

# Iniskin – Iliamna Estuary Nearshore Fish and Invertebrates

## Investigators:

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February 2012



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# Study Goals

- Build on historic data from area with comparable sampling approaches
- Gain understanding of seasonal habitat use by fish and invertebrate assemblages in the study area



# Cook Inlet

## Inskin/Iliamna Estuary (IIE)



# Previous Work

- Blackburn et al. (1980) 1978 OCSEAP work in IIE

- Beach seine (9 sta; Apr – Oct)
- Tow net (surface) (9 sta; May – Oct)
- Gill net (1” – 2.5”) (9 sta; May – Sept)
- Trammel net (bottom) (9 sta; May – Sept)
- Try net trawl (only fished outside IIE)
- Stomach analyses (22 species)

- ADF&G herring surveys 1978 – Present (T. Otis)

- April – June
- Aerial surveys
- Ship surveys

# Study Objectives

- Describe NS pelagic fish assemblages
- Describe demersal fish and invertebrate assemblages
- Clarify seasonal patterns
- Examine feeding relationships
- Define herring spawning areas (if any?)
- Sample for background chemistry



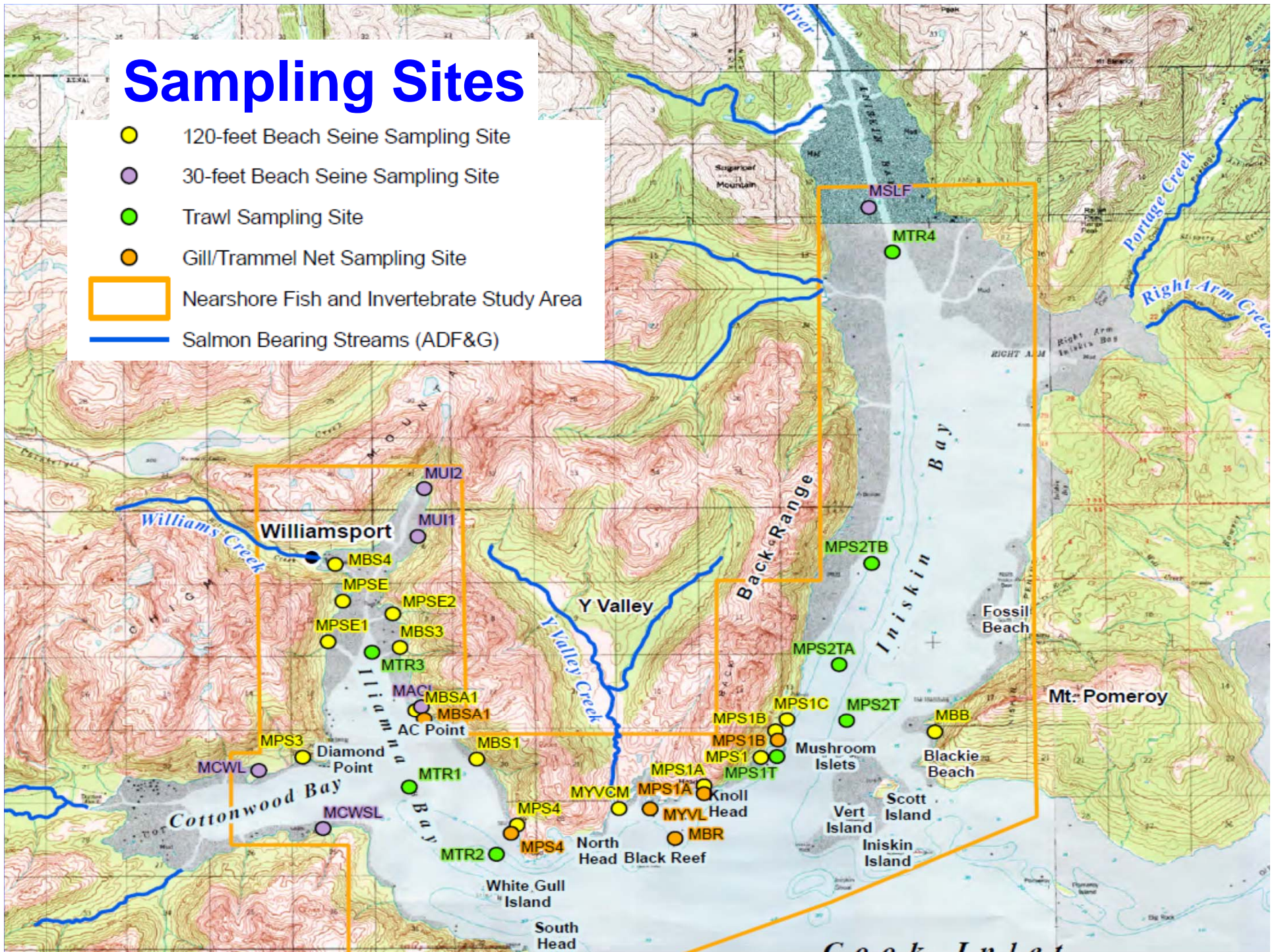
# 2004-2008 Field Work



- Fish/Invert use of nearshore waters
  - Beach seining
  - Otter trawl
  - Gill/Trammel Net
- Tissue samples
- Sediment/Water samples
- Sample Periods
  - Aug 04
  - May-Aug 05
  - Apr, May, Sept 06
  - Sept-Oct 07
  - Mar-Nov 08

# Sampling Sites

- 120-foot Beach Seine Sampling Site
- 30-foot Beach Seine Sampling Site
- Trawl Sampling Site
- Gill/Trammel Net Sampling Site
- ▭ Nearshore Fish and Invertebrate Study Area
- Salmon Bearing Streams (ADF&G)

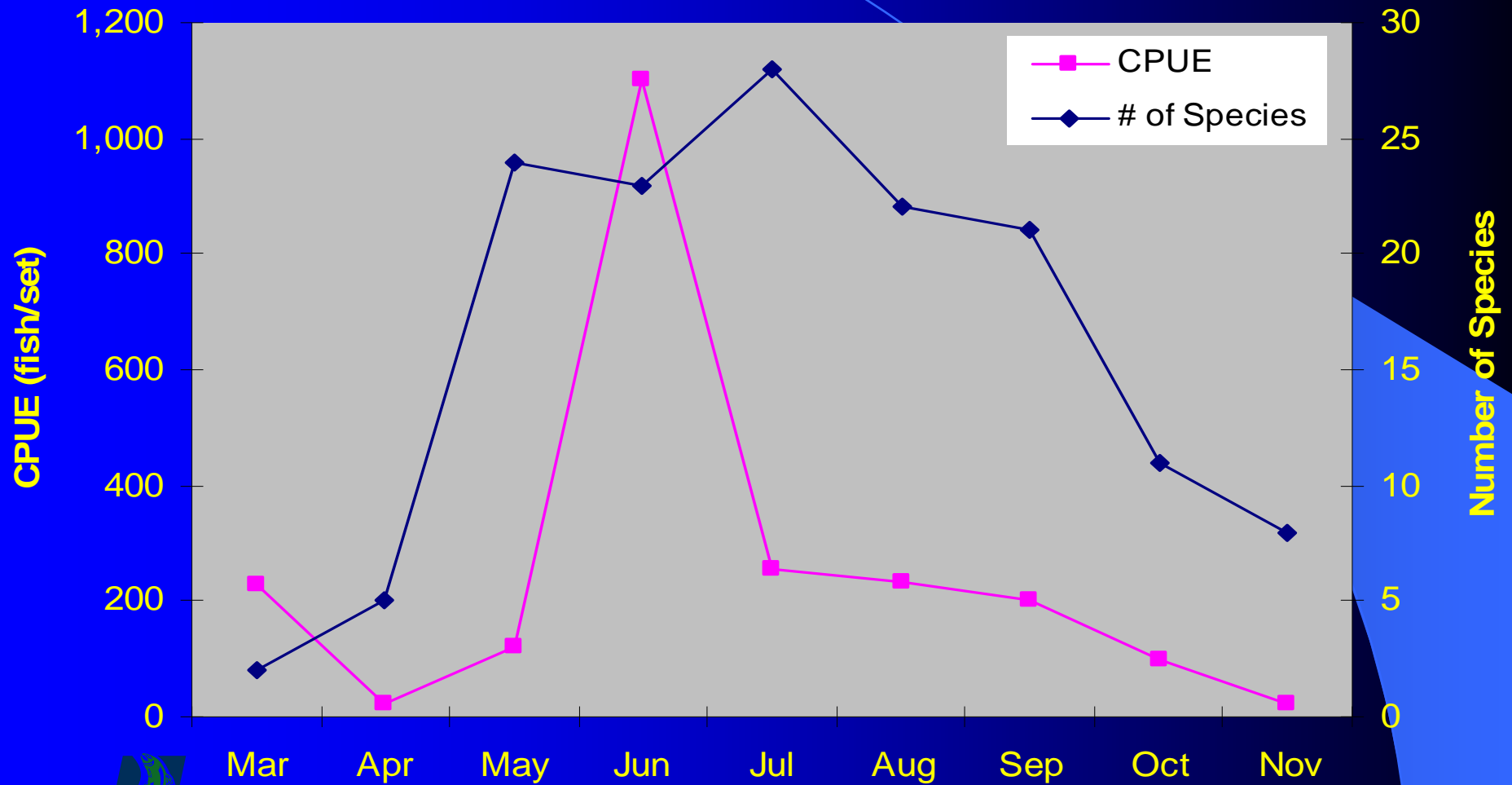


# Littoral Use by Fish (Beach Seine)

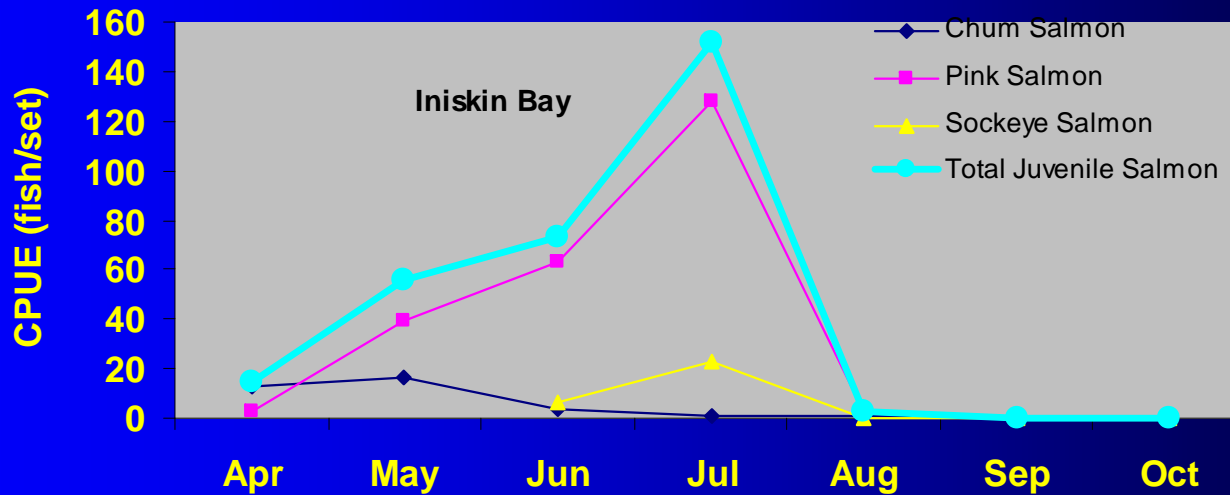
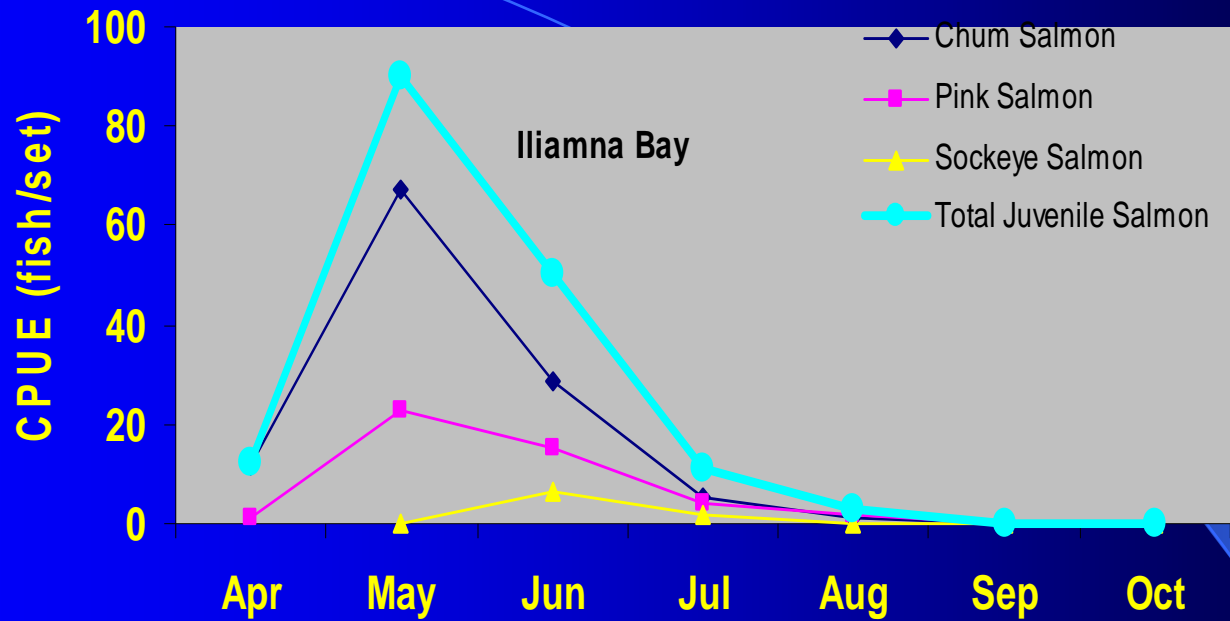
- Salmonids
  - Migration
  - Feeding
  - Osmoregulation
  - Refuge
- Forage fish
  - Herring
  - Surf and Longfin smelt
  - Pacific sand lance
- Flatfish
- Cottids



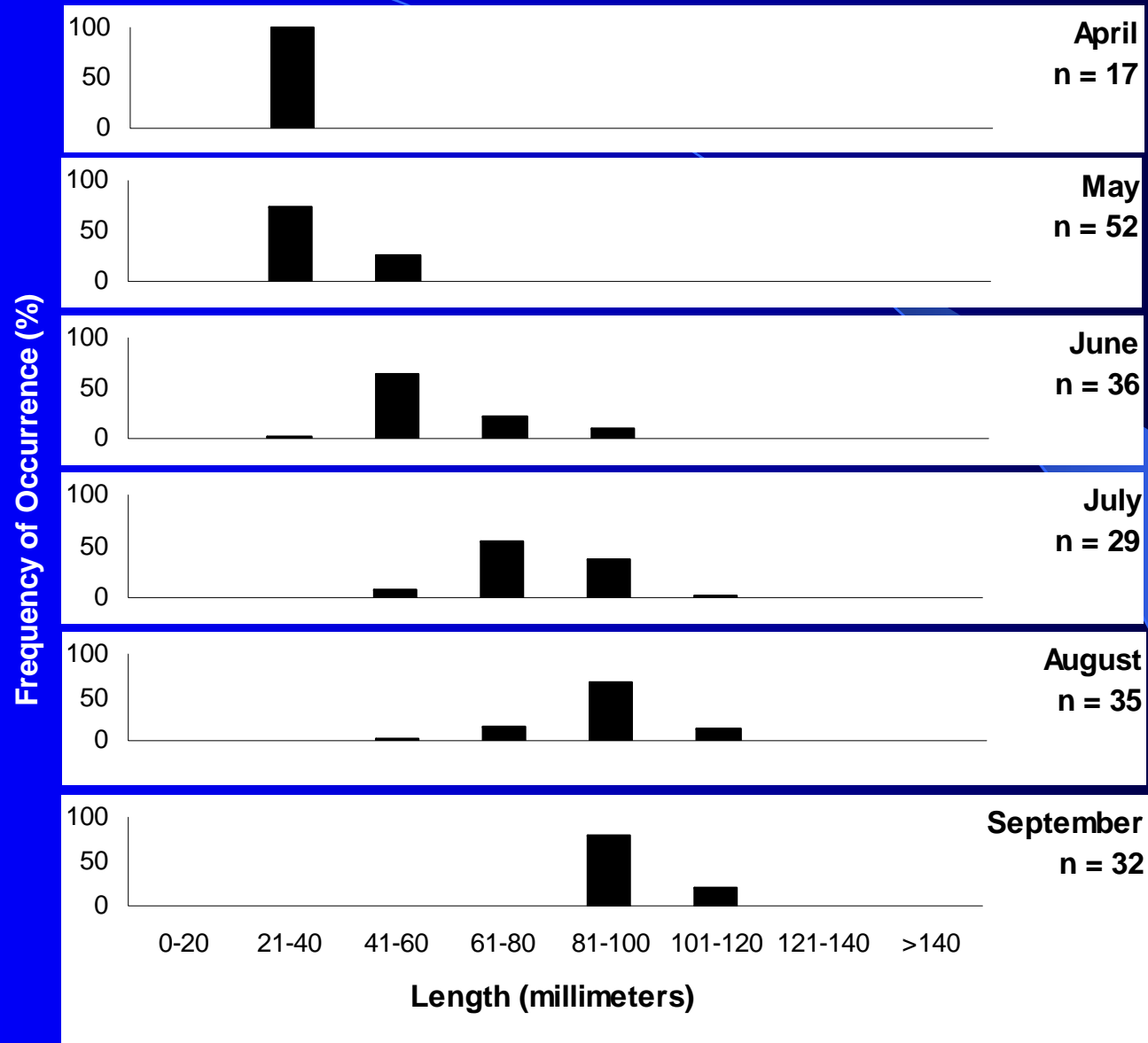
# Fish Catch and Species Richness (Beach Seine – 2004-2008)



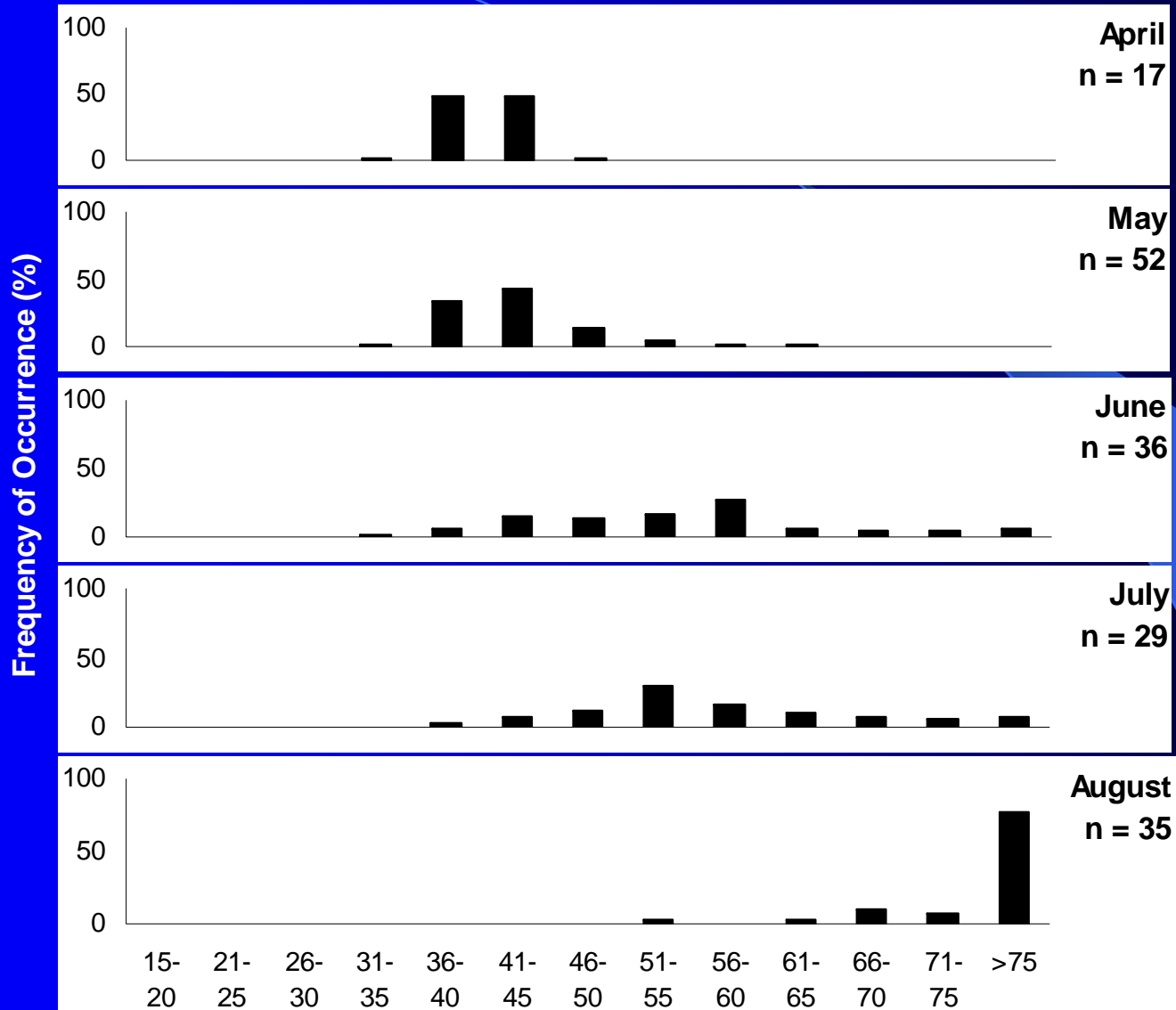
# Juvenile Salmon CPUE (2004-2008)



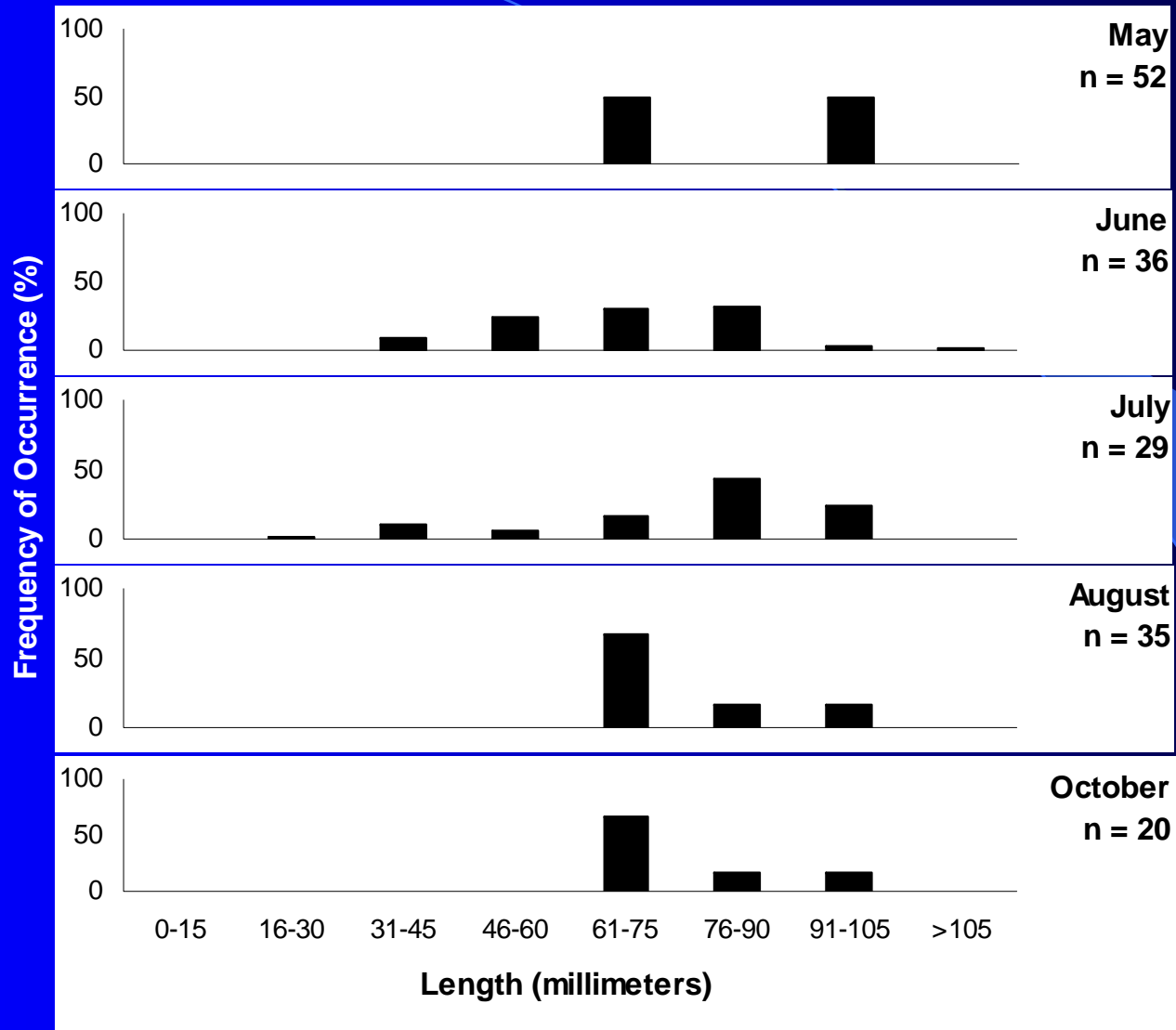
# Juvenile Pink Salmon L/F



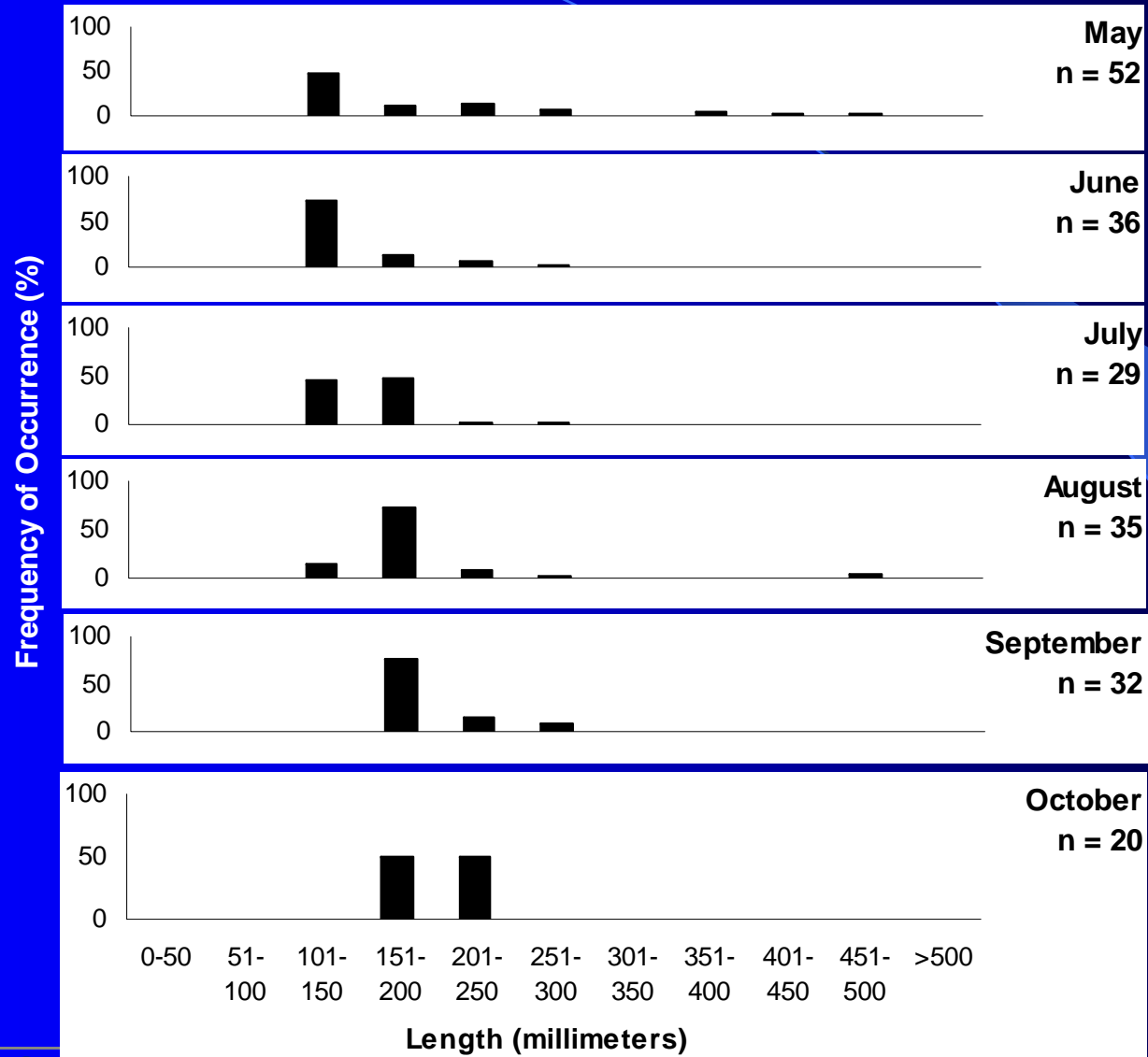
# Juvenile Chum Salmon L/F



# Juvenile Sockeye Salmon L/F

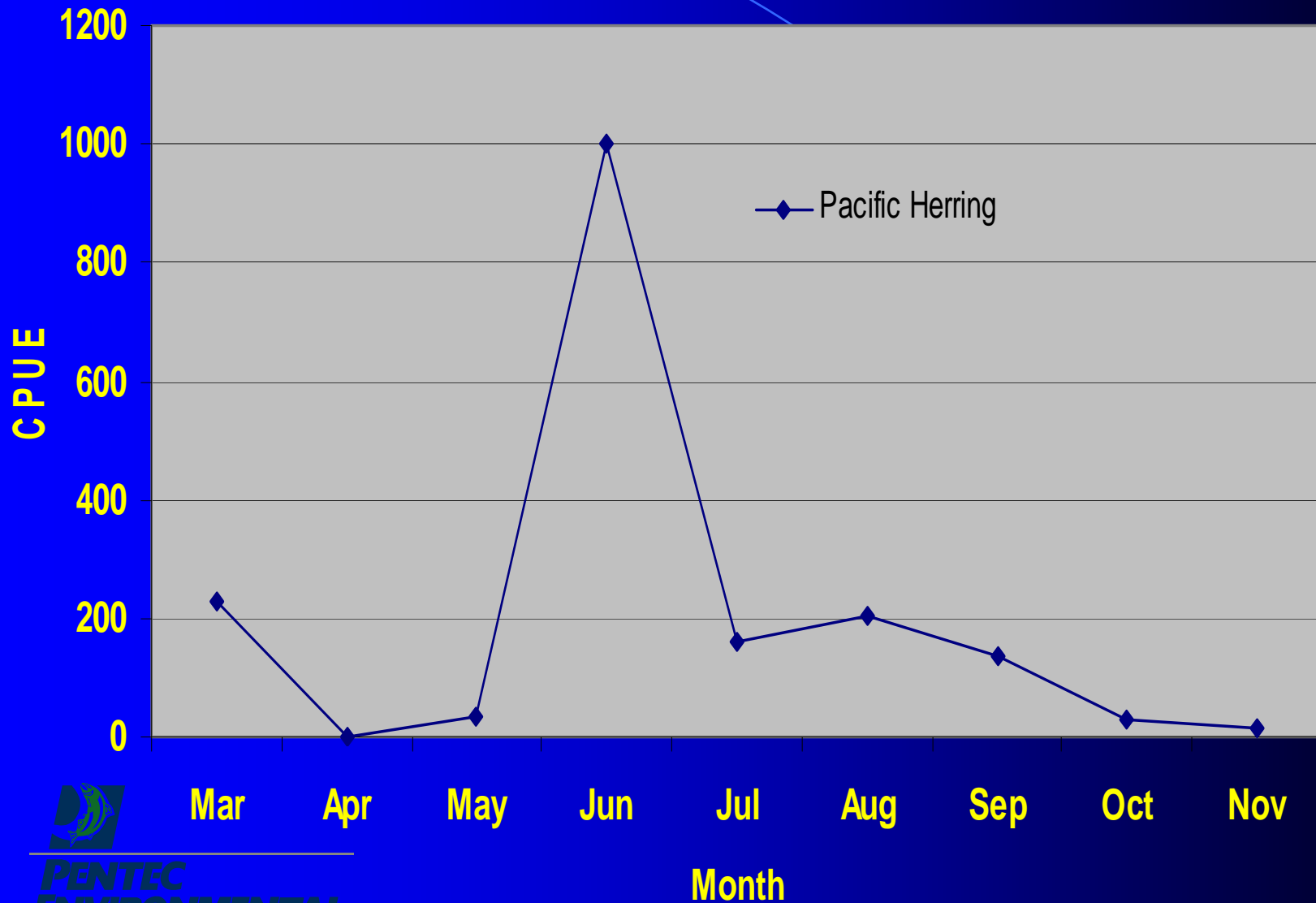


# Dolly Varden L/F



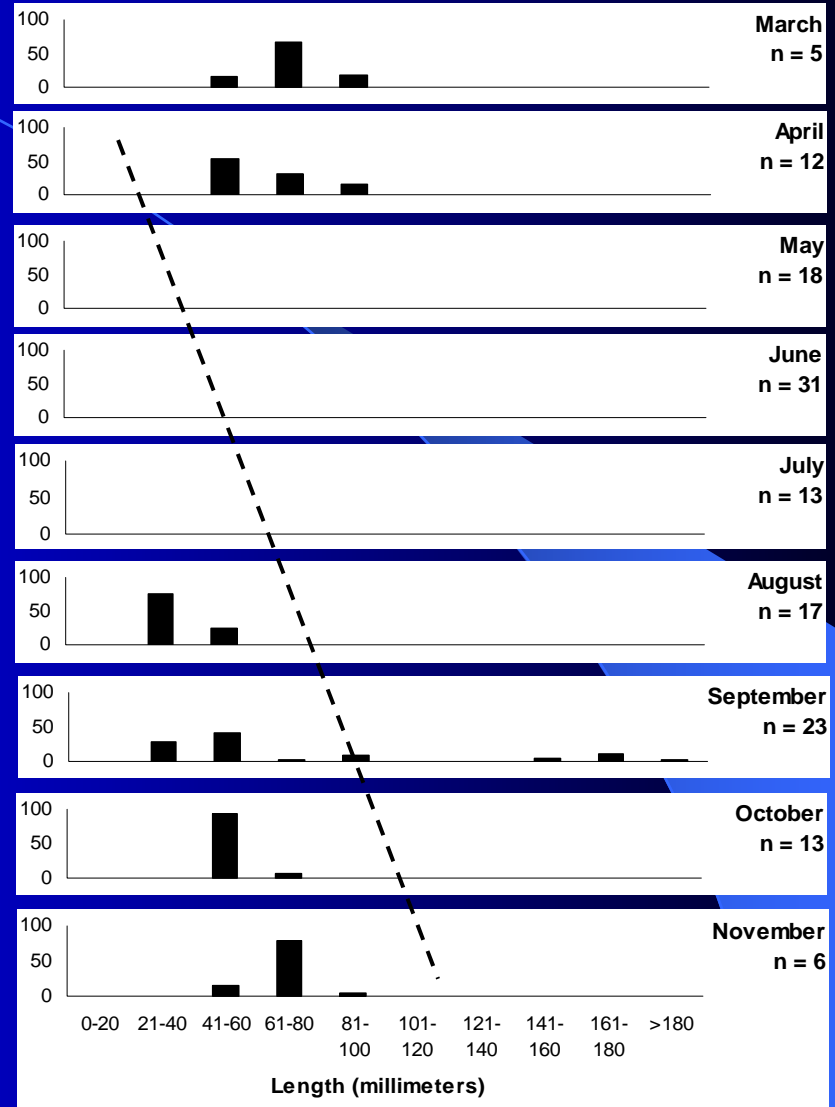
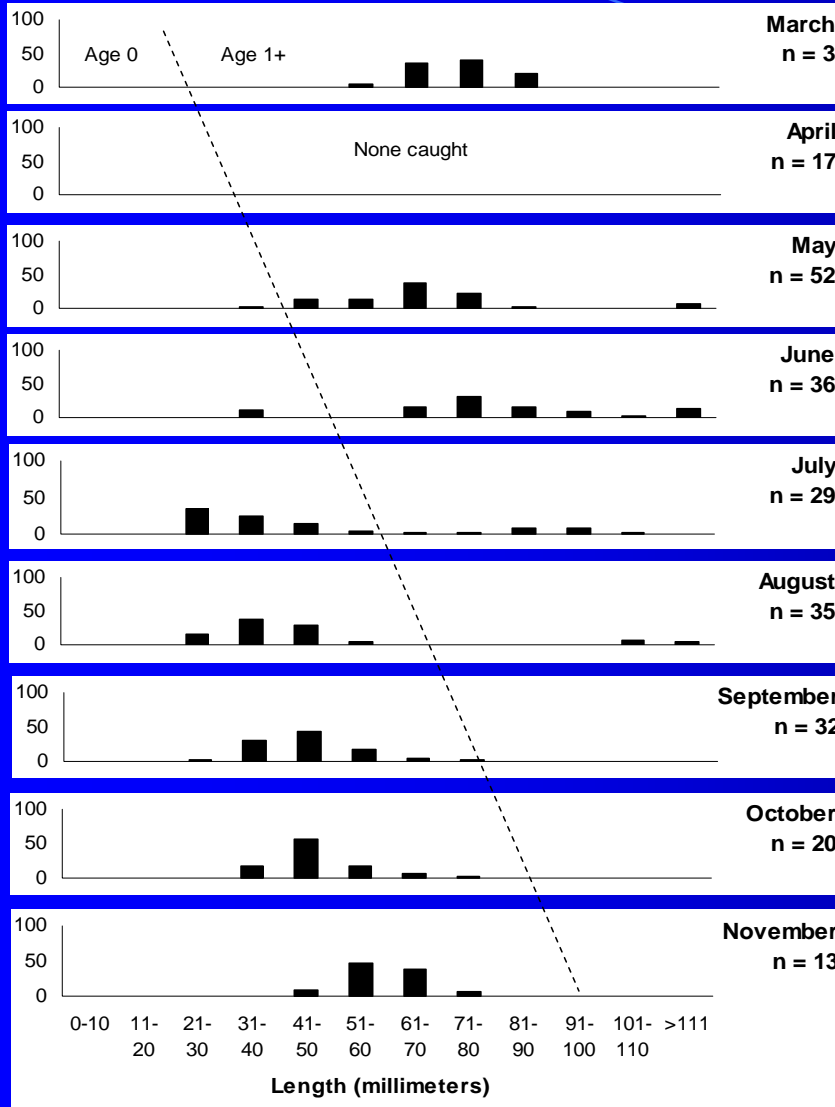
# Juvenile Herring CPUE

(2004 – 2008 Beach Seine)



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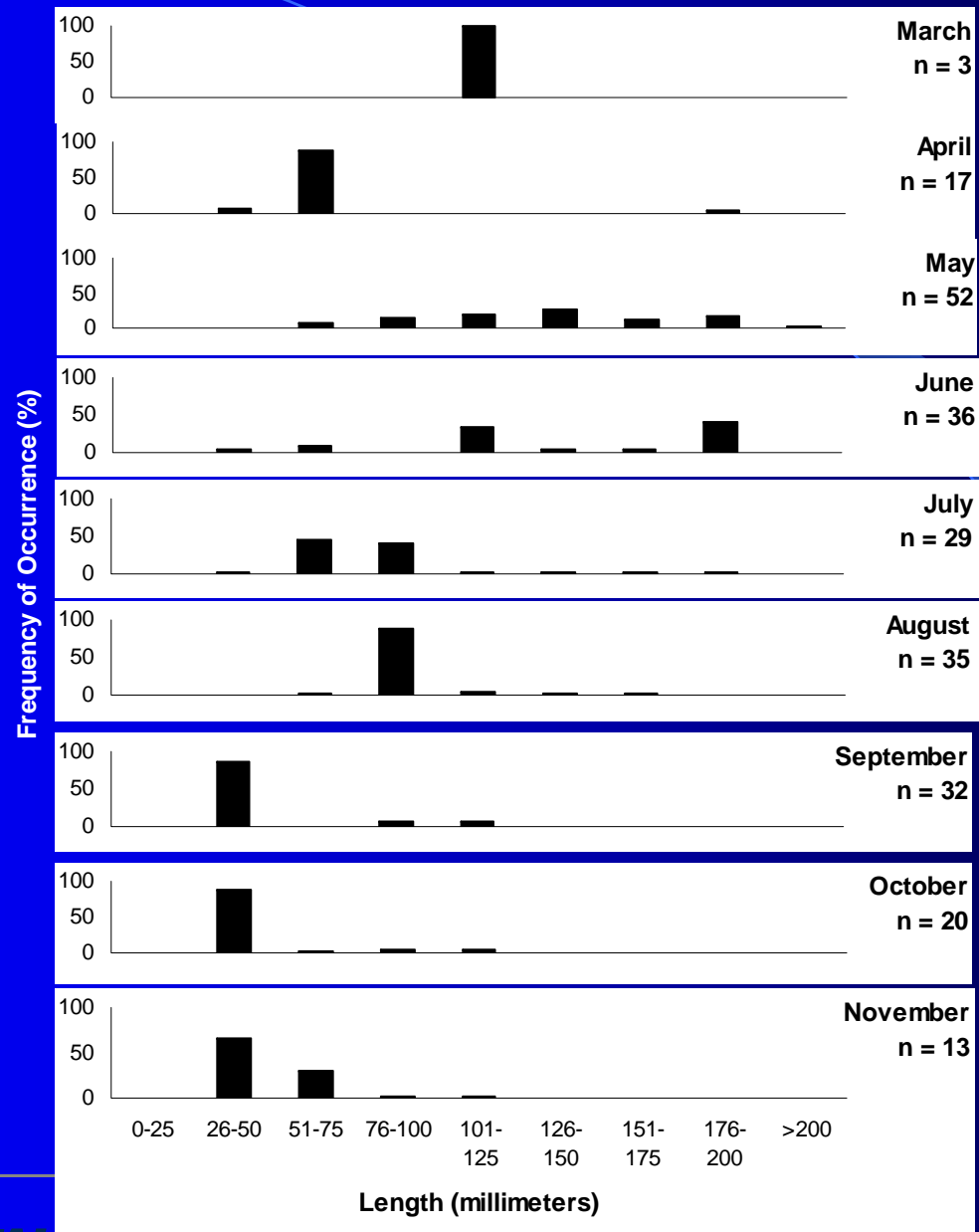
# Juvenile Herring L/F



 **Nearshore (Beach Seine)**  
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**Demersal (Otter Trawl)**

# Surf Smelt L/F

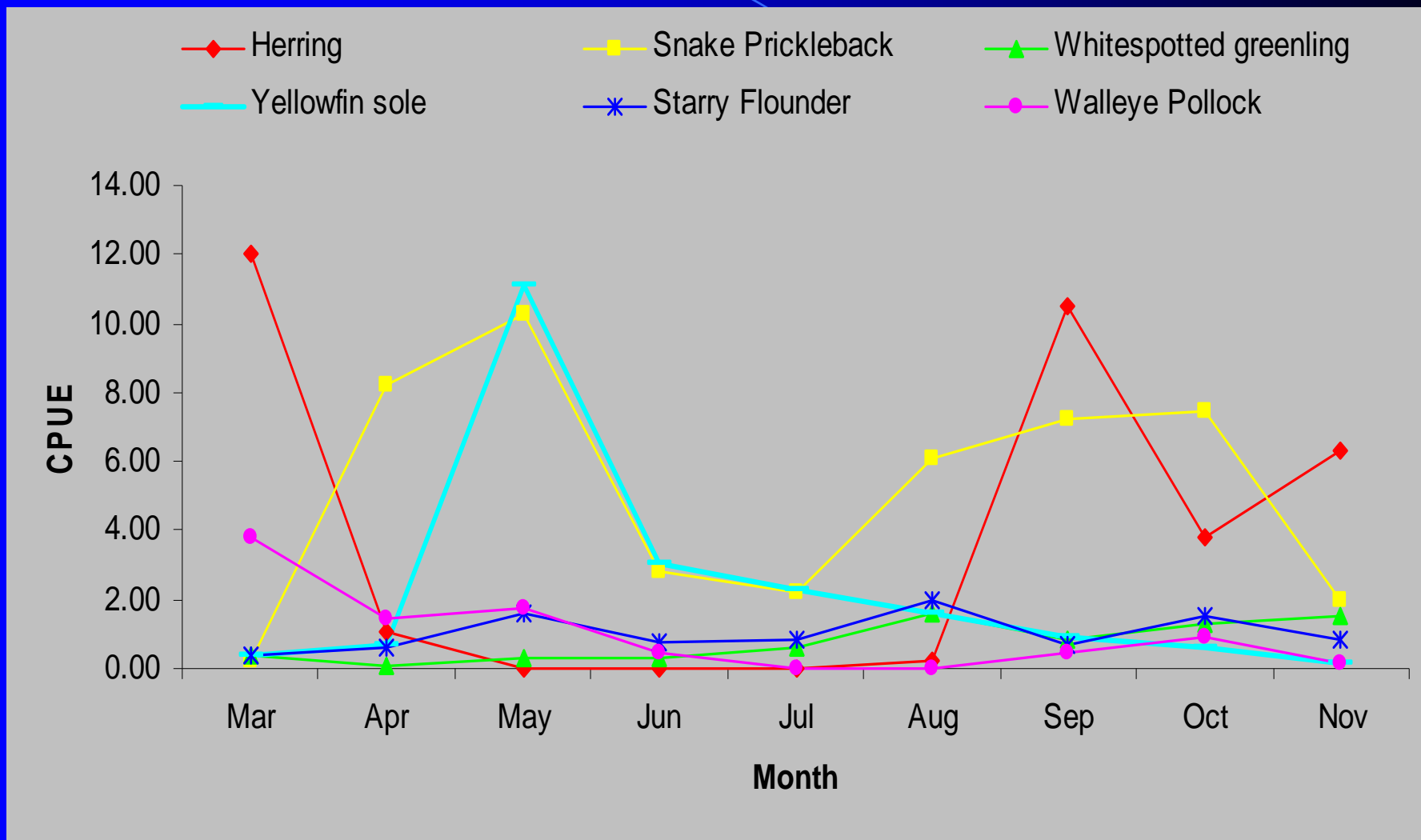


# Subtidal Fish (Trawl)

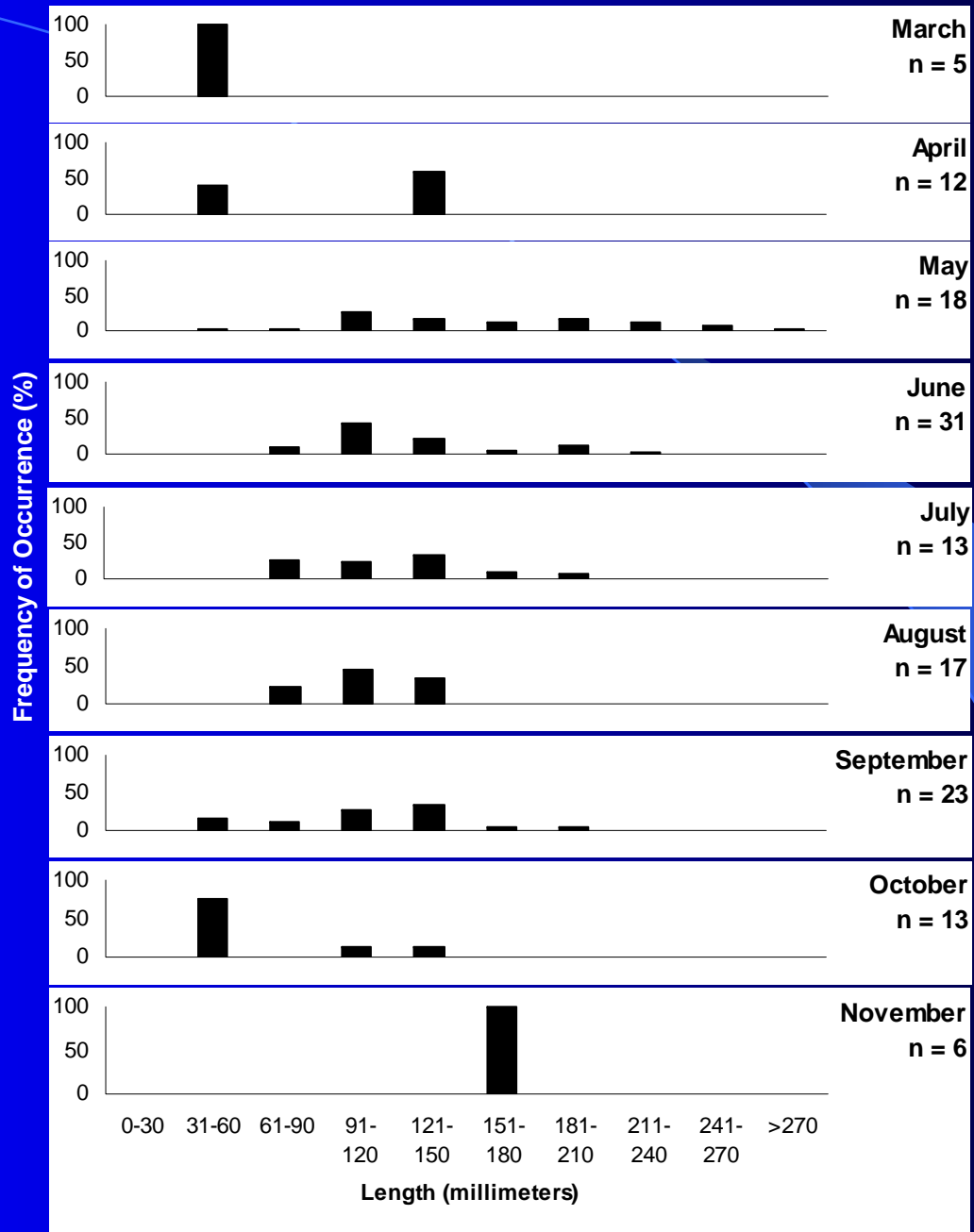


- Flat fish
  - Y-fin
  - Sand sole
  - Starry flounder
  - Ak. plaice
  - Halibut
- Gadids
  - Pacific cod
  - Saffron cod
- Other
  - Snake prickleback
  - Poachers (2 spp.)
  - Sculpin (5 spp.)
  - Whitespotted greenling
  - Snail fish

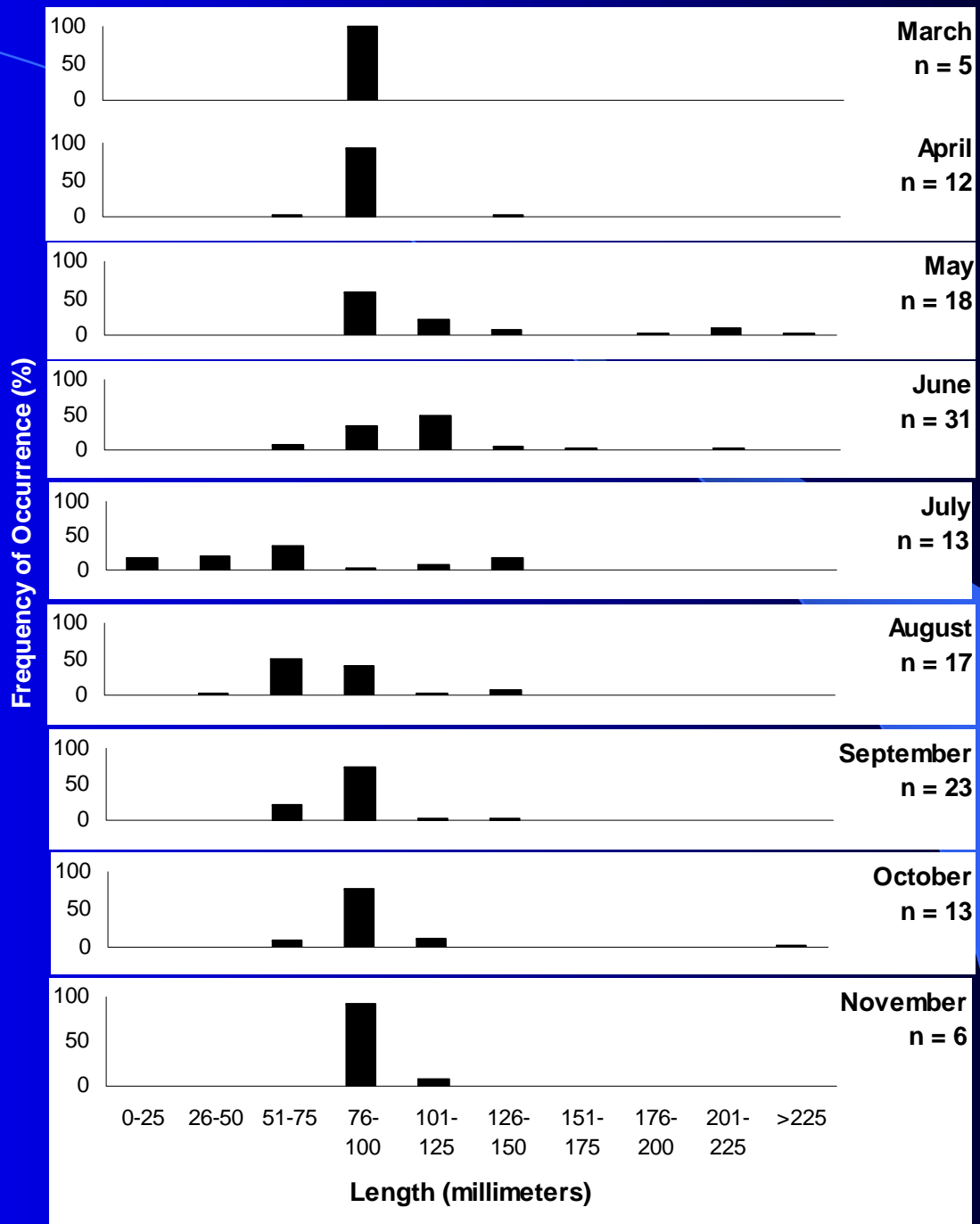
# Seasonal CPUE for Demersal Fish Species



# Yellowfin Sole L/F



# Snake Prickleback L/F



# EBD v. 1978 Beach Seine Comparison

| Species                  | <u>EBD Sampling*</u> |            | <u>Blackburn et al.**</u> |            |
|--------------------------|----------------------|------------|---------------------------|------------|
|                          | Rank                 | % of Total | Rank                      | % of Total |
| Pacific Herring          | 1                    | 77.5       | 5                         | 7.2        |
| Pink Salmon              | 2                    | 5.3        | 4                         | 8.3        |
| Chum Salmon              | 3                    | 4.8        | 2                         | 13.6       |
| Surf Smelt               | 4                    | 4.6        | 17                        | 0.3        |
| Pacific Sand Lance       | 5                    | 2.3        | 1                         | 38.5       |
| Dolly Varden Char        | 6                    | 1.5        | 3                         | 11.8       |
| Pacific Staghorn Sculpin | 7                    | 1.1        | 8                         | 2.0        |
| Starry Flounder          | 8                    | 1.0        | 10                        | 1.3        |
| Sockeye Salmon           | 9                    | 0.7        | --                        | 0          |
| Longfin Smelt            | 10                   | 0.5        | 6                         | 4.7        |

\* Based on sampling, March-November, 2004-2008

\*\* 1978 data include Kachemak and Kamishak bays

# EBD v. 1978 Gill/Trammel Net Comparison

| Species                  | EBD Sampling |            |             |            | Blackburn et al. 1980 |            |             |            |
|--------------------------|--------------|------------|-------------|------------|-----------------------|------------|-------------|------------|
|                          | Gill Net     |            | Trammel Net |            | Gill Net              |            | Trammel Net |            |
|                          | Rank         | % of Total | Rank        | % of Total | Rank                  | % of Total | Rank        | % of Total |
| Pacific Herring          | 1            | 91.2       | 4           | 4.5        | 1                     | 43.5       | 1           | 25.3       |
| Dolly Varden             | 2            | 4.3        | 8           | 1.5        | 3                     | 15.9       | --          | 0          |
| Calico Sculpin           | 3            | 1.2        | 5           | 3.0        | --                    | 0          | --          | 0          |
| Sturgeon Poacher         | 4            | 1.2        | 9           | 0.8        | --                    | 0          | 3           | 11.3       |
| Starry Flounder          | 5            | 0.7        | 3           | 16.2       | 9                     | 2.9        | --          | 0          |
| Yellowfin Sole           | 6            | 0.7        | 7           | 2.3        | --                    | 0          | 4           | 9.6        |
| Pacific Staghorn Sculpin | 7            | 0.7        | 6           | 3.0        | 6                     | 2.9        | 6           | 5.4        |
| Whitespotted Greenling   | --           | 0          | 1           | 35.9       | 10                    | 1.5        | 3           | 25.3       |
| Spiny Dogfish            | --           | 0          | 2           | 27.5       | 5                     | 2.9        | --          | 0          |

# Littoral Use by Invertebrates (Beach Seine)

- Mysids
- *Crangon*
- Gammarids
- “Jellyfish”
  - *Polyorchis*
  - *Pleurobranchia*



# Subtidal Inverts (Trawl)



## ➤ Crustaceans

- Crangon (abund. on mud flats)
- Crab
- Pandalids
- Hermits

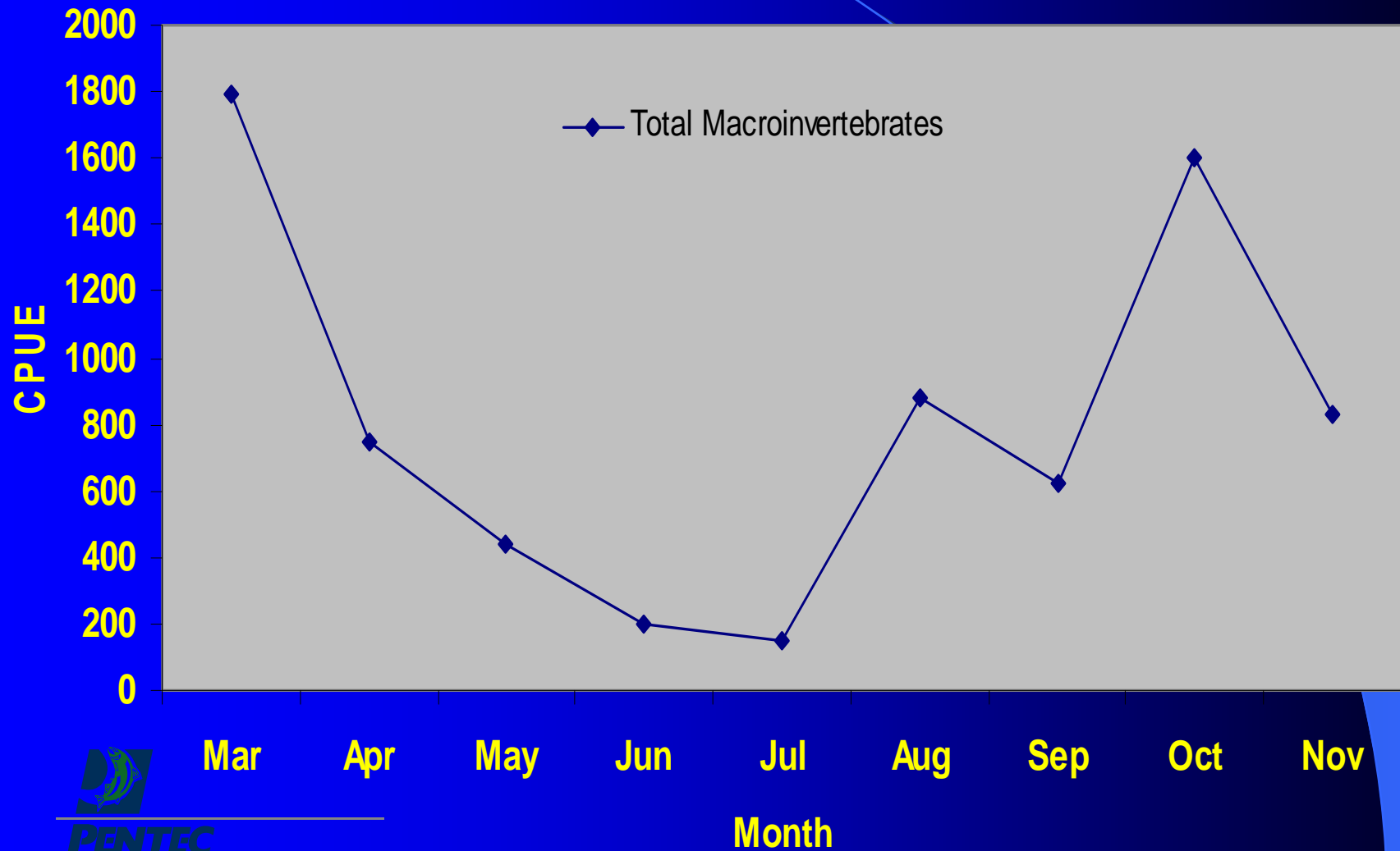


## ➤ Sponges

## ➤ Hydroids

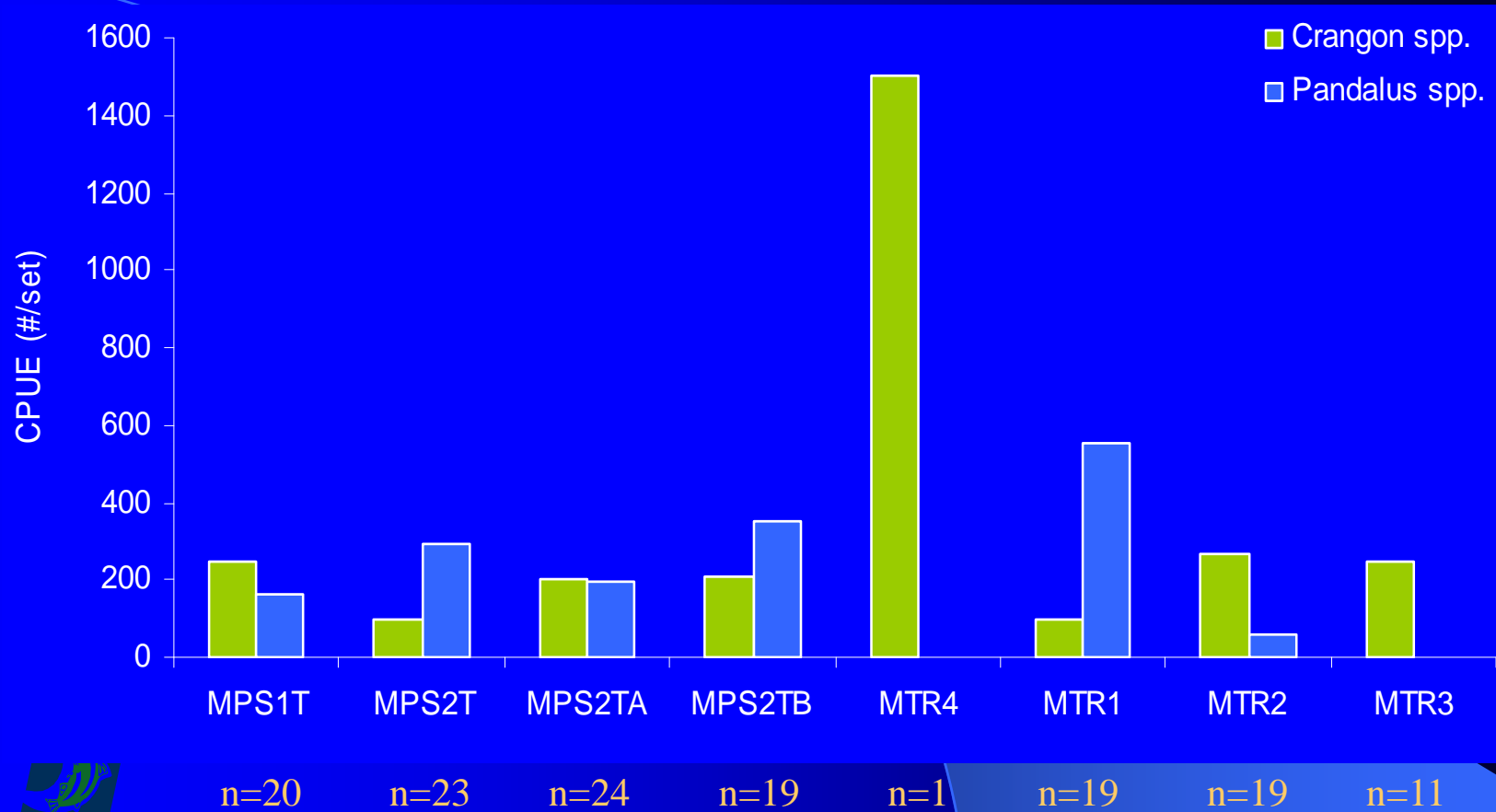
## ➤ Bryozoans

# Seasonal CPUE for Demersal Invertebrates



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# CPUE – Crangon and Pandalus in the IIE



# Sampling Sites

- 120-foot Beach Seine Sampling Site
- 30-foot Beach Seine Sampling Site
- Trawl Sampling Site
- Gill/Trammel Net Sampling Site
- ▭ Nearshore Fish and Invertebrate Study Area
- Salmon Bearing Streams (ADF&G)



# Dominant Invertebrates in Trawl Catches (2005-2007)

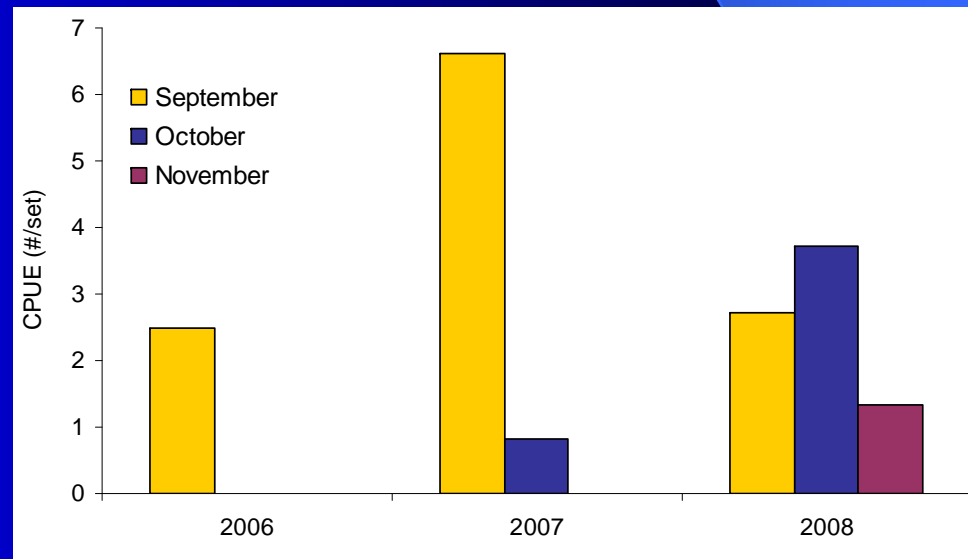
| Taxon              | Rank  |     |      |      |     |      |     |
|--------------------|-------|-----|------|------|-----|------|-----|
|                    | April | May | June | July | Aug | Sept | Oct |
| <i>Crangon</i>     | 1     | 1   | 3    | 1    | 2   | 1    | 2   |
| <i>Pandalus</i>    | 2     | 2   | 1    | 3    | 1   | 2    | 1   |
| <i>Neomysis</i>    | 3     | 3   | 4    | 4    | 4   | 4    | 3   |
| <i>Heptacarpus</i> | 4     | 4   | 2    | 2    | 3   | 3    | 4   |



# Tanner Crabs

(*Chionoecetes bairdi*)

- Commercially important species
- Juveniles present in most trawl sets during fall
- Possible overwinter refuge for juveniles

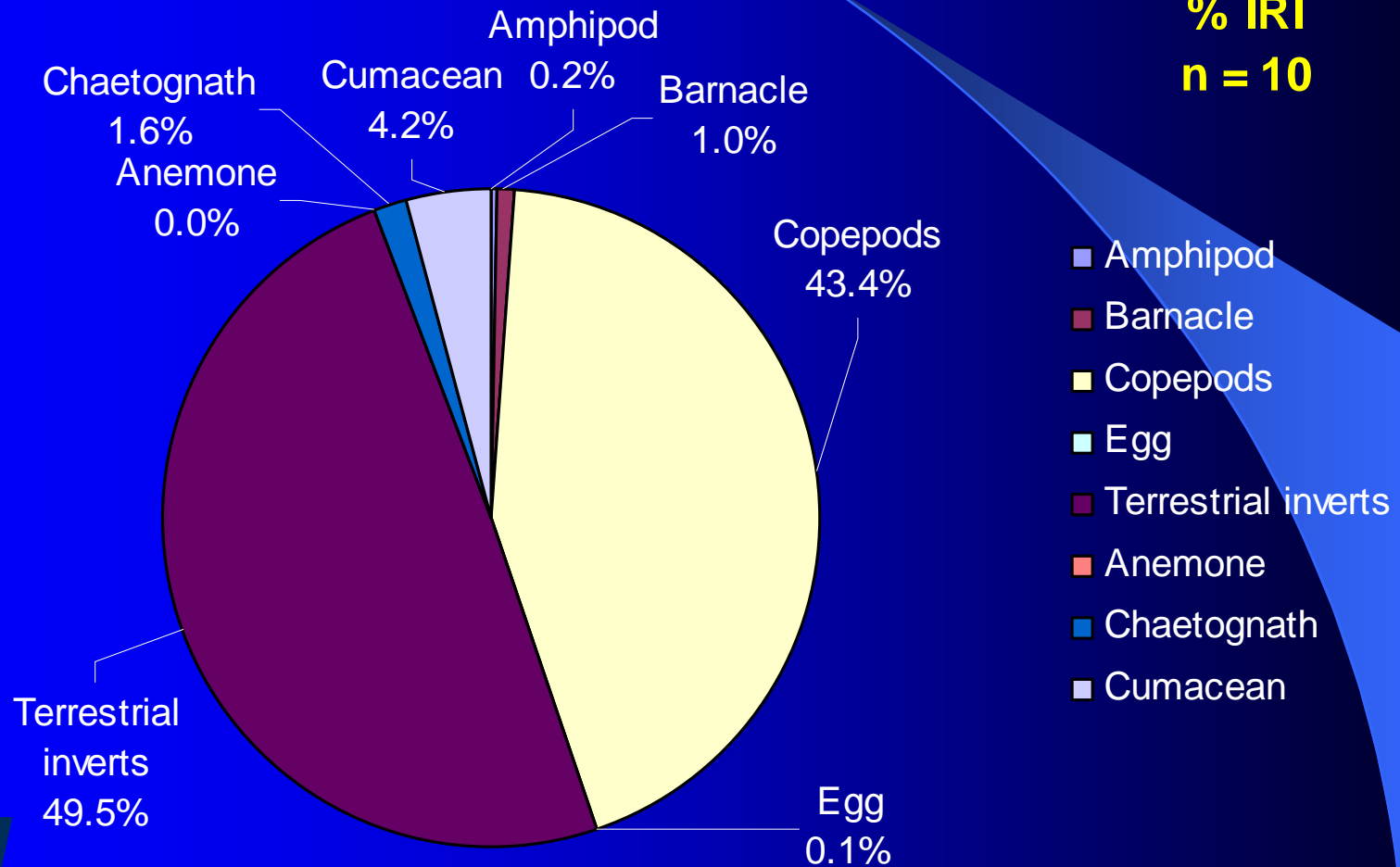


# Dietary Composition of Juvenile Pink Salmon

**Pink Salmon**

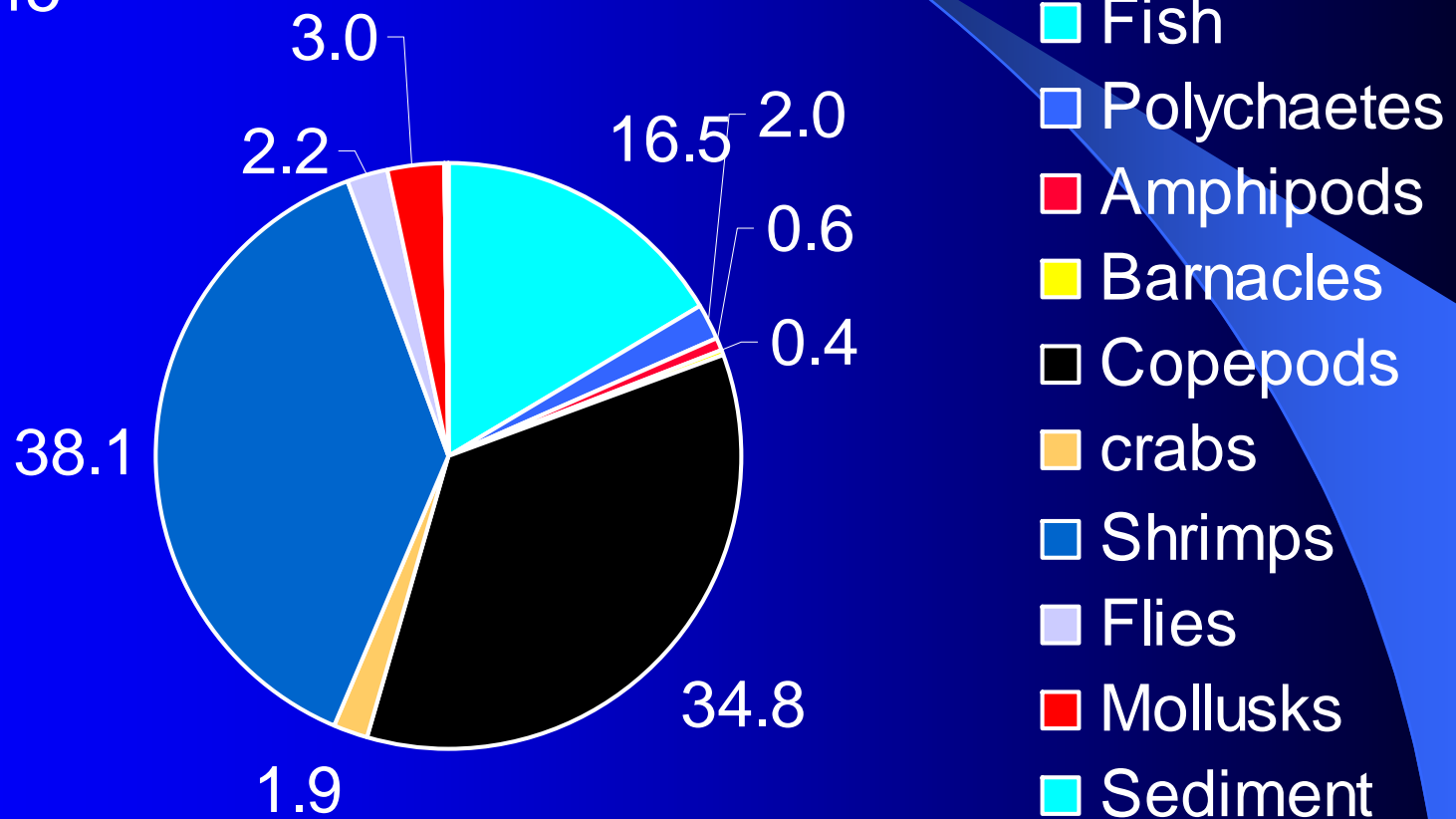
**% IRI**

**n = 10**

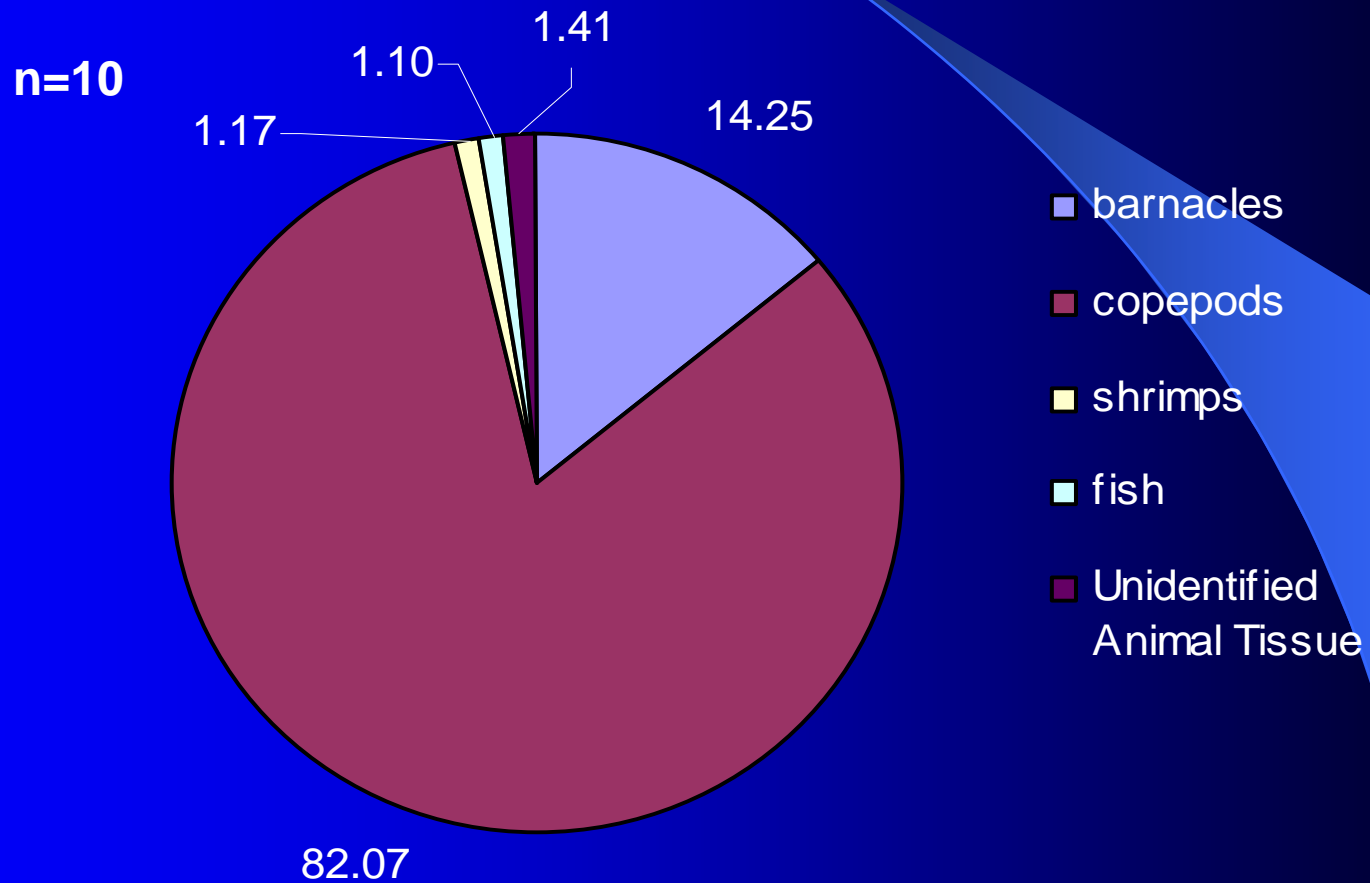


# Dietary Composition of Juvenile Chum

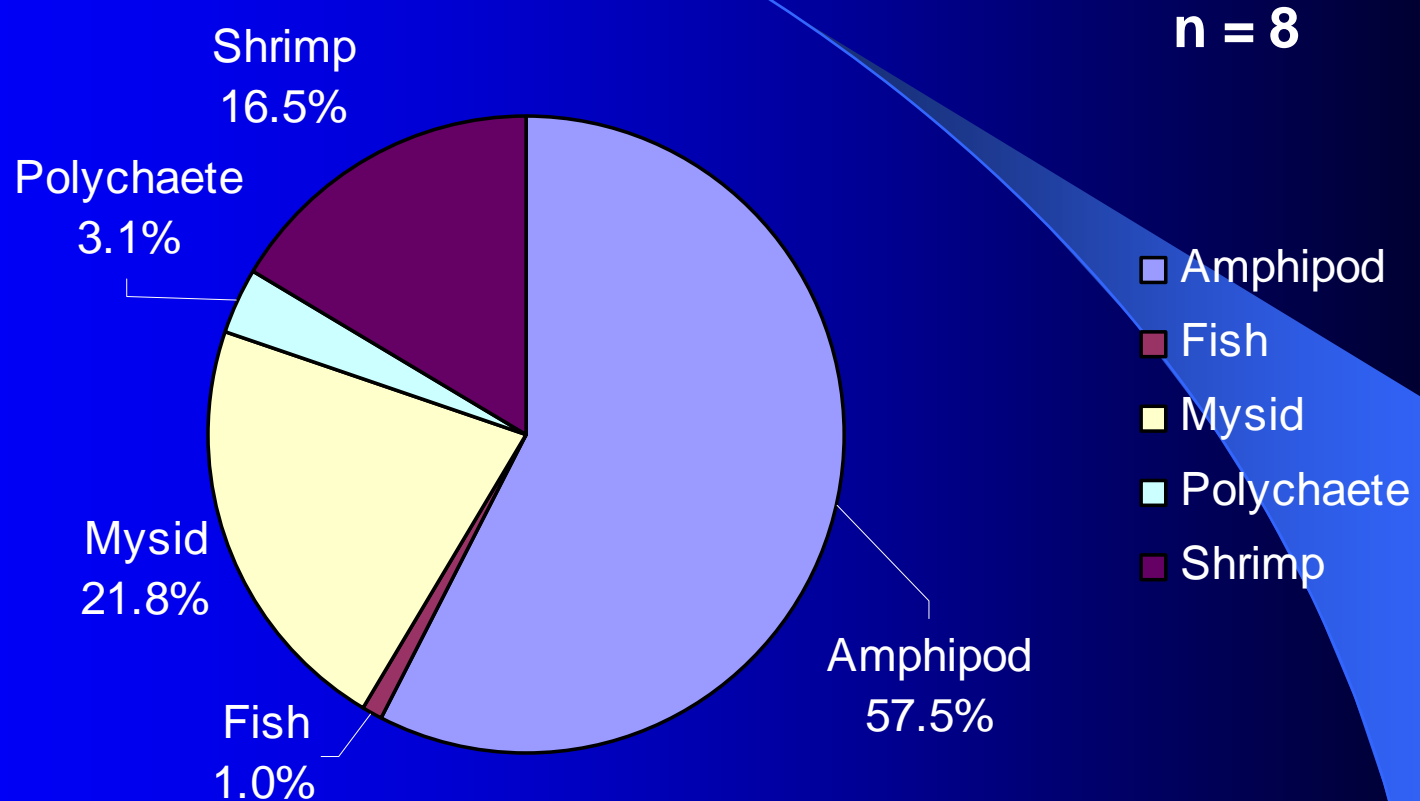
n=45



# Dietary Composition of Surf Smelt

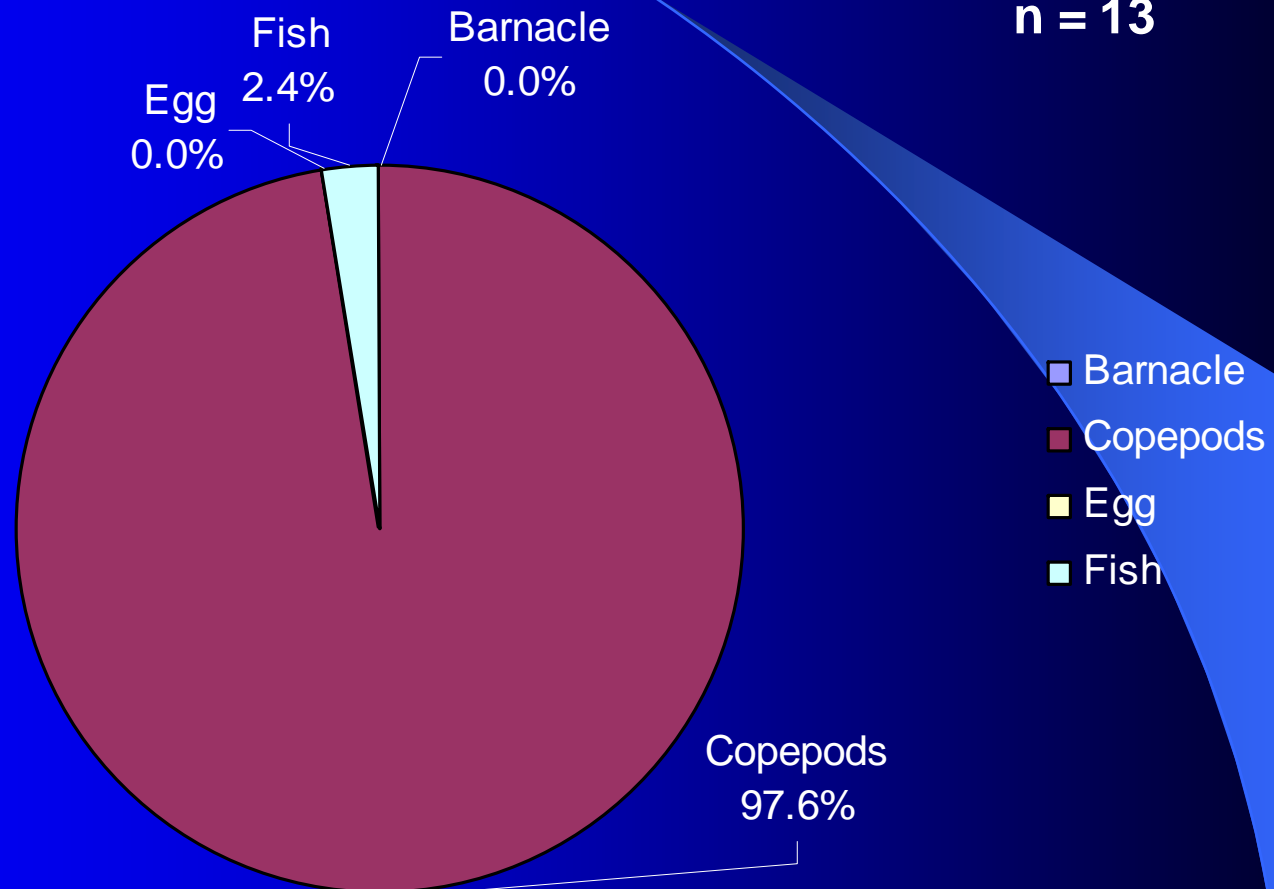


# Dietary Composition of Whitespotted Greenling



# Dietary Composition of Pacific Herring

n = 13

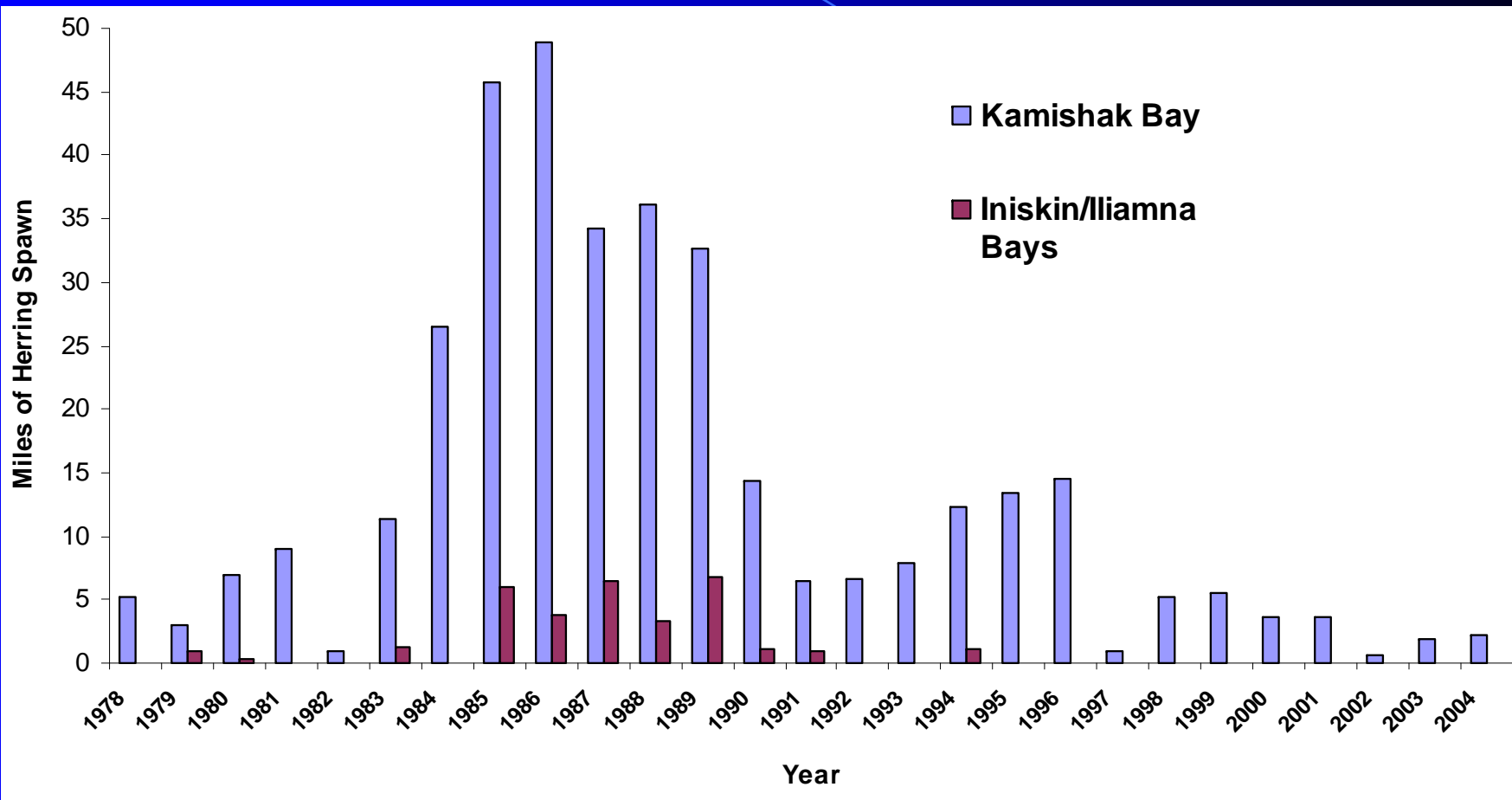


# Pacific Herring Spawn

- ADF&G reported spawning in IIE most years from 1978-1994
- Very little spawning from 1995-2004
- EBD sampling found no spawning 2006
- Spawning herring returned in 2008, 2010, and 2011



# Miles of Herring Spawn in IIE and Kamishak Bay – 1978-2004

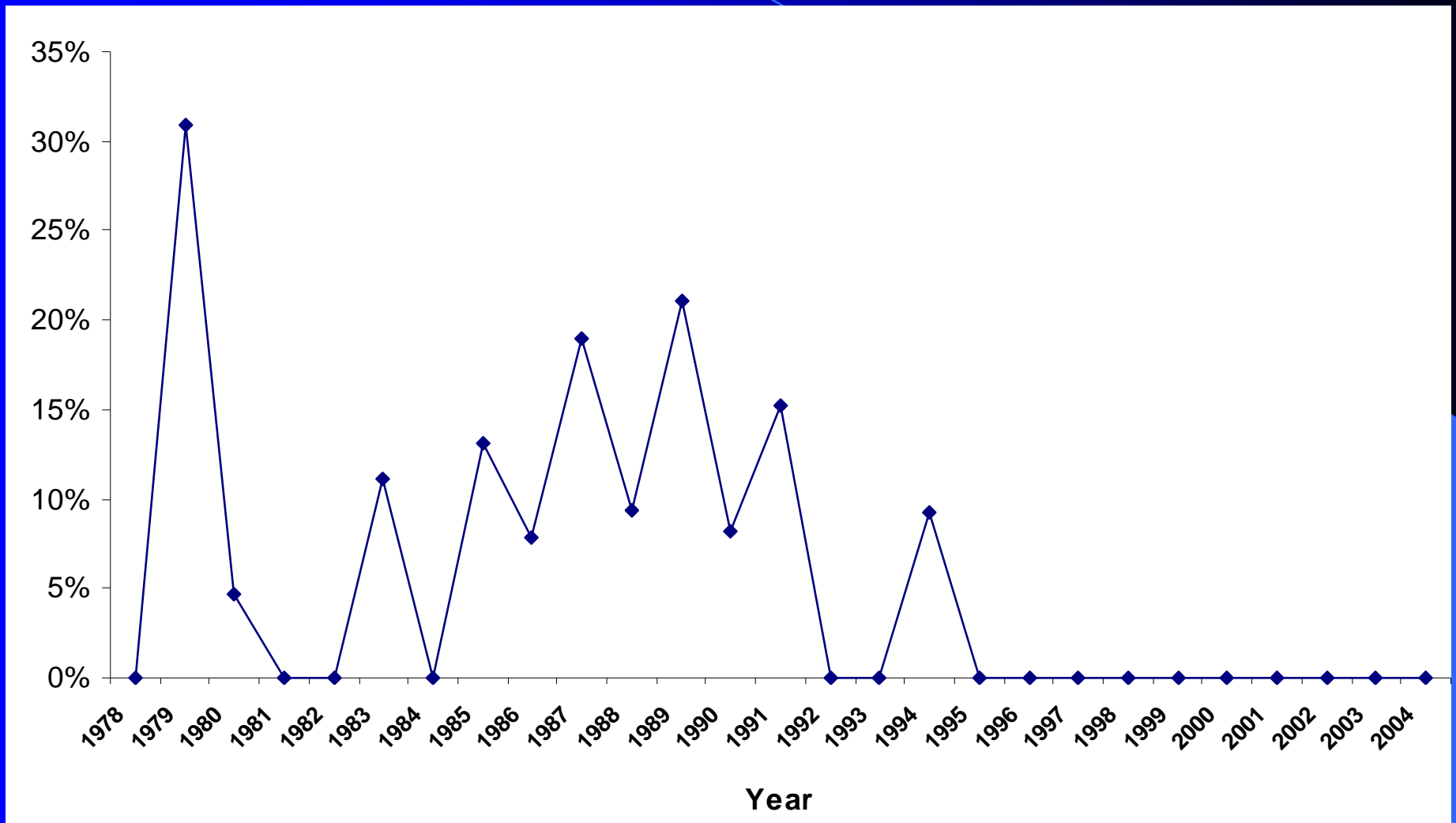


# ADF&G Herring Spawn Distribution 1978 – 1989

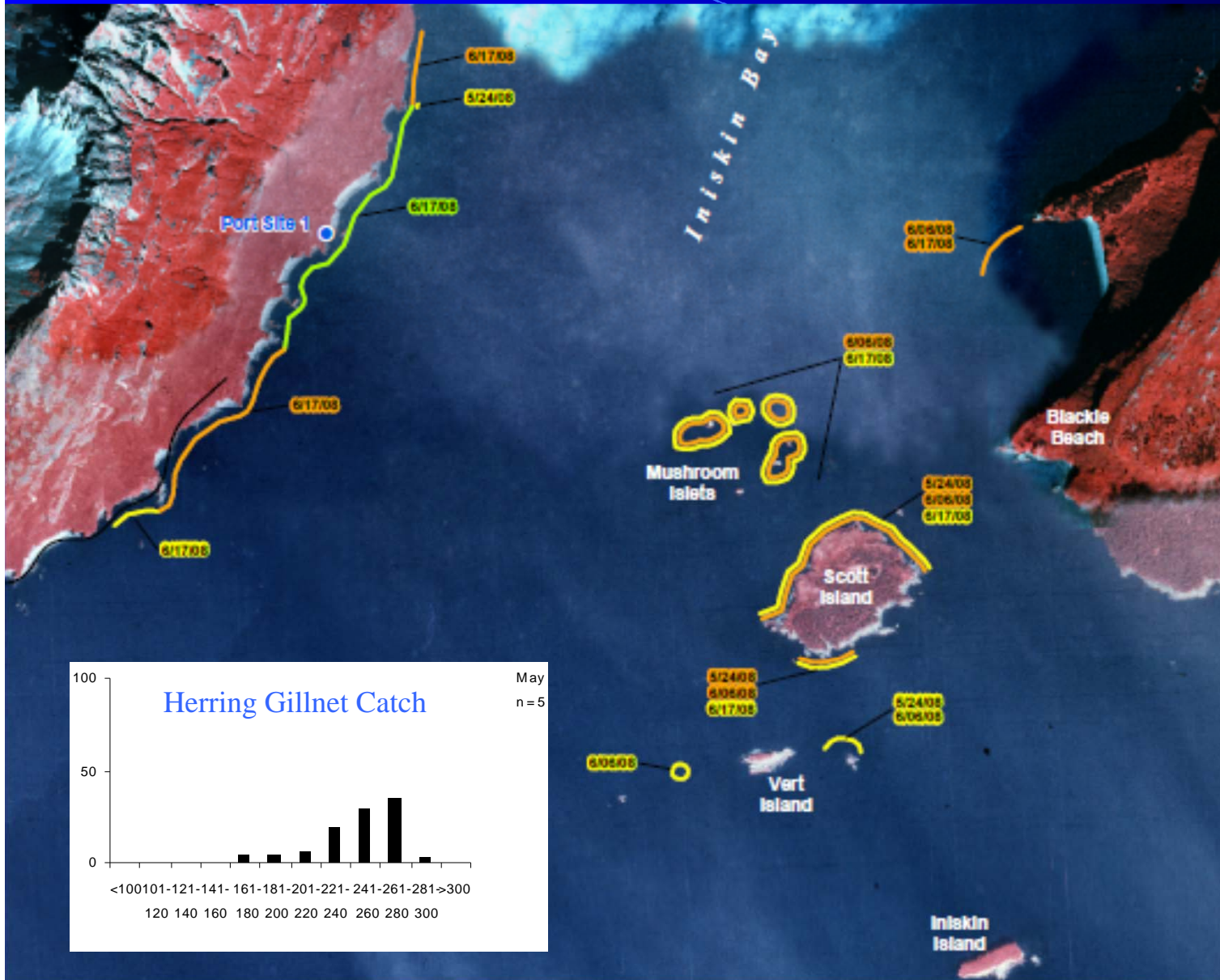
- 5.1 linear miles of spawning in 1989
- Very little spawning 1994 to 2006



# % of total SW Cook Inlet Spawn in IIE 1978-2004



# Herring spawn detected in 2008

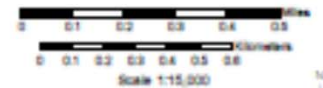


## Herring Spawn Survey Results in 2008 DRAFT

### Legend

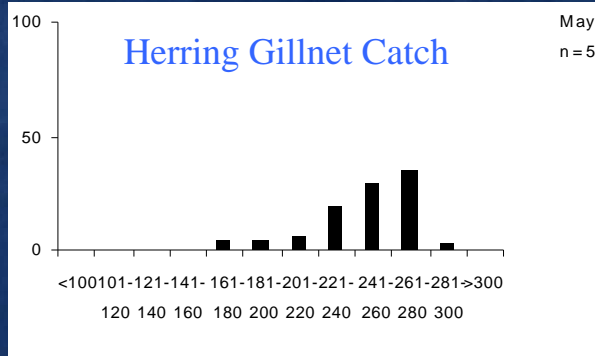
#### Herring Spawn Survey Results

- Moderate
- Low
- Trace
- Port Site
- Preliminary Road Alignment (5/14/2008)

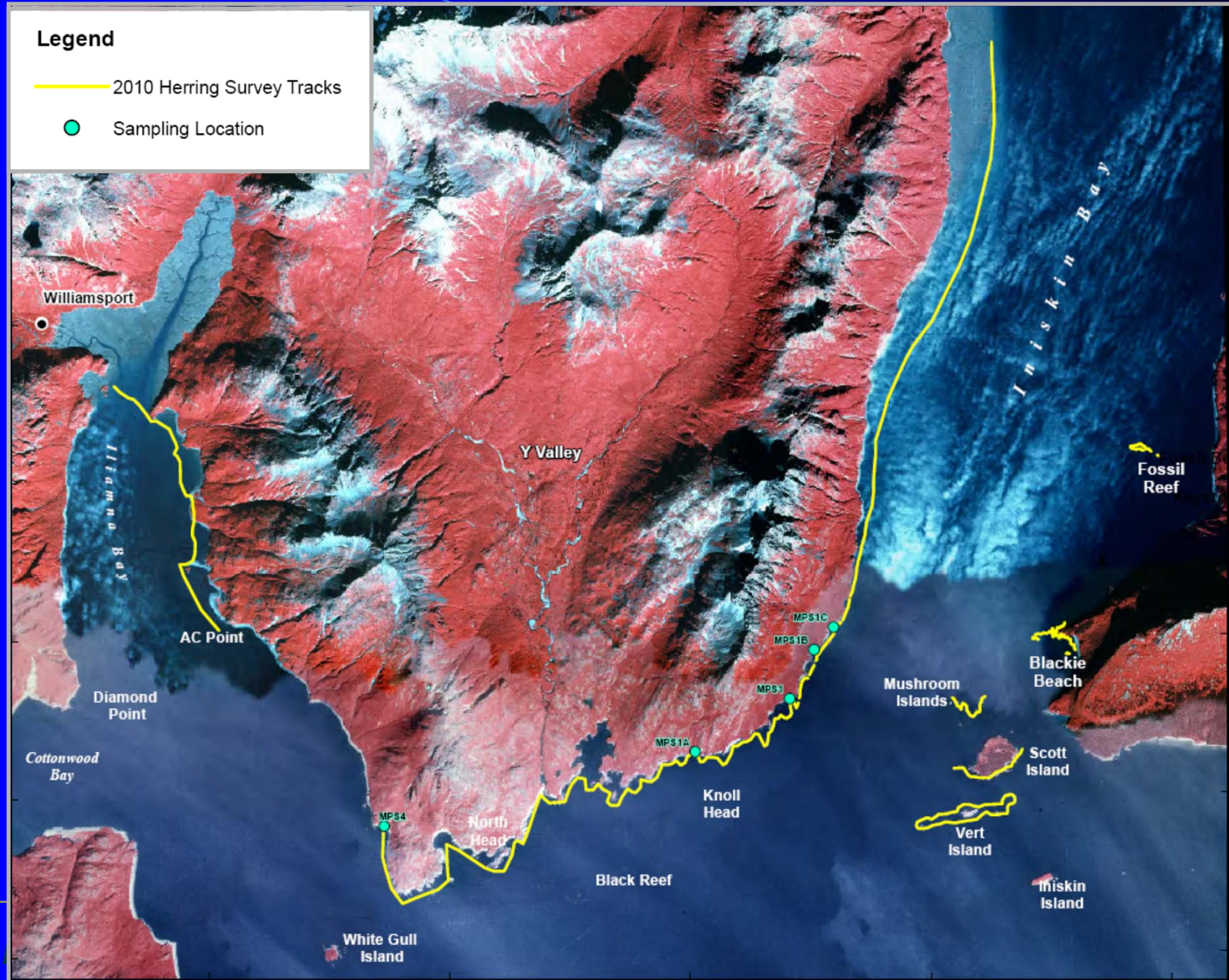


Alaska State Plane Zone 5 (units feet)  
1983 North American Datum

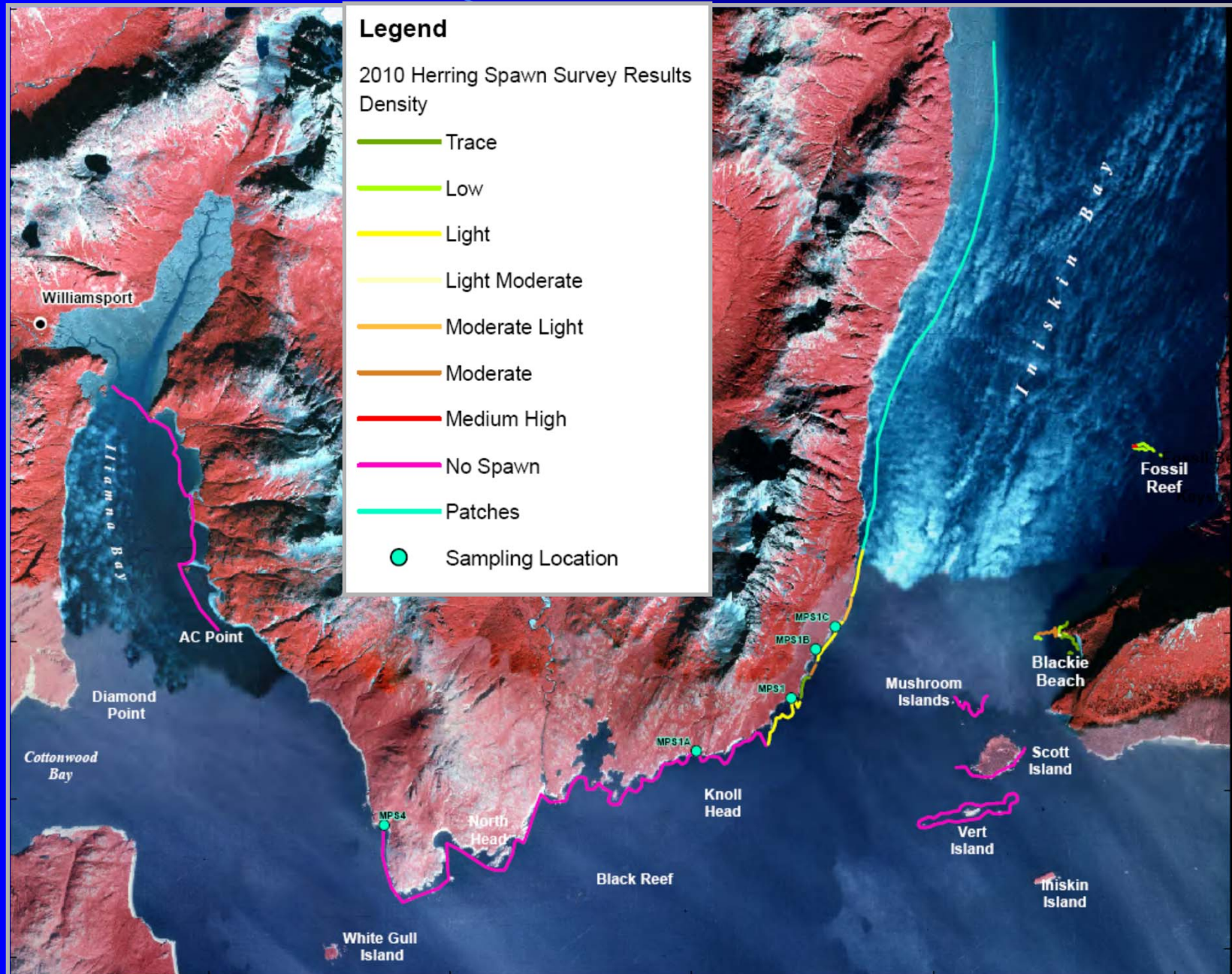
|  |                         |
|--|-------------------------|
| File: R01_Fer_Herring_Spawn_Fig0302_002025_half_030808 | Date: November 20, 2008 |
| Version: 1   | Author: R01LA           |



# 2010 Herring Spawn Survey Transects



# 2010 Herring Spawn Deposition



# Nearshore Fish Summary

- Diverse habitats
- Moderate stress environment
- Highly seasonal use
- Variable fish densities
  
- Probable importance to adjacent Kamishak ecosystem
  - Herring spawning
  - Nursery for salmon, FF, flatfish, and crab



# Questions?

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[Jason.stutes@pentecenv.com](mailto:Jason.stutes@pentecenv.com)

# Dietary Composition of Yellowfin Sole

n = 8

