Invasive Species Occurrence, monitoring, and impact to resources

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- **Thank You:**
- **Alaska Sea Grant and National Seagrant**
- **Marine Advisory Program**
- **Linda Shaw of NOAA NMFS**
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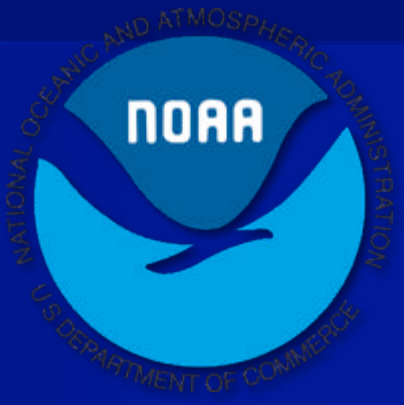
- BASC (Glenn, Lewis, Quniq)

- Thanks to everyone who has contributed to marine
- invasive species monitoring in Alaska!!!!!

- **Photo Credits:** ADF&G, G. Ashton, CSRIO, Robert Chadwick, Gary Freitag, Heather Mueret- Woody, Linda Shaw, Whitney Rapp, en.academic.ru, trailershut.com,alaskaharvest.com,yukonnews.com,outdoorswebshots.com,myhopemydreamsmylife.blogspot.com, www2.ucsc.edu, divernet.com, pznow.co.uk, dailykos.com, myclassiclyrics.com, theoysterbar.ca, dfg.ca.gov

Alaska Sea Grant

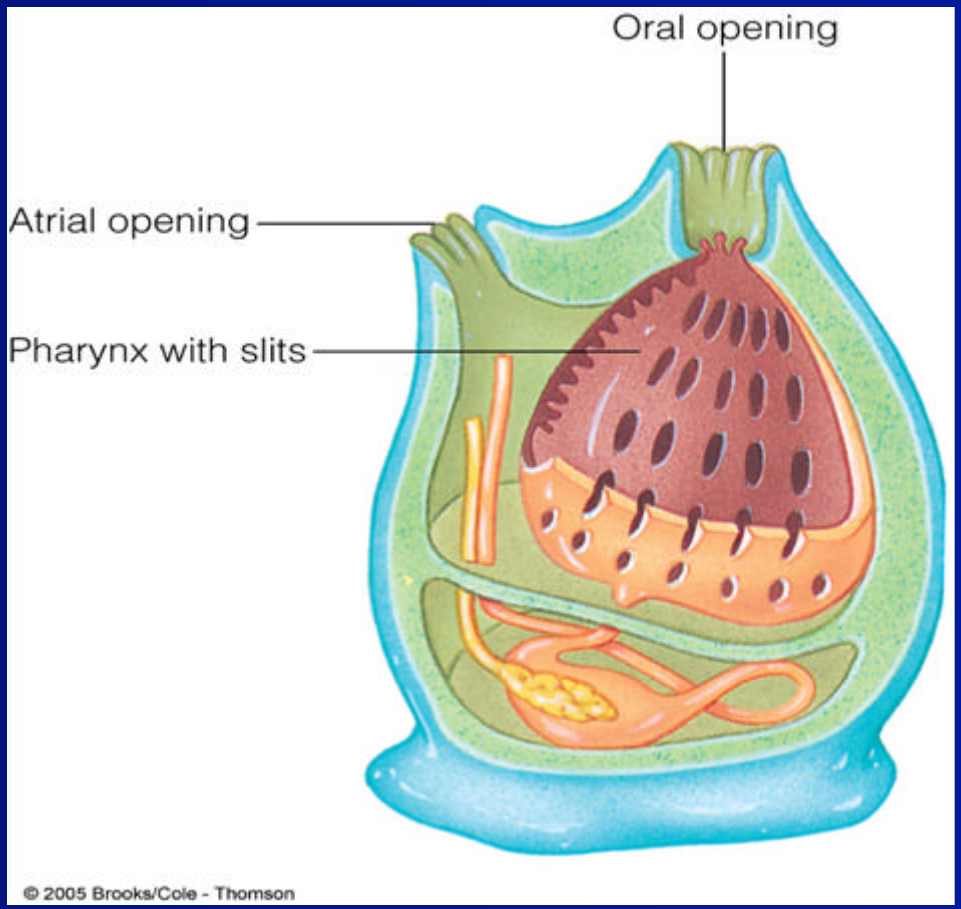
- Partnership between NOAA and UAF with statewide mission
- 3 legs - Research, Education, Extension
- Marine Advisory Program (MAP) is state's marine extension program. MAP partners and focuses on Alaska based issues.



What Marine Organisms are we currently concerned about?

- Tunicates
- Non-Indigenous Crab
- Non –Indigenous Kelp

What's a Tunicate??



Tunicates

Sampling

Sampling began June 2007 on downtown waterfront.

Smithsonian Environmental Research Center & University of California, Davis

Protocol -10 Plates deployed and retrieved every 3 months

Other Observations

Additional monitoring include examining docks and lines in Ward Cove,

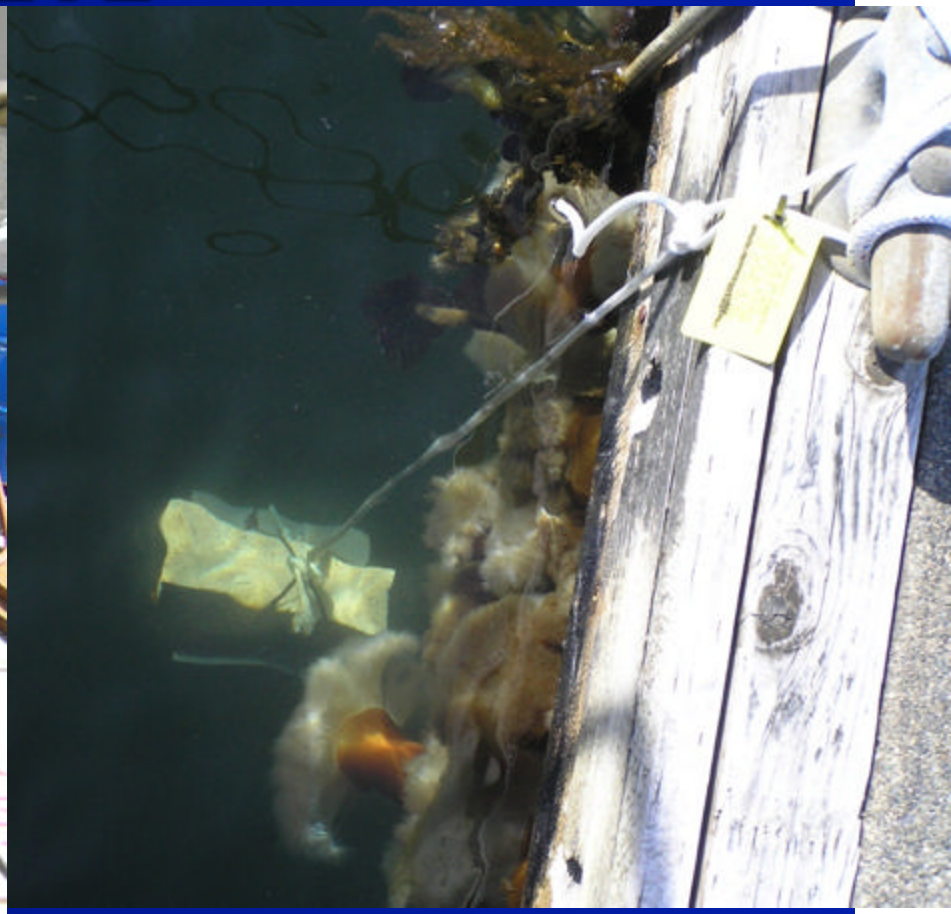
North and South of downtown Ketchikan , Metlakatla Harbor

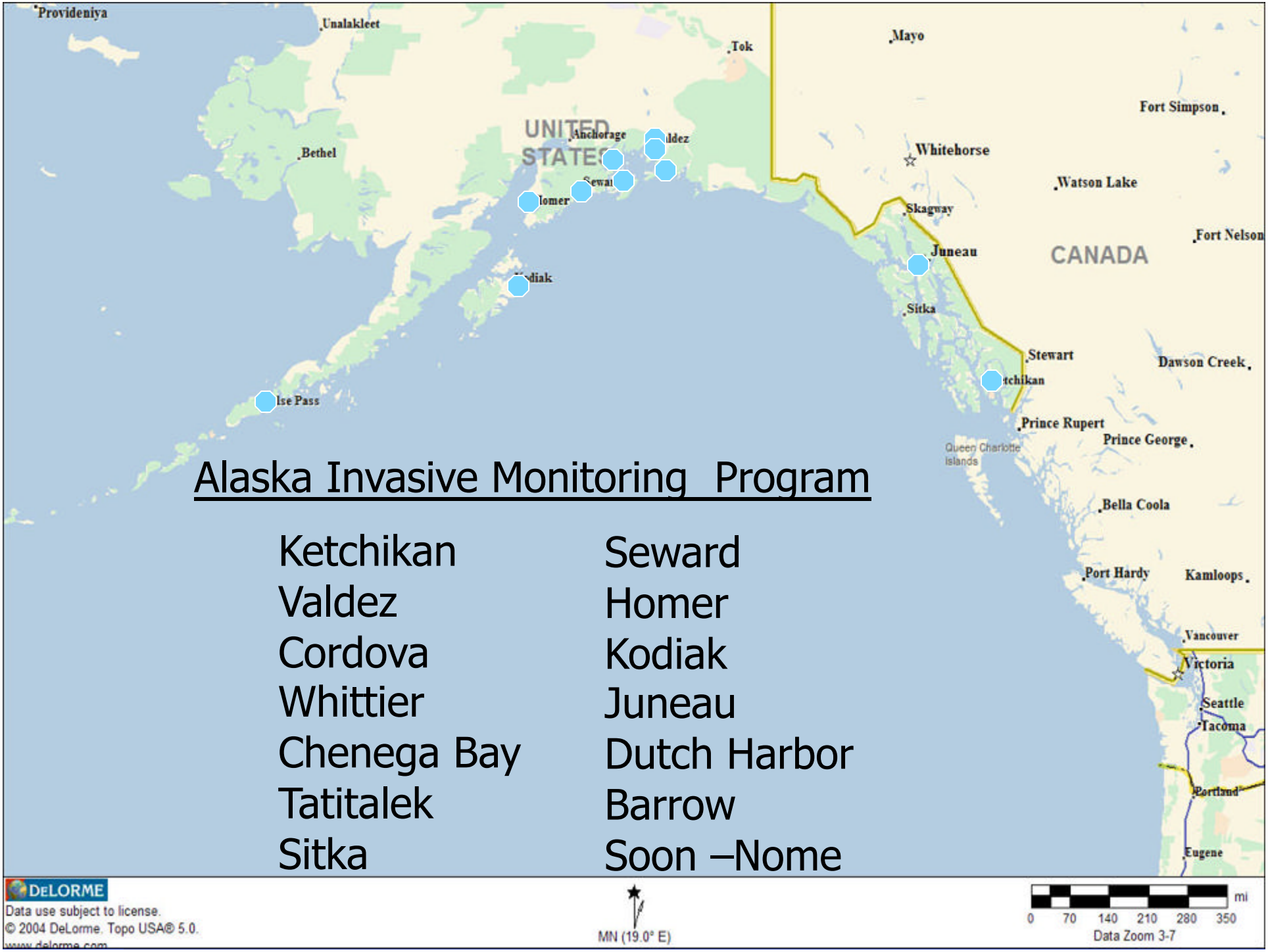
Fouling organisms

Several NIS found in coastal AlaskaSC Alaska

- Animals and algae
- Primarily sessile
- Invasive species can change benthic habitats by overgrowing/out-competing native flora and fauna
- Potential impacts to aquaculture

Plate monitoring
SERC Protocol SETL




Provideniya
Unalakleet
Tok
Mayo
Fort Simpson
UNITED STATES
Anchorage
Bethel
Whitehorse
Watson Lake
Skagway
Fort Nelson
Juneau
CANADA
Sitka
Stewart
Dawson Creek
Prince Rupert
Prince George
Queen Charlotte Islands
Bella Coola
Port Hardy
Kamloops
Vancouver
Victoria
Seattle
Tacoma
Portland
Eugene
Alaska Invasive Monitoring Program
Ketchikan
Valdez
Cordova
Whittier
Chenega Bay
Tatitalek
Sitka
Seward
Homer
Kodiak
Juneau
Dutch Harbor
Barrow
Soon –Nome
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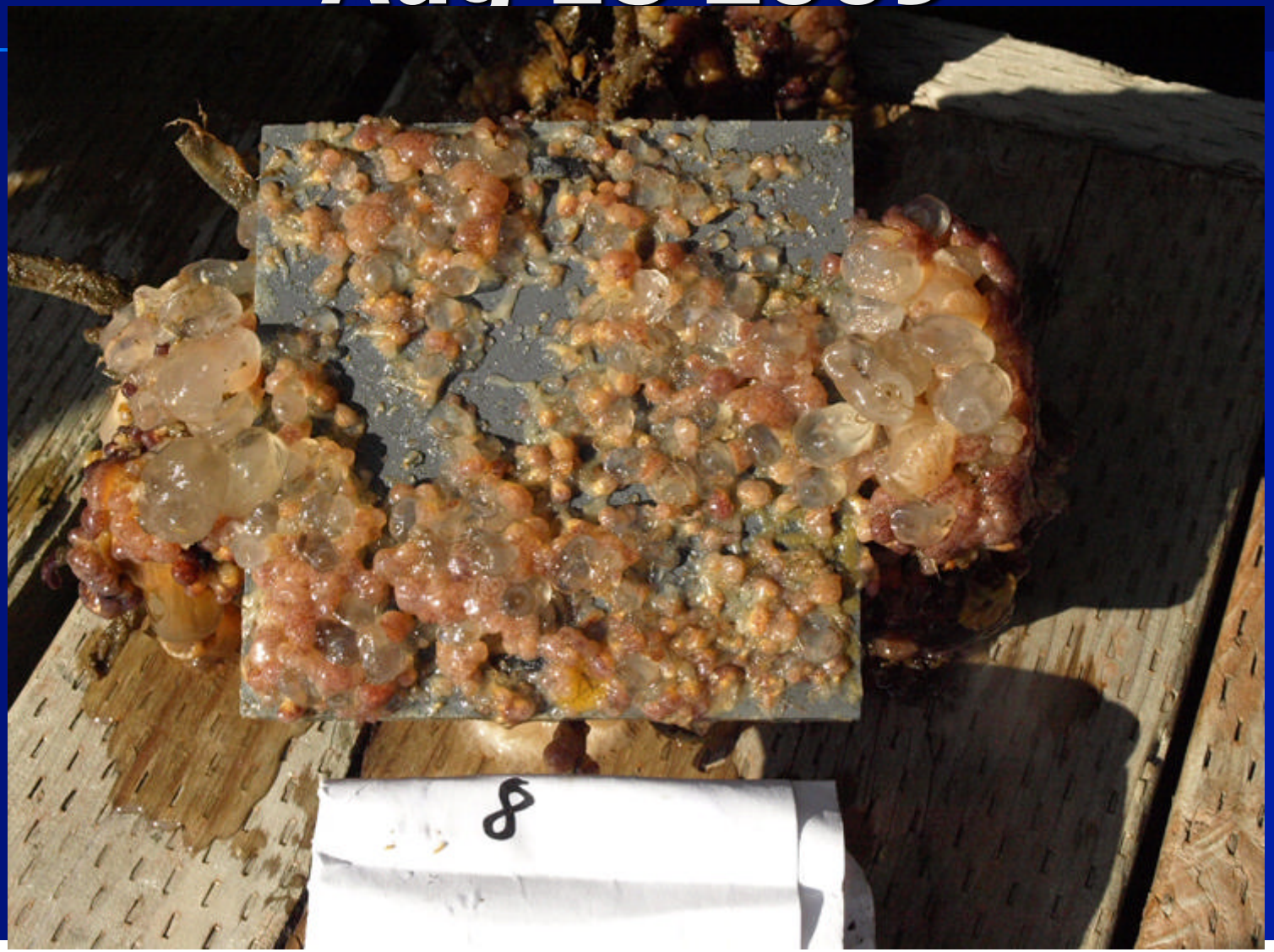
0 70 140 210 280 350 mi
Data Zoom 3-7

Tunicates
Aug 18 2009



Sept 22 2009

Bay Ketchikan
Plate # C-8
Marina/harbor Carlin
Collector's name FRG/TAG
Date 9/22/09
H12

Plate Results

- Invasive tunicates found on some plates each retrieval period except during the January to March period.

Example of a plate recovered Sept 2007

With Botryllid tunicates

Observation of docks and lines

- Invasive Tunicates observed in Ward Cove , Downtown waterfront, Metlakatla Harbor
- None found North or South of downtown

Photos of Tunicates
Metlakatla Harbor

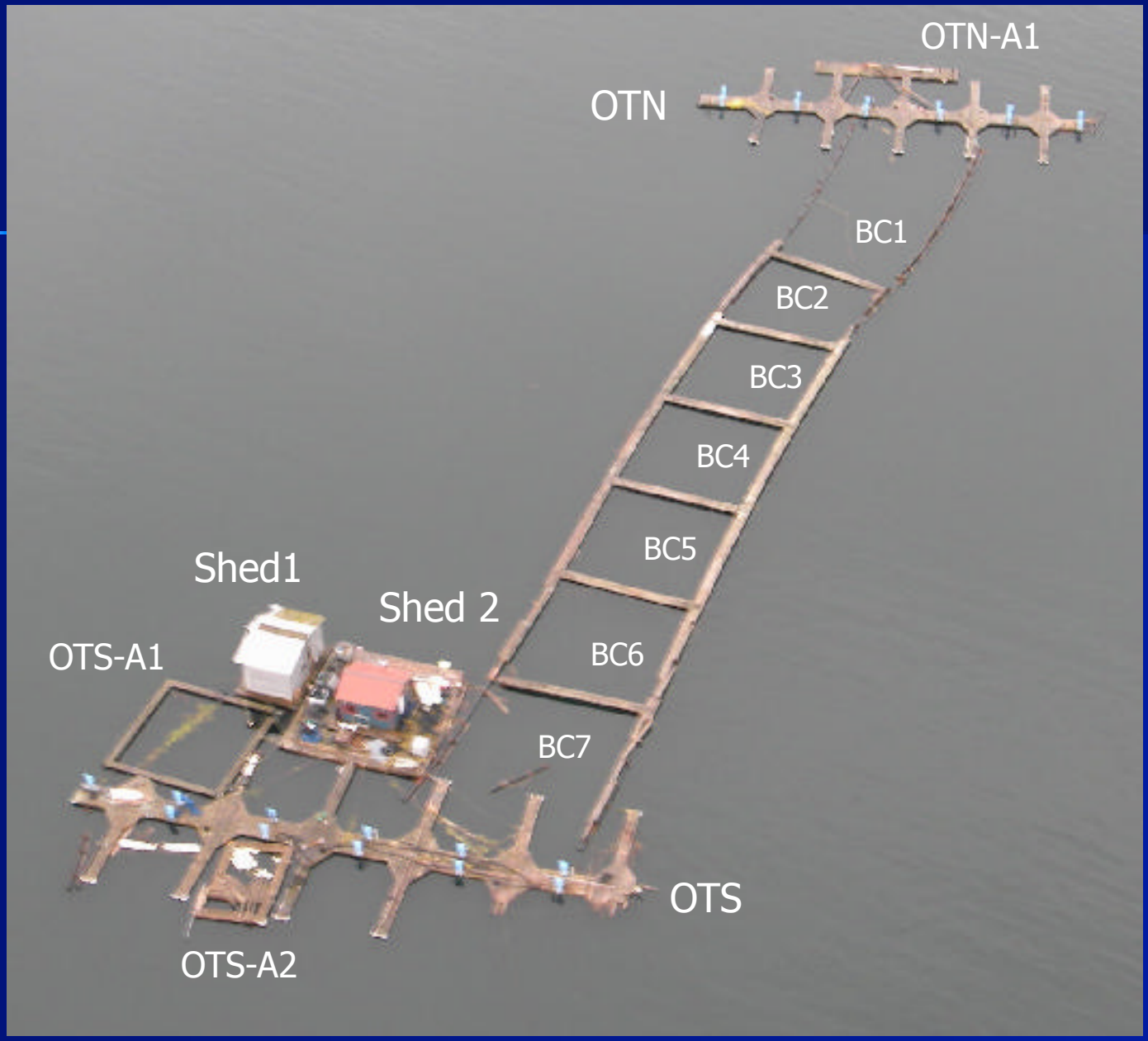
Ward Cove Tunicates

On old tree branches

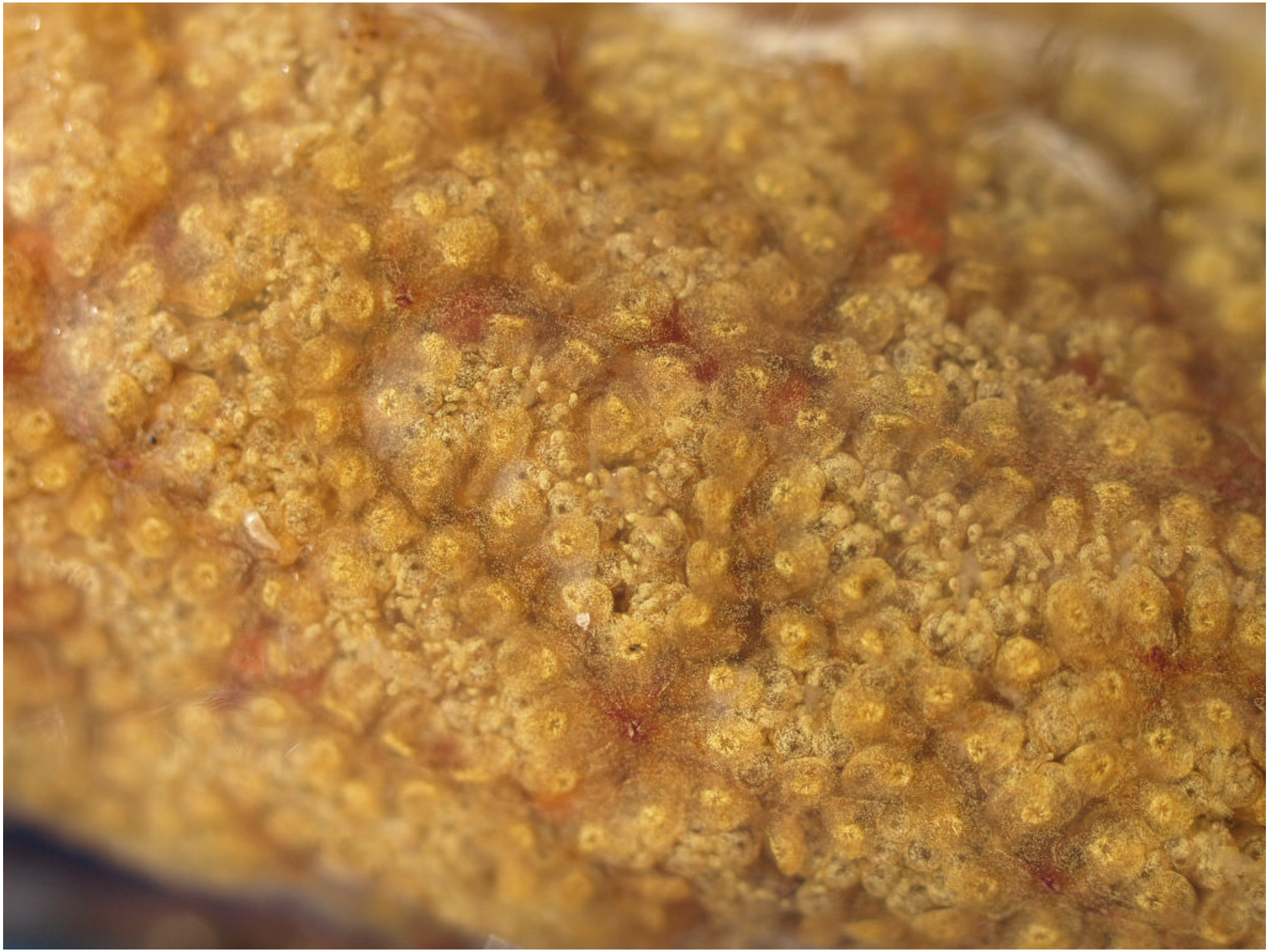
ARKive
© Sue Daly / naturepl.com

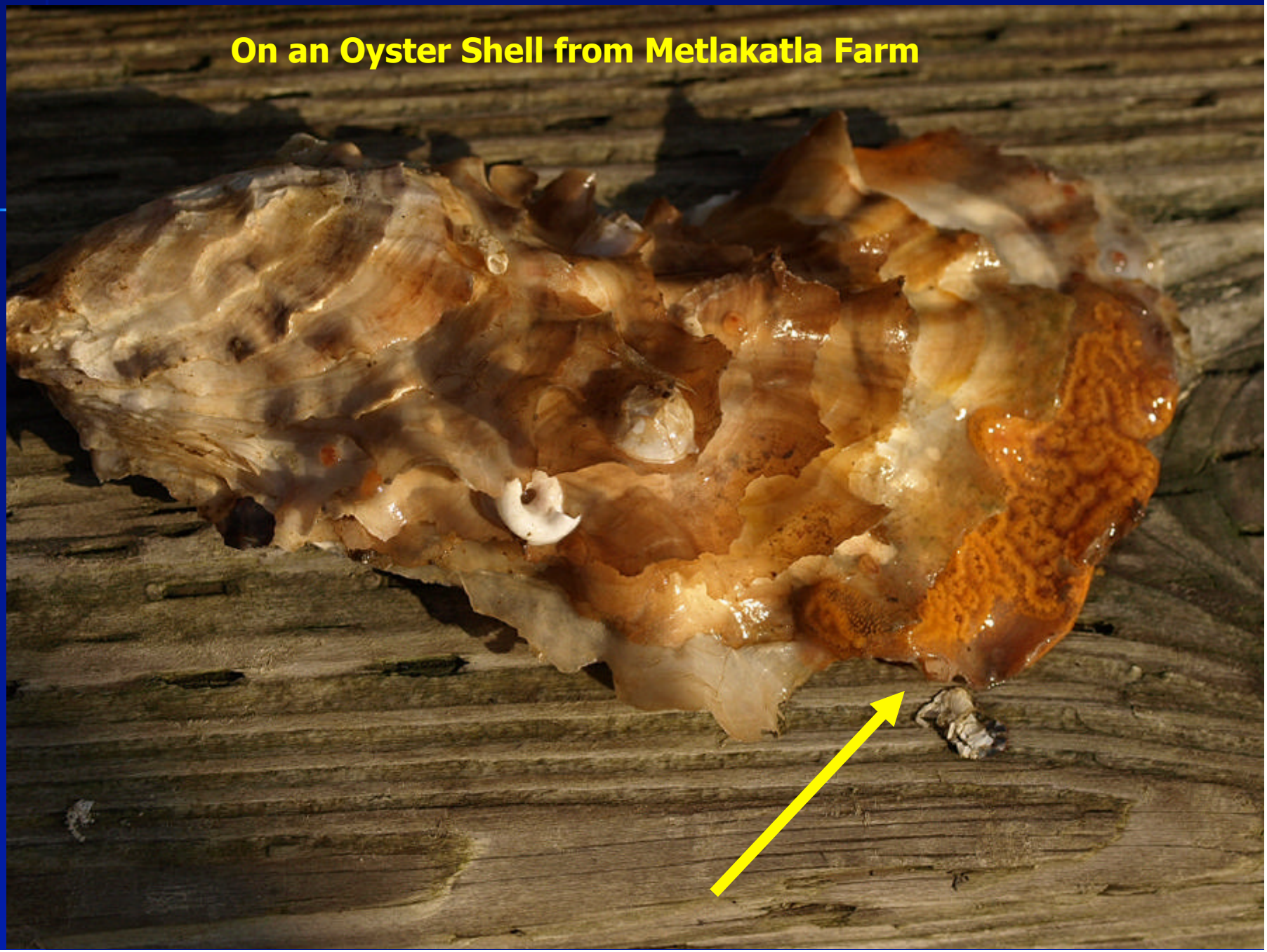
ARKive

ARKive
© D. W. Greenslade / ARDEA LONDON

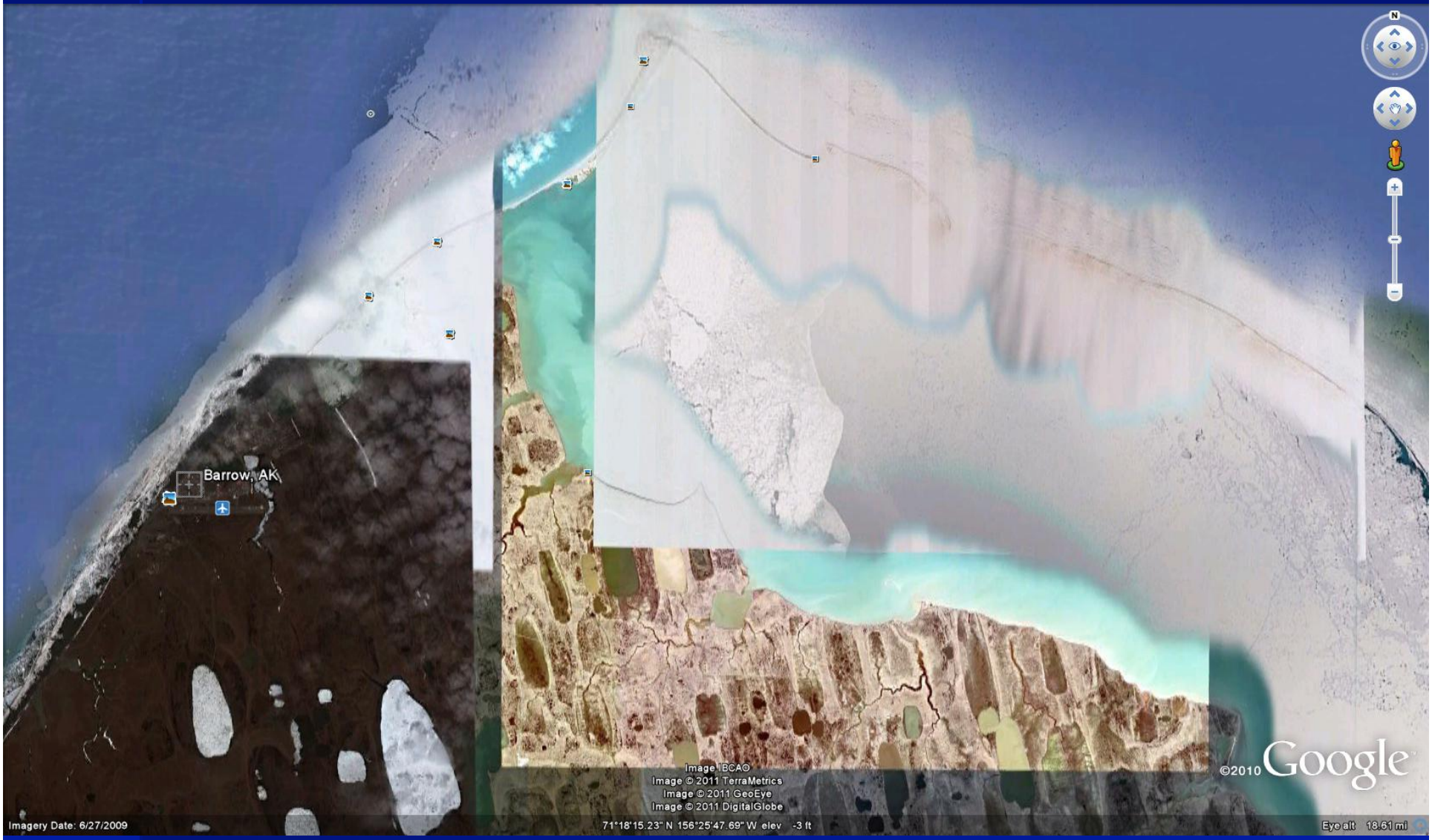

OTN-A1
OTN
BC1
BC2
BC3
BC4
BC5
BC6
BC7
Shed1
Shed 2
OTS-A1
OTS
OTS-A2

Ketchikan Area Botrylloides




On an Oyster Shell from Metlakatla Farm

Expanded to Barrow

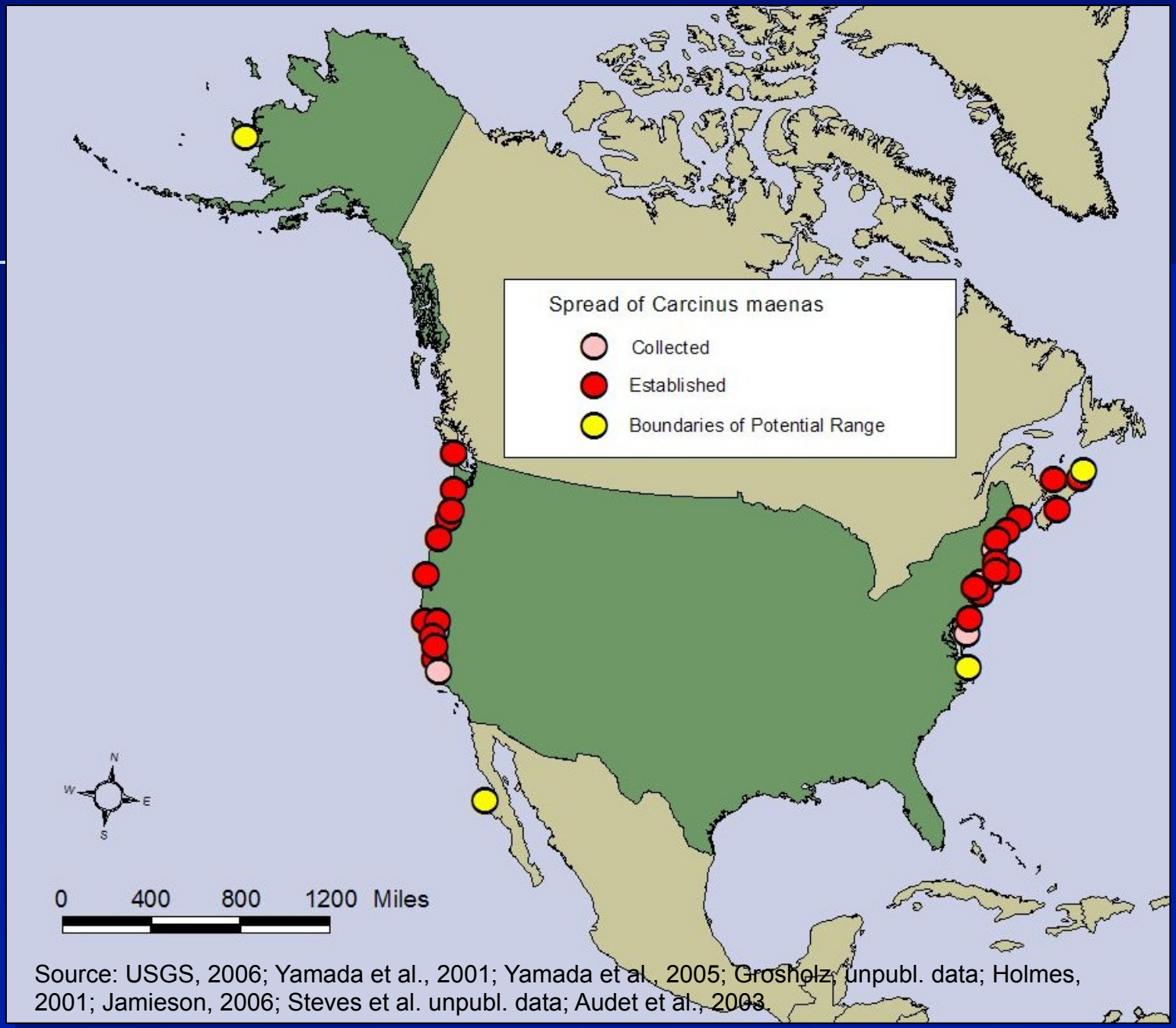

Barrow, AK
Image IBCAO
Image © 2011 TerraMetrics
Image © 2011 GeoEye
Image © 2011 DigitalGlobe
©2010 Google
Imagery Date: 6/27/2009
71°18'15.23" N 156°25'47.69" W elev -3 ft
Eye alt 18.61 mi

European Green Crab Sampling

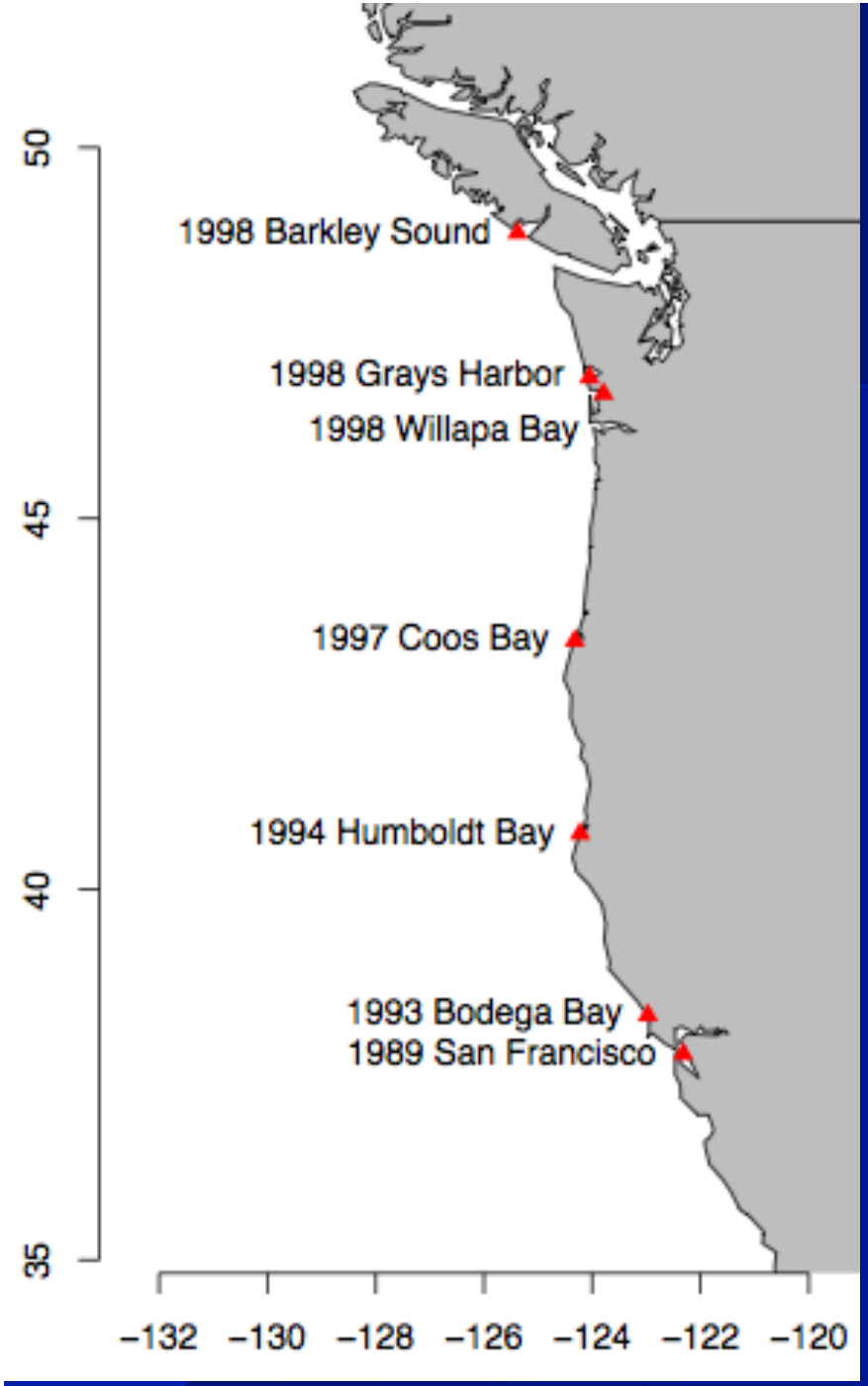
Ketchikan Monitoring
European Green Crab

Native to NE Atlantic
Invaded six regions globally
Broad environmental tolerances
Planktonic larvae can spread by ballast water or currents
Impact recipient communities:Preys upon a diversity of taxa, fishery species
Outcompetes native animals

Catherine de Rivera, Brian Steves, Paul Fofonoff, and Greg Ruiz



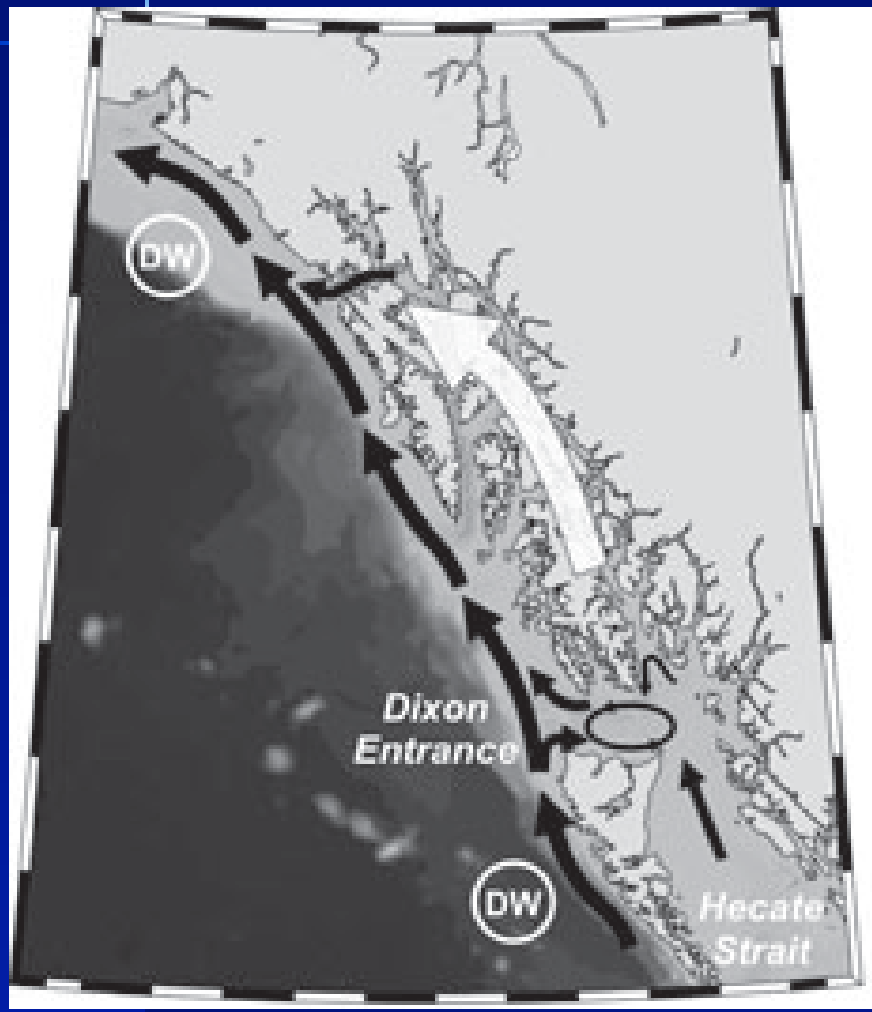
Source: USGS, 2006; Yamada et al., 2001; Yamada et al., 2005; Grosholz, unpubl. data; Holmes, 2001; Jamieson, 2006; Steves et al. unpubl. data; Audet et al., 2003.

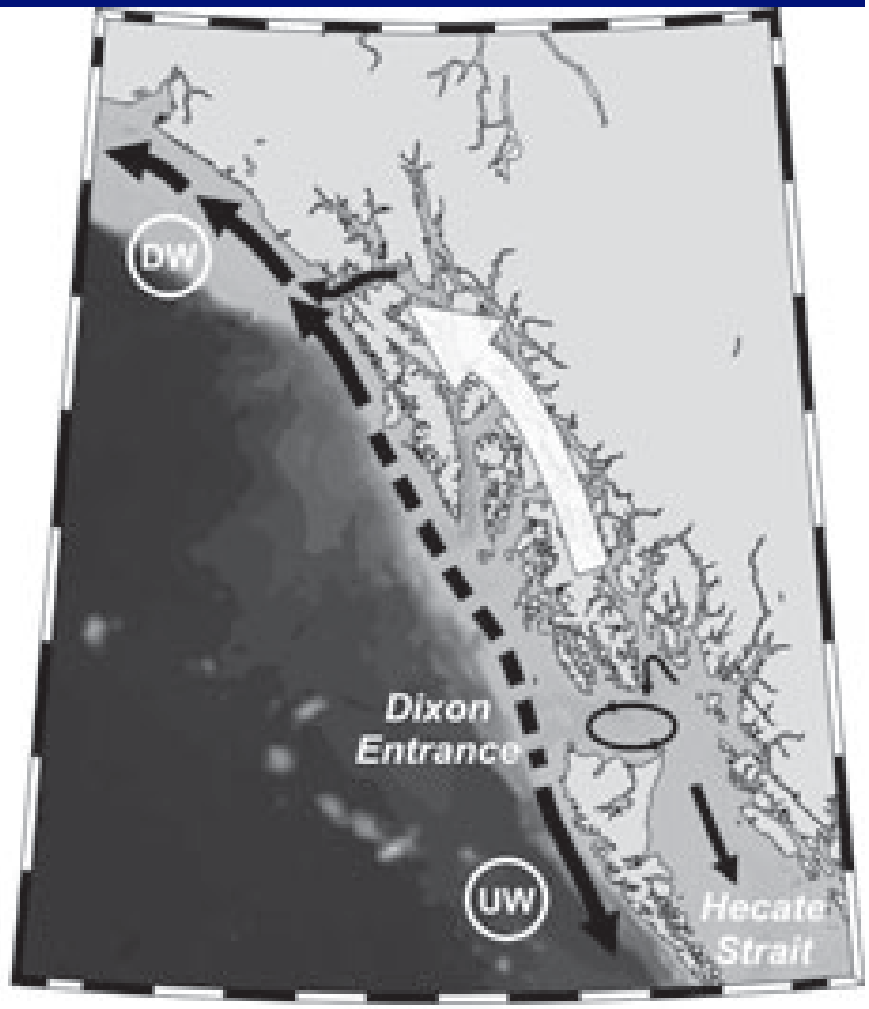


Carcinus maenas Spread on the West Coast

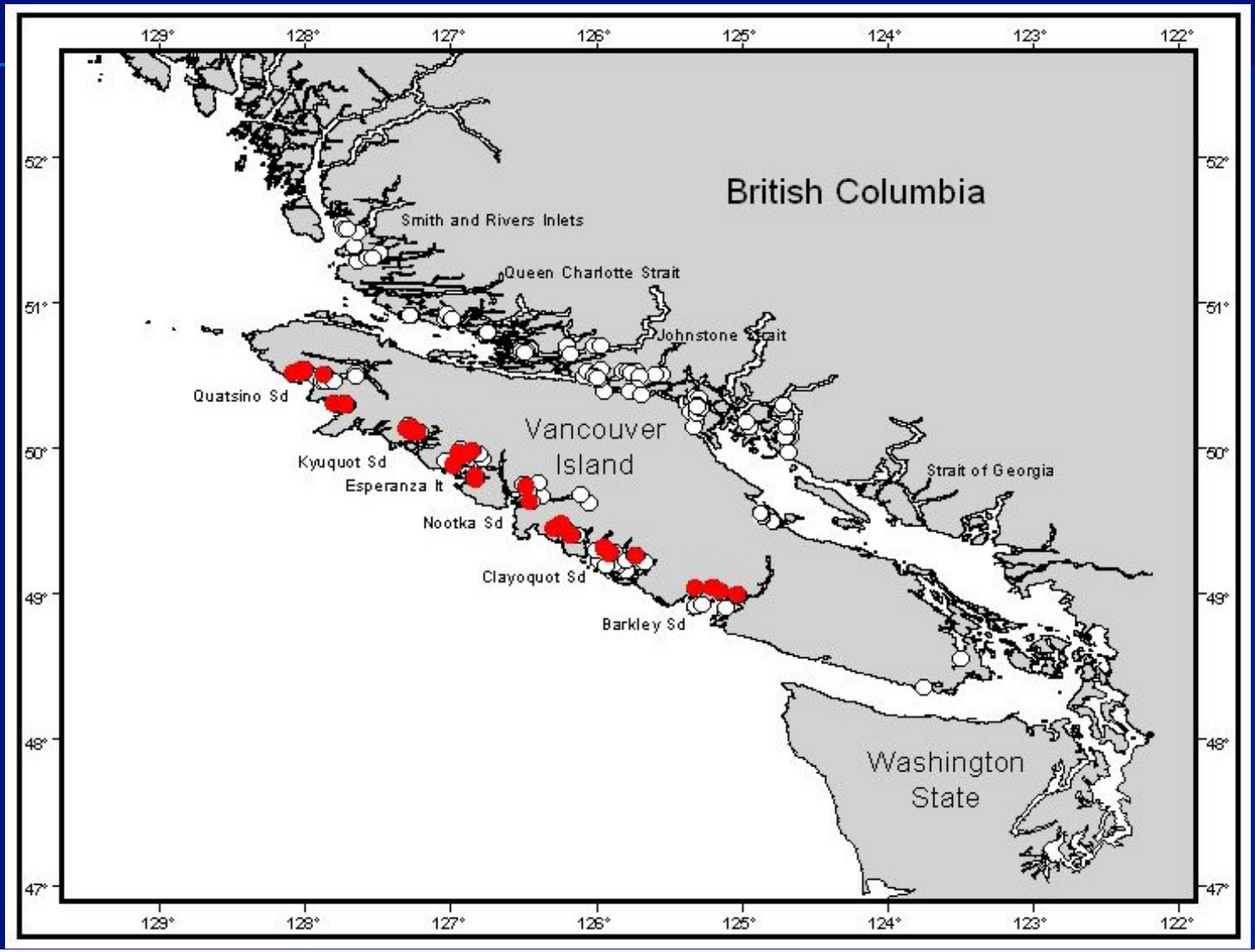
Photo by P. Sean McDonald

Wind , Upwelling and Down welling Conditions all contribute to Risk

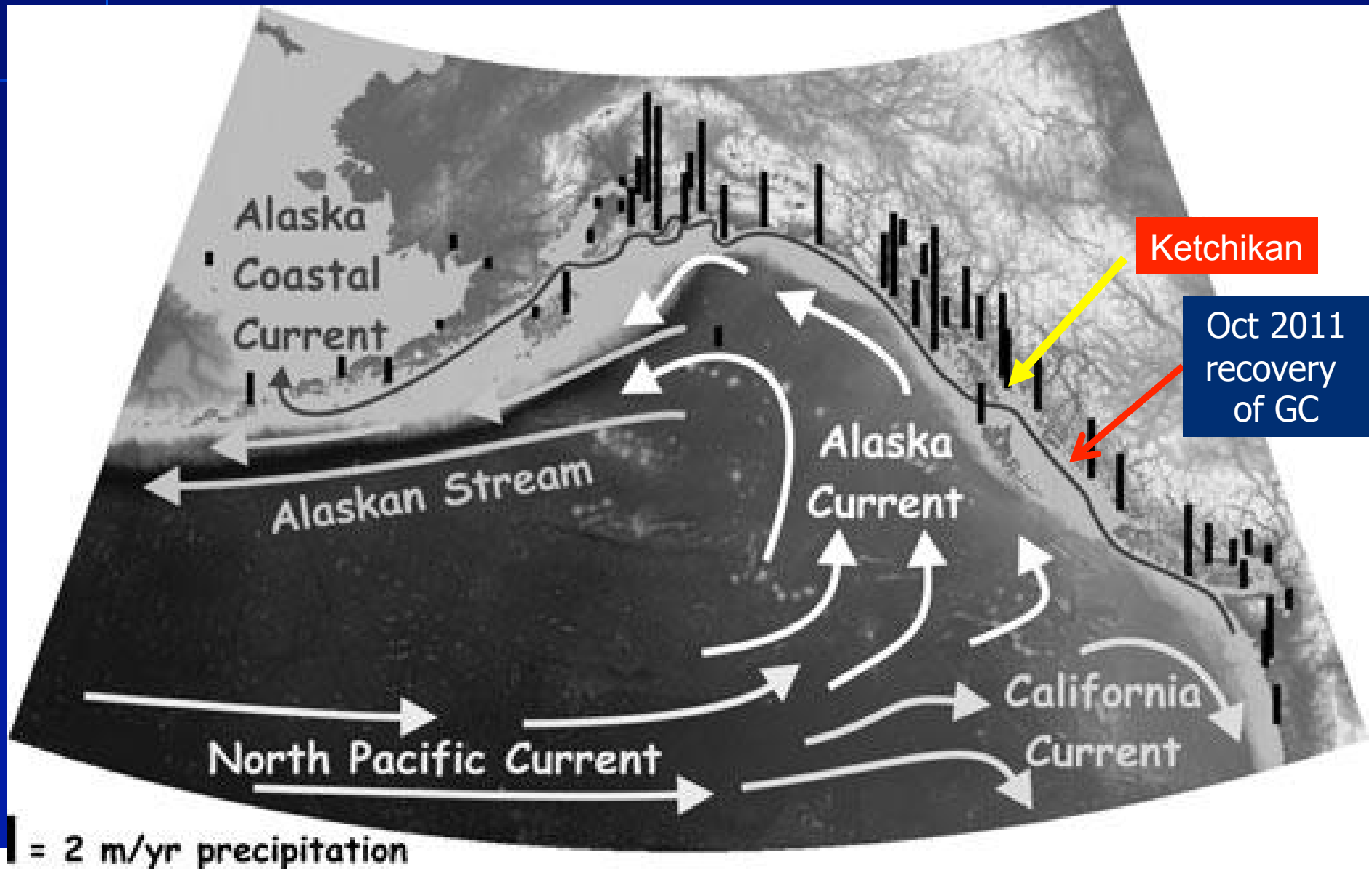




Graham E. Gillespie and Antan C. Phillips
Fisheries and Oceans Canada
Pacific Biological Station
Nanaimo, BC, Canada



Ocean Currents

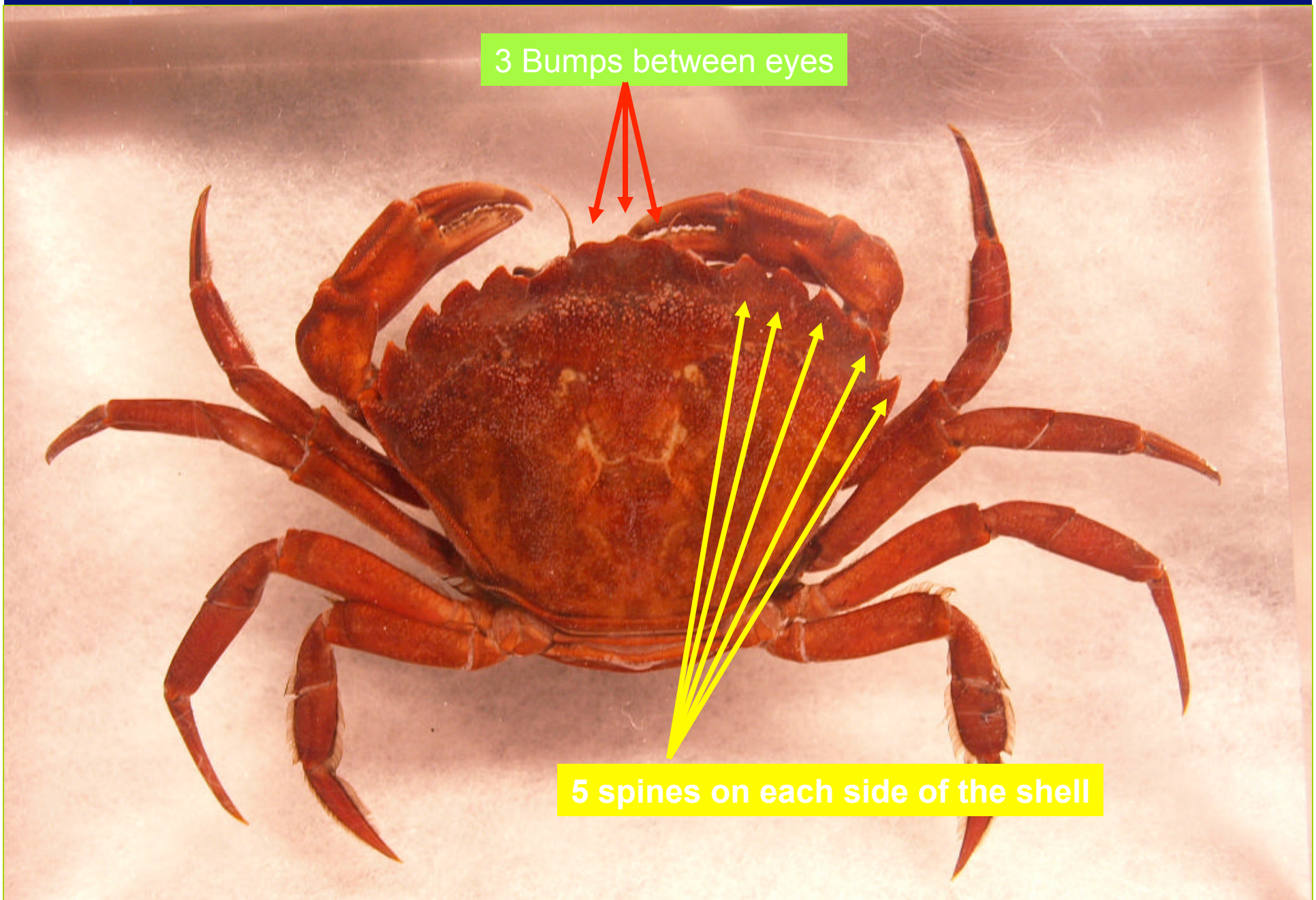


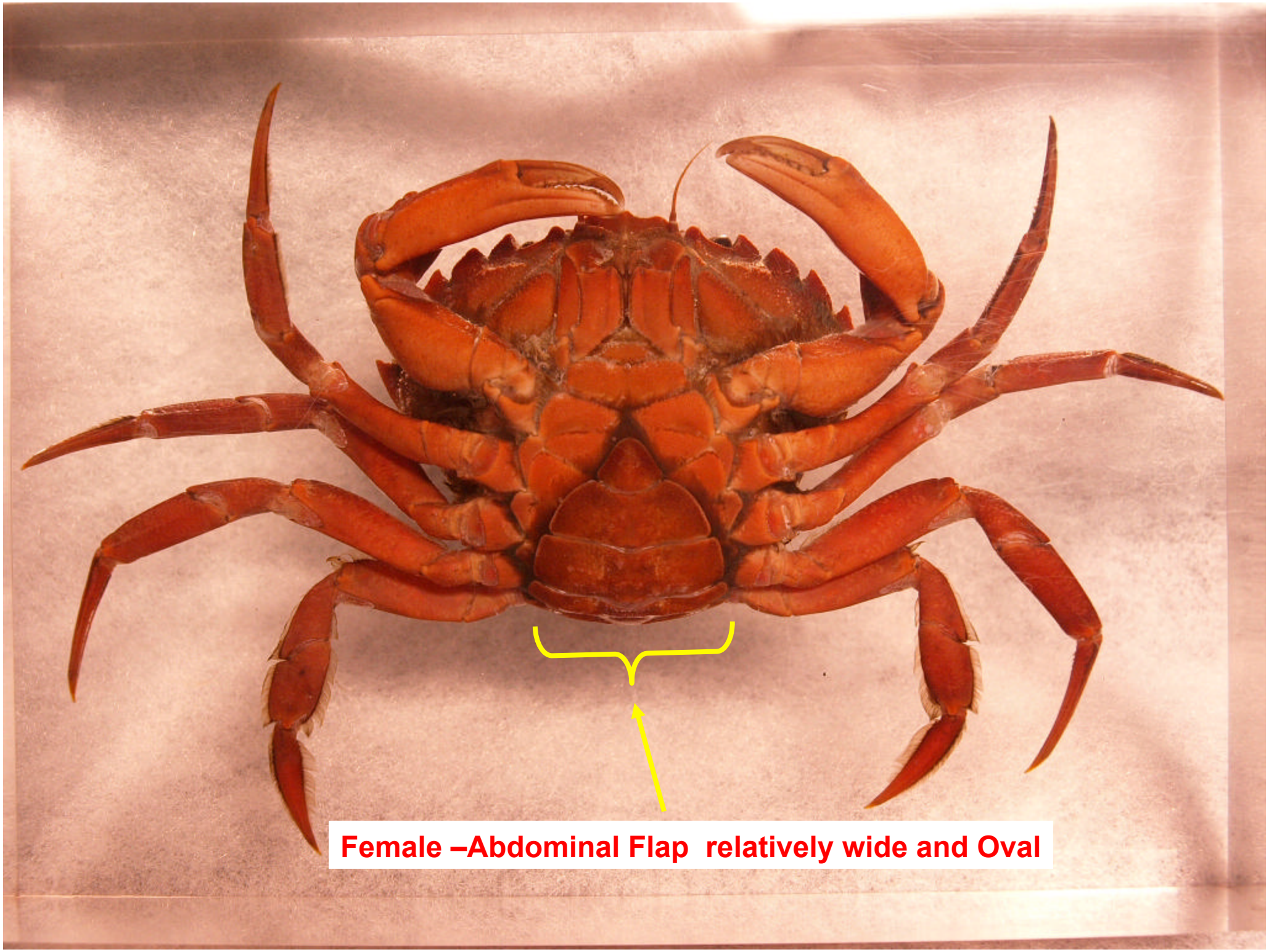
European Green Crab Sampling

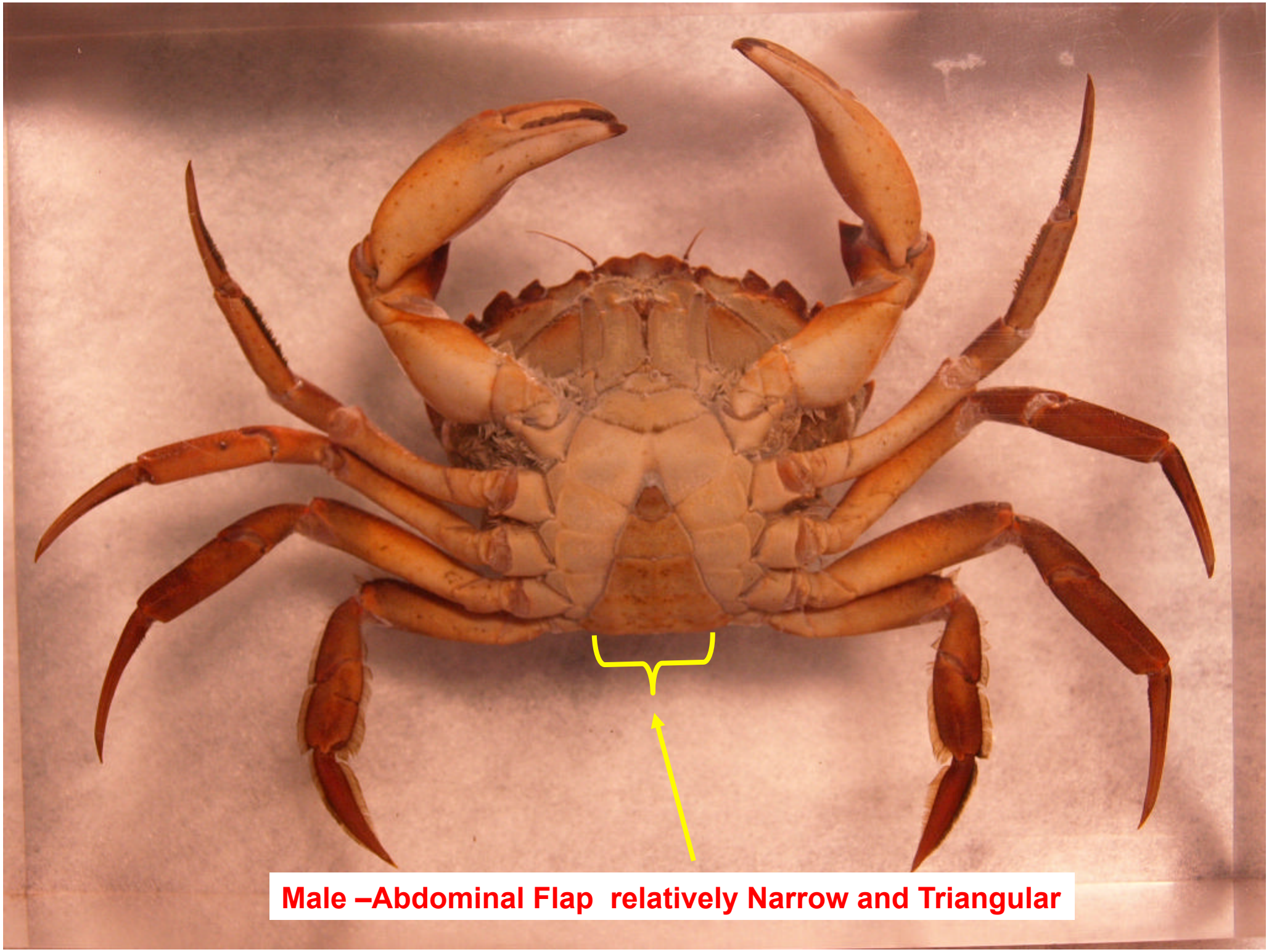
Security Cove Entrance

Sampling from a floatplane

Distinguishing Characteristics




Female –Abdominal Flap relatively wide and Oval


Male –Abdominal Flap relatively Narrow and Triangular

The European Green Crab Intensive Sampling project using Citizen science Start up Results – Progress Report

Gary Freitag Alaska Sea Grant – Marine Advisory Program Ketchikan Alaska

The Invasive species section of the take home education brochure that each of the participants takes back with them describing the invasive species concerns, what was found on their tour and the program

AN ALASKAN ADVENTURE: STEWARDSHIP & SURVIVAL

On behalf of the Allen family, welcome aboard!

The best way to explore the grandeur and diversity of Alaska is on the water. We believe this tour is a great way to experience the beautiful scenery and fascinating history of the Ketchikan area.

Allen Marine Tours is a family-owned company based in Sitka that has been conducting boat excursions for visitors to Alaska since 1970. Three generations of the Allen family are active in the company. With a fleet of over 20 vessels and operations in famous Ketchikan and Sitka, we are the largest day cruise company in Alaska.

All of the vessels operated on our tours were built by us in our Sitka shipyard. Catamarans dominate our fleet. The superior speed, maneuverability and stability of the twin hull design is perfect for Alaskan waters. Our many years of sightseeing experience are evident in each vessel we design and build. Our highest priorities are passenger safety, comfort and panoramic viewing.

We hope you enjoy your excursion with us today. We look forward to seeing you again in the near future. Bon Voyage!

— Captain Bob Allen
Founder, Allen Marine Tours, Inc.

WHAT IS A CITIZEN SCIENTIST?

mphasizing scientifically sound practices volunteers perform research-elated tasks such as observation, measurement or computation.

o survive or thrive, in this rugged environment, good stewardship of our esources is needed. This includes monitoring potentially adverse impacts to ur resources. Participants in this study help the University of Alaska and the mithsonian gather more data than they would otherwise acquire, while at the me time, gaining experience and information about our natural world.

ur participation is so invaluable! The State of Alaska can't thank you enough r your help with this monitoring program!

mmon Alaskan Crabs

Dungeness crab

- Uneven oval shell with 10 spines on each side
- Narrow frontal area with 5 unequal spines
- Light-colored leg tips

Pygmy cancer crab

- Large claws with black tips
- Nearly circular shell
- Legs very hairy

elmet or horse crab

- Large jagged spines on each side of the shell
- Entire shell covered with stiff hairs
- Frontal area extends past eyes

Data Points:

Water Temp: _____

Surface Salinity: _____

7 M Salinity: _____

Green Crab Present? Yes/No

WHAT WAS FOUND IN THE POT?

_____

_____

_____

_____

_____

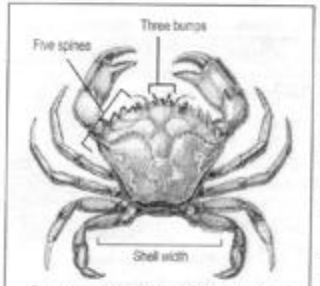
_____

_____

_____

WHY MONITOR INVASIVE SPECIES?

They may be small, but ***European green crabs*** are mighty! These foragers can easily open bivalve shellfish such as clams, oysters and mussels. Green crabs also eat Dungeness crabs of the same size or smaller. Both live in shallow waters, giving Green Crabs the opportunity to reduce populations of juvenile Dungeness through predation. The Alaskan Dungeness crab fishery is a multi-million dollar commercial industry and a valued personal use fishery. Scientists and resource managers agree it is not a matter of 'if' but 'where and when' green crabs will reach Alaskan waters.



Green crabs can be identified by their unique shell shape. Adults can have shells up to four inches across in width.

Aquatic invasive species may constitute the largest single threat to Alaska's coastal ecosystem. Allen Marine Tours is pleased to partner with the University of Alaska, NOAA, Sea Grant and the Smithsonian Environmental Research Center monitoring Alaska's first city for the invasive green crab.

Scientists have been tracking the movement of the invasive European Green Crab as they move up the West Coast of North America. The Green Crab have been caught as far north as the Northern tip of Vancouver Island in British Columbia. Proximity to BC suggest that Ketchikan waters may be the first place in Alaska to be colonized as the coastal currents continue to push the larval stages of the Green Crab northward. To responsibly manage the Dungeness crab, and reduce impact on all local species, we must monitor and regulate other species that can have an adverse impact.

Barb Morgan Describes the characteristics of a Helmet crab to the participants of one of the tour groups

An example of a typical picture of a sample from the Gravina North sampling site on June 9th 2011 –tour group 0609G1

ALLEN MARINE CREW

Examples of the Data that is being collected from the individual sampling collections

European Green Crab Monitoring Project Data Sheet

Date: 6-9-11		Time: 11:10a	
Name of Sampler: Barbara Morgan		AMT Group#: 0609G1	
Site Name: N. Gravina		GPS Coord N:55 16' 53.49"	
Water Depth:16ft		GPS Coord W:131 41' 9.20"	
Salinity in ppt:	At surface: 28.4	At 1m: 28.6	At 5m: 28.8
Temp in °C	At surface: 10.8	At 1m: 11.3	At 5m: 10.6
Image File Name: 0609G1NG1-2, -7 thru -11, -14, -16 thru -20, -33			
Species Present:	1 Sculpin	Green Crab Present? No	
1 red rock crab	1 sm rockfish		
5 helmet crab	2 sunstars		

European Green Crab Monitoring Project Data Sheet

Date: 6-10-11		Time: 10:44A	
Name of Sampler: Pete Arntzen		AMT Group#: 0610G0	
Site Name: E. Gravina		GPS Coord N: 55 17'18.98"	
Water Depth:12ft		GPS Coord W: 131 39'01.54"	
Salinity in ppt:	At surface:	At 1m:	At 5m:
Temp in °C	At surface:	At 1m:	At 5m:
Image File Name: 0610G0-1 thru -14			
Species Present:	1 med. Sunstar	Green Crab Present? No	
	1 sm. Sunstar		
	2 Kelp Greenling		

Marine Algae

GUIDE TO MARINE INVADERS IN THE GULF OF MAINE

Undaria pinnatifida

undaria kelp, wakame seaweed

Potential Invader

Photos: Steve Lonhart /Monterey Bay NMS

HABITAT PREFERENCE

- Found from low intertidal to subtidal depths of approx. 15 ft (5 m)
- Grows on hard surfaces including rocks, ropes, docks, pilings, moorings, and other structures
- Can form dense 'kelp forests' in sheltered waters

PHYSICAL DESCRIPTION

- Brown kelp with wide, brown to yellow-tan blades
- Mature plants have a divided blade (with pinnae) with conspicuous midrib, holdfast, stipe (stem), and spiral, folded sporophyll
- Young plants have holdfast, stipe, undivided blade, and initially no midrib
- Grows rapidly to 3-9 ft (1-3 m) long

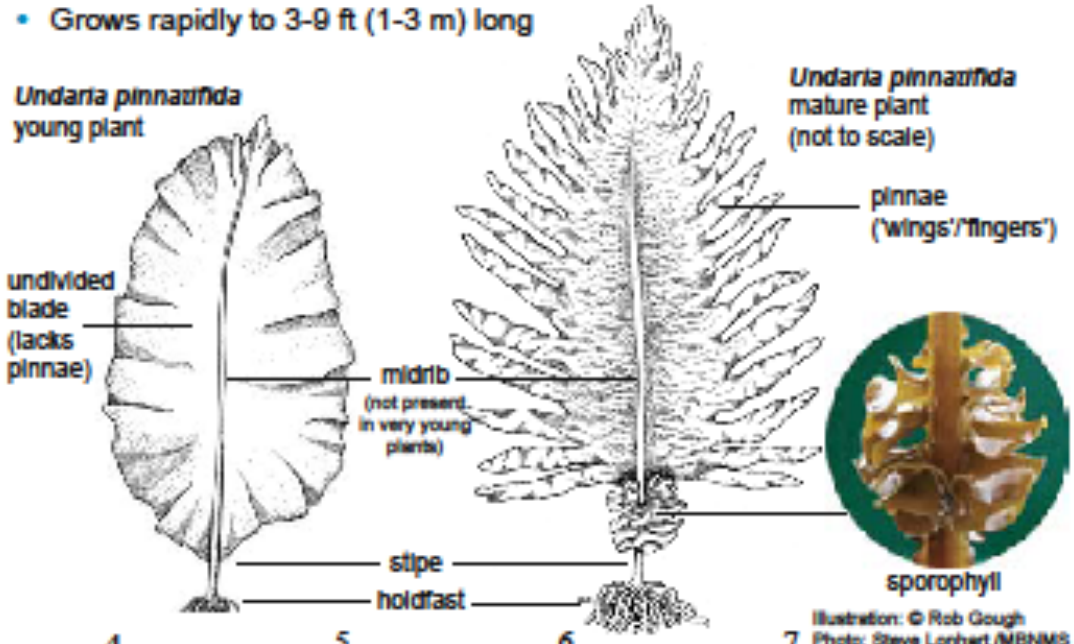
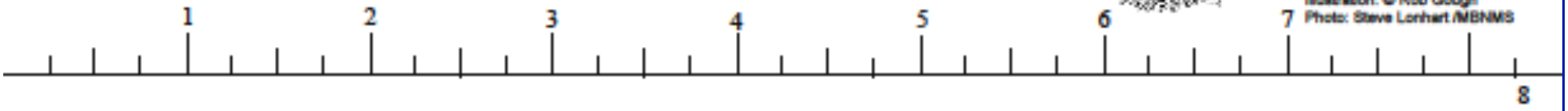


Illustration: © Rob Gough
Photo: Steve Lonhart /MBNMS



- *Undaria pinnatifida* is an invasive kelp native to Japan. Commonly known as 'wakame', an ingredient in miso soup, this alga is commercially
- grown throughout Asia for human consumption. It has invaded many of the world's ocean's, from European waters, to waters off New Zealand.
- In 2001, *U. pinnatifida* was discovered on North American shores in Monterey Bay, CA, where efforts to manually remove it continue today.
- This alga is a very prolific and hardy species, with a growth rate measured at 1-2 cm per day, and a max. length of 9 ft (3 m). It can establish
- itself on a wide variety of surfaces. As a result of its amazing growth rate and wide blades, this seaweed quickly starves the natural understory
- algae of light. As these algae die, fish and invertebrates must move elsewhere to find food, thus creating extra feeding pressure on adjacent
- areas. *U. pinnatifida* has drastically affected the ecosystem of many waters that it has invaded. In addition to such ecological damages, it is a
- fouling species on ship hulls, nets, fishing gear, moorings, ropes, and other structures, and as such, increases labor and maintenance costs.

- ***Saccharina latissima*** (sugar kelp)
- *Undaria pinnnatifida* may be mistaken for
- our region's native brown kelps, particularly *Saccharina latissima*.
- However, *S. latissima* has ruffled edges along undivided blades with no
- midrib, vs. divided blades and conspicuous midrib of *U. pinnatifida*.
- **Other local kelps**
- While several of the Gulf of Maine's native kelp species possess some
- of the features of *U. pinnatifida* (i.e. midrib in *Alaria* sp., divided blades
- of *Laminaria digitata*), none possess the folded, spiral sporophyll.

Sporophyll

- Questions
- ?