NOAA FISHERIES

NWFSC

Fishery-independent data

FISH 576, Week 2

Topics for this week

- Brief background of surveys used in last full assessments of widow and yelloweye rockfish
  - Bottom trawl surveys (Vlada)
  - Long-line and juvenile midwater trawl surveys (Ian)
- Constructing indices of abundance (Kiva)
- Processing survey length/age compositions data (Vlada)
- Splitting into two teams to work on two species

Fishery-independent surveys used

Photo Credit: Diana Watters, Southwest Fisheries Science Center and Alaska Department of Fish and Game

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Fishery-independent surveys used

West Coast Groundfish Bottom Trawl Survey (WCGBTS)
2003 – Present

AFSC/NWFSC Triennial Bottom Trawl Survey (Triennial)
1977 – 2004

IPHC longline survey for Pacific halibut
1997 – 2024

Rockfish Recruitment and Ecosystem Survey (juvenile survey)
1983 – Present

Photo Credit: Diana Watters, Southwest Fisheries Science Center and Alaska Department of Fish and Game

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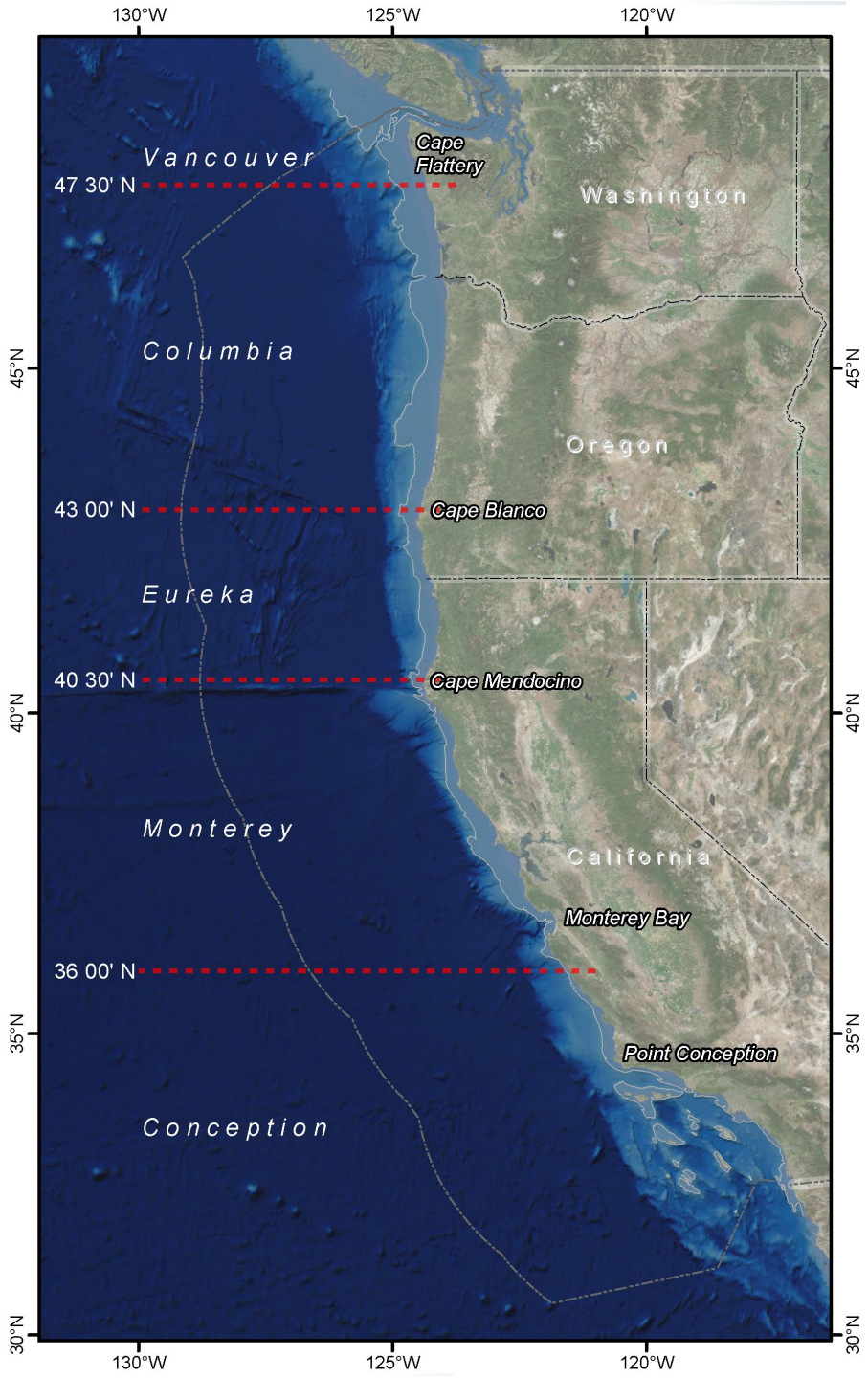
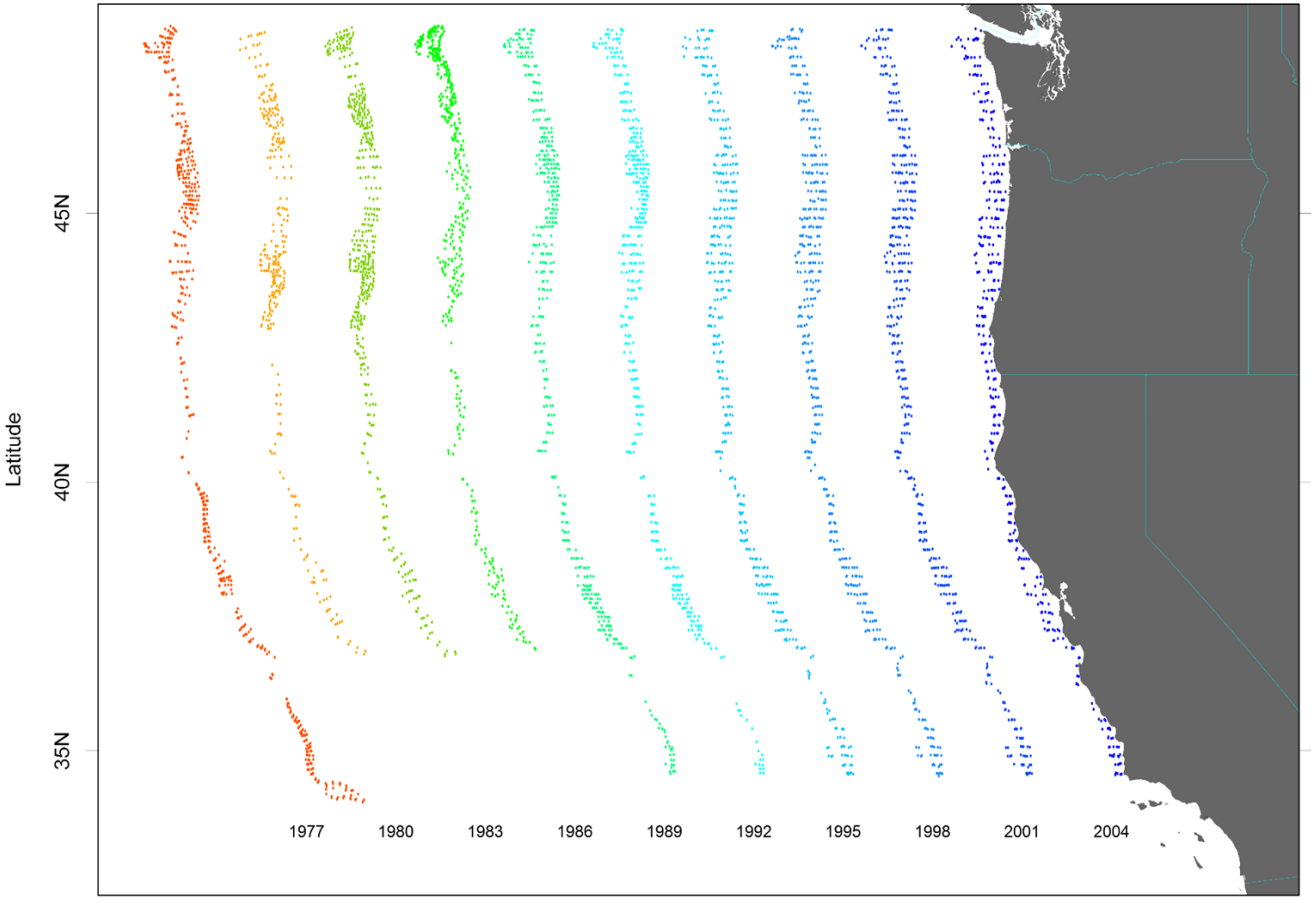
Bottom trawl surveys' spatial coverage

Survey	Year	Latitudes	Depths (fm)	Depth (m)
WCGBTS	2003-2019	32° 34'- 48° 27'	30-700	55-1,280
	2021-2024	32° 34'- 48° 27'	30-700	55-1,280
Triennial	1977	34° 00'- Canadian border	50-250	91-457
	1980	36° 48'- 49° 15'	30-200	55-366
	1983	36° 48'- 49° 15'	30-200	55-366
	1986	36° 48'- Border	30-200	55-366
	1989	34° 30'- 49° 40'	30-200	55-366
	1992	34° 30'- 49° 40'	30-200	55-366
	1995	34° 30'- 49° 40'	30-275	55-500
	1998	34° 30'- 49° 40'	30-275	55-500
	2001	34° 30'- 49° 40'	30-275	55-500
	2004	34° 30'- Canadian border	30-275	55-500

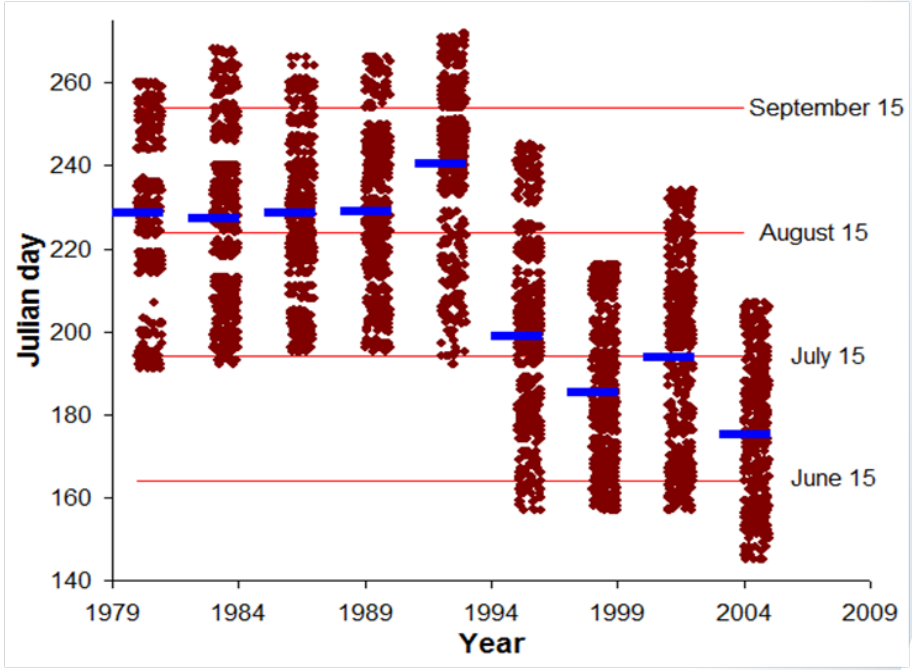


AFSC Triennial Survey

Latitudinal coverage



Survey timing



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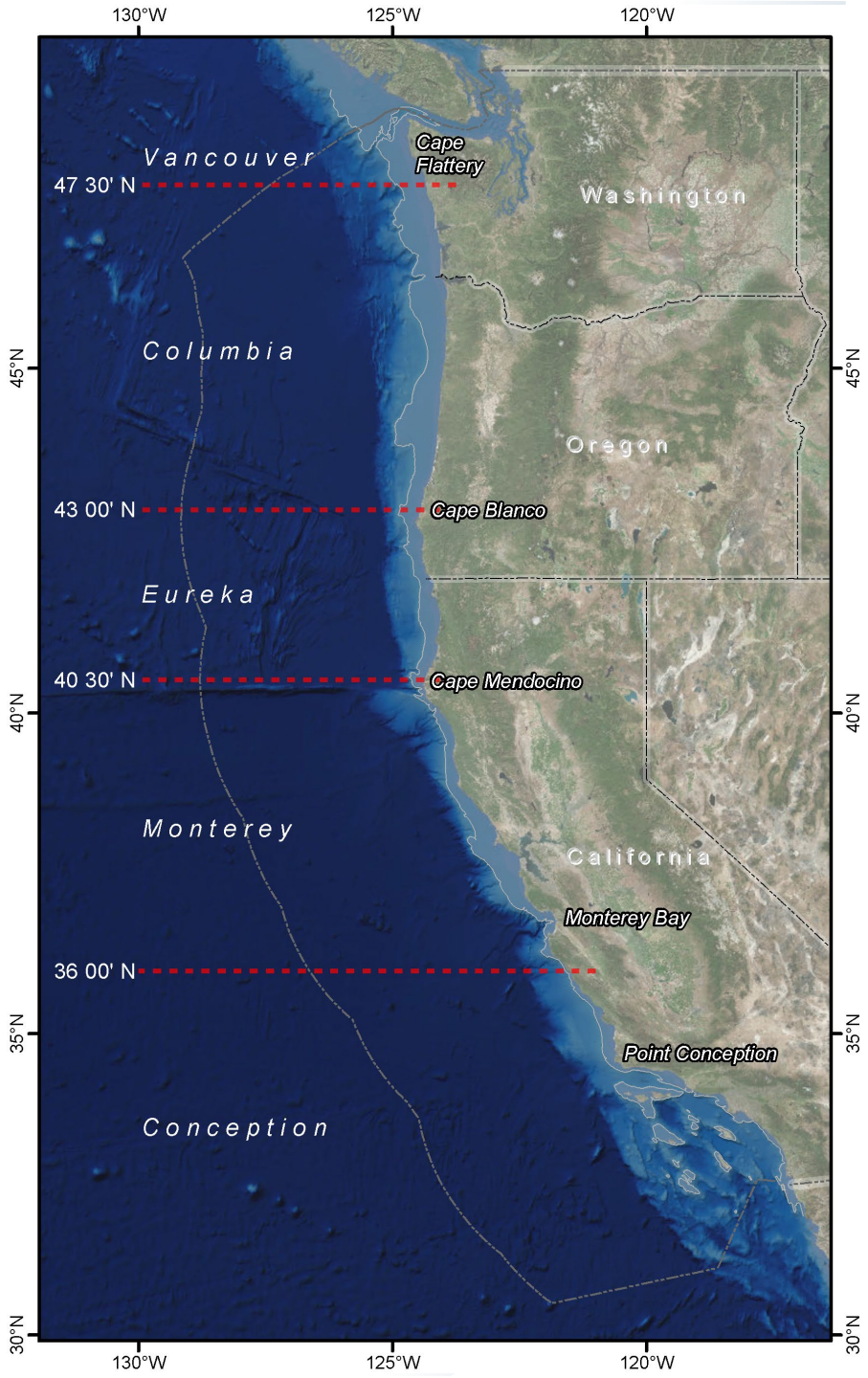
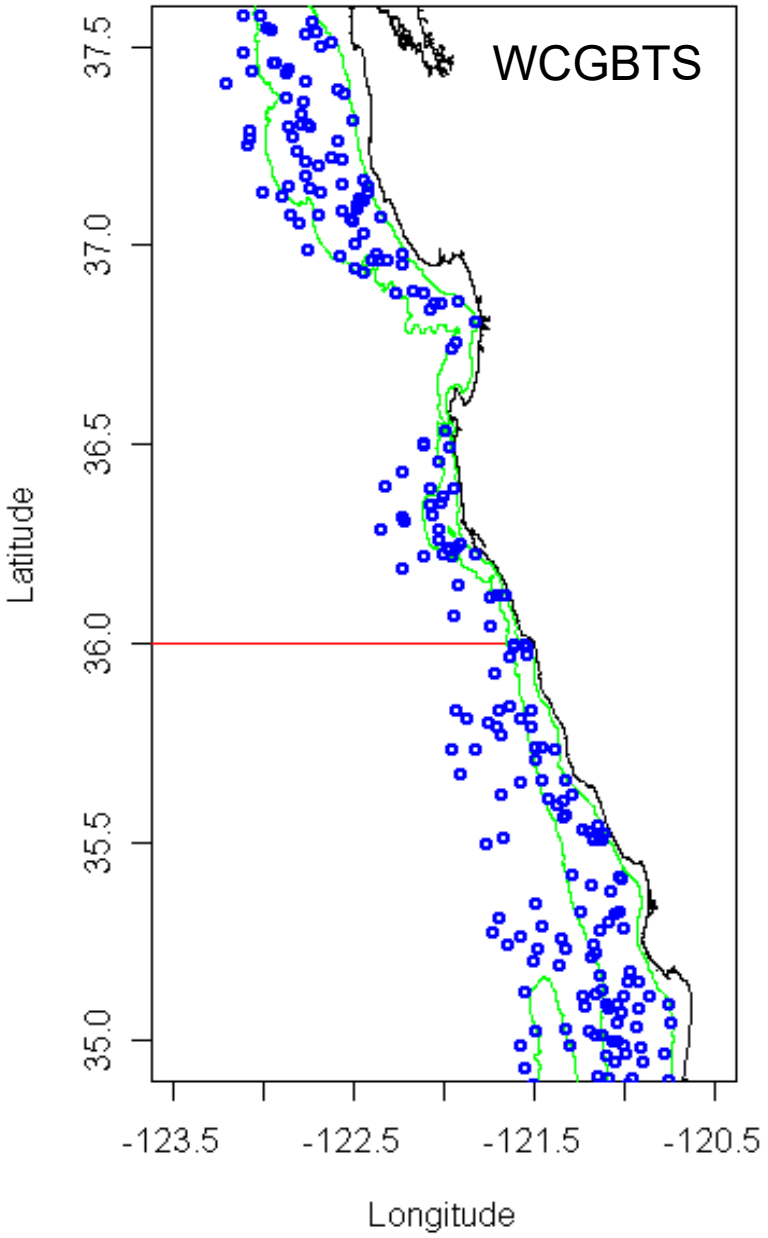
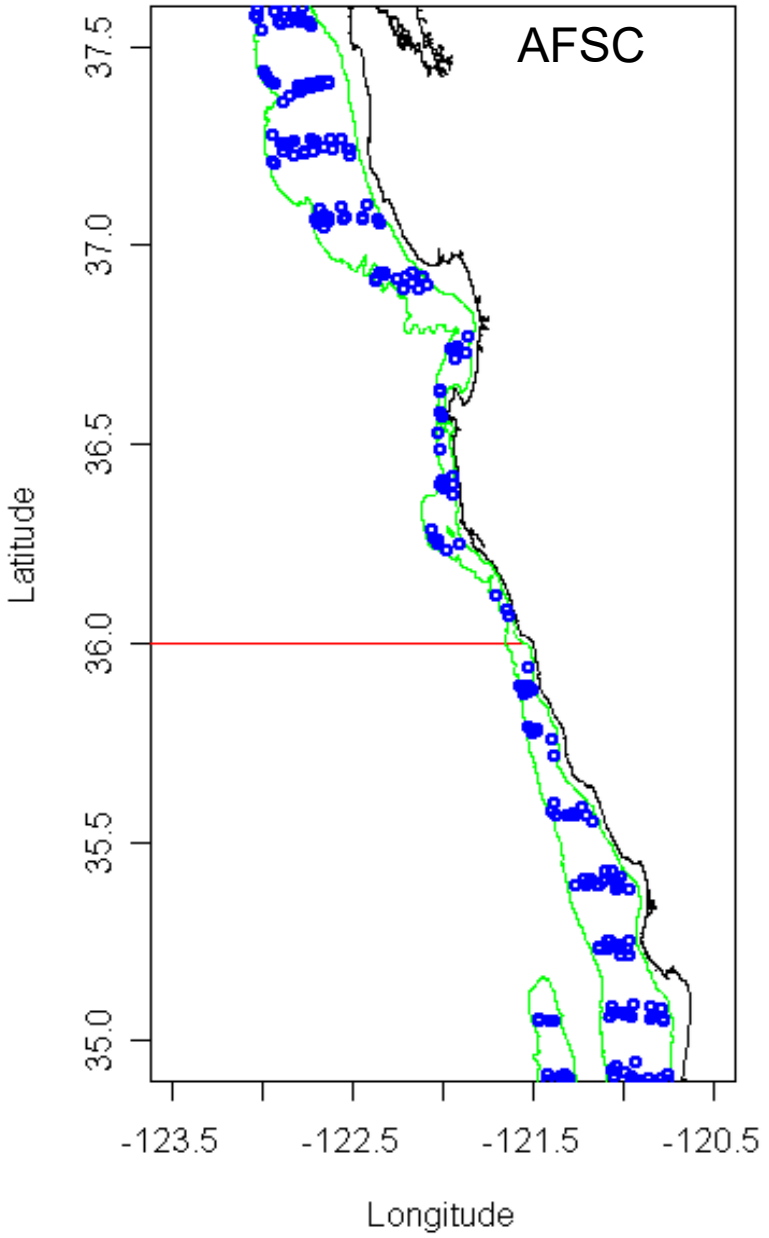


- Based on a random-grid design,
- Four vessels per year are assigned an approximately equal number of randomly selected grid cells.





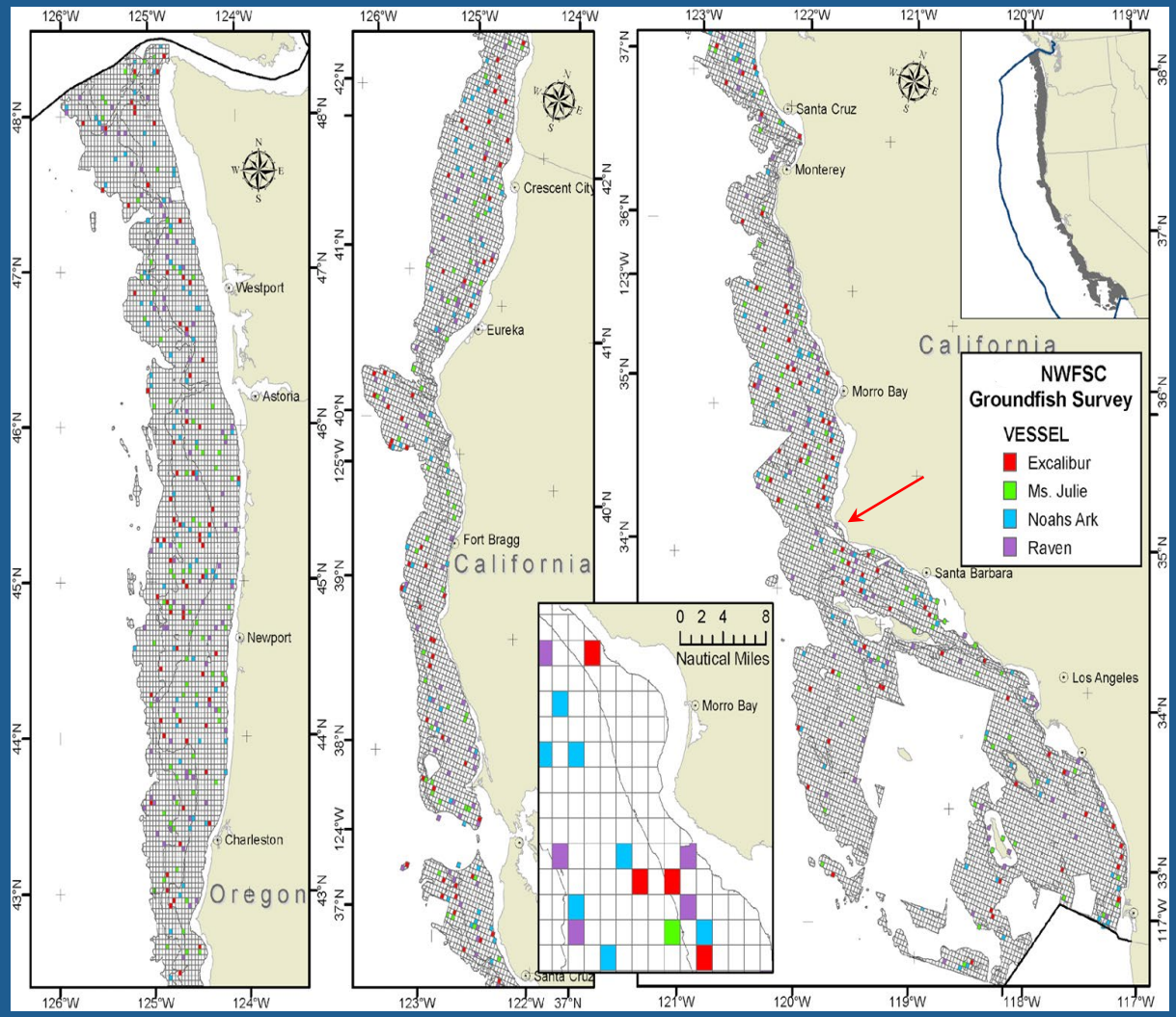
- The basic design was a series of equally spaced transects,
- Tows were conducted along these transacts in specific depth ranges.

WCGBT Survey Description

- Each year NWFSC charters 4 West Coast fishing vessels (~20 to 30 m)
- Vessels complete 2 passes down the entire coast (N to S)
- 2 vessels per pass (May – Jul; Aug – Oct.)
- 3 scientists; 4 crew
- Fish during daylight hours
- Average 4 – 5 hauls per day

Survey Design: Stratified-Random Sampling

- Survey area sub-divided into ~13,000 equally sized cells
- Each of 4 charter vessels randomly assigned a set of 188 cells.
- 2 geographic strata: N and S of Pt. Conception
- 3 depth strata (55-183 m, 183-549 m; 550-1,280 m)
- Percentage of sampling stations is allocated to each strata, minimum 30 tows/strata (with four vessels)



Excluded Areas:

- Cow cod area (985 cells)
- Protected areas: state (109 cells), federal (46 cells)
- Safety: shipping lanes, pipelines, cables, chemical waste (238 cells)
- Military test range (43 cells)
- Radioactive dumpsites (47 cells)
- Mooring /subsurface instruments (16 cells)

initial number of cells 12,996
current number of cells 11,512
89% of possible cells included

Challenge: Non-trawlable habitat

Trawlable:

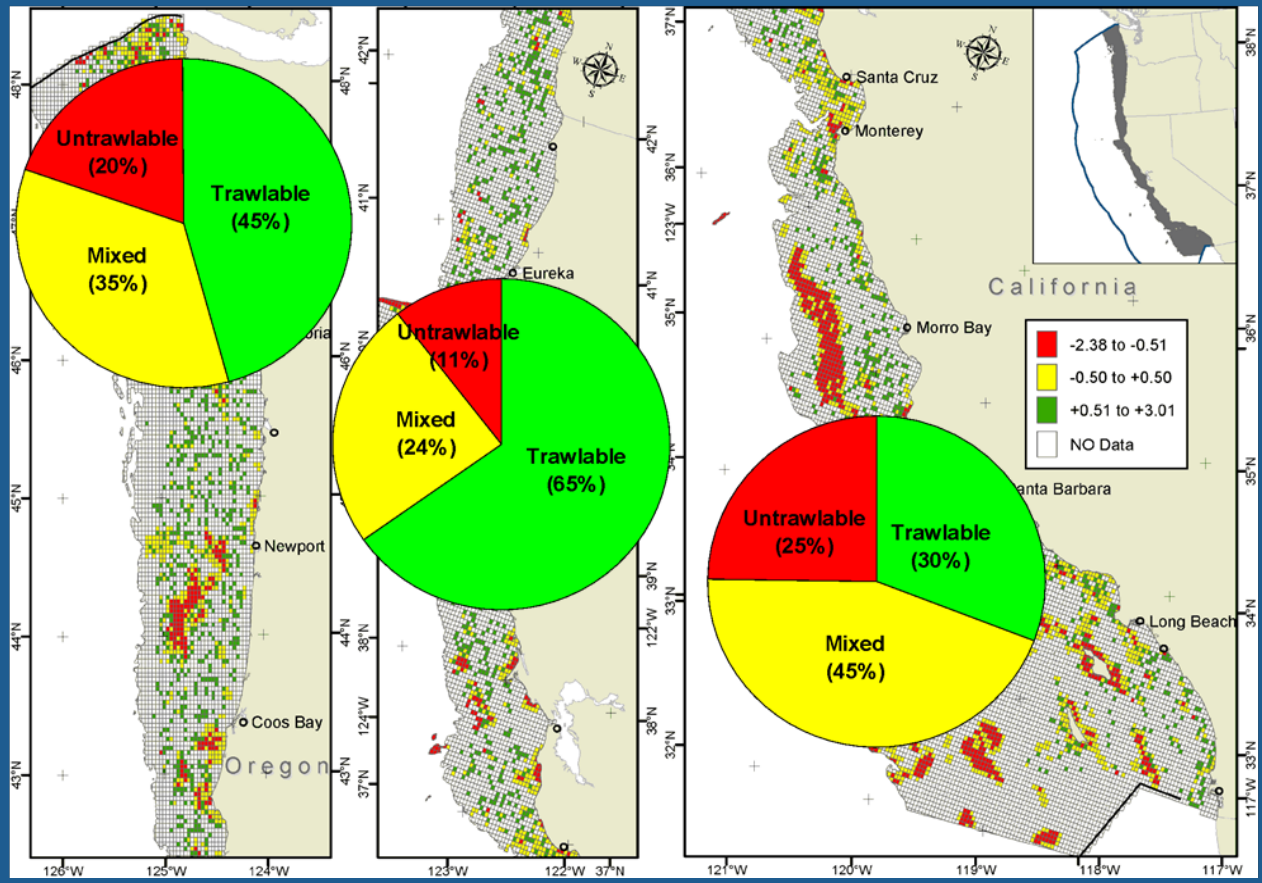
- At least one 15 min tow completed with no hangs
- At least two tows completed with only minor hangs

Mixed:

- One tow completed with minor hangs
- Mixed substrate mapped

Non-trawlable:

- Cell searched (60 min) with no sets made
- At least two tows 'hung' on bottom
- 100% hard substrate mapped



2003 – 2007: 4377 stations

Data Collection

Haul Level Data:

- Sort by species
- All catch weighed by species
- Subsample FMP species for biological sampling
- Count non-FMP species

Individual level data:

- Sex
- Lengths
- Individual weights
- Extract otoliths/vertebrae/spines
- Remove stomachs
- DNA samples (fin clips)
- Ovary samples for maturity
- Tissue samples – diet studies
- Samples for special projects

Sampling Protocols: length, weight, age per haul

Species	Lengths per Tow	Age Structures per Tow
arrowtooth flounder	20	5
aurora rockfish	100	15
Baird`s Tanner Crab	50	-
bank rockfish	100	25
big skate	100	-
black and yellow rockfish	100	15
black rockfish	100	15
blackgill rockfish	100	50
blackspotted rockfish	100	15
blue rockfish	100	15
bocaccio	100	50
bronzespotted rockfish	100	15
brown rockfish	100	15
butter sole	100	25
cabezon	100	15
calico rockfish	100	15
California scorpionfish	100	15
California skate	100	-
canary rockfish	100	50
chameleon rockfish	100	15
chilipepper	25	15
China rockfish	100	15

Similar protocols established for an additional 68+ species – not shown

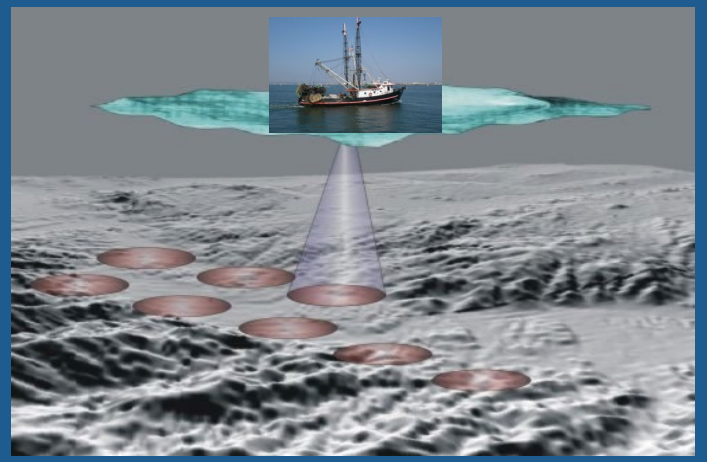
Data Collection: continued

During tow via sensors on trawl:

- Depth
- Temperature
- Salinity
- Dissolved oxygen
- Chlorophyll fluorescence
- Pressure
- Irradiance - at depth
- Turbidity
- BCS: seabed slope, roughness

Continuous via sensors on vessel:

- Wind speed
- Irradiance - surface
- EK 60 – bottom type



How to access survey data?

- All data collected by the NMFS are publicly available.
- It is stored in the NWFSC warehouse: https://www.webapps.nwfsc.noaa.gov/data/map
- We will go through an example of how to extract the data.