

Bottom Trawl Surveys to Characterize Demersal Marine Fish Communities in Puget Sound

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Puget Sound Groundfish

English Sole



Walleye Pollock



Spiny Dogfish



Spotted Ratfish



Questions of Interest

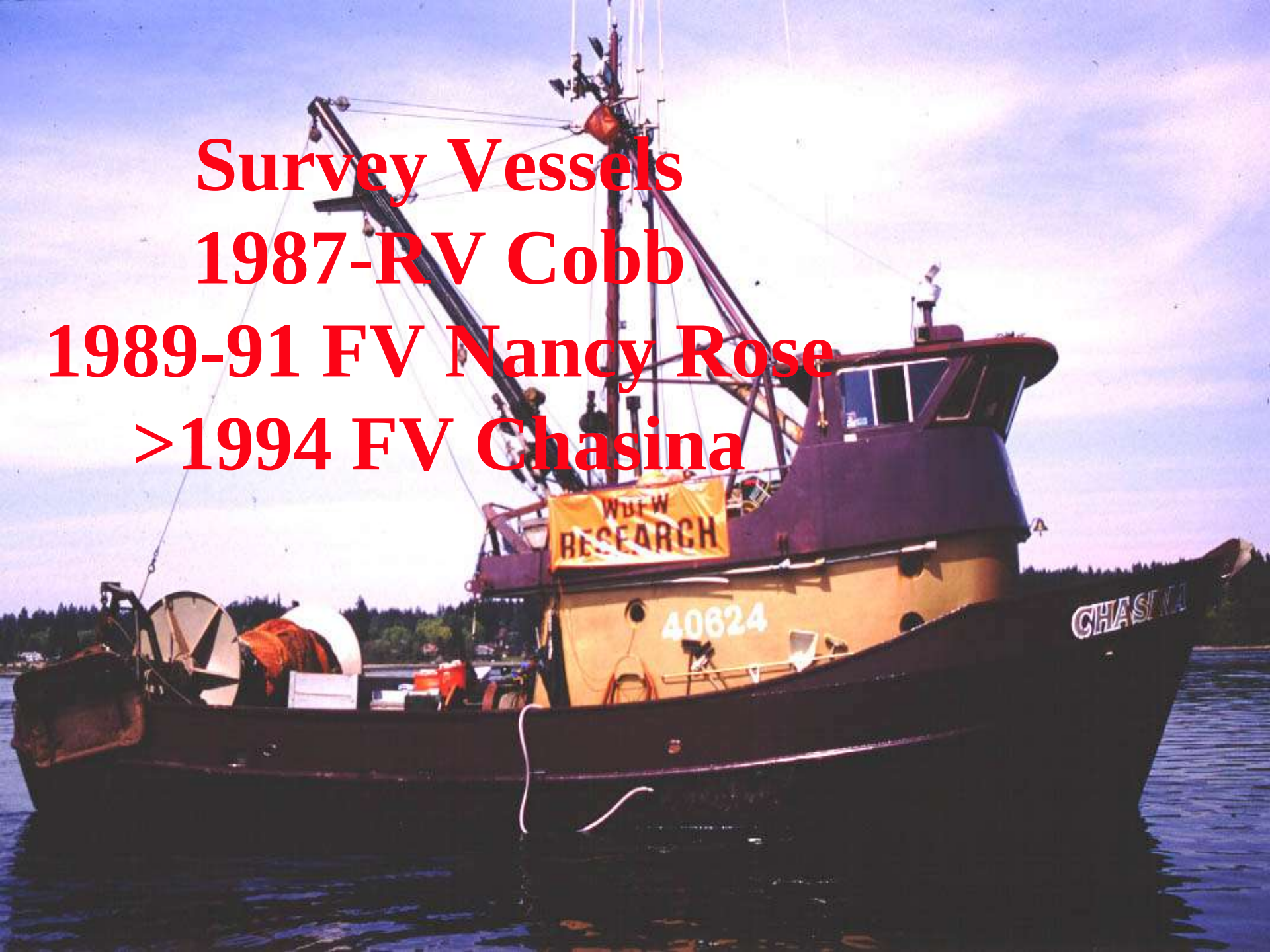
- Does fish abundance vary over time?
- Are fish communities predictable?
- Do they vary among basins?
- Do they vary by depth?
- What are the biological characteristics of key species



Survey Design
Some Results



Survey Vessels
1987-RV Cobb
1989-91 FV Nancy Rose
>1994 FV Chasina



Survey Vessels

1987-RV *Cobb*

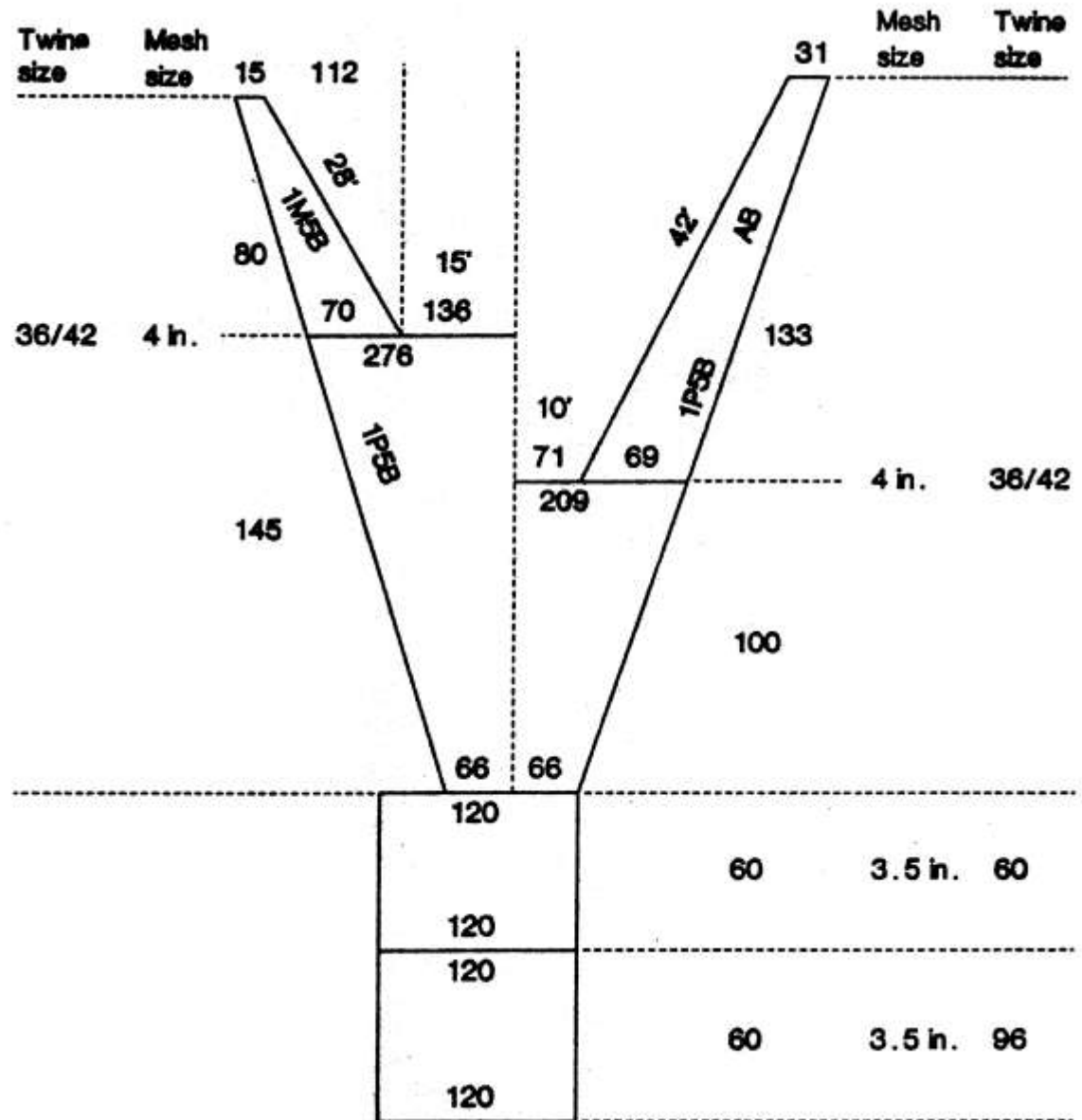
1989-91 FV *Nancy Rose*

>1994 FV *Chasina*

Net and Doors



1.25 cm liner



Survey Characteristics

- Irregular intervals
- Over 1,750 tows, up to 168 stations/year
- Assume all organisms in path are captured
- No mensuration: Warp/depth study
- Densities by the Area-Swept Method



Survey Design

- **Spring-time, except 1987**
- **Stratified by region and depth**
- **Winch locked**
- **10 min tows/2-3 knots or .4 nm for index**

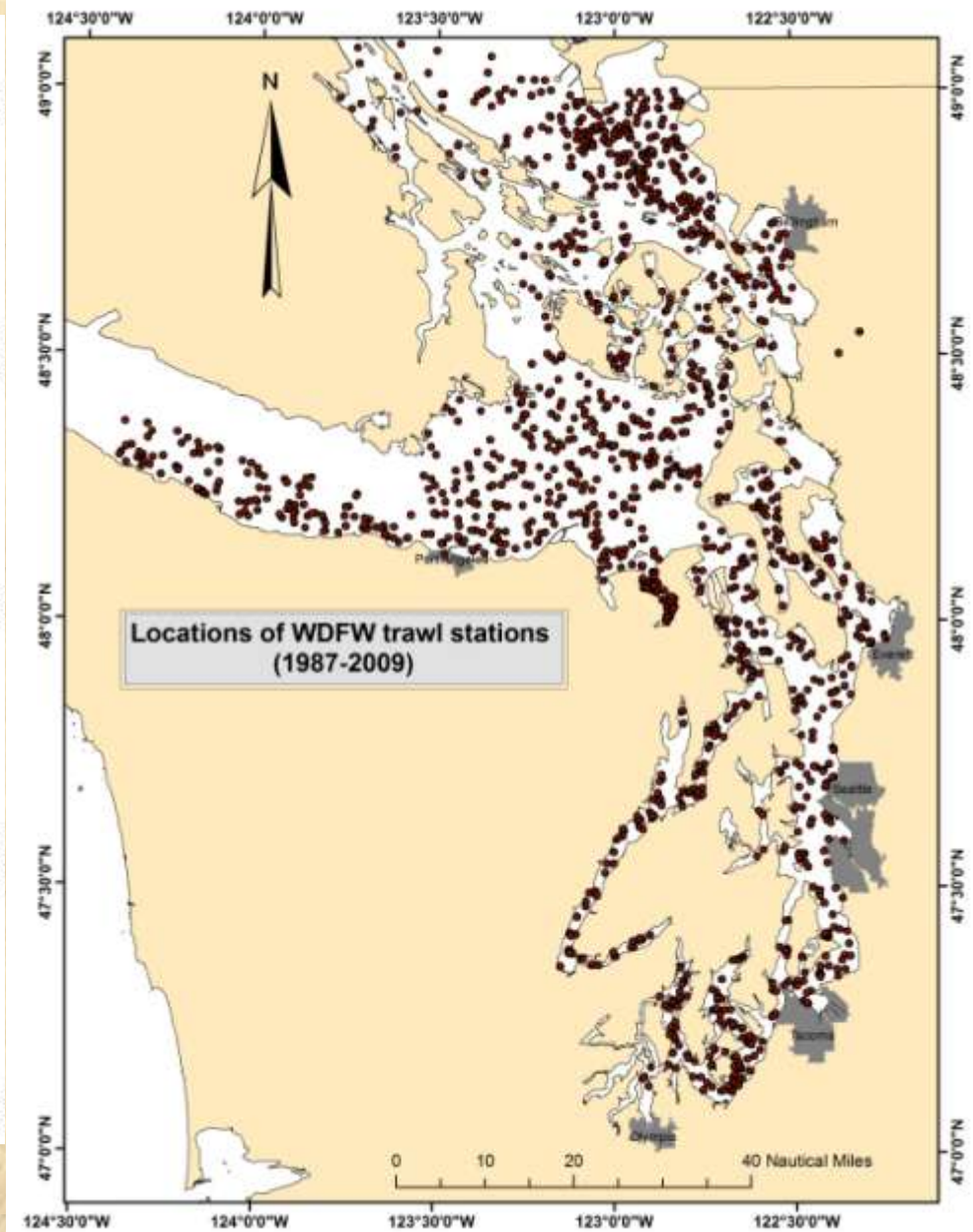
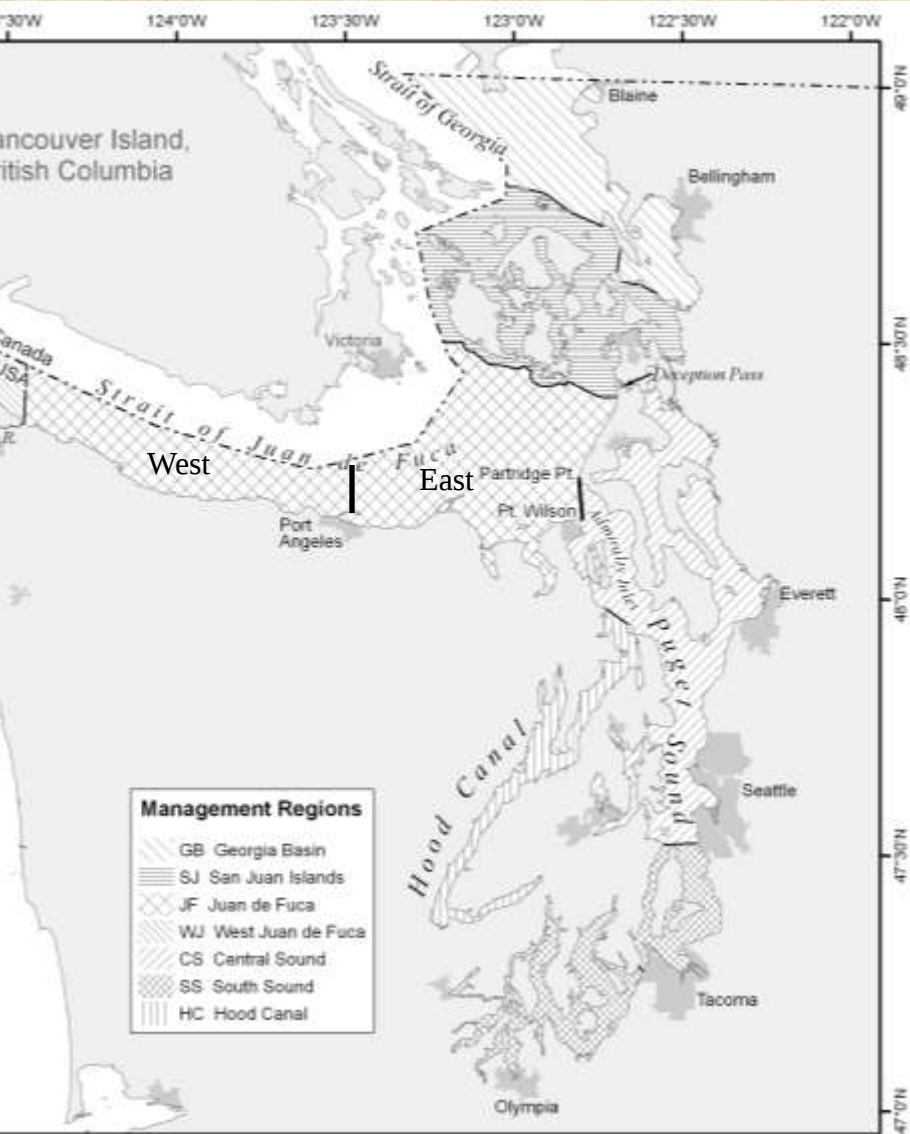
Design	Coverage	Stations	Years
Systematic	Puget Sound	71-93	1987, 1989, 1991
Systematic	Regional: 1-4	35-50/region	1994-2001
Random	Regional: 1-4	26-50/region	2002-2007
Index	Puget Sound	51 w/2 replicates	>2008 annual

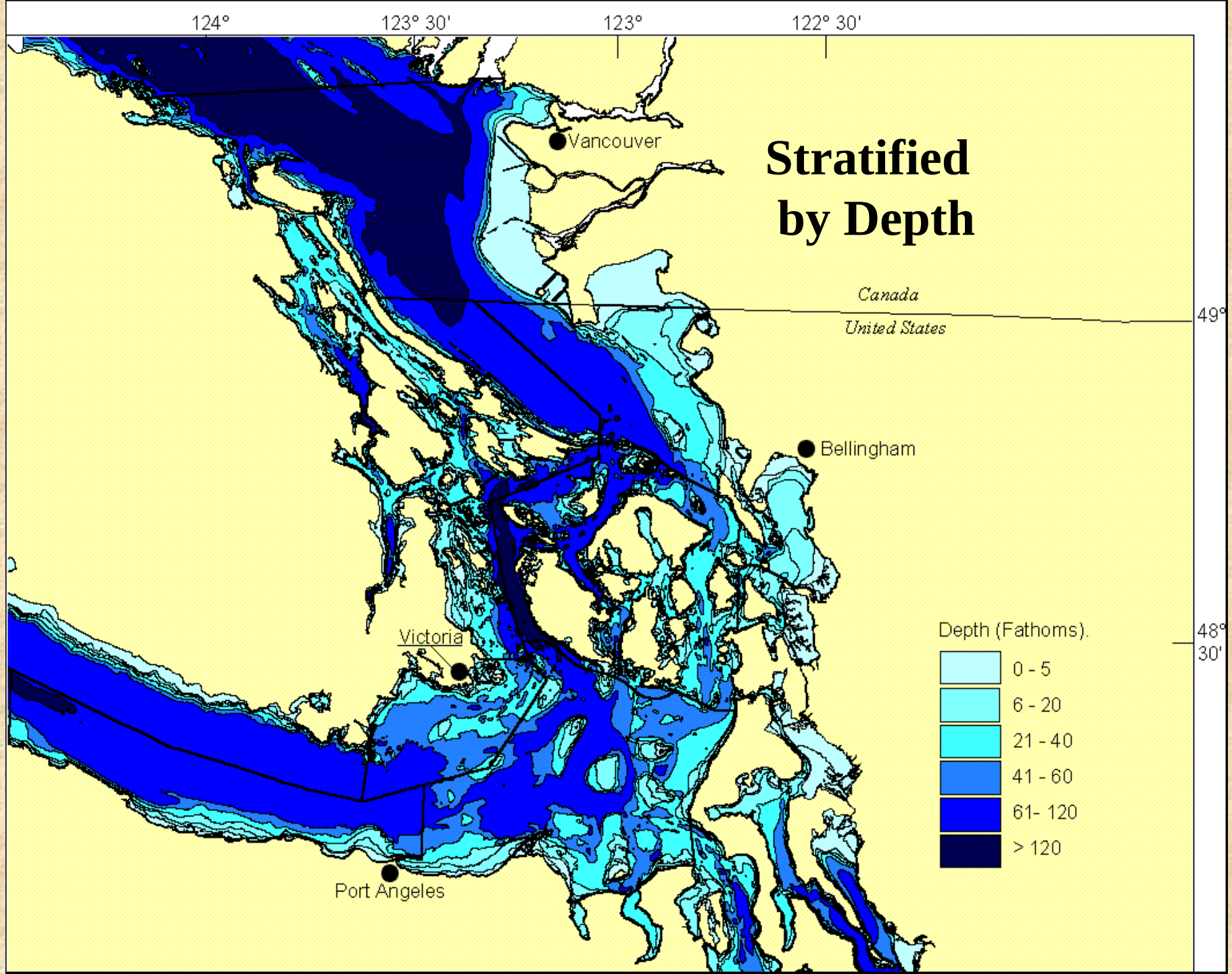
Catch Processing

- Identify all living taxa
- Count/weigh everything
 - Mechanical scale
- Biological samples
 - Length, age, genetics
- Drift vegetation & Marine debris
- CTD recently added
- Other samples of opportunity

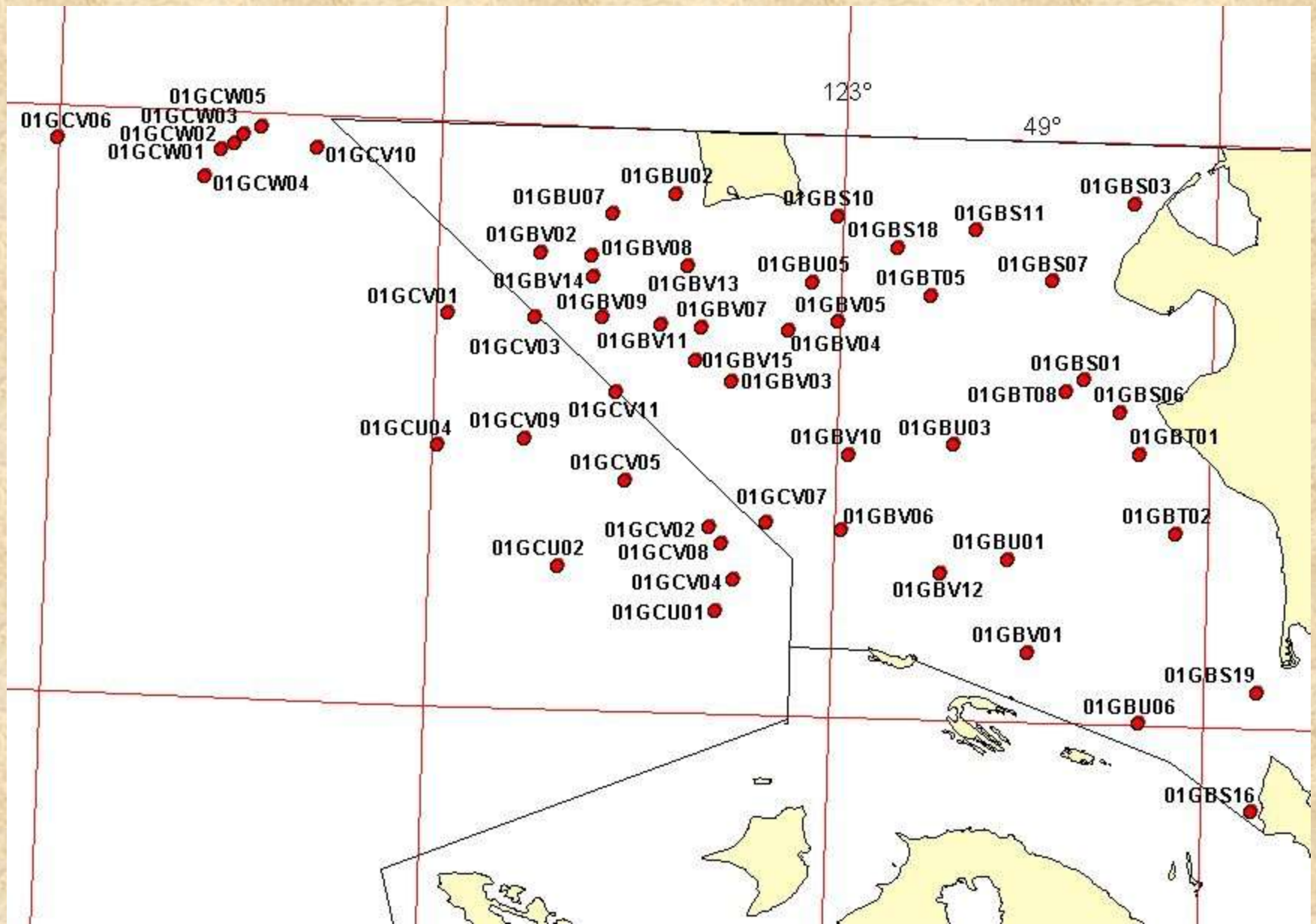


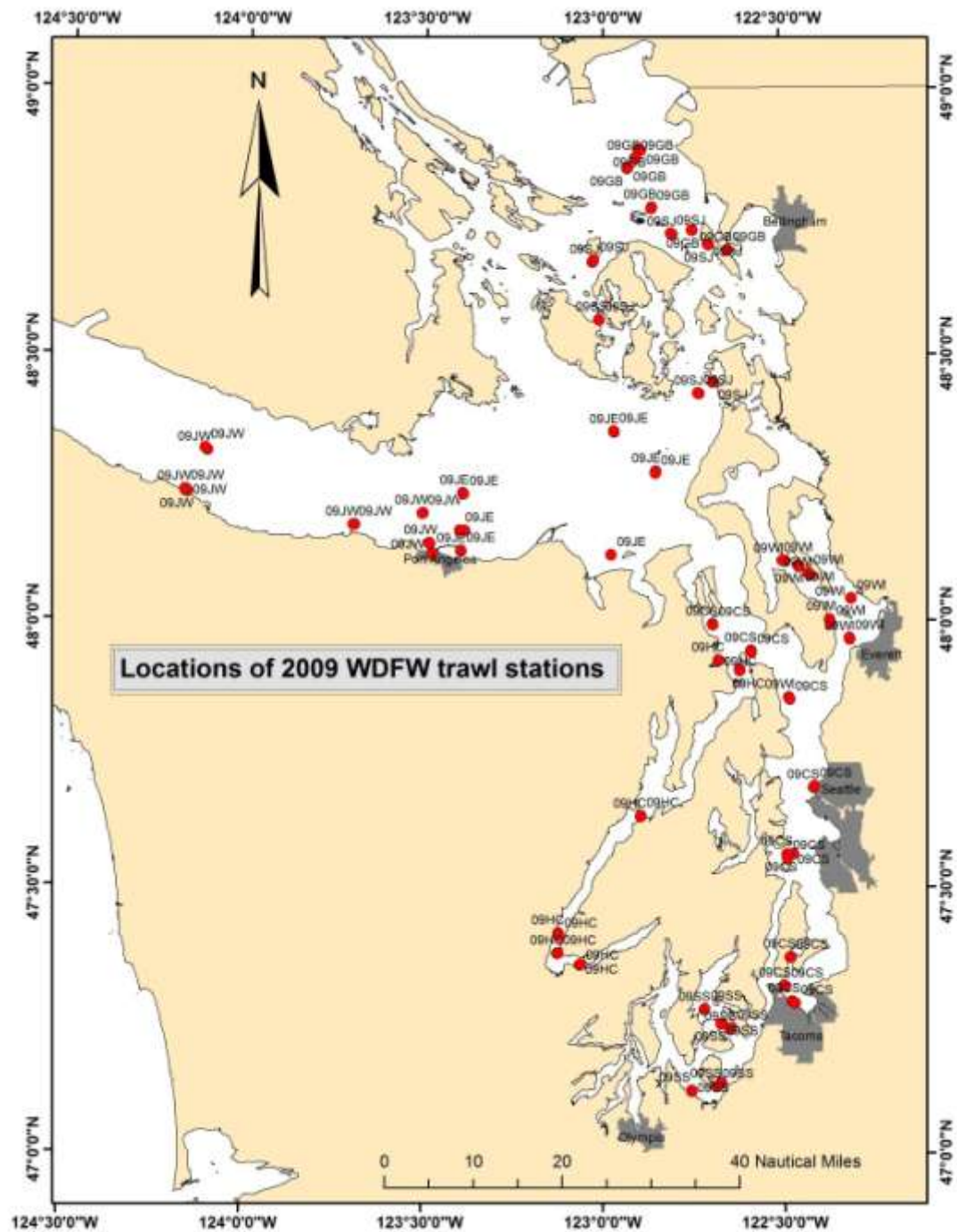






Depth Stratified – Random Region Intense

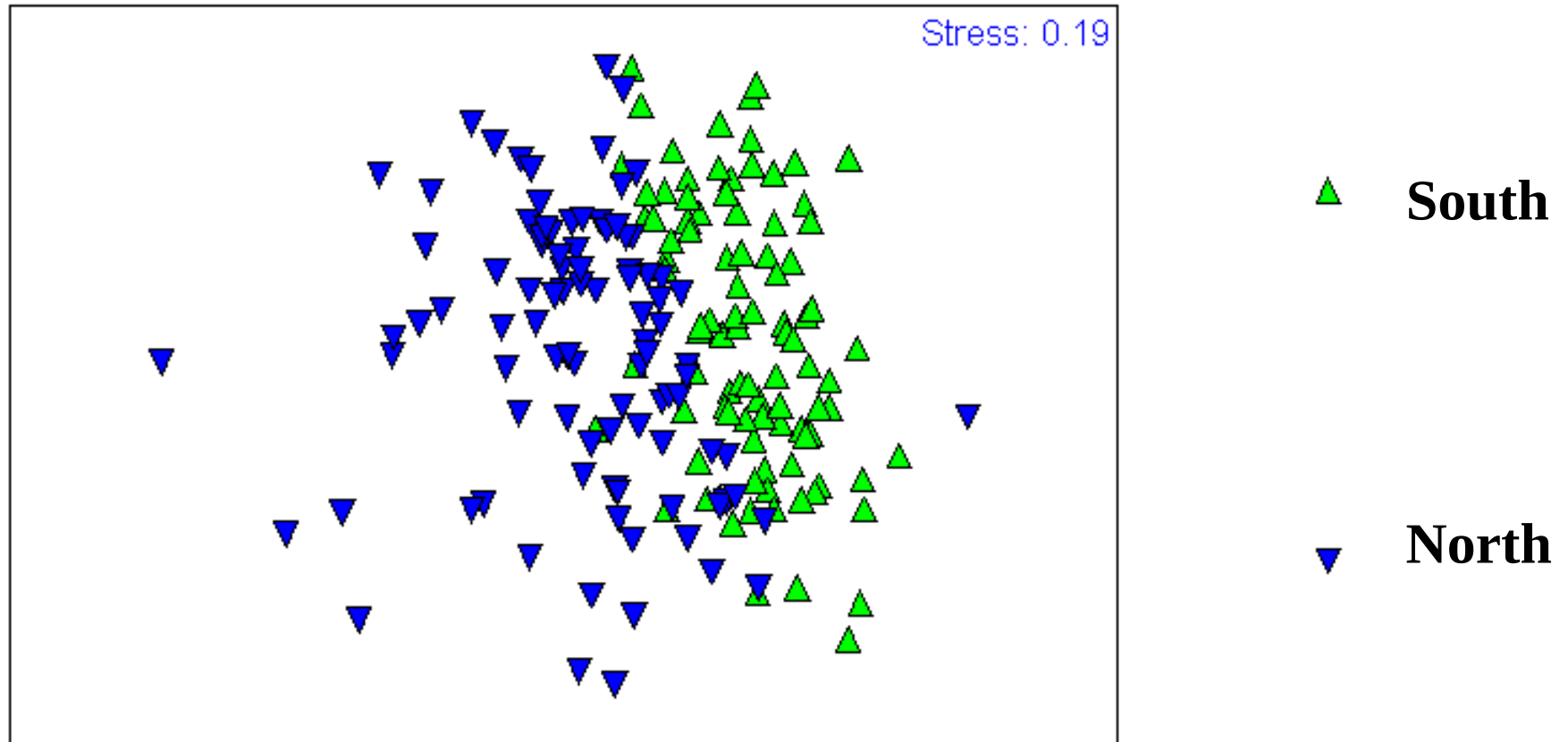




Top Species Similarities (Similarity Percentages)

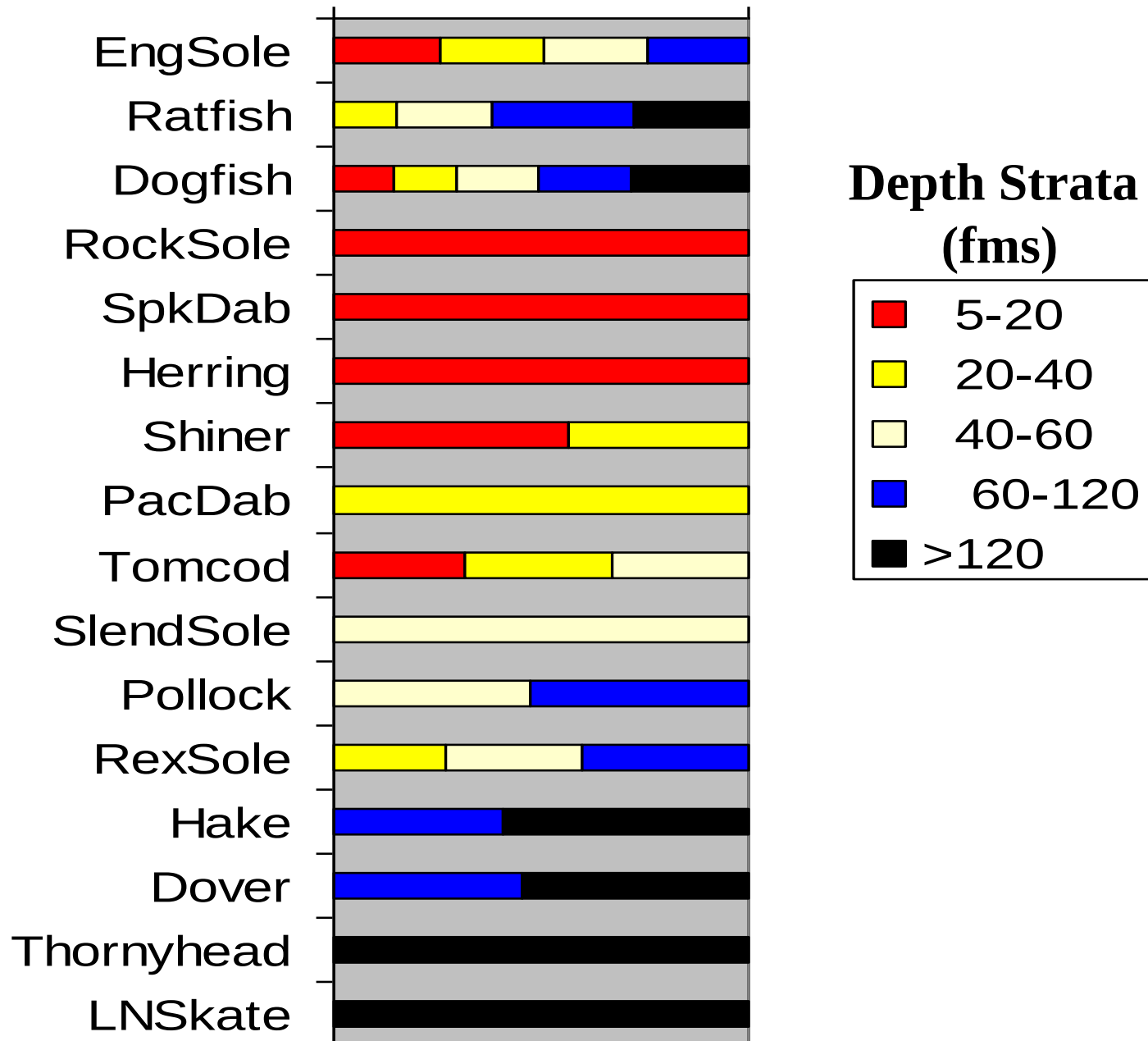
W Fuca	% N Sound	% S Sound	%
Ratfish	19.8 English Sole	8.9 English Sole	13.1
Pollock	7.6 Ratfish	8.3 Ratfish	11.2
English Sole	7 Dogfish	8 Slender Sole	7.4
Dogfish	6.6 Pollock	6.4 Midshpman	5.9
Rex Sole	5 Tomcod	6 Dogfish	5.7
Arrowtooth	4 Dover Sole	5.5 Tomcod	4.8
PacDab	3.8 Herring	4.8 Shiner Perch	4.6
Cod	3.2 Rex Sole	4.3 Hake	4.4

INDIVIDUAL DENSITY



ANOSIM $R=0.265$, 0.1% significance

Depth Affinities of Principal Species

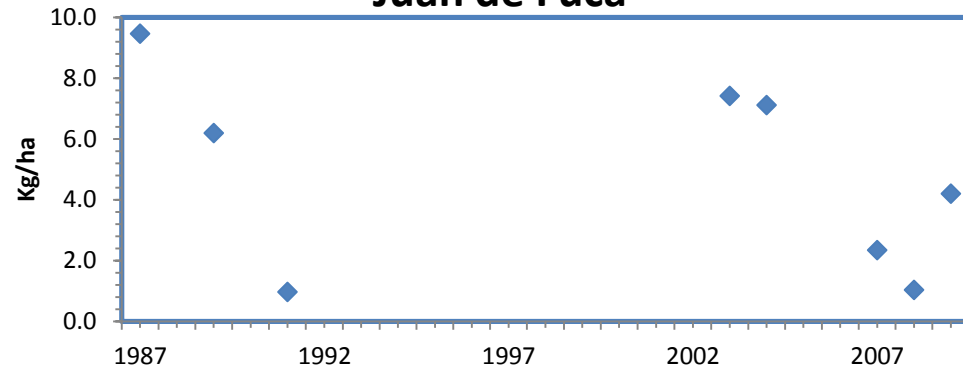




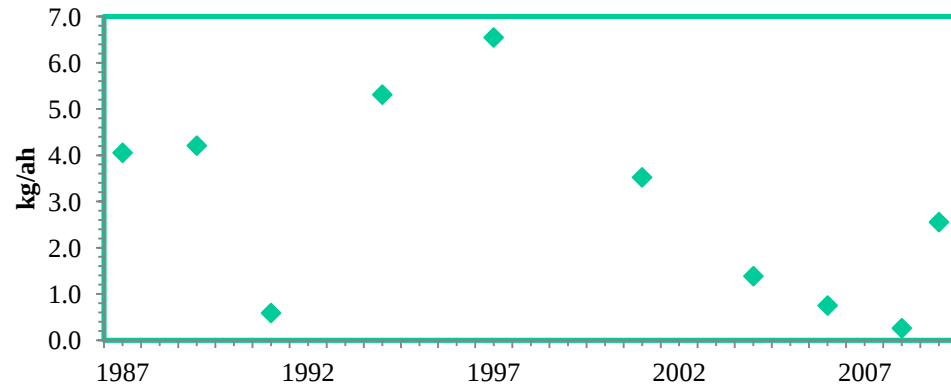
Pacific Cod

**Average
density
(kg/ha) in
intermediate
and deep
strata**

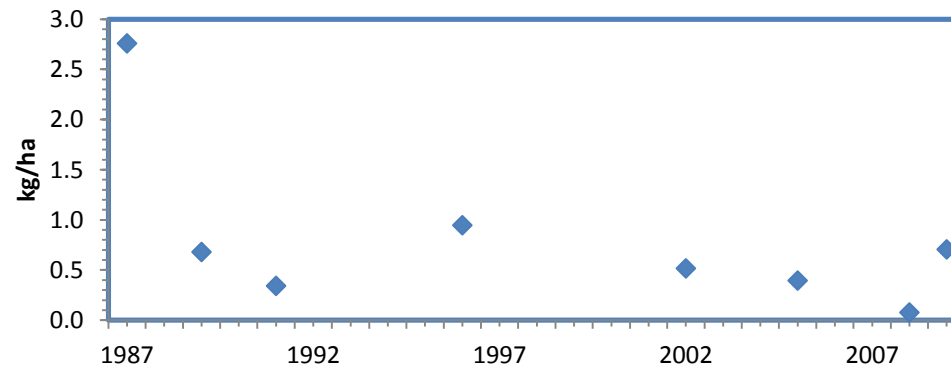
Juan de Fuca



Georgia Basin

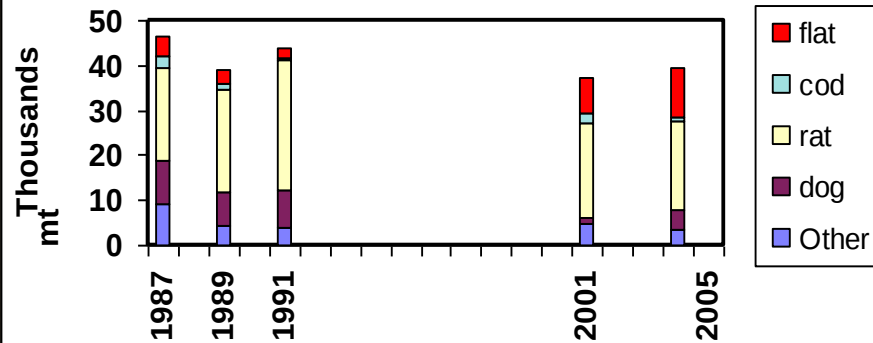


South Sound

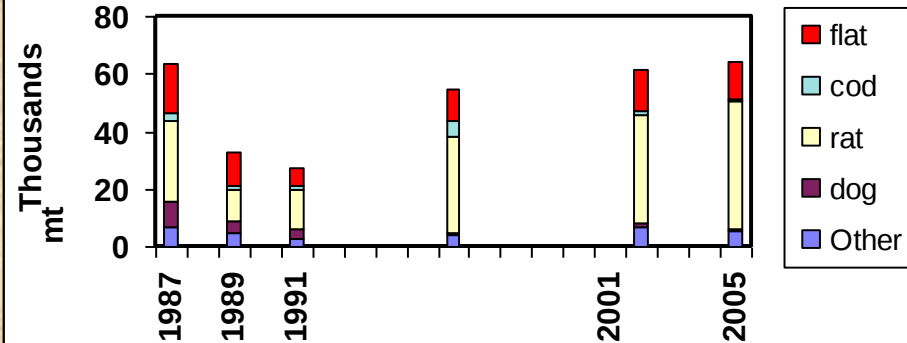


Long-term Results

North Sound



South Sound



Summary



- **Provide independent indices of abundance.**
- **Community-habitat analysis.**
- **Community and food-web structure.**