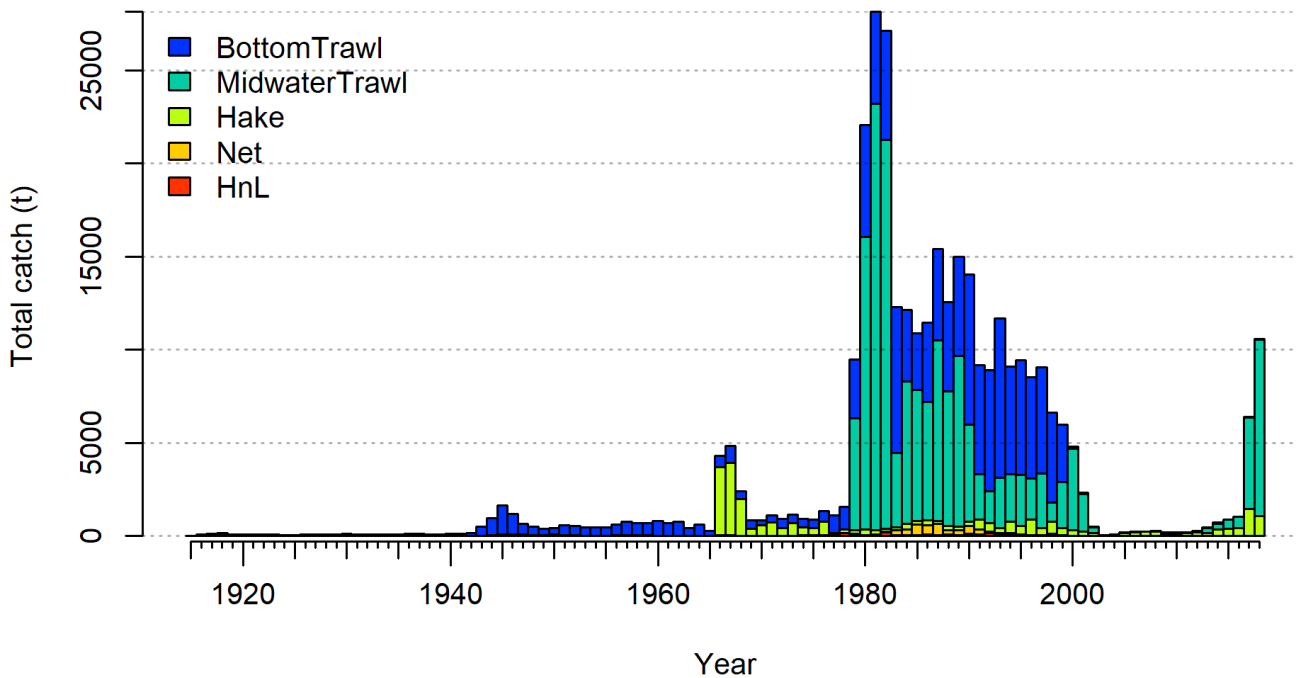
- Discard rates/amounts are added to the model for existing fleets. No additional fleets added.
- Based on those discard rates/amounts, the model will estimate discards by year *internally*.
- Discard length compositions and mean weight are added to the model, within the same fleet but marked as discard.
- Selectivity section in control file is modified to estimate retention curve in addition to selectivity curve.



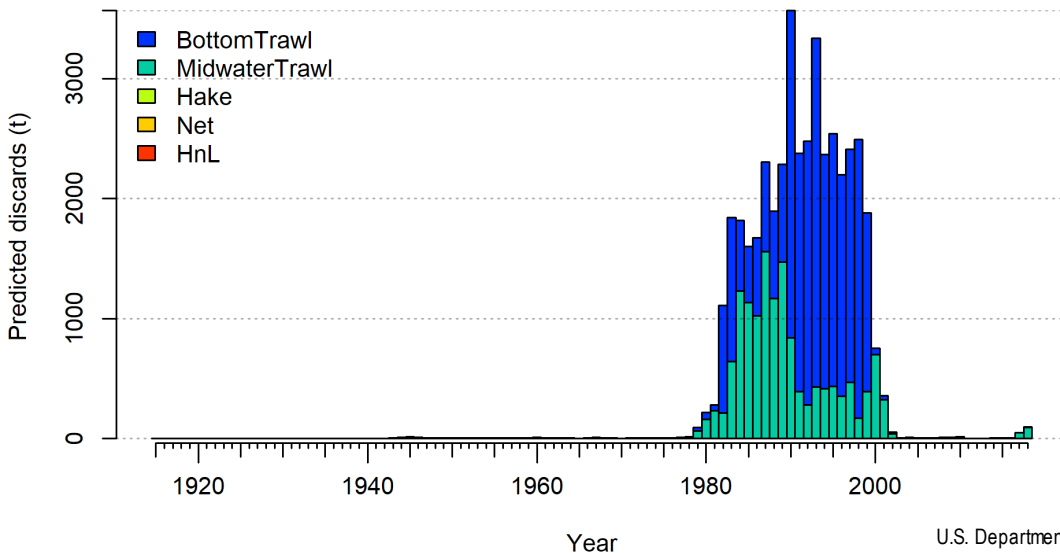
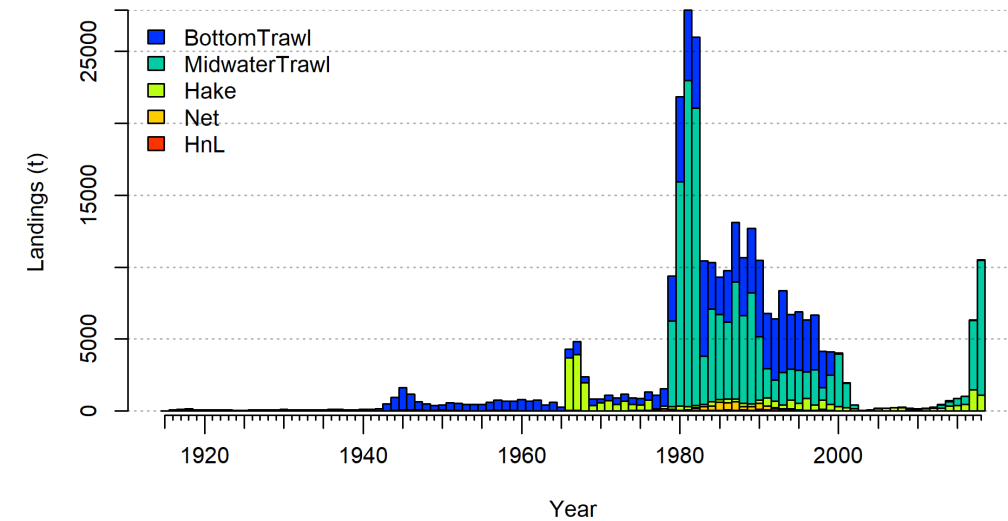
# Yelloweye rockfish catch history



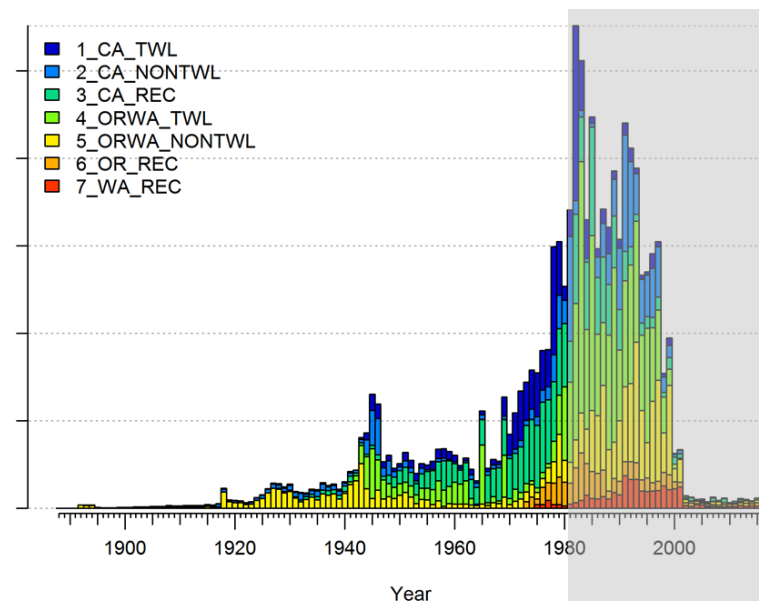
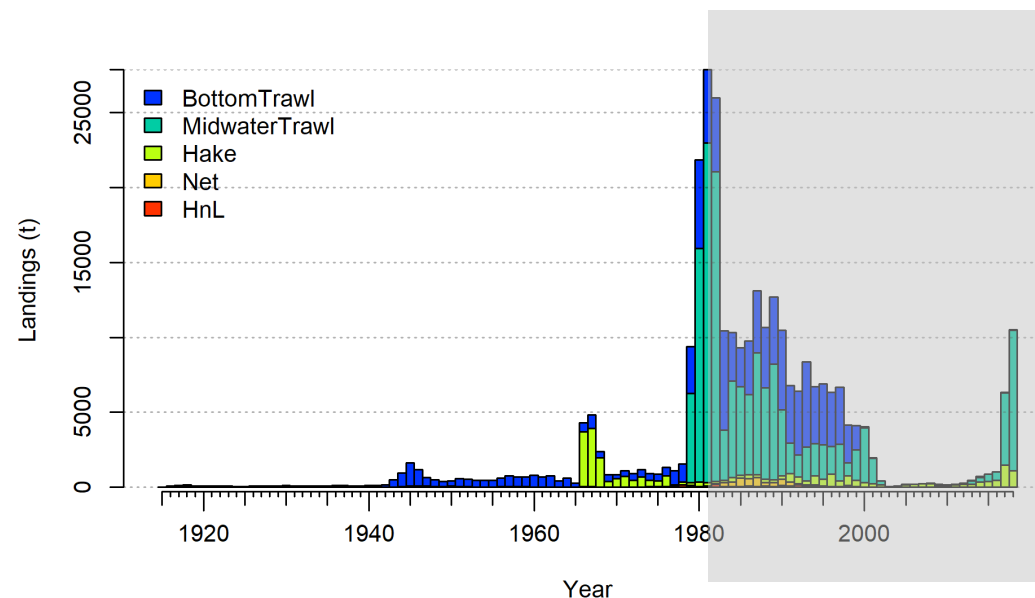
# Widow rockfish catch history



# Widow rockfish catches

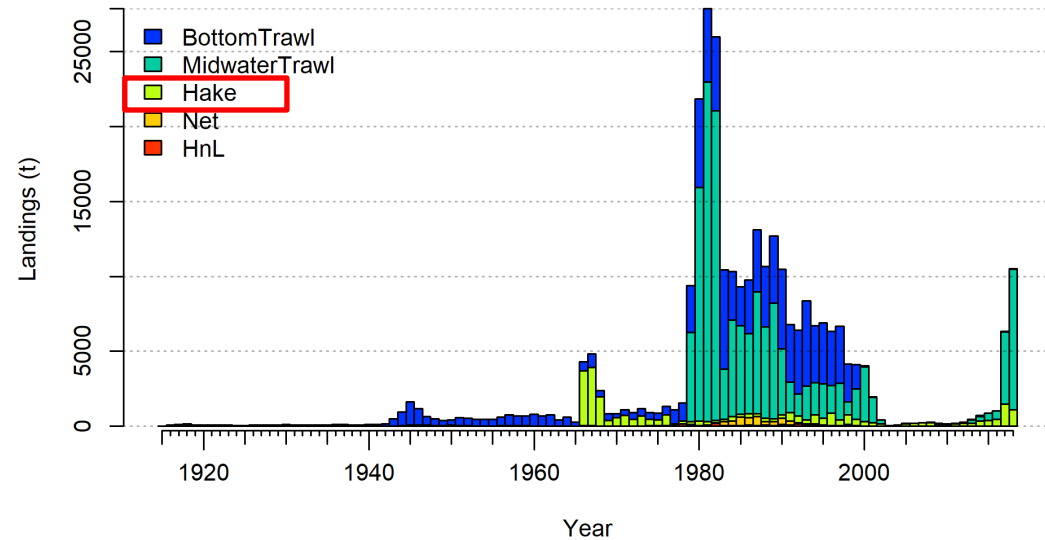


# Sources of commercial landings data

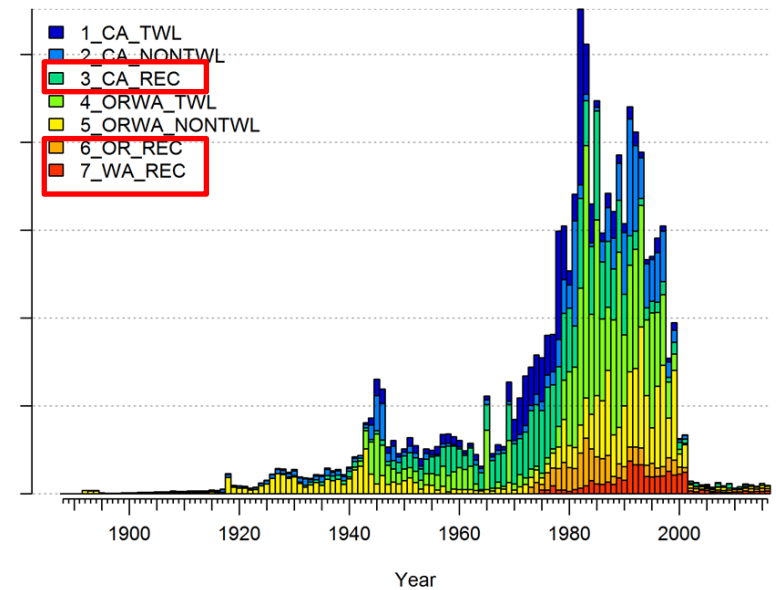


- **Recent period (1981 – present): Pacific Fisheries Information Network (PacFIN)**
- **Historical catch reconstructions have been conducted by state, and should be obtained from individual state agencies (WDFW, ODFW and CDFW).**

# Bycatch and recreational fishery sources



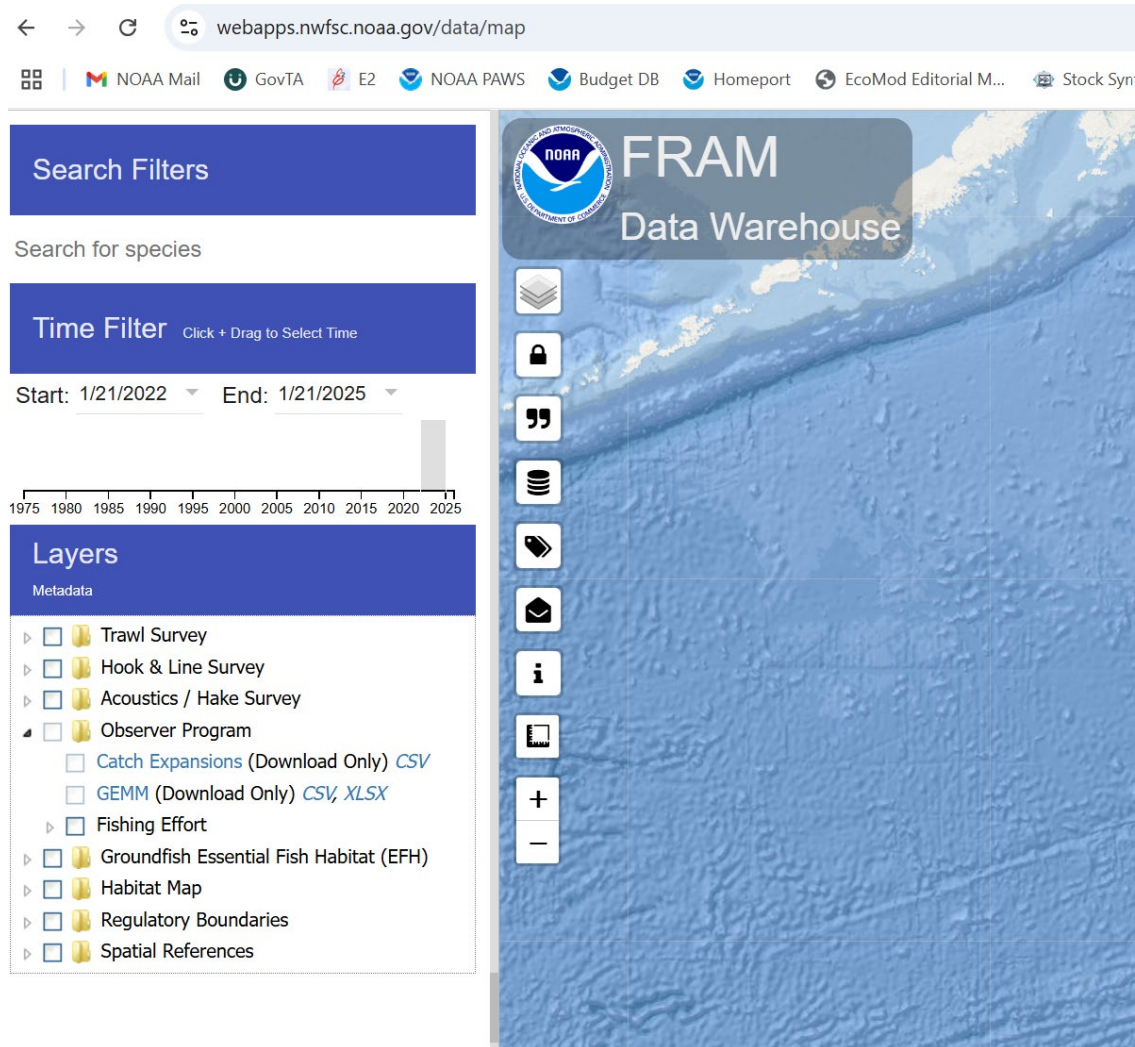
- Bycatch within At-Sea Hake fishery.
- Data to be requested.



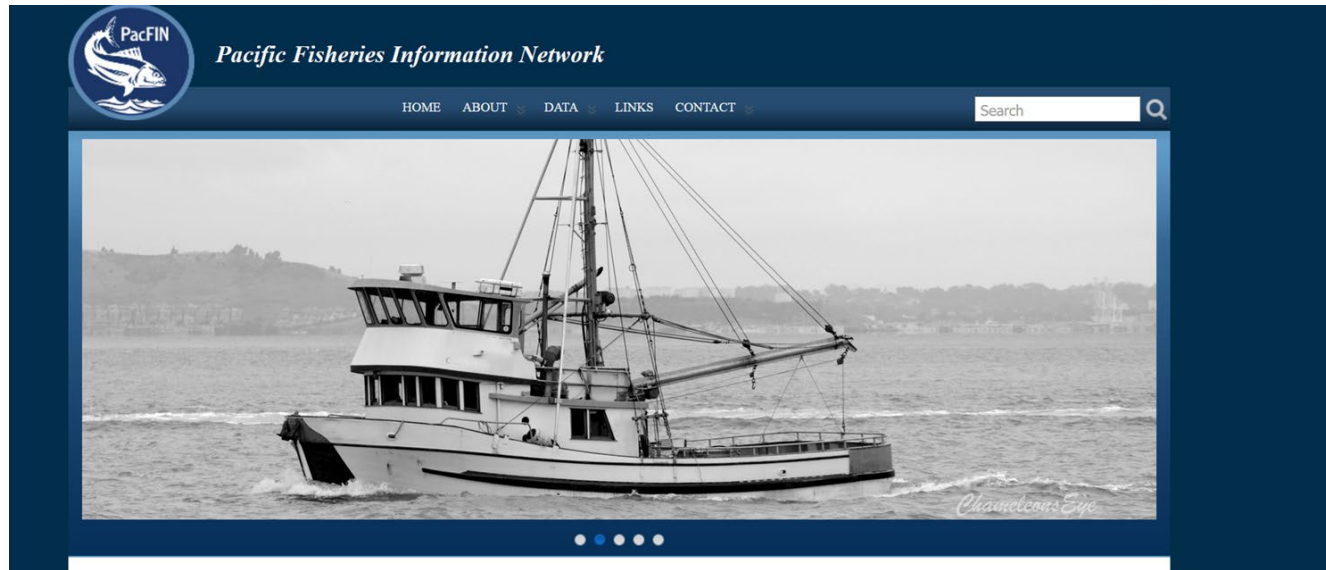
- Recreational catches – Pacific Coast Recreational Fisheries Information Network (RecFIN)



# All catches by sources from 2002 forward are also available from GEMM



# Accessing PacFIN data



- Request is submitted through “pacfintools” GitHub repository.
- Two files are provided – catch and biological data.

# Navigating PacFIN catch data

- Plot landings by state, gear and fleet used in the previous assessment.
- PacFIN codes are on “pacfintools” GitHub page.
- Compare current landings with those in last assessments. Are they different? Why?
- While processing fishery data and aggregation level, keep in mind confidentiality rule (no finer than 3+ vessel aggregations).

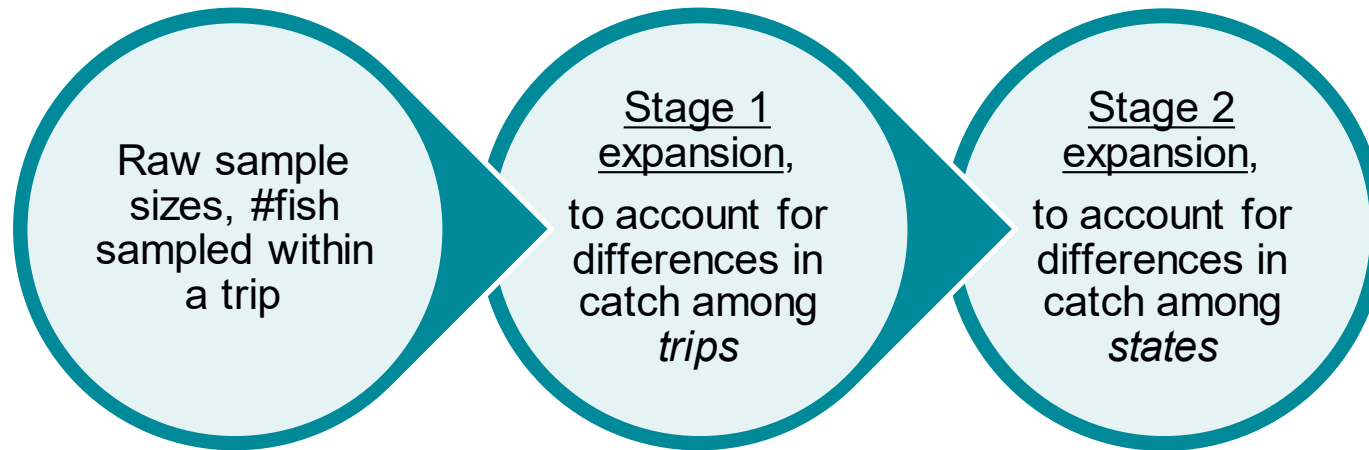
# PacFIN biological data (BDS)

- Much more messy than catch file.
- Includes length, age, weight, maturity data for individual fish.
- State agencies have different sampling programs, report some elements differently.
- pacfintools— a set of functions we use to work up the commercial biological data to create comps in format needed for ss3 input file.

# Processing PacFIN BDS data

- Fish size/age distributions are not uniform (ontogenetic movements, size/age specific distributions, etc.)
- Amount of catch varies by boat, area, etc.
- Fish numbers sampled for length/age within trip or state are not proportional to amount caught (usually set #fish per trip)
- To develop accurate length frequency distributions for assessment, we need to account for differences in catch among trips, and states, and weight length samples accordingly.

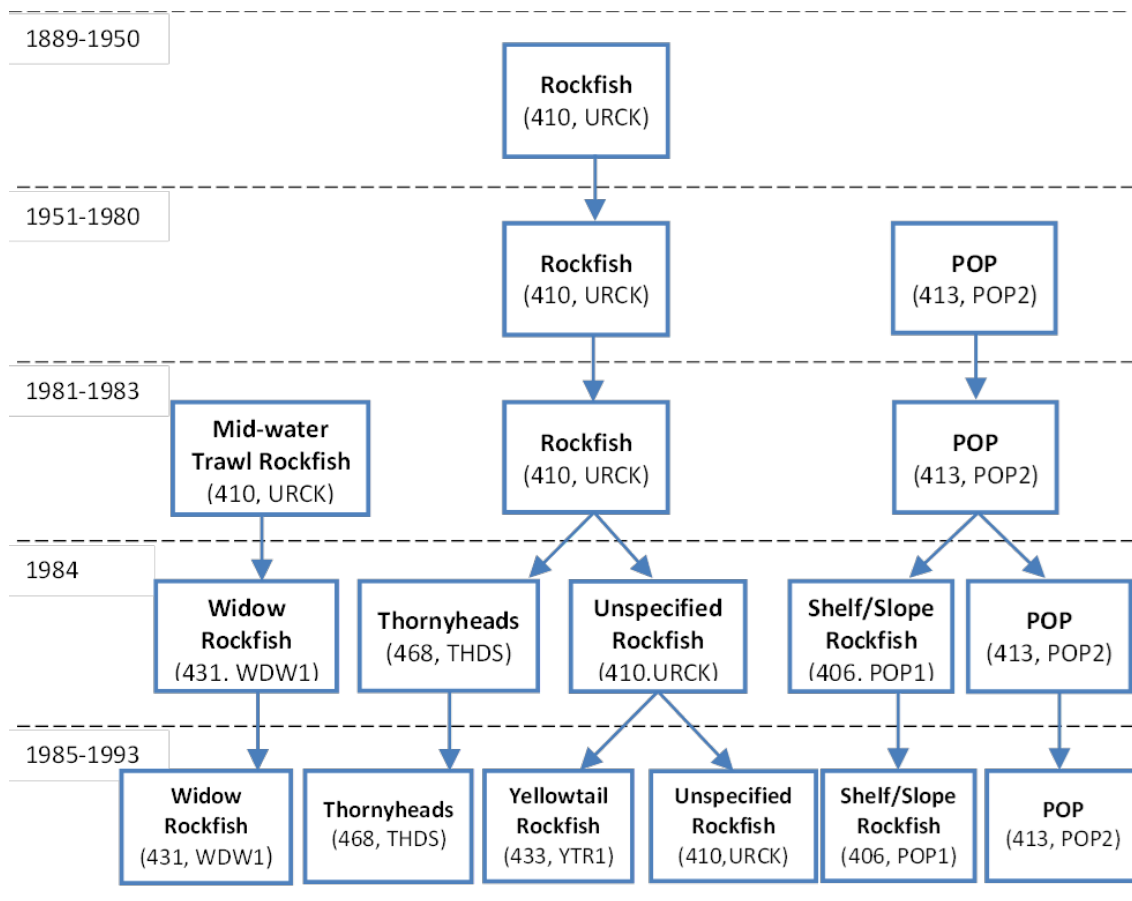
# Processing PacFIN BDS data



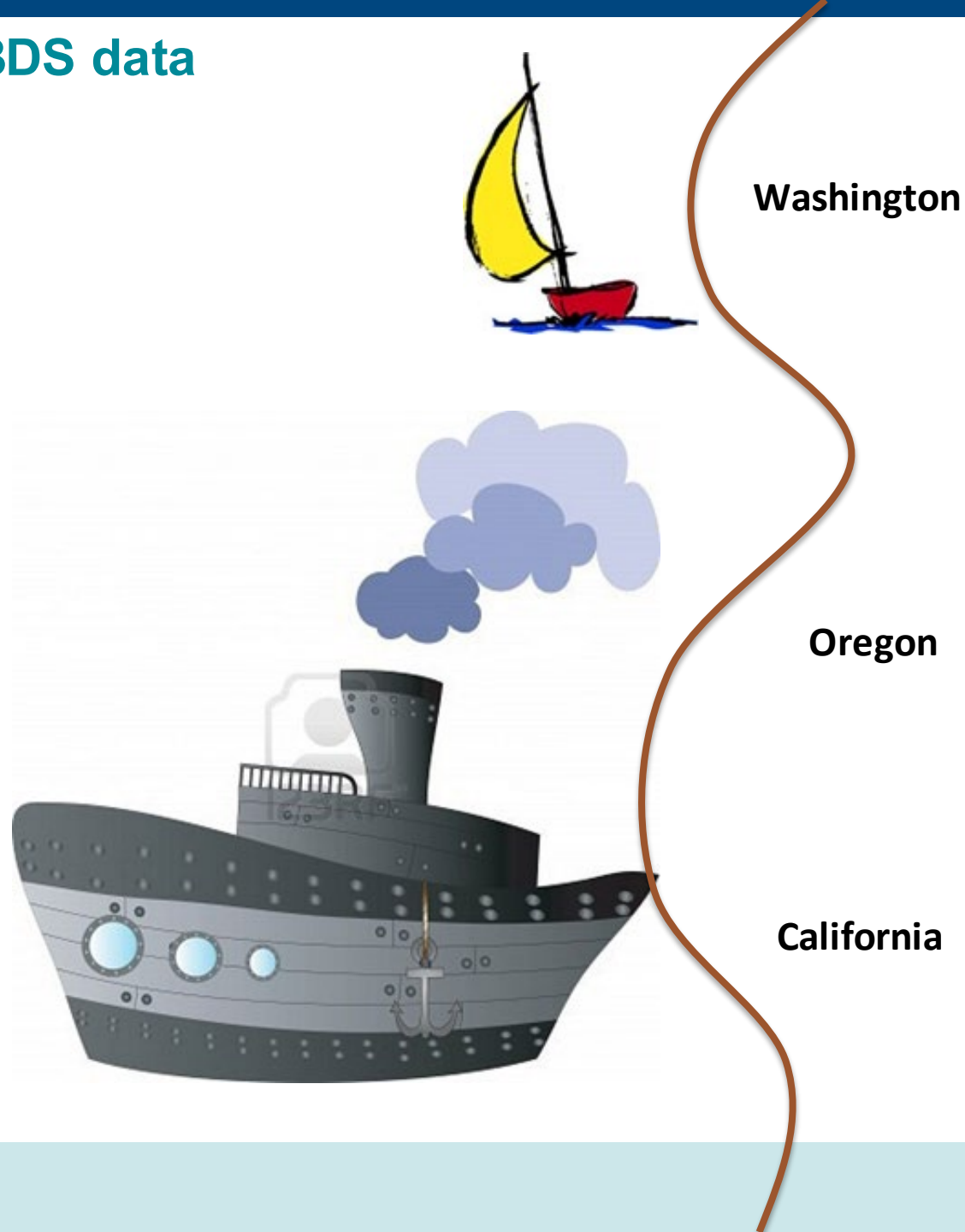
Process is similar to that of survey data, but in fishery-dependent data there are much more details to deal with.

# Processing PacFIN BDS data

- Rockfish historically were landed in multi-species category
- This adds extra steps in compositional data expansion process

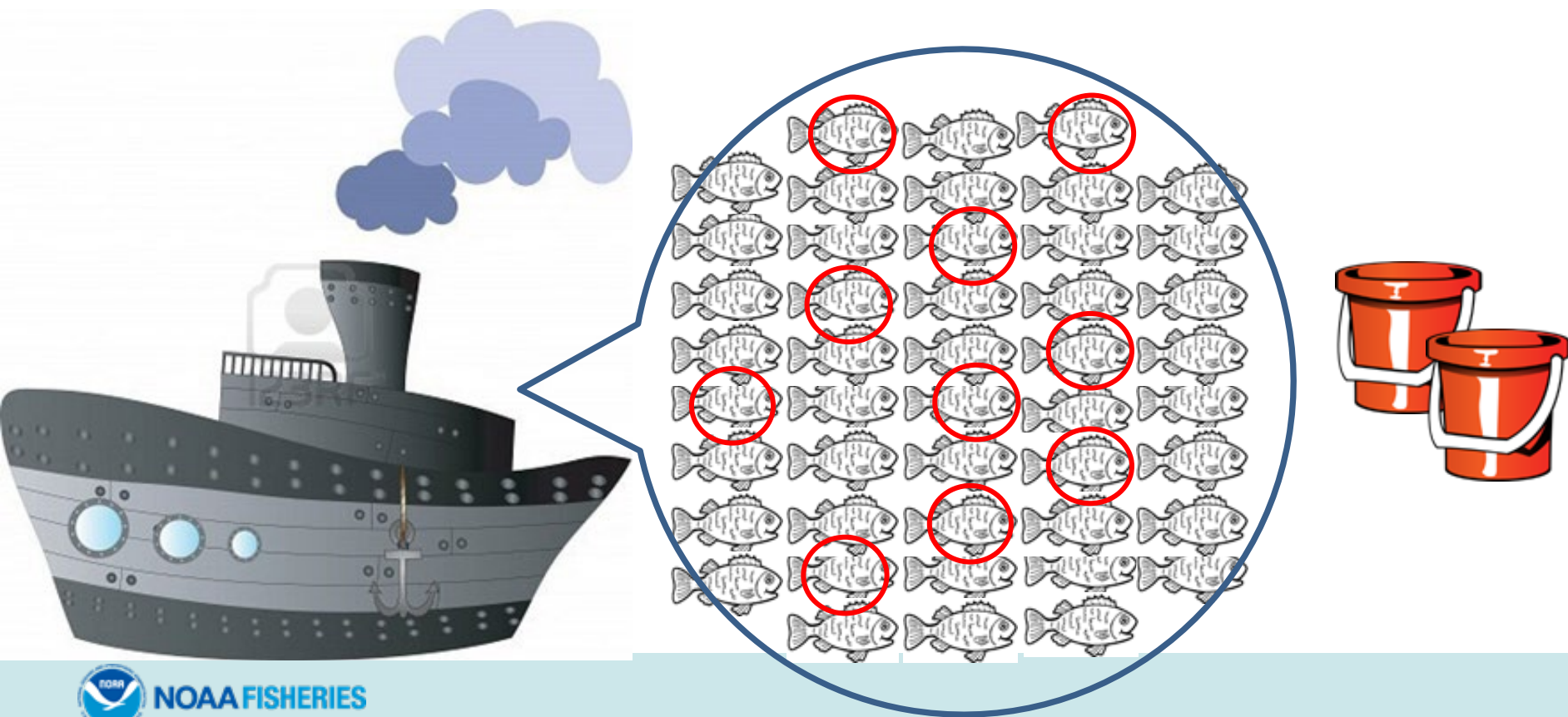
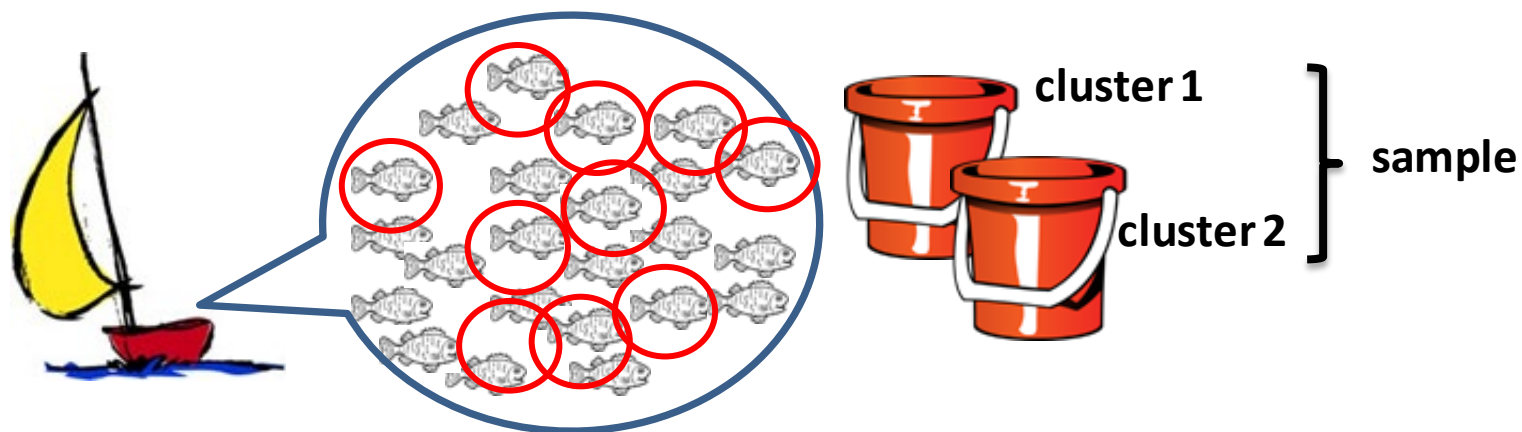


# Expansion of PacFIN BDS data

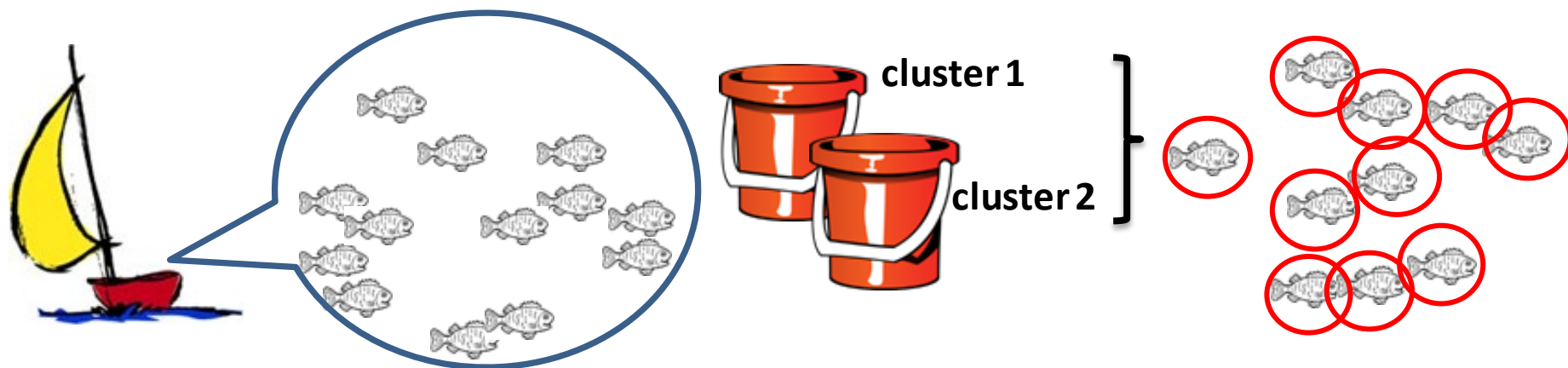




# Single species market category



## Single species market category

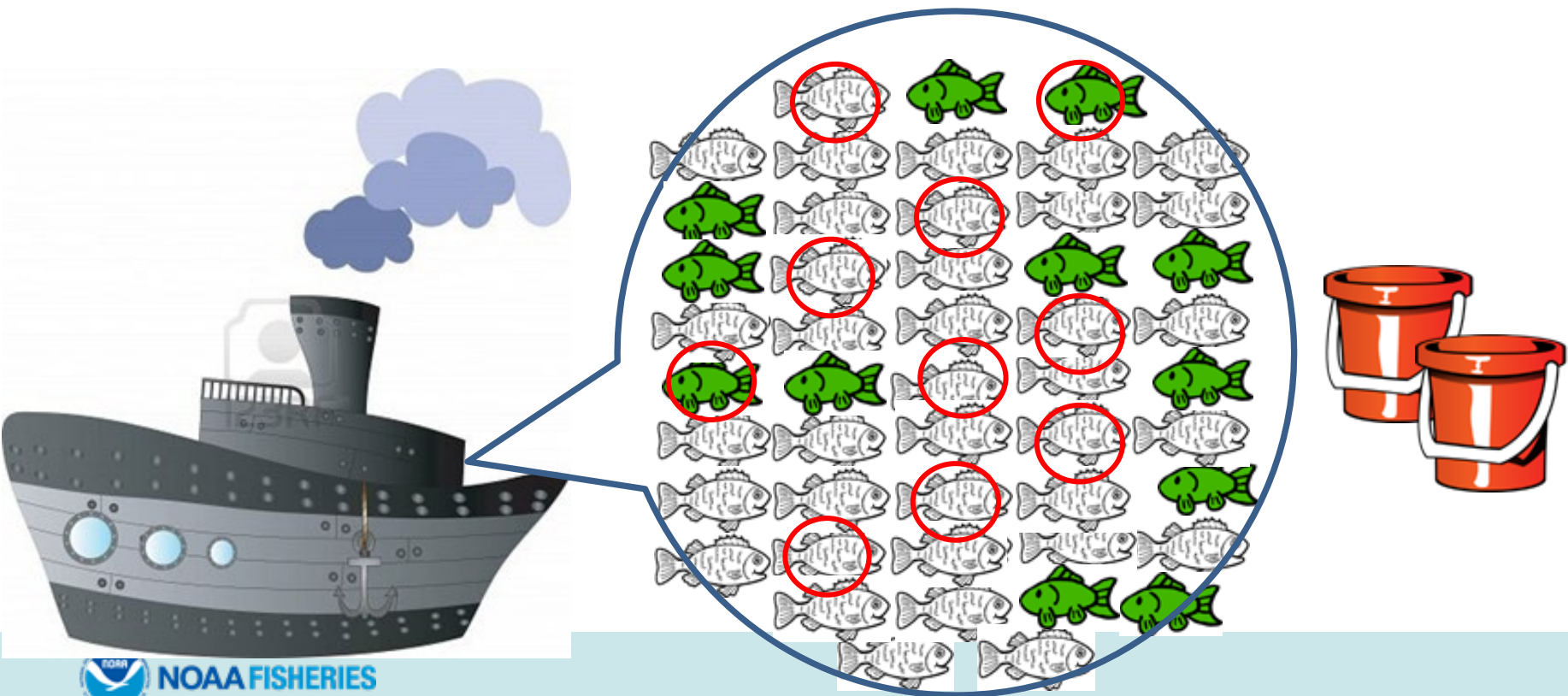
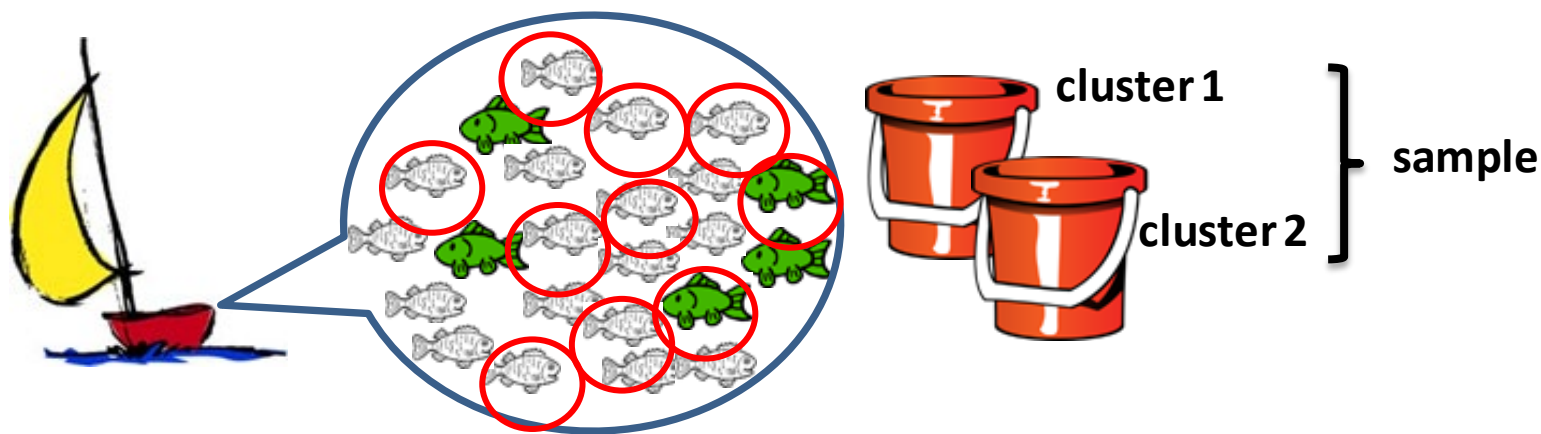


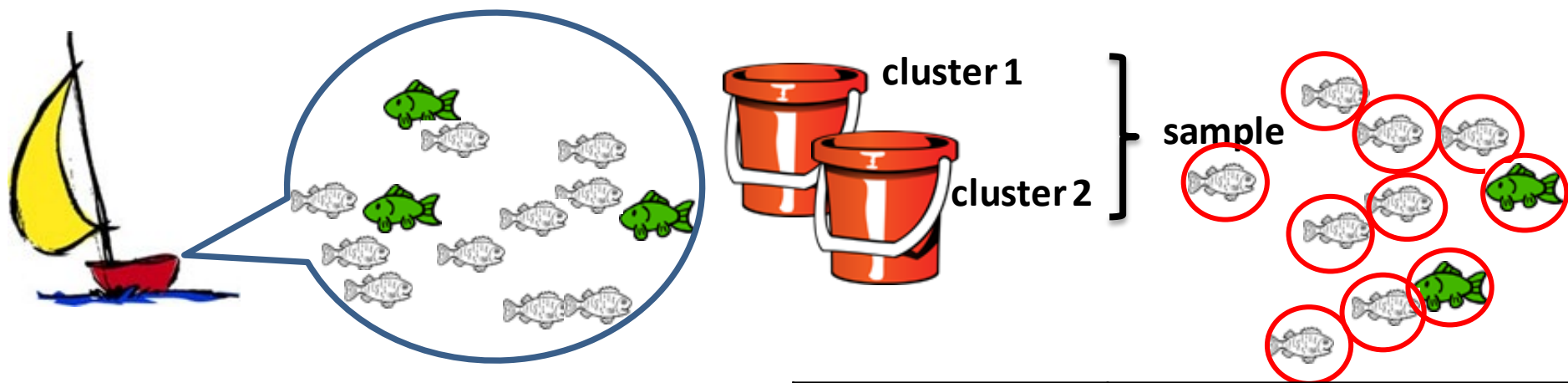
**Expansion factor 1**

$$= \frac{\text{species(i) landed weight}}{\text{species(i) sampled weight}}$$

Fields in BDS file	
<b>total_wgt</b>	Total landed weight the market category
<b>exp_weight</b>	Use this when available instead of total_wgt
<b>species_wgt</b>	all fish of the same species in one cluster

Multi species market category





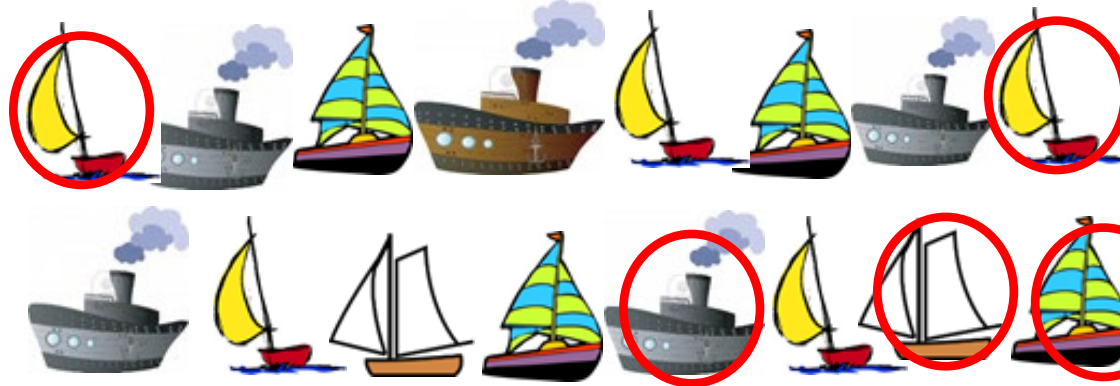
$$\% \text{ species}(i) \text{ in a sample} = \frac{\sum \text{species\_wgt}}{\text{all\_cluster\_sum}}$$

$$\begin{aligned} \text{species}(i) \text{ landed weight} \\ = \text{total\_wgt} \cdot \% \text{ species in a sample} \end{aligned}$$

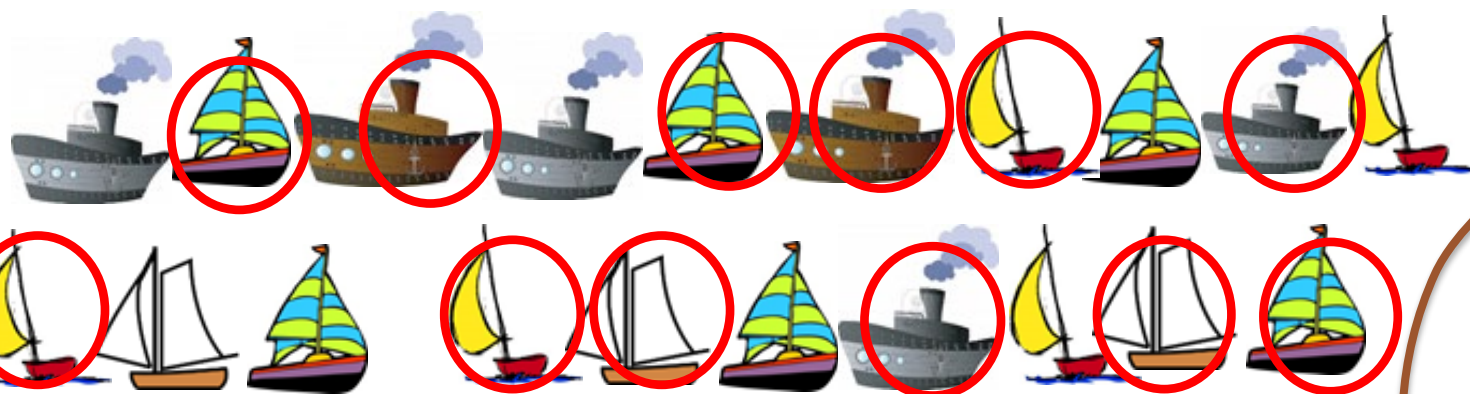
$$\begin{aligned} \text{Expansion factor 1} \\ = \frac{\text{species}(i) \text{ landed weight}}{\text{species}(i) \text{ sampled weight}} \end{aligned}$$

Fields in BDS file	
<b>total_wgt</b>	Total landed weight the market category
<b>exp_weight</b>	Use this when available instead of total_wgt
<b>species_wgt</b>	all fish of species (i) in one cluster
<b>all_cluster_sum</b>	weight of all species of the same market category in a sample

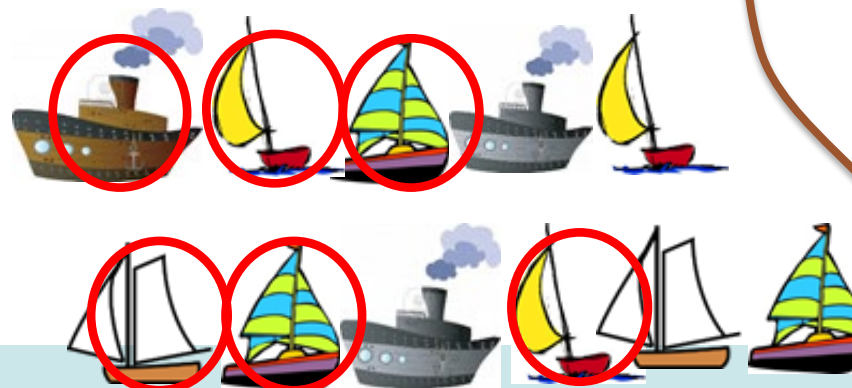




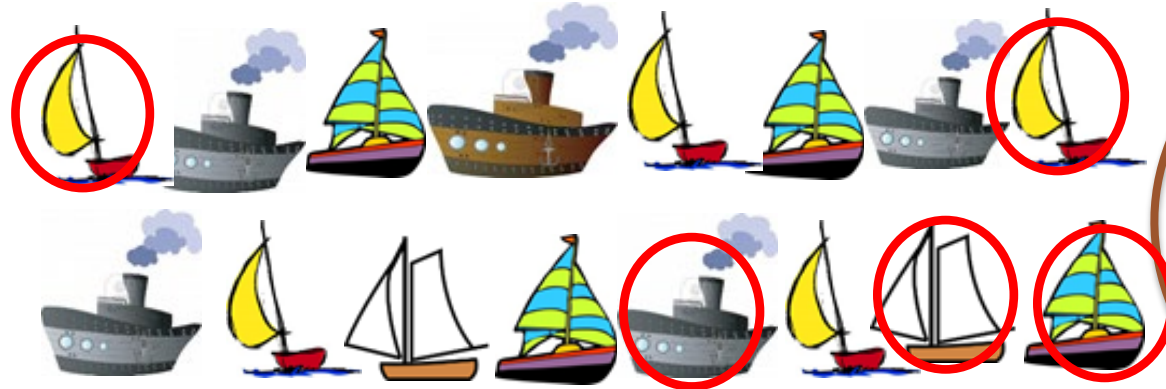
Washington



Oregon



California

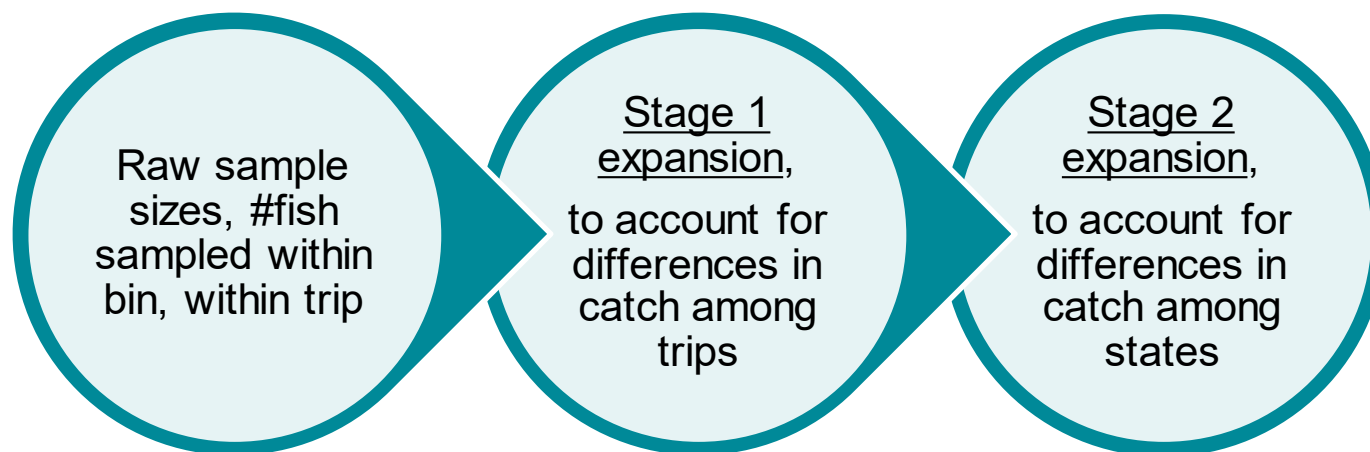


Washington

$$\text{Expansion factor}_2 = \frac{\text{Landed catch in each state}}{\text{Sampled catch in each state}}$$

Calculated for  
each state and  
each year

# Putting everything together:



$$N_{b,y} = \sum_{s=1}^{s=k} \sum_{t=1}^{t=n} L_{b,t} \cdot \left( \frac{LC_t}{SC_t} \right) \cdot \left( \frac{LC_{s,y}}{SC_{s,y}} \right) \Bigg|_{\substack{b \in [1,2,\dots,26] \\ y \in [1,2,\dots,n]}}$$

Summed within trip and state

Expanded #fish

Raw number of fish sampled

Expansion factor 1

Expansion factor 2

By bin, and year

# What pacfintools does:

- Filters the raw data stored in PacFIN (removes unusable records, samples from areas not included in the assessment, etc.)
- Combines information from catch file (a separate, formatted file) and BDS file.
- Weight length samples by the amount of catch within a trip and within a state.
- Formats compositions to enter directly to ss3 data file.
- 
- Calculates year-specific input sample sizes based on #trip and #fish.



# Switch to pacfintools page on GitHub

<https://github.com/pfmc-assessments/pacfintools>

# At-sea hake fishery data

## Start of the fishery

- Large-scale harvesting of Pacific hake in the United States began in 1966
- Factory trawlers from the Soviet Union and other countries began targeting this stock.

## Joint-Venture

- 200-mile U.S. Exclusive Economic Zone was declared in 1977
- a Joint-Venture fishery was initiated between U.S. and Soviet factory trawlers acting as mother-ships (larger, slower ships for fish processing and storage while at sea).

## U.S. Fleet

- By 1989 the U.S. fleet capacity had grown to a level sufficient to harvest the entire quota.
- No further foreign fishing was allowed.

# Processing at-sea hake fishery data

- The fishery is currently 100% observed by the at-sea hake observer program (A-SHOP)
- ASHOP is part of WCGOP.
- Data is to be requested from Vanessa Tuttle ([vanessa.tuttle@noaa.gov](mailto:vanessa.tuttle@noaa.gov))
- Two files will be provided (catch and bio)
- The data processing is similar to other fishery data, but samples to be expanded to haul level (level 1 expansion)
- No generalized code on GitHub yet, but there is a code to help started on length data expansion)