



13

Dive Fisheries in Alaska



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Presentations



Readings



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Questions

This module will cover four main areas:

1. Biology Invertebrate Species
2. Dive Fisheries
3. Dive Fishery Management
4. Paralytic Shellfish Poisoning

When viewing recorded lectures, the slides will automatically advance. The Prev and Next buttons are available but it is recommended you listen and view the recorded lectures in auto mode. You can return to the main menu of the recorded lectures by tapping the recorded lecture icon (speaker).

At the end of each of the areas there are self-check quizzes to make sure that you understand the basic student learning outcomes for each area.





By the end of this module you should be able to:

- List the important Invertebrate species of Alaska
- Describe the basic ecology for the commercial invertebrates harvested in Alaska
- Identify various invert harvest techniques
- Identify the products that are the target of invertebrate dive harvests
- Demonstrate basic tenants of invertebrate management
- Differentiate between the types of abundance estimates
- Describe the species, symptoms and treatments for Paralytic Shellfish Poisoning
- Identify techniques for sampling invertebrates for PSP



## Fisheries Technology

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Read pp1-8 in  
Dive Fisheries.pdf in iBooks

A vertical stack of four blue and white illustrations of marine life: a fish, a shell, a crab, and another fish.

## Fisheries Technology

About the Presenter

Kellan Shoemaker - Dive Fisherman

Invertebrate Biology

General Biology of Invertebrates (10 minutes)

Dive Fisheries

How Dive Fisheries Work (35 minutes)

Dive Fishery  
Management

Dive Fishery Management (20 minutes)

Paralytic Shellfish  
Poisoning

Paralytic Shellfish Poisoning in invertebrates (10 minutes)



## Kellan Shoemaker

Dive Fisherman  
Sitka, Alaska

Growing up in Southcentral Alaska Joel was continuously exposed to the outdoors and fisheries. After graduating from Bartlett High school in Anchorage, he pursued a growing passion for fisheries by attending Montana State University in Bozeman, MT where he received a B.S. in Fish and Wildlife Management while honing his skiing and fly fishing skills. This newfound knowledge allowed Joel to work various fisheries jobs all over Alaska, traveling to exotic places all while under the context of 'work'. After spending time in places like Katmai, Aniakchak, Kenai Fjords, Denali, The Tongass and Wrangell St. Elias he decided to pursue a graduate degree in Marine Biology from the University of Alaska Fairbanks where he used SCUBA to study the nearshore fish and habitat complexity in Kachemak Bay.



Before coming to the UA system, Joel was a research fisheries biologist with the Kachemak Bay Research Reserve in Homer. While there he studied marine ecology and questions pertaining to fish habitat use in the nearshore environment. Joel also coordinated a nationwide water quality and meteorological monitoring project and worked on a hardshell clam recruitment and growth study focused on determining the timing of spawning, recruitment and growth of pacific littleneck clams.

Joel has been with the Fisheries Technology program since 2013 when he was an outreach coordinator and adjunct faculty at the Homer campus. In his free time Joel enjoys backcountry skiing, fishing, sailing, is an avid Scuba diver and dive instructor, and generally likes spending time outside. He is passionate about teaching and Alaskan fisheries.

# Dive Fisheries

Is a dive fishery like a dive Bar?





## Dive Fisheries

Dive fisheries target species that cannot be captured with other methods

Hook & Line

Bait

Traps

Trawls







## Species Targeted

Sea Cucumbers

*Parastichopus californicus*



Red Sea Urchins

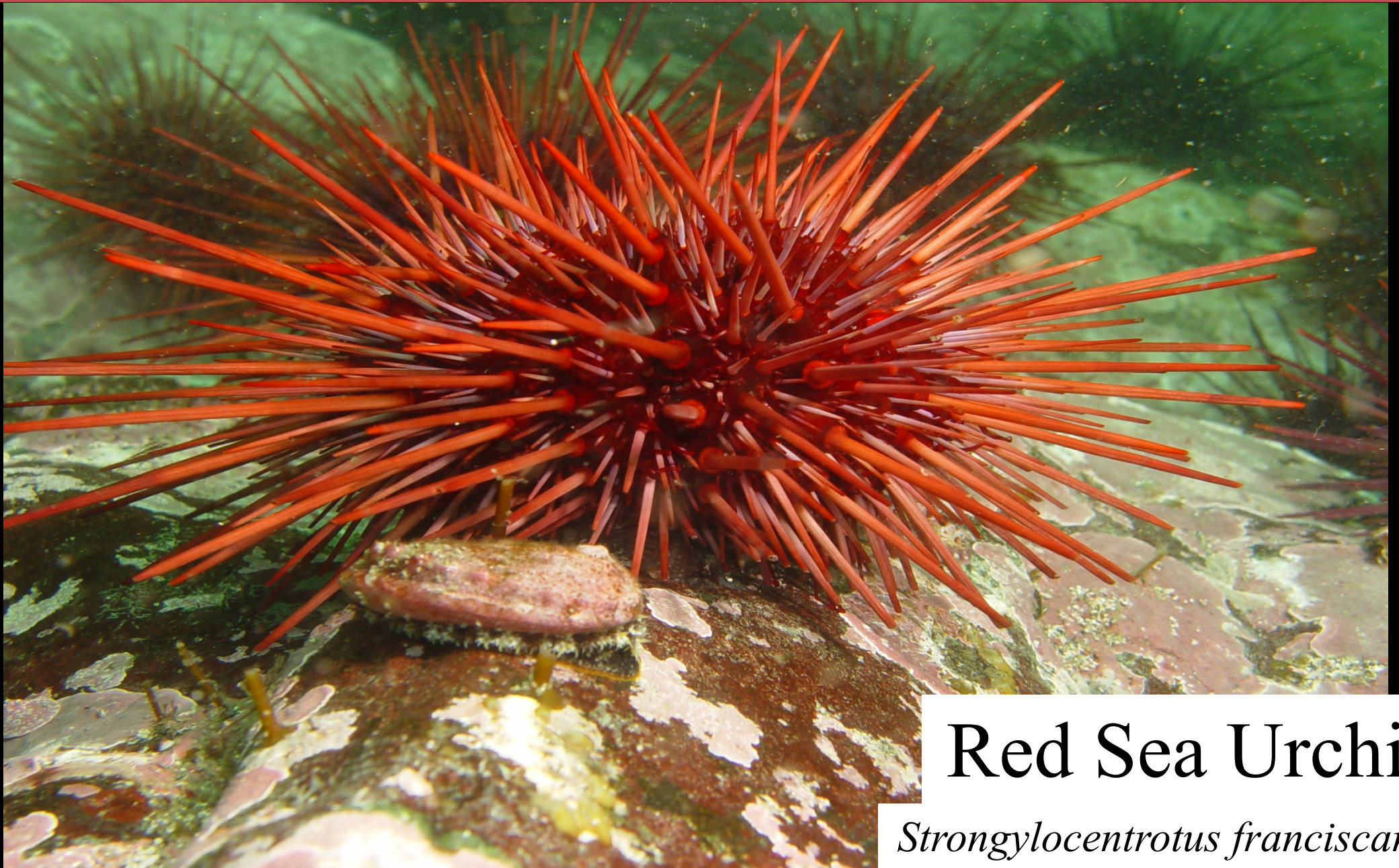
*Strongylocentrotus franciscanus*



Geoduck Clams

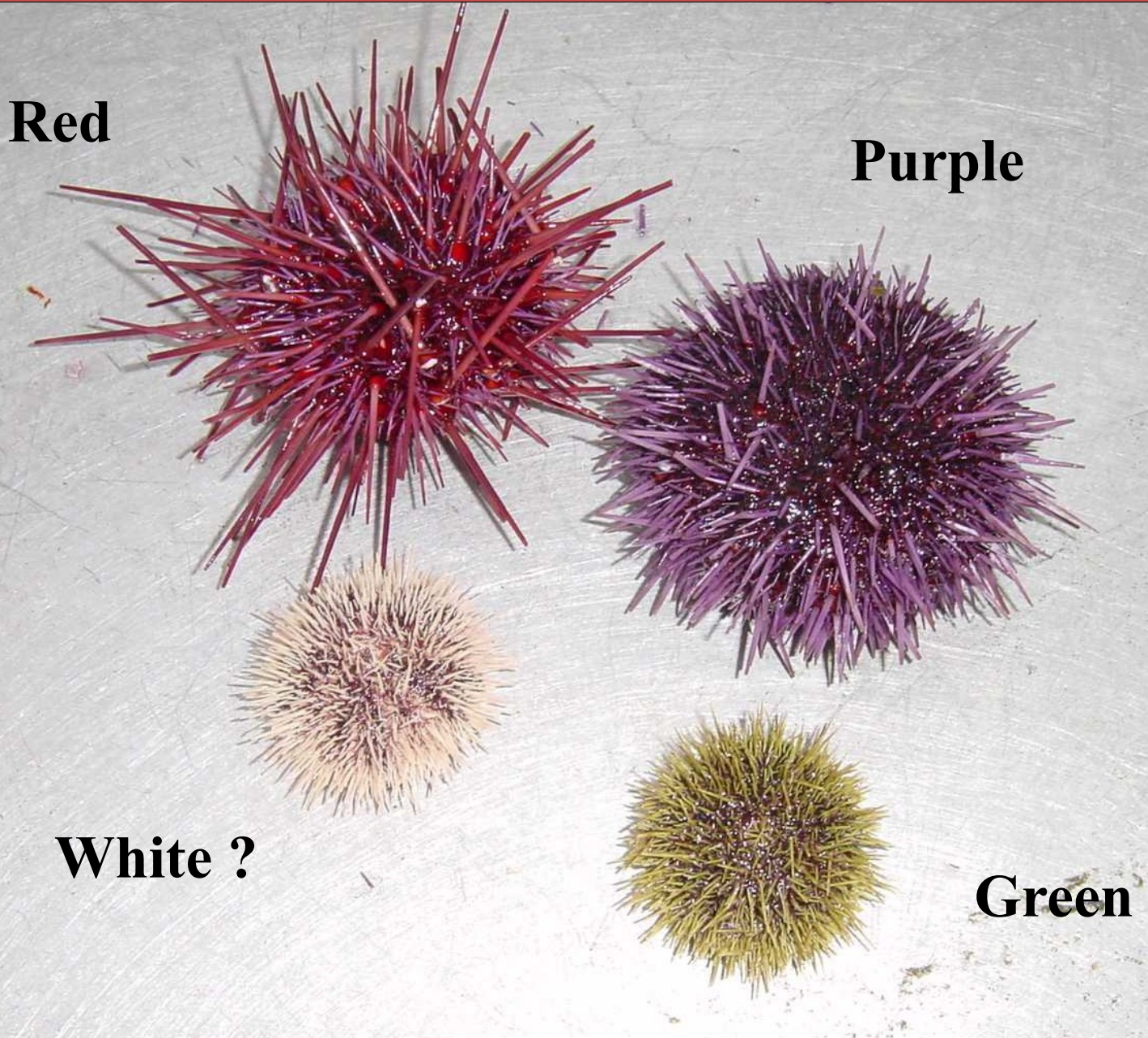
*Panopea abupta*





## Red Sea Urchin

*Strongylocentrotus franciscanus*



**Red**

**Purple**

**White ?**

**Green**



# Red Sea Urchins

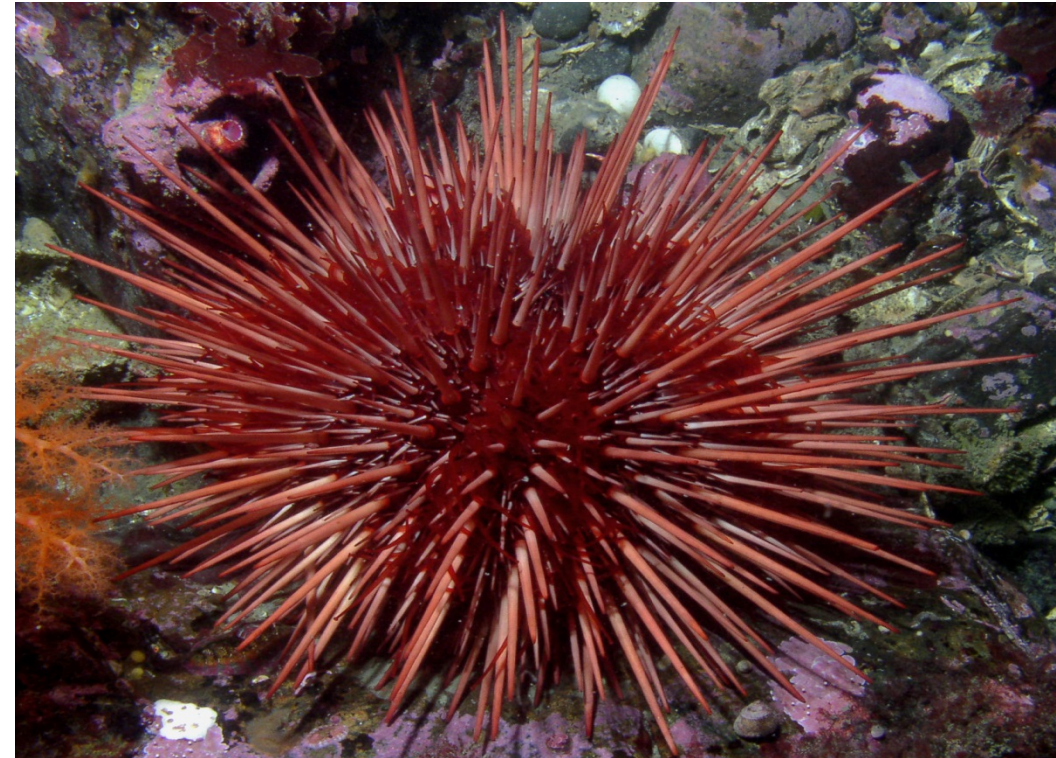
(*Strongylocentrotus franciscanus*)

Ak to Baja

0 – 90m (300ft)

Diameter to About 10 Inches

Age to 30 Years ?? New data suggests 100 years +





# Red Sea Urchins

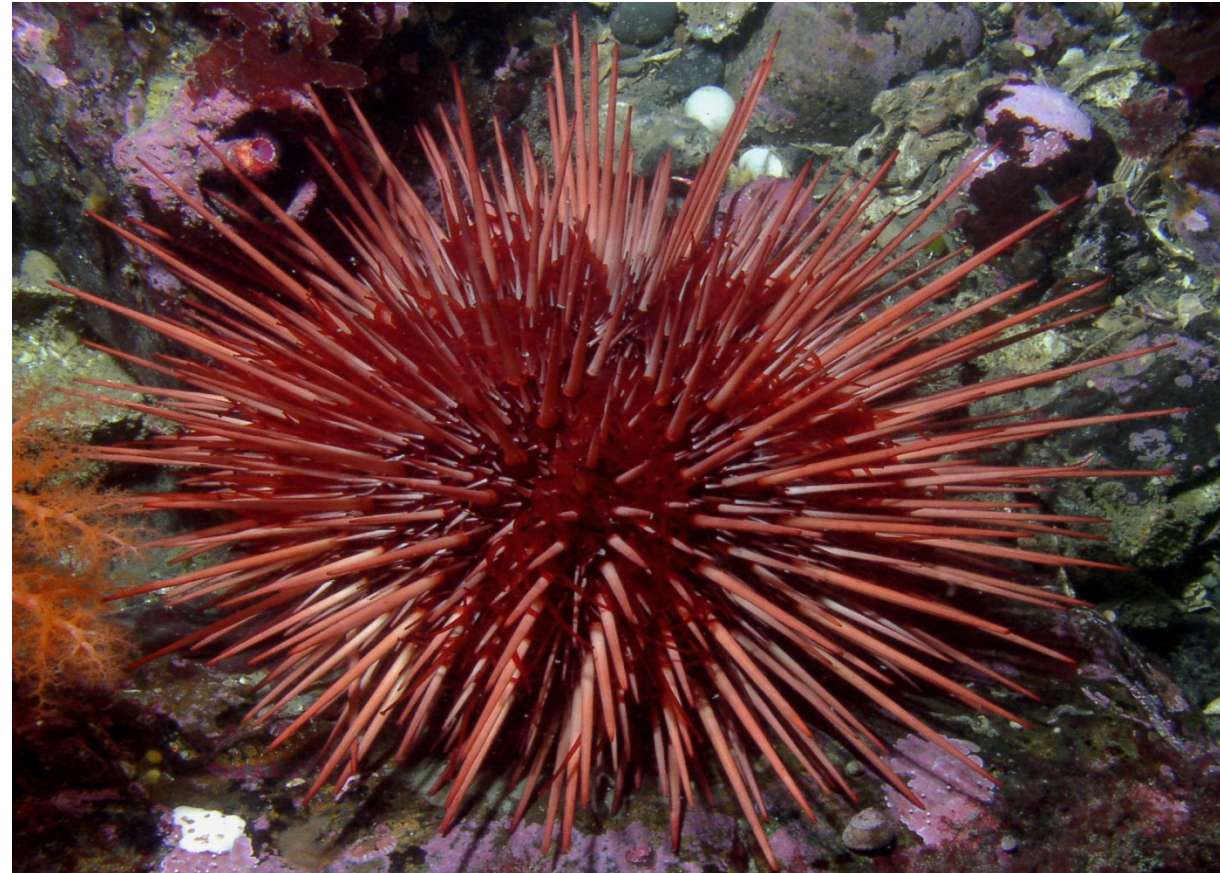
*(Strongylocentrotus franciscanus)*

Mouth with special jaws (Aristotle's lantern)

Broadcast spawners

Phylum?

Symmetry





Urchin Roe - Green Urchin



# Red Sea Urchin Roe "Skein"



# Red Sea Urchin Processing





# Urchin Dive Boat



# Urchin Dive Gear

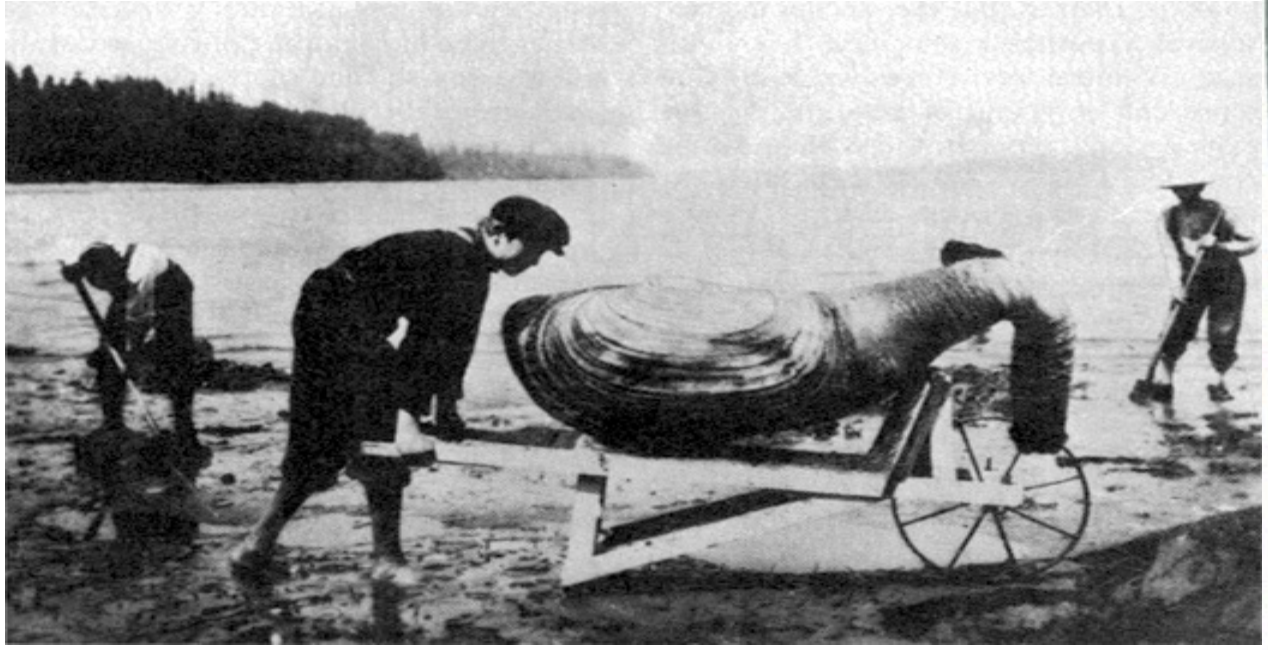




## Geoduck Clams

*Panopea abupta*

# There Big!





# Geoducks (*Panopea abrupta*)

Ak to Washington

Size to 7 3/4 inches (as much as 2 m (6 ft))

Depth to 100 m (330 ft +)

Weight up to 10 pounds (2.5 lb avg.)

Largest intertidal clam in the world

Age to 147 years (avg 40 yrs, 11-89) **THAT'S OLD!**

Body cannot be withdrawn into shell





## Bivalves

Geoduck

Nuttals cockle

Horse clam

False geoduck

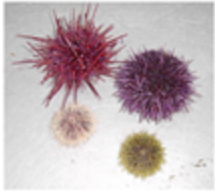
Truncated softshell clam

Northern horsemussel

Kennerlys venus



Identify the Red Sea Urchin from the below Picture



## Invert Biology

*Quiz - 4 questions*

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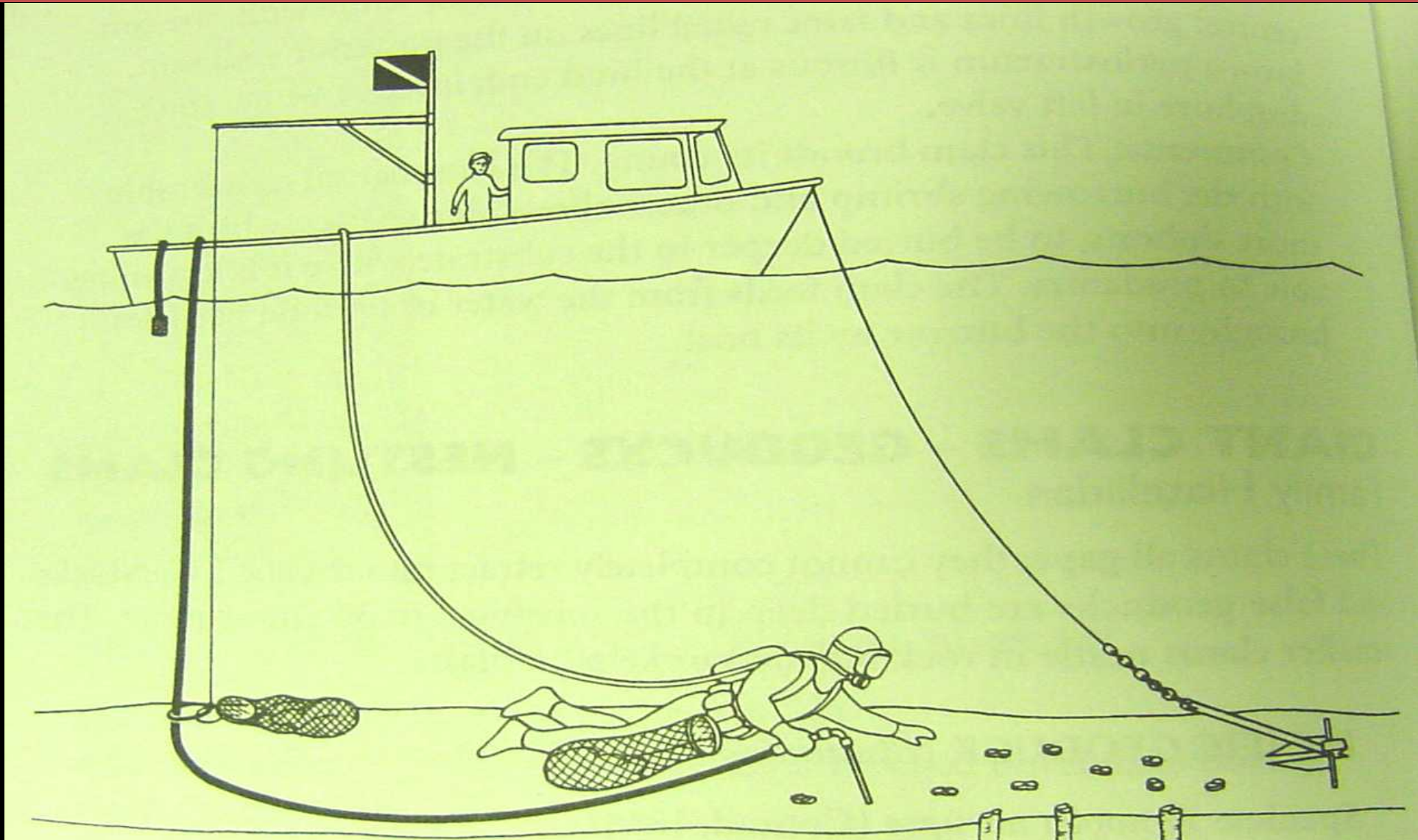


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Geoduck fishing vessel



Geoduck Harvest Method





## Sea Cucumber

*Parastichopus californicus*



# California Sea Cucumbers

*(Parastichopus californicus)*

AK to S. California

0 – 250 m (820 ft)

Up to 50 cm long

Largest sea cucumber in our area

Age to 12 years ?

What Phylum?



# California Sea Cucumbers

*(Parastichopus californicus)*

Moves by using tube feet

Eats sediment and filter feeds

Mouth is surrounded by 20 tentacles

Has ability to eject “guts” when agitated

Broadcast spawner



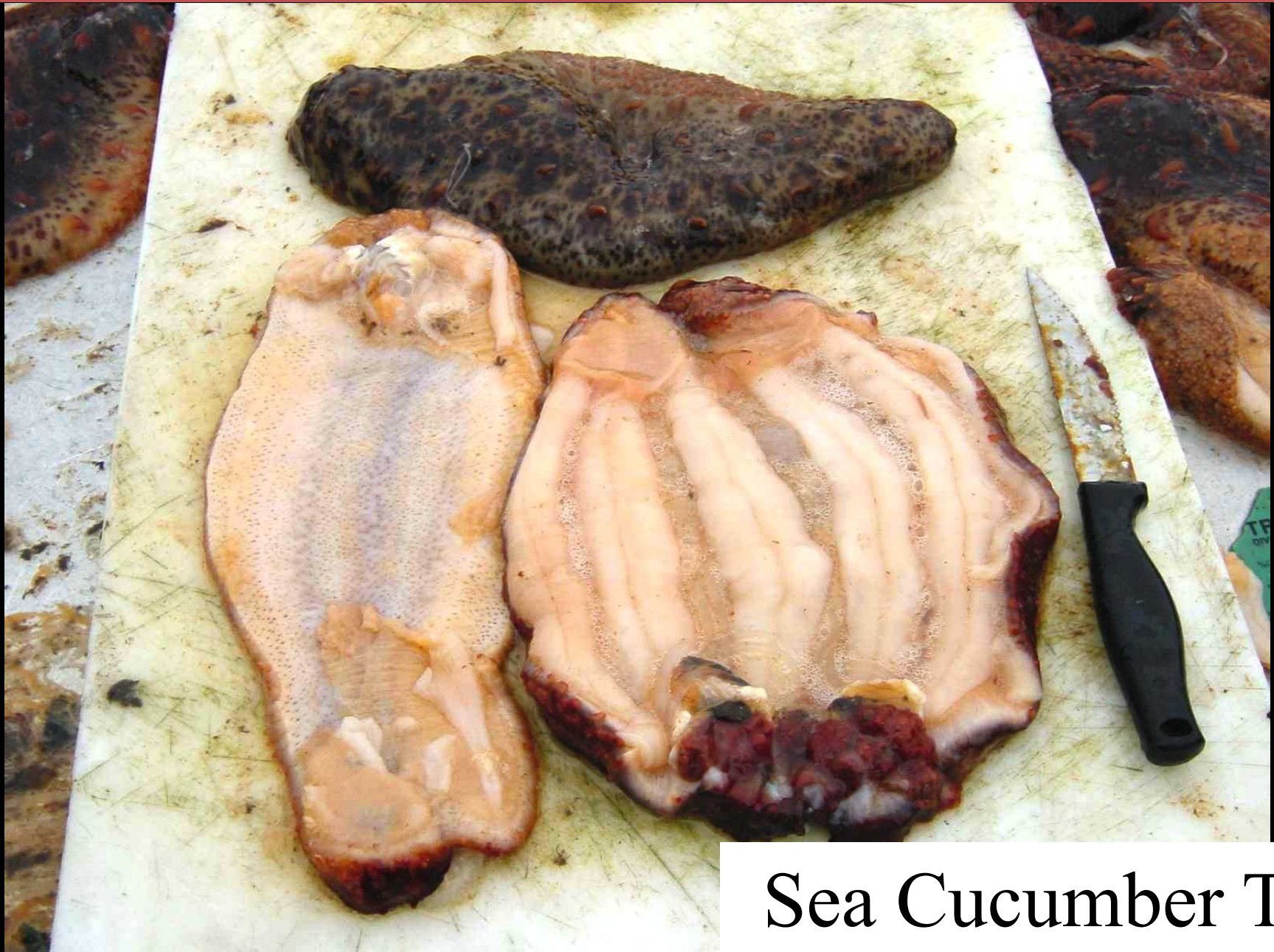


## Sea Cucumber

*Parastichopus californicus*







Sea Cucumber Tissue



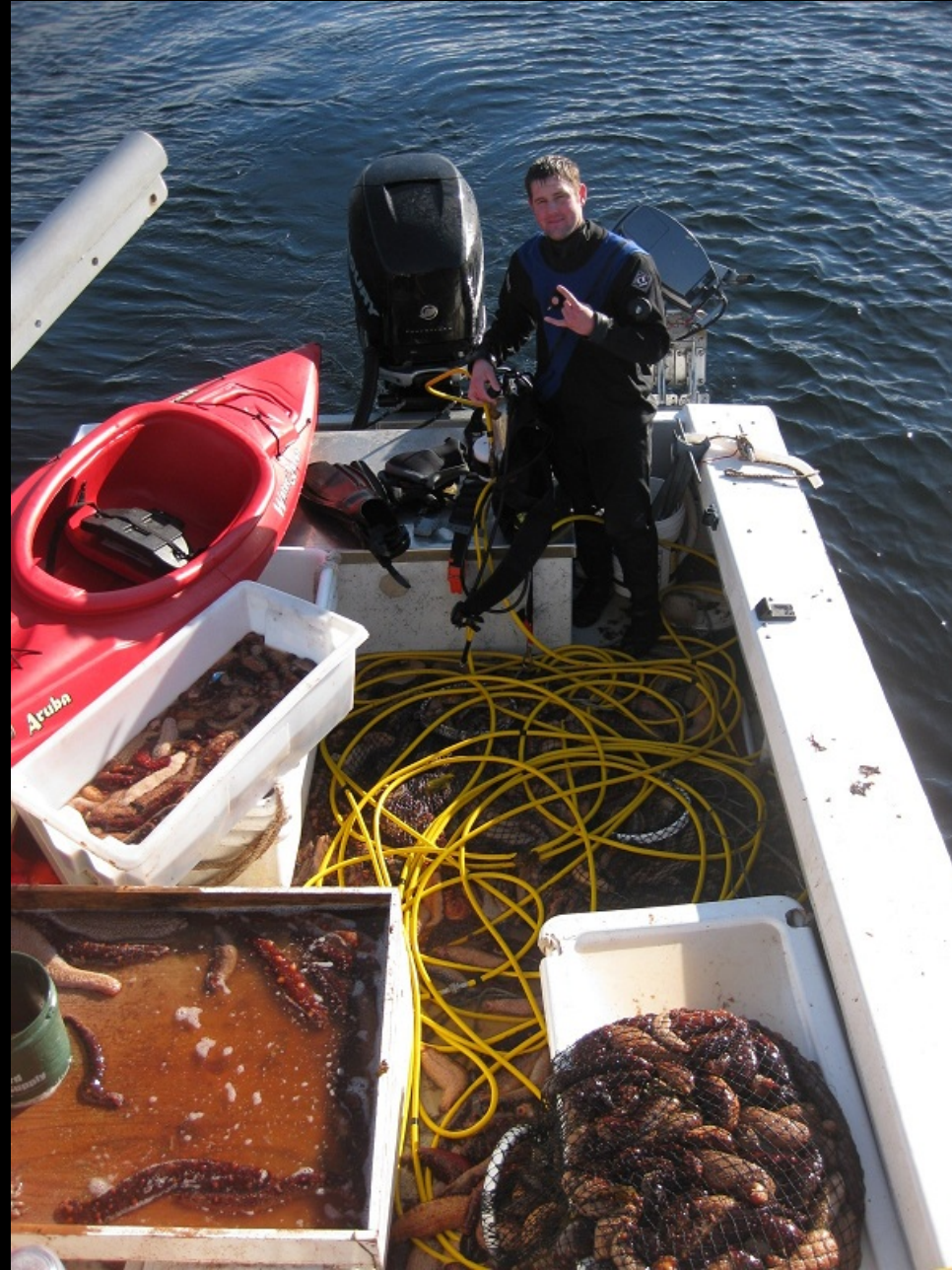
Sea Cucumber Meat



Sea Cucumber Fishing Vessel



Sea Cucumber Fishing Vessel

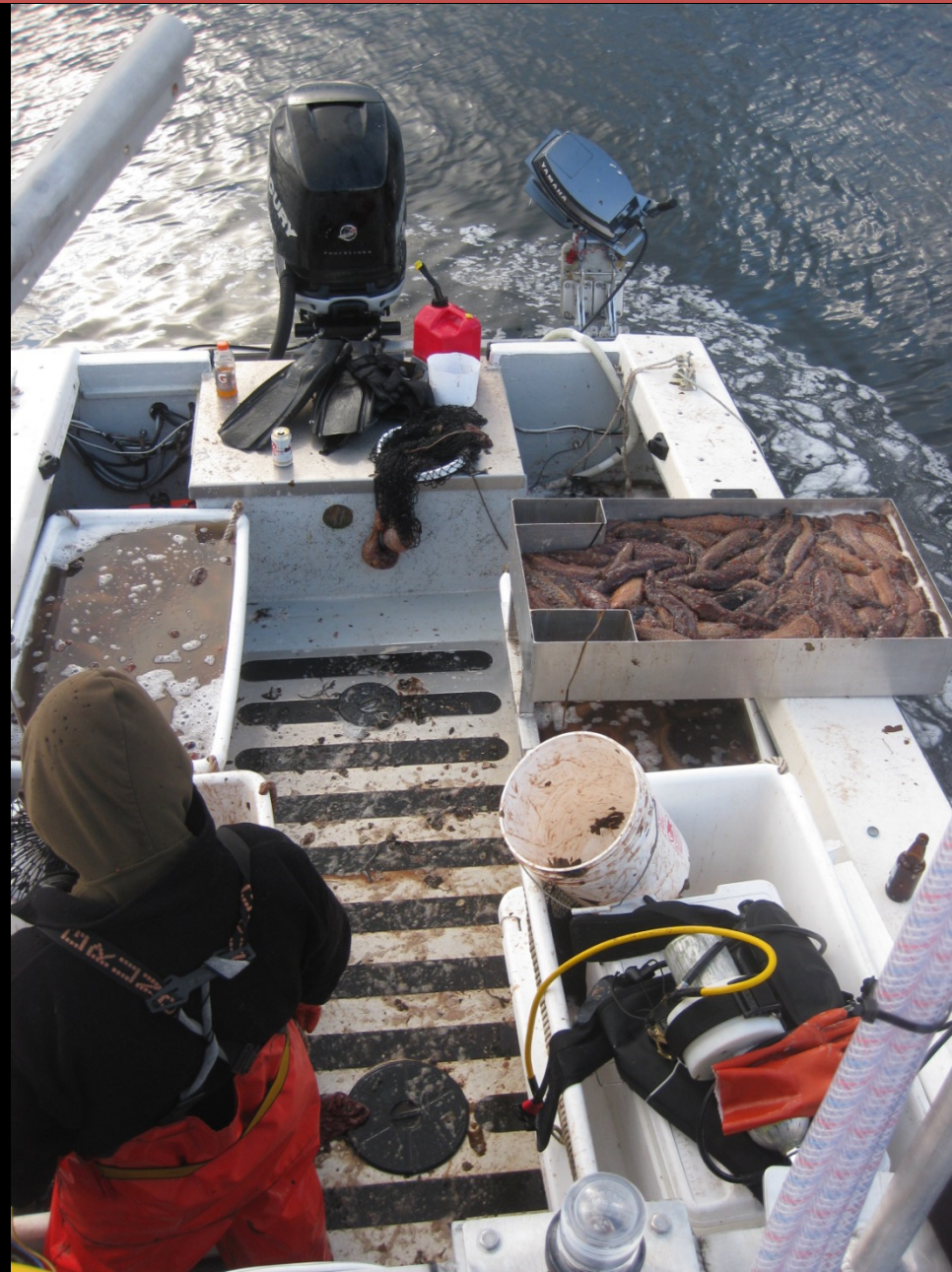














Sea Cucumbers on Dive Boat





## Dive Fishery

Quiz - 4 questions

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# Management

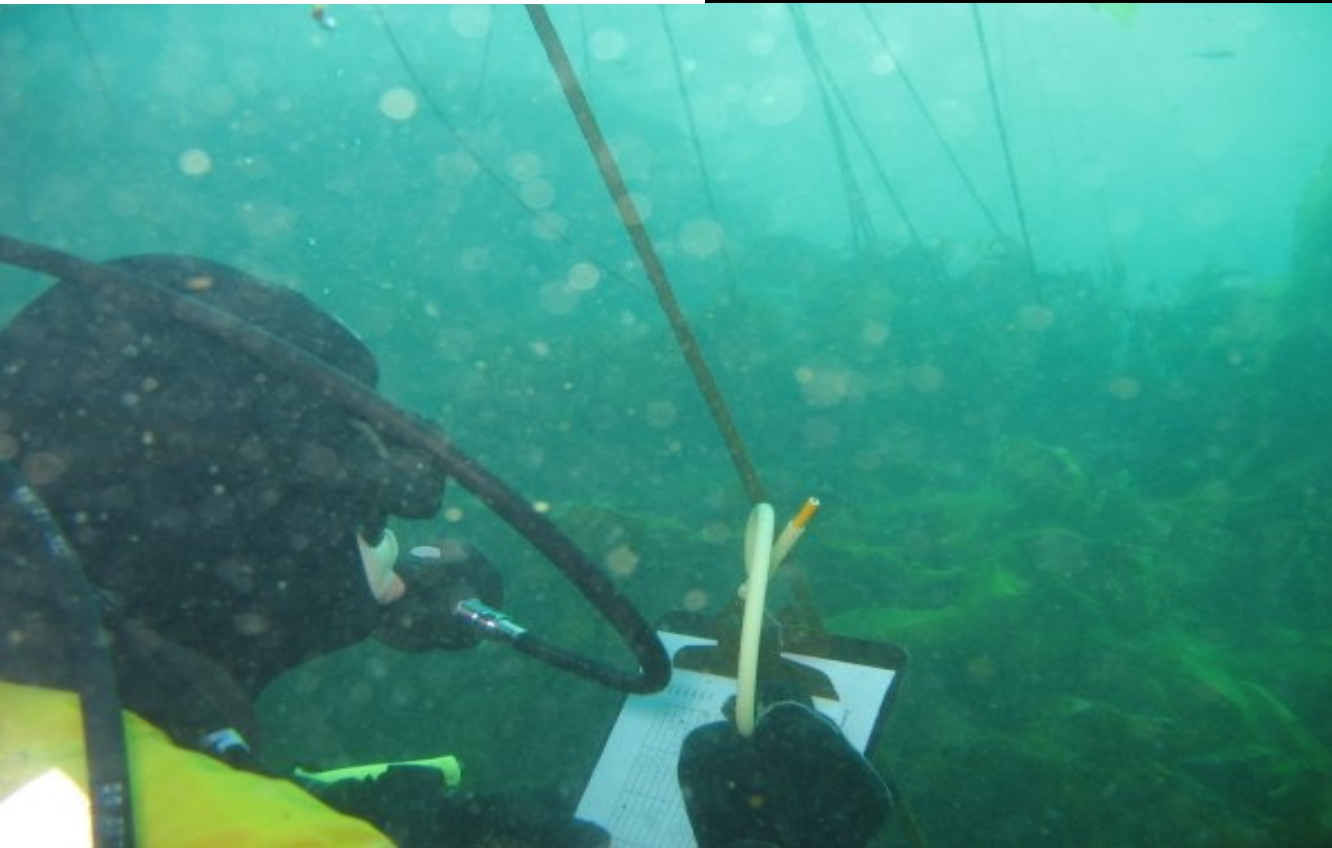
I want to commercially harvest sea cucumbers, sea urchins and geoduck clams.



How do I determine how many there are?

Management

# Dive Surveys



## Dive Surveys

Areas are managed by sub-district or area

Miles of shoreline are measured

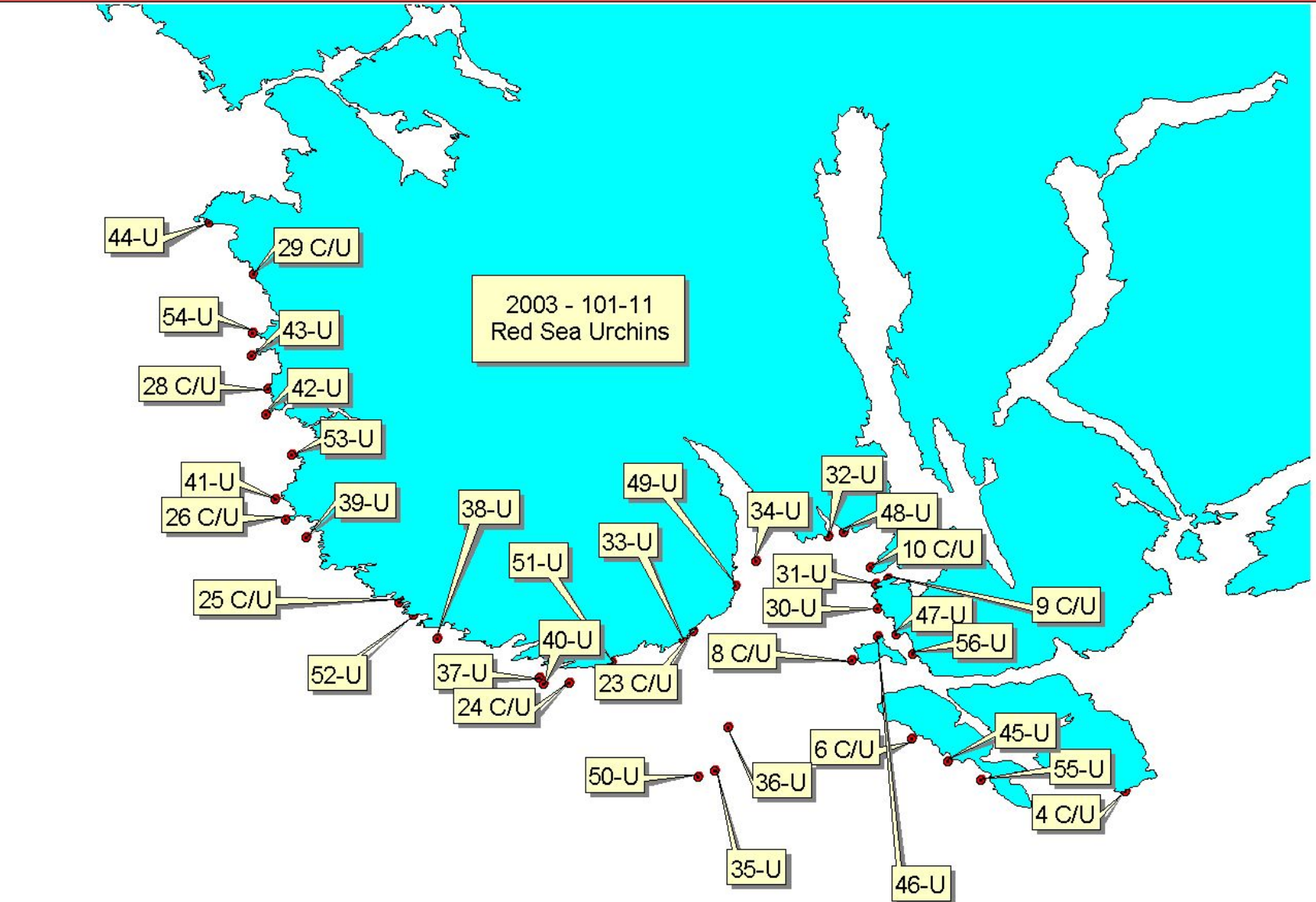
Dive sites are determined using random number generator

Dives are perpendicular to the shoreline “0 feet” to “-50” + or - tide

Divers estimates are made by divers along a 1 or 2 meter wide strip

Number of animals along with substrate data are recorded

# Management



Survey Sites for one area



# Management



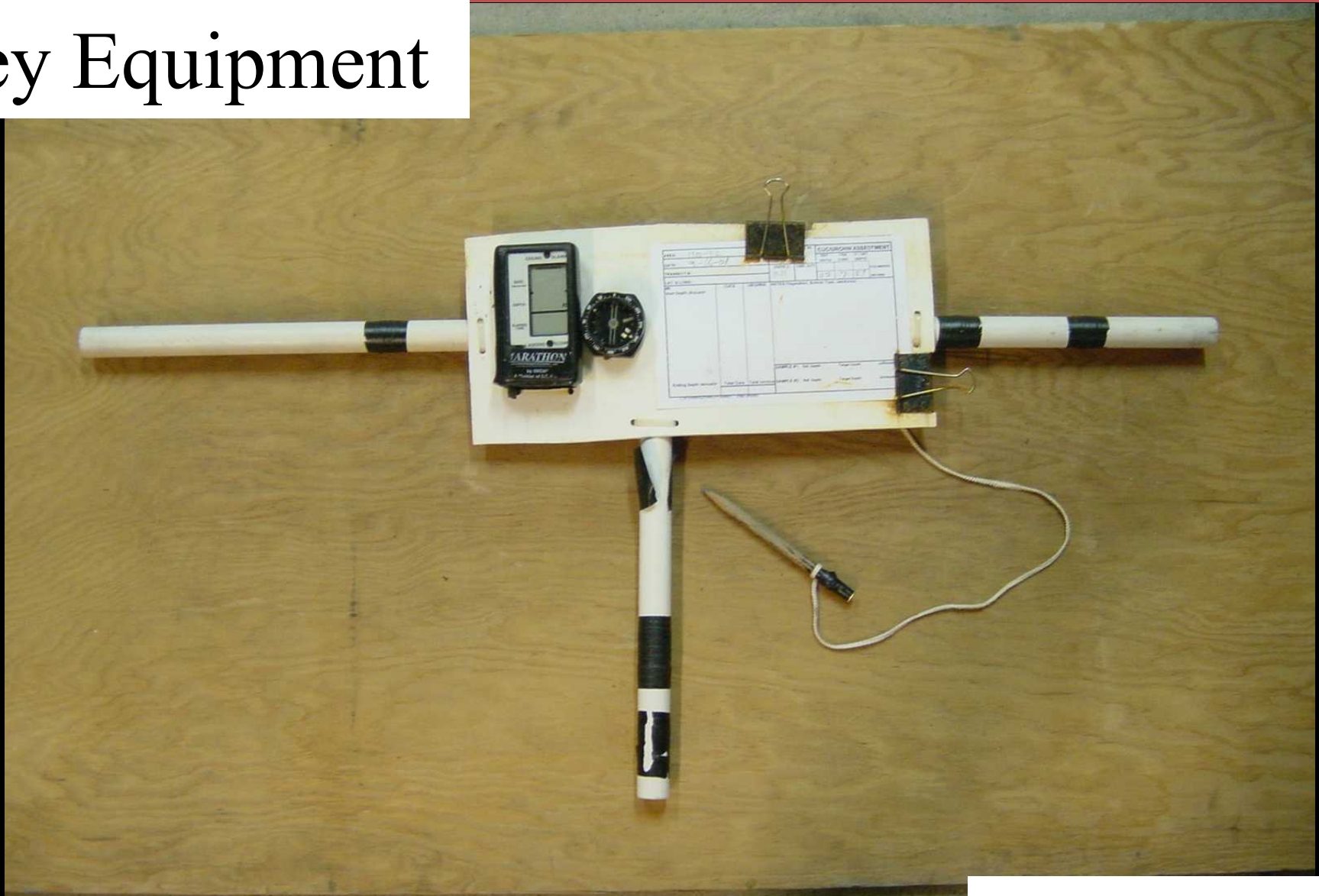
Research Vessel Kestrel

# Management



Dive Boat

## Survey Equipment

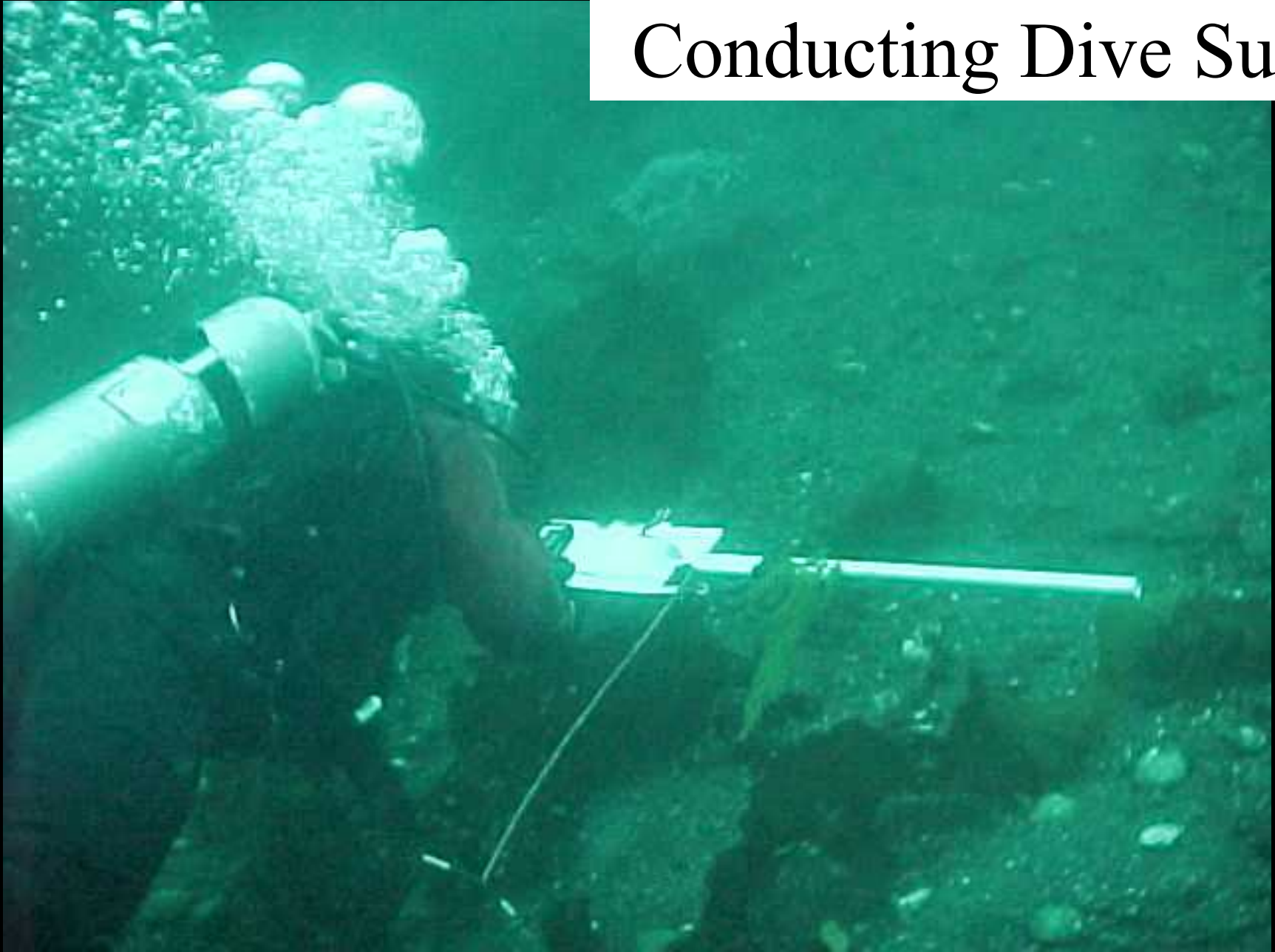


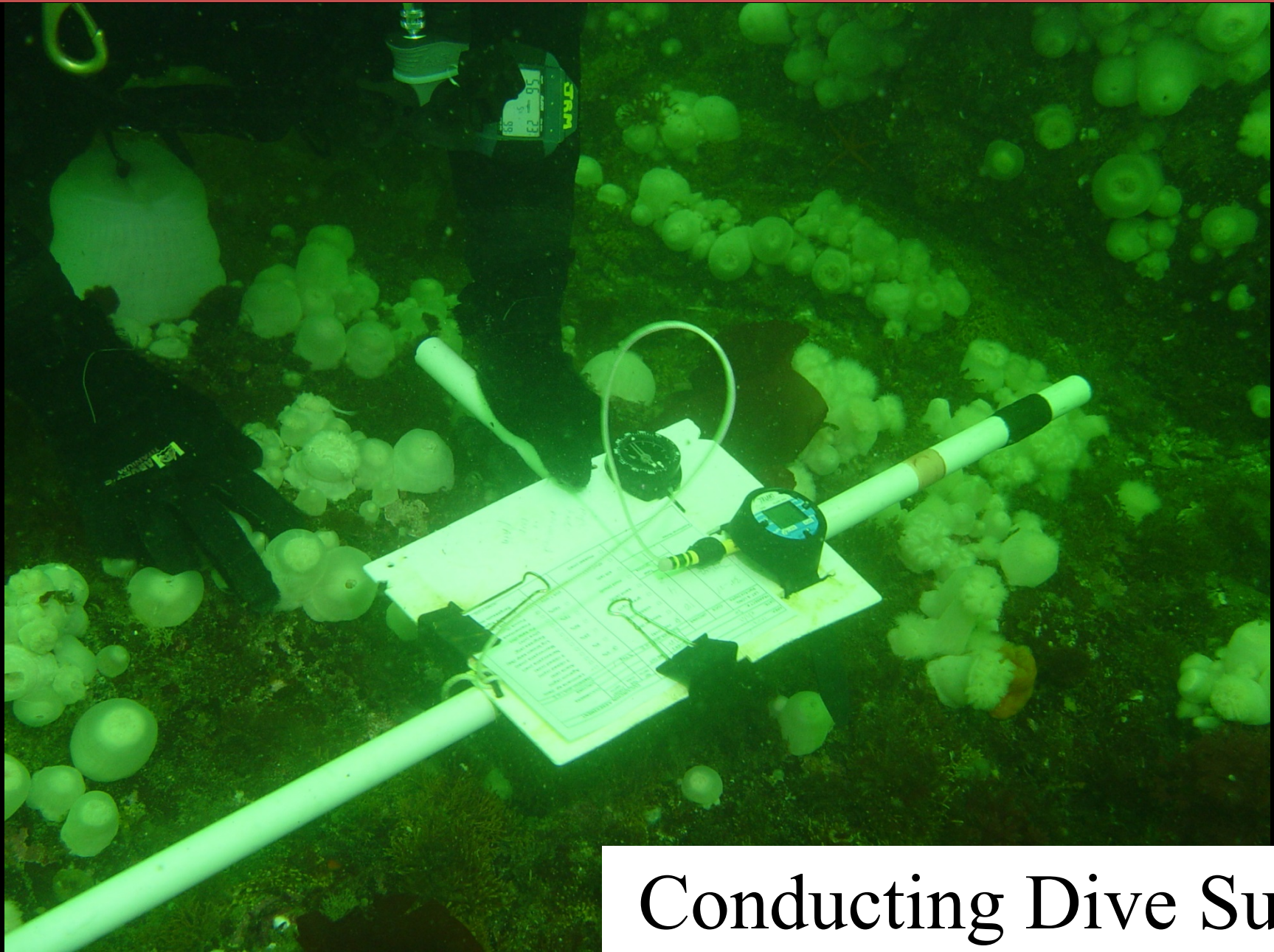
1 or 2 meter rod



Conducting Dive Surveys

## Conducting Dive Surveys





Conducting Dive Surveys

## Biomass Estimates

### **Density X Mass X Habitat**

Density = animals per linear meter shoreline (mean across all transects)

Mass = size of animals mean across all transects

Habitat = linear meters of shoreline or area

# Geoduck Assessment Surveys



How do you count a geoduck?



# Management



Geoduck “show”



Geoduck “show”



Horse clam “show”

# Management



Poor geoduck show

## Geoduck Dive Surveys

Beds are surveyed

New beds are found by reconnaissance surveys

Biomass surveys are conducted on known beds

Shows are counted

# Management



Sea Cucumber Mgmt

## Sea Cucumber Management

### **SARDFA**

Dive fishery assessment

– GHL (Guideline Harvest Level) is determined

Fishery is on three year rotation

Vessels are Registered

Catches are Summarized

Areas are Closed when GHL is reached

## Sea Cucumber Management

Fishery occurs Monday and 1/2 of Tuesday

First Monday in October

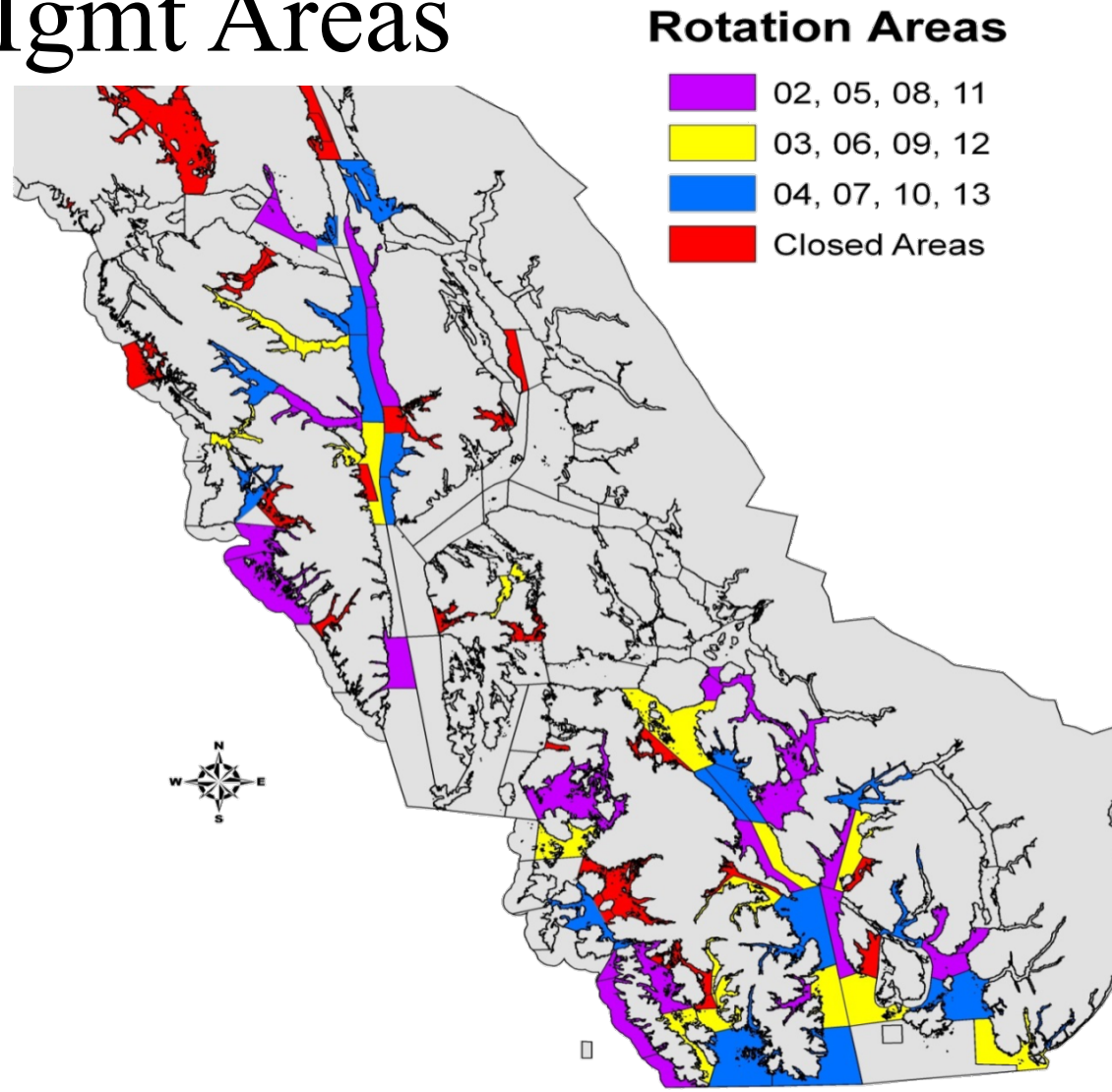
Daylight hours only

Divers have trip limit of 2000 pounds

Only two divers can harvest off a registered fishing vessel

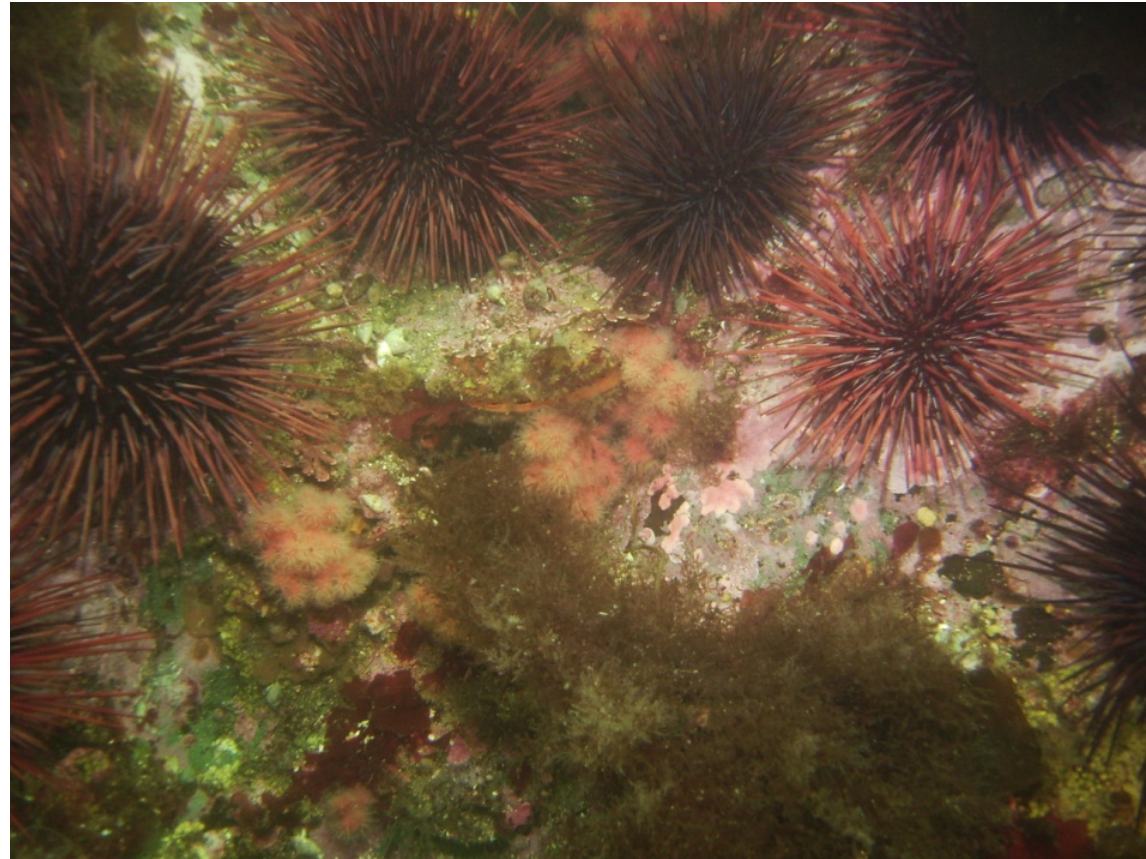


## Sea Cucumber Mgmt Areas



**Southeast Alaska Sea Cucumber Fishery  
3 - year rotation schedule**

# Red Sea Urchin Management



## Red Sea Urchin Management

Urchin Areas Surveyed

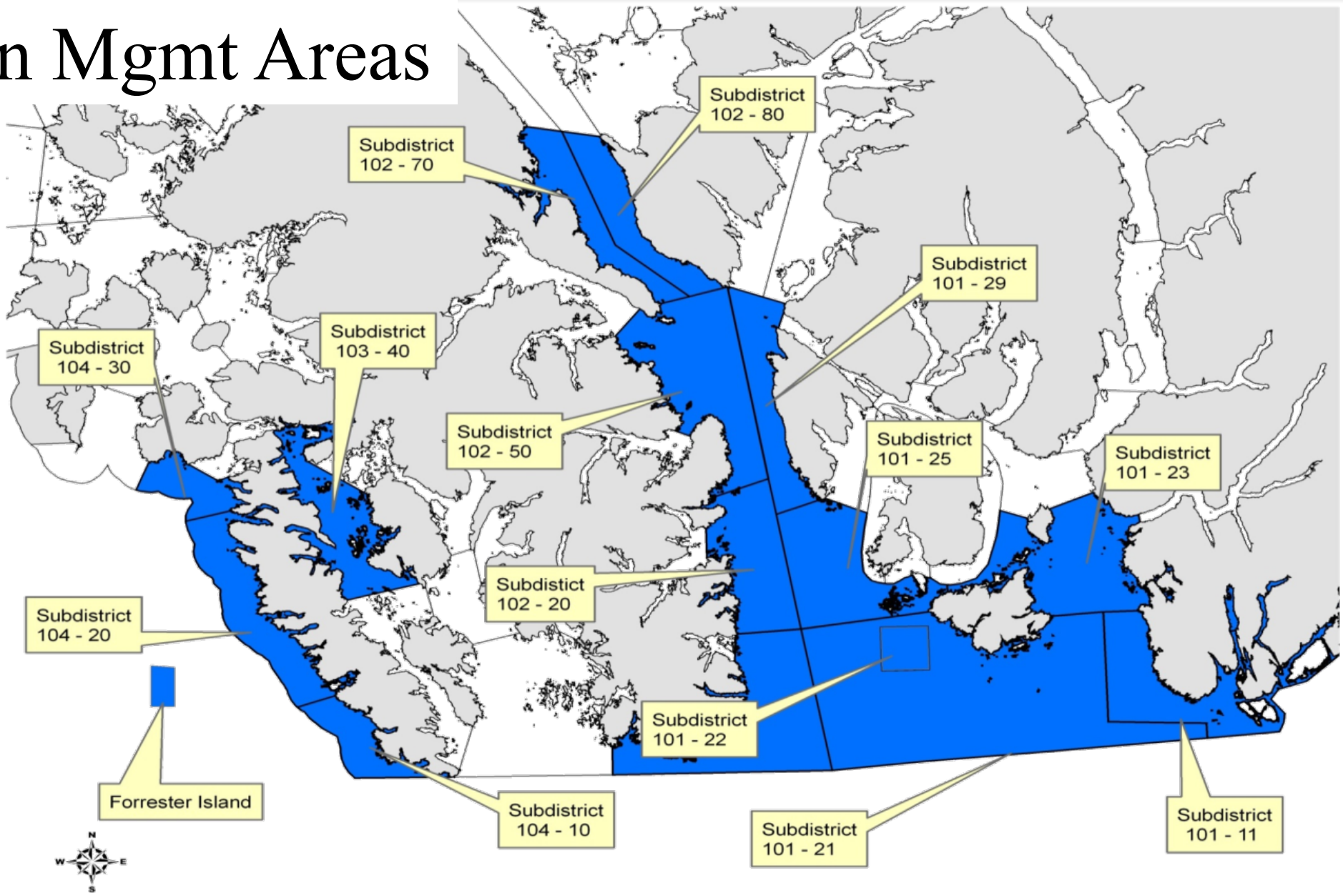
Guideline Harvest Level (GHL) is determined

Areas opened for Commercial Harvest

Fishery for eggs or “Uni”

Areas closes as GHL's are reached

## Urchin Mgmt Areas



Management

# Geoduck Management



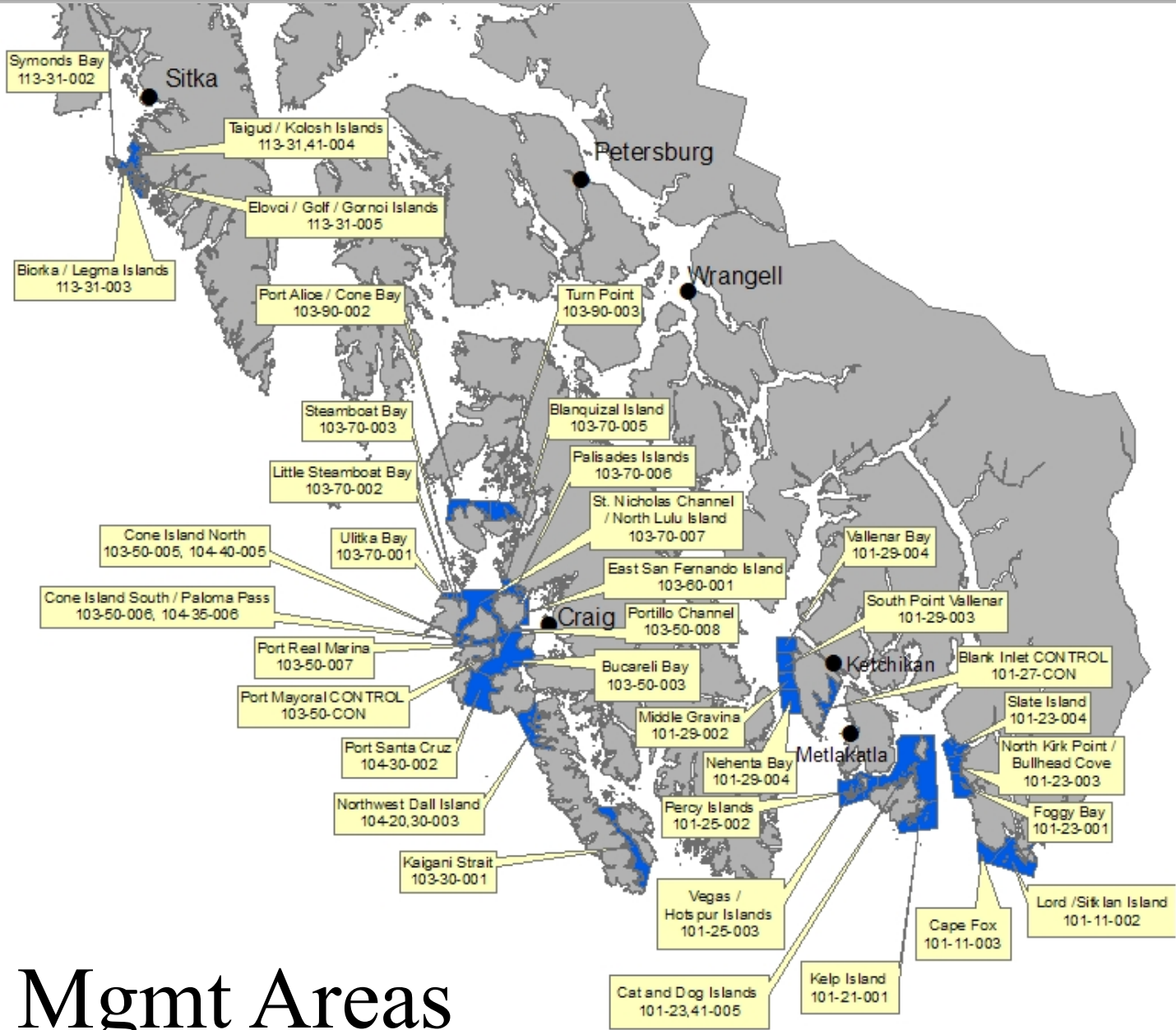
## Geoduck Management

GHL's are determined by diving

The Department works with SARDFA (Southeast Alaska Regional Dive Fisheries Association) to determine fishery times – 2006 - Oct – First Thursday

Fished Thursday each week until Thanksgiving then Wed-Thur each week

# Management



# Geoduck Mgmt Areas

Cucumbers, Urchins, and Geoducks are counted by managers using

- Dive Surveys
- Trawl Surveys
- ROV Surveys
- Abundance Estimates

## Dive Management

*Quiz - 5 questions*

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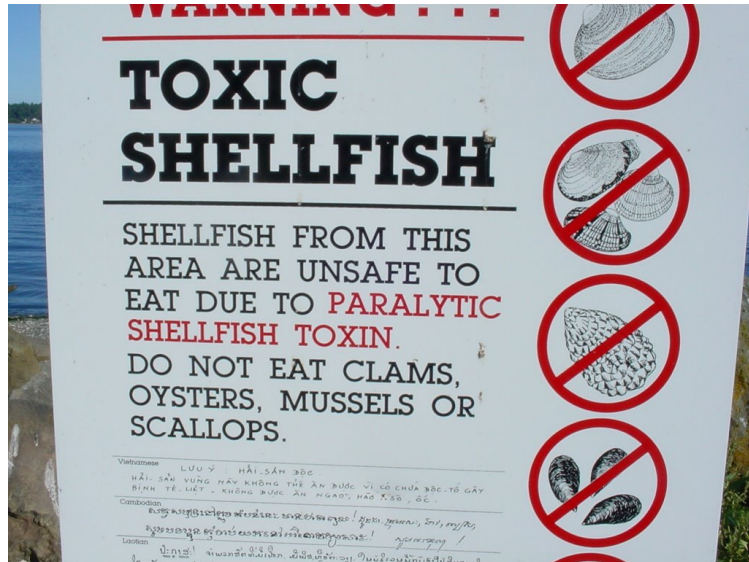


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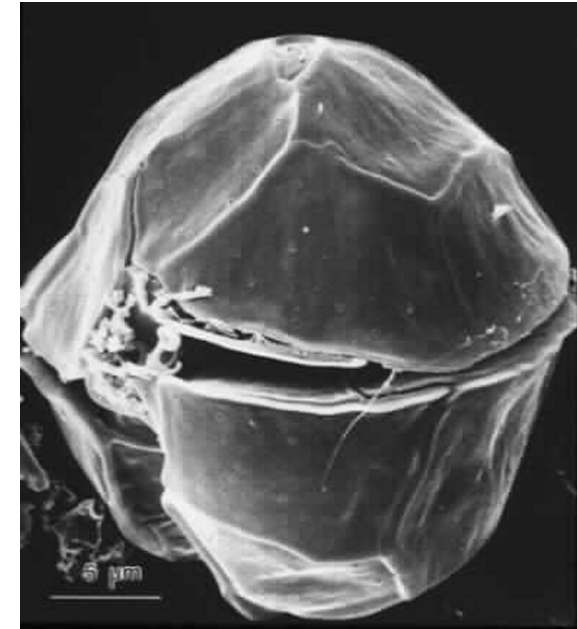


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## PSP levels



The determining factor for the geoduck clam fishery



# Paralytic Shellfish Poisoning - PSP



@ PJS Franks

# How PSP Effects the Commercial Fishery

Diver want to sell geoducks live to get top market prices





**PSP**



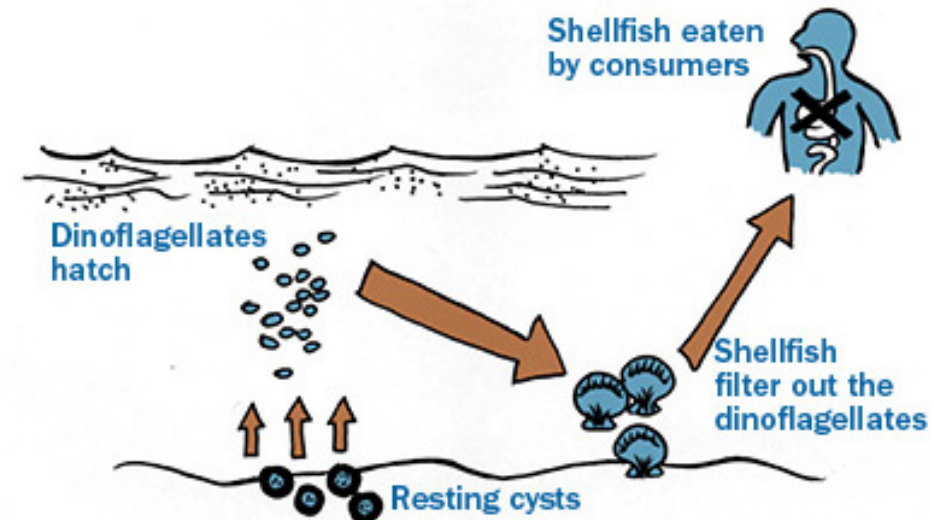
# PSP - Paralytic Shellfish Poisoning

Single - celled dinoflagellate algae

Produces saxitoxin a neurotoxin as a normal by product

Clams collect and concentrate toxins in tissue

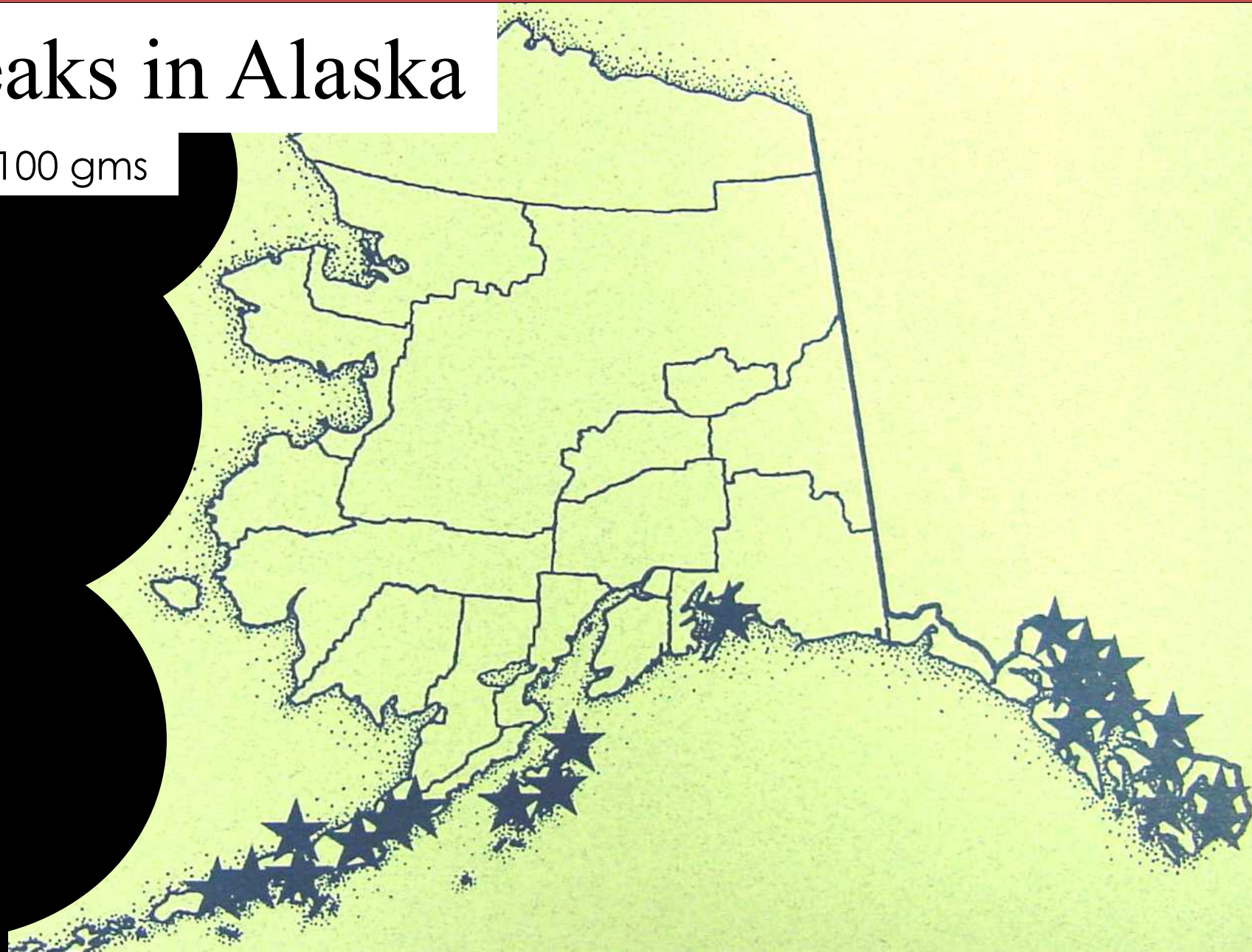
Mouse test only approved method to determine toxin levels





# PSP outbreaks in Alaska

Safety level is 80ug/100 gms





To be sold live, PSP levels must be under 80 ug/100 gms of tissue

“HOT” Geoducks must be processed

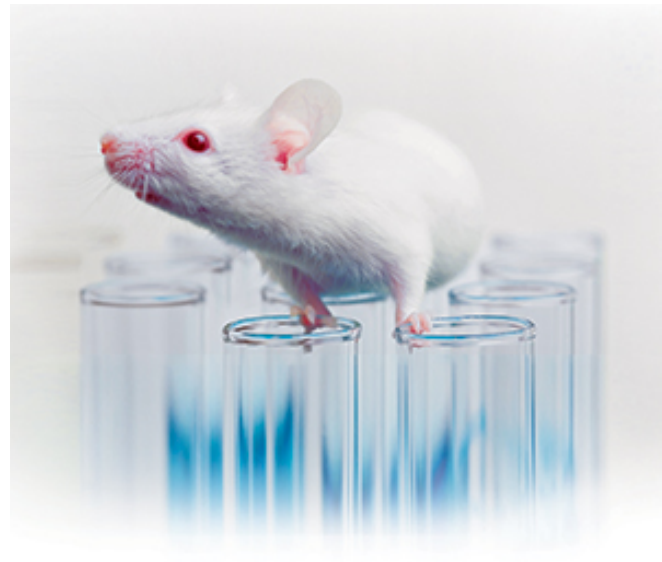
Processed = \$1.50 (06) vs Live = \$5.00 (06)



# Geoduck PSP Sampling

Before each fishery divers collect 3 clams and sends them to the ADEC lab in Anchorage for a “mouse test”

The information is sent to Fish and Game and the fishery occurs.







## Dive Research

*Quiz - 4 questions*

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There are no Videos for this module











-  How are Geoducks aged?
-  Do Geoducks accumulate toxins?
-  What do Sea Cucumbers taste like?
-  How many Sea Cucumber permits are there?
-  How Long is the Sea Cucumber season?
-  How do you choose where to harvest Sea Cucumbers?
-  Do you ever interact with sea life while underwater?
-  Is PSP related to temperature or season in any way?











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