Marine Invasive Species

Alaska Shellfish Growers Association

Annual Meeting 2010

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Alaska Department of Fish and Game

Invasive Species and the Shellfish Farmer

- What are invasive species?
- What invasive species are of interest to Alaska shellfish farmers and what are their impacts?
- Life history of the organisms of interest
- Looking at native species versus introduced
- How did they get here?
- Where and how have they been detected?
- What you can do to help

What are invasive marine species?

Botrylloides violaceus

Photo: J. Nichols

European green crab

Photo: G. Freitag

Didemnum vexillum

Photo: M. Motet

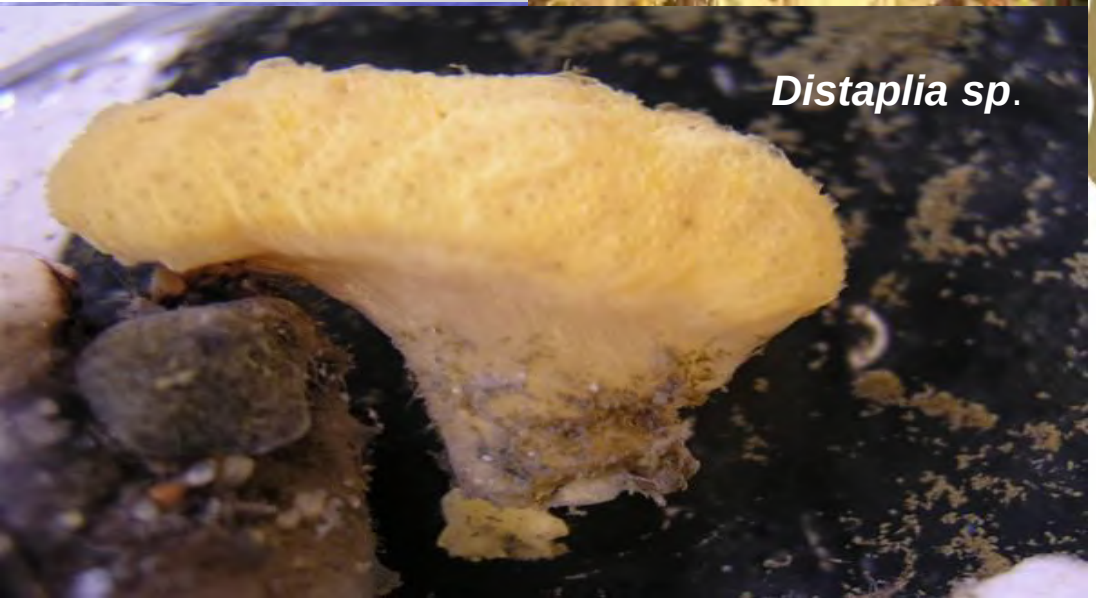
The National Invasive Species Information Center defines an invasive species as a species that is: “non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Tunicates

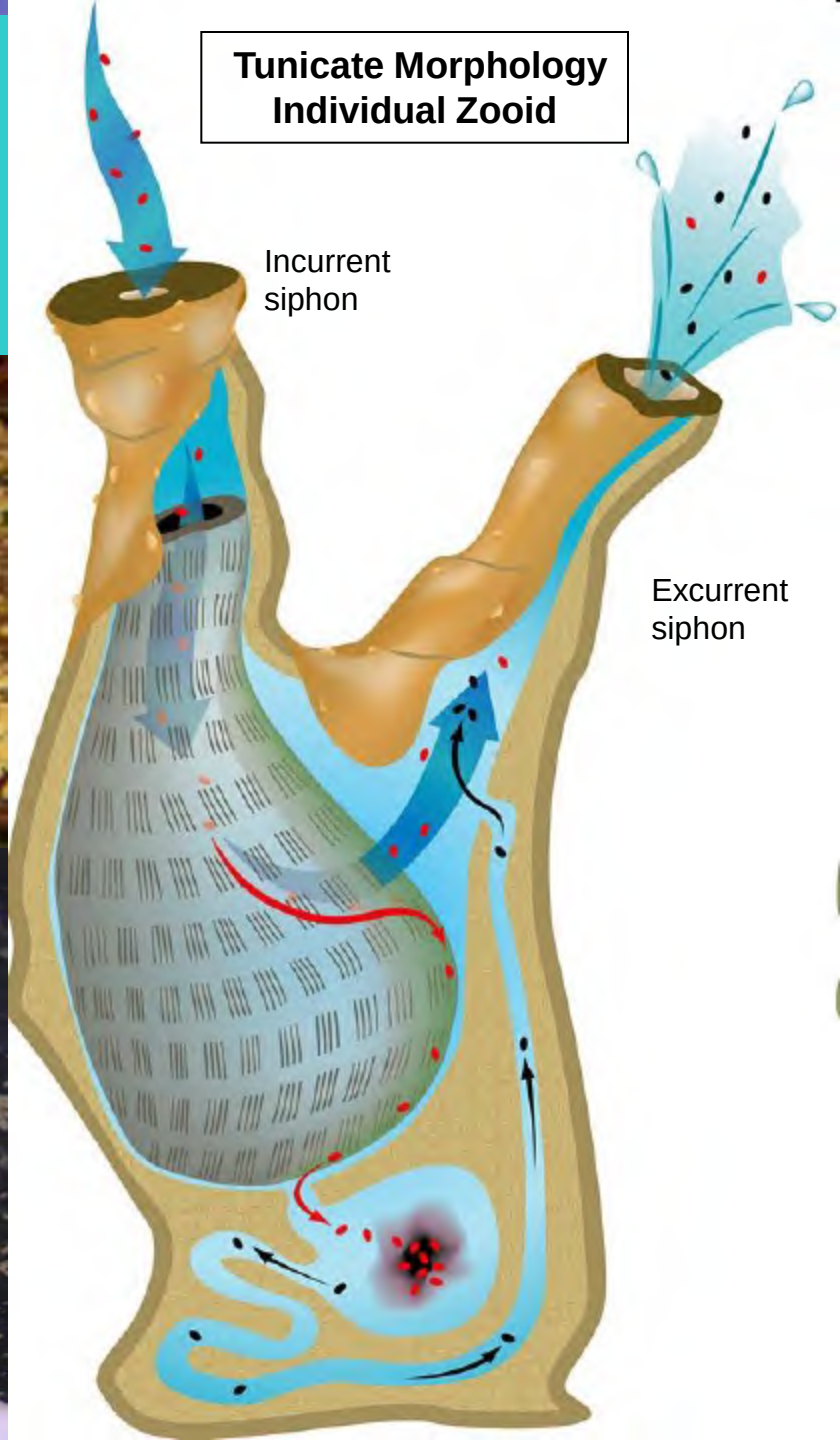
Commonly called sea squirts, tunicates make up a group of marine non-motile animals that spend most of their lives attached to docks, rocks or the undersides of boats. There are native and non-native tunicates that can foul mariculture gear.

Corella inflata Photo: Freitag

Sea Peach



Distaplia sp.



Primary Marine Invasive Species of Concern in 2010

Invasive Colonial Tunicates

Scientific name	Common name
Didemnum vexillum	Marine vomit
Botrylloides violaceus	Violet or Golden chain tunicate
Botryllus schlosseri	Golden star tunicate

Other Species of Concern

Carcinus maenas	European green crab

Didemnum vexillum

Marine Vomit or Glove leather tunicate

Distinguishing features: Colonial tunicate grows in large sheets and can form dripping, beard-like tendrils.

Predominantly tan, yellow or orange. May have spotted appearance- can look like sponge organisms but texture is gelatinous rather than sponge-like.

Habitat: Grows on hard substrate ranging from docks, to shells of bivalves to gravel seabeds; has been found growing on kelp and eel grass, but not on sandy sea floor.

Reproduction: Tunicates reproduce sexually and asexually. Fragments that fall or are broken off can establish colonies. Larvae do not move far beyond their parent colony.

IMPACTS: By overgrowing seaweed, sponges, hydroids, anemones, limpets, oysters, mussels, scallops, barnacles and other sea squirts, they outcompete and suffocate filter feeders. This tunicate grows rapidly.

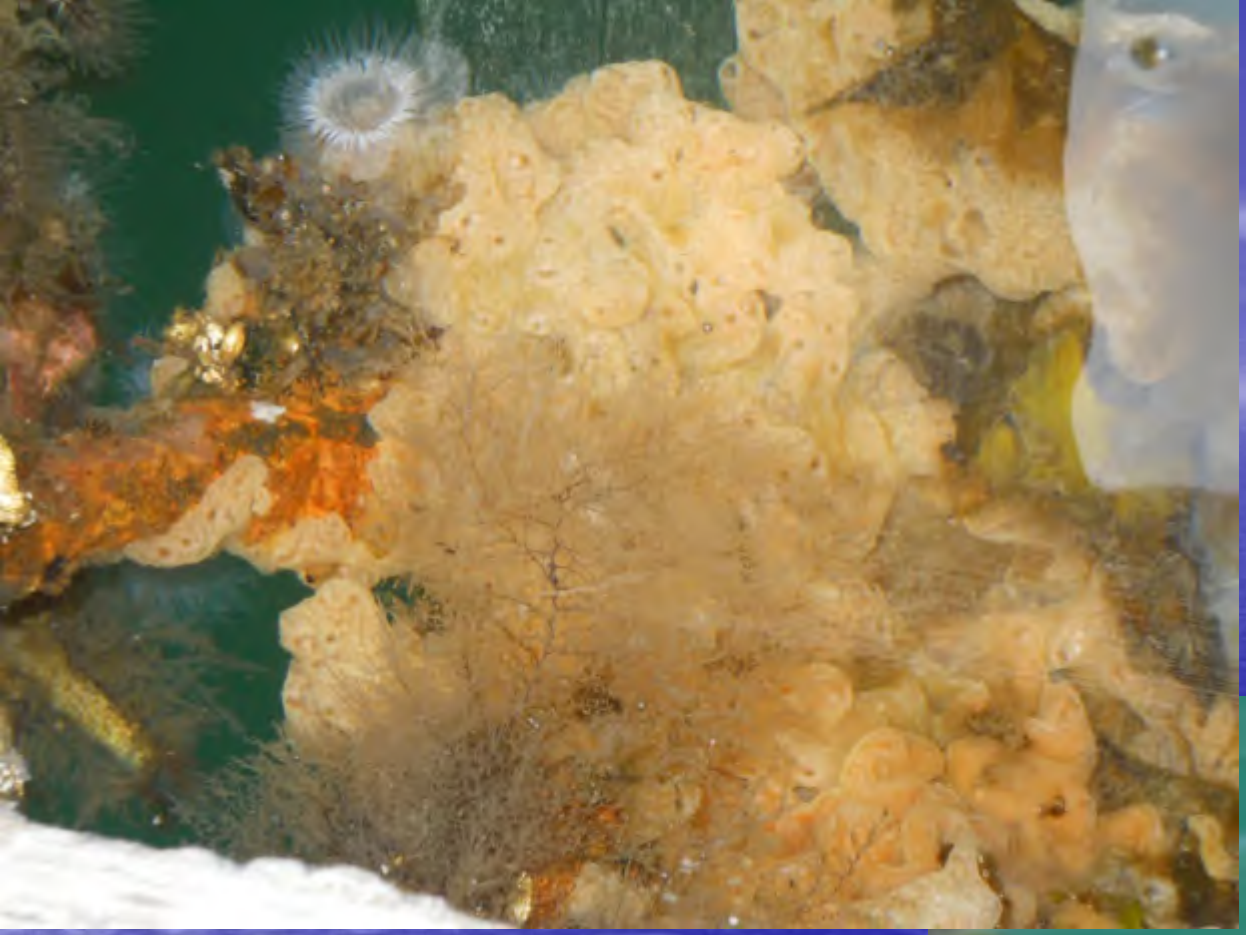
****Didemnum vexillum is growing over a ~100 m^2 area offshore the east coast of the U.S. with 50 – 90% coverage.**

Didemnum vexillum growing over seaweed

Photo: ADF&G

Didemnum vexillum and native solitary tunicate *Corella inflata* growing on mariculture lantern net

Photo: ADF&G



Photos: ADF&G

Didemnum vexillum overtakes mussels and seaweed in Whiting Harbor, Sitka.

Didemnum vexillum growing over an oyster.

Photo: Anna Epelbaum

Diplosoma spp. and *Didemnum vexillum* tunicates smothering an aquaculture grown scallop

Photo: Karney

Various growth forms of *Didemnum vexillum.* *Fouling mariculture gear and suffocating bivalves*

Photos: Puget Sound Partnership

Botrylloides violaceus
Violet or Golden Chain tunicate

Distinguishing features: Colonial tunicate forms large sheets.

Colonies are usually one solid color (purple, pink, tan, yellow, orange or white). Individual zooids are upright or vertical to the substrate and form elongated, meandering rows. Gelatinous material holding the colony together is generally clear.

Habitat: Prefers hard substrates, natural and man-made in protected areas. Often found growing under docks. Can tolerate polluted habitats.

Reproduction: Tunicates reproduce sexually and asexually. Fragments that fall or are broken off can establish colonies. Larvae do not move far beyond their parent colony.

Similar native species: Most sponges-texture of tunicates is gelatinous.

IMPACTS: By overgrowing seaweed, eelgrass, scallops and oysters they outcompete and suffocate filter feeding bivalves and other living organisms.

The invasive tunicate *Botrylloides violaceus* will grow, merge and eventually smother the scallop to such an extent that it can no longer open to feed *(see 4* colonies on the shell of the scallop in bottom photo).

Photos and text: R. Karney

Close up of *Botrylloides violaceus*
Individual tunicate animals, called zooids, are clearly visible.

Photo: G. Freitag


Botrylloides violaceus overgrowing native *Corella sp.*
Photo: Heather Meuret-Woody

Botrylloides violaceus color morphs

http://convoluta.ucdavis.edu/gallery


Native
Distaplia
vs.
Non native
Botrylloides
Photo: J. Nichols
H. Meuret-Woody
G Freitag

Botrylloides violaceus growing on a scallop; individual zooids visible and chain-like formation clear.

Photo: C. Freitag

Botryllus schlosseri

Golden star tunicate

Distinguishing features: Colonial tunicate forms thin, flat sheets.

Colonies are comprised of zooids that are all the same color, predominant colors are black, brown orange and green, held in a clear firm gelatinous material. Individual zooids are horizontal to the substrate and form star or flower patterns.

Habitat: Prefers hard substrates, natural and man-made in protected areas. Often found growing under docks. Can tolerate low salinities, such as in estuarine habitats.

Reproduction: Tunicates reproduce sexually and asexually. Fragments that fall or are broken off can establish colonies. Larvae do not move far beyond their parent colony.

Similar native species: Most sponges-texture of tunicates is gelatinous.

IMPACTS: These tunicates grow on and can suffocate cultured shellfish including oysters and mussels, as well as grow on eelgrass and seaweeds. Impacts to mariculture products and habitats used by native organisms.

Botryllus schlosseri color morphs

Photo: Heidi Gartner

Botrylloides schlosseri growing on a scallop

Photo: R. Karney


In Sitka, *Botryllus schlosseri*
observed on boat hull
Photo: H. Meuret- Woody

Vectors: How invasive species are moved to Alaska

- Fouled vessel hulls, especially slow-moving vessels
- Ballast water
- Relocating fouled docks from infested waters
- Contaminated aquaculture gear and products
- Contaminated imported shellfish stock

Plate monitoring using the SERC protocol

Alaska Tunicate Monitoring Program

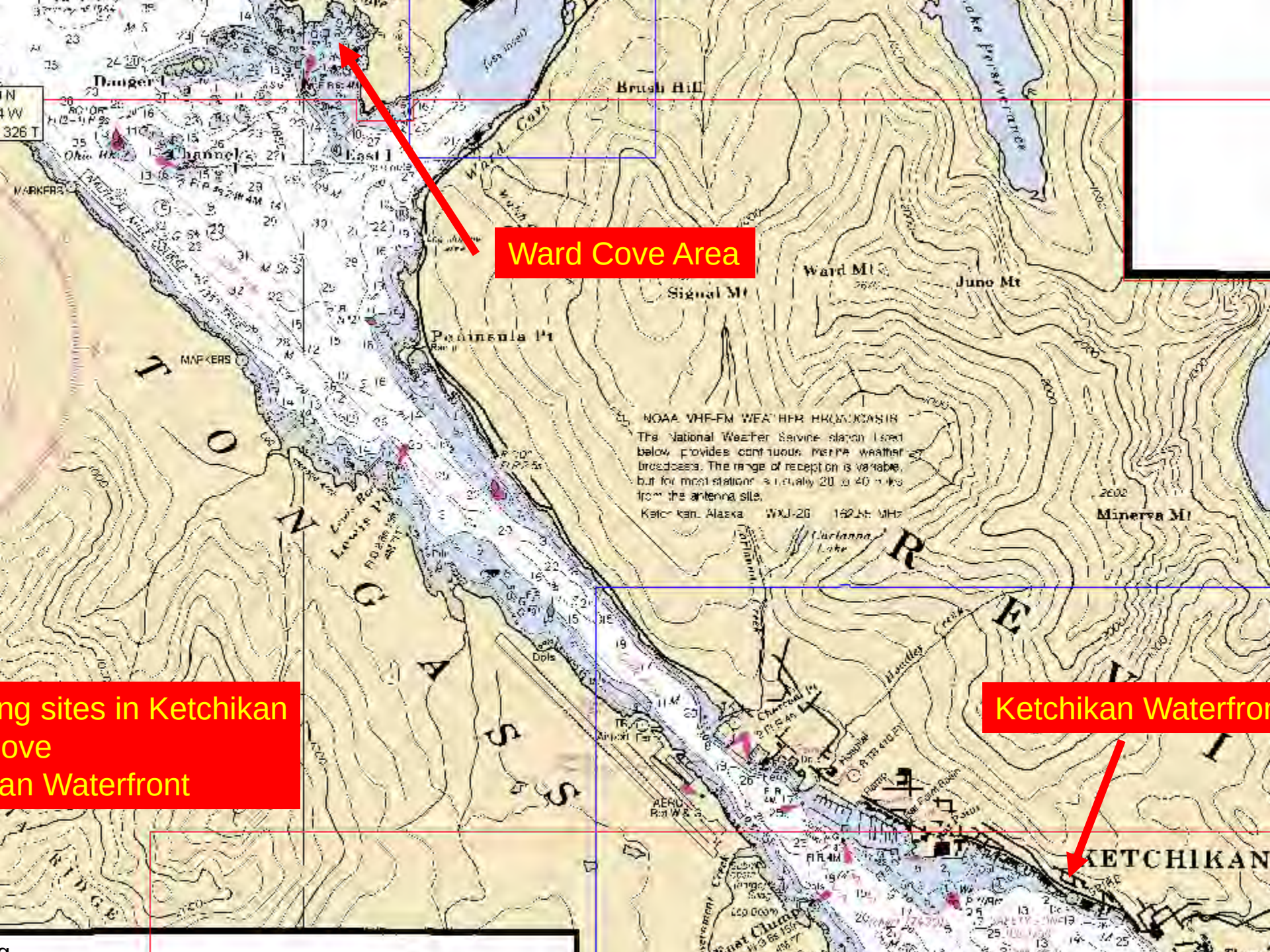
Ketchikan	Seward
Valdez	Sitka
Cordova	Homer
Whittier	Kodiak
Chenega Bay	Juneau
Tatitalek	Dutch Harbor

Have we found them?

Colonial tunicates detected in Southeast and Southcentral communities: Ketchikan, Sitka and Homer

Invasive Tunicate monitoring occurs in Eliaison, Thompson and ANB Harbors in Sitka.

Botrylloides and *Botryllus spp.* have been detected in Sitka for the past several years. *Didemnum vexillum* was detected in Whiting Harbor in June and genetics confirmed the species in August, 2010.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Juno Mt
Signal Mt
Peninsula Pt
Minerva Mt
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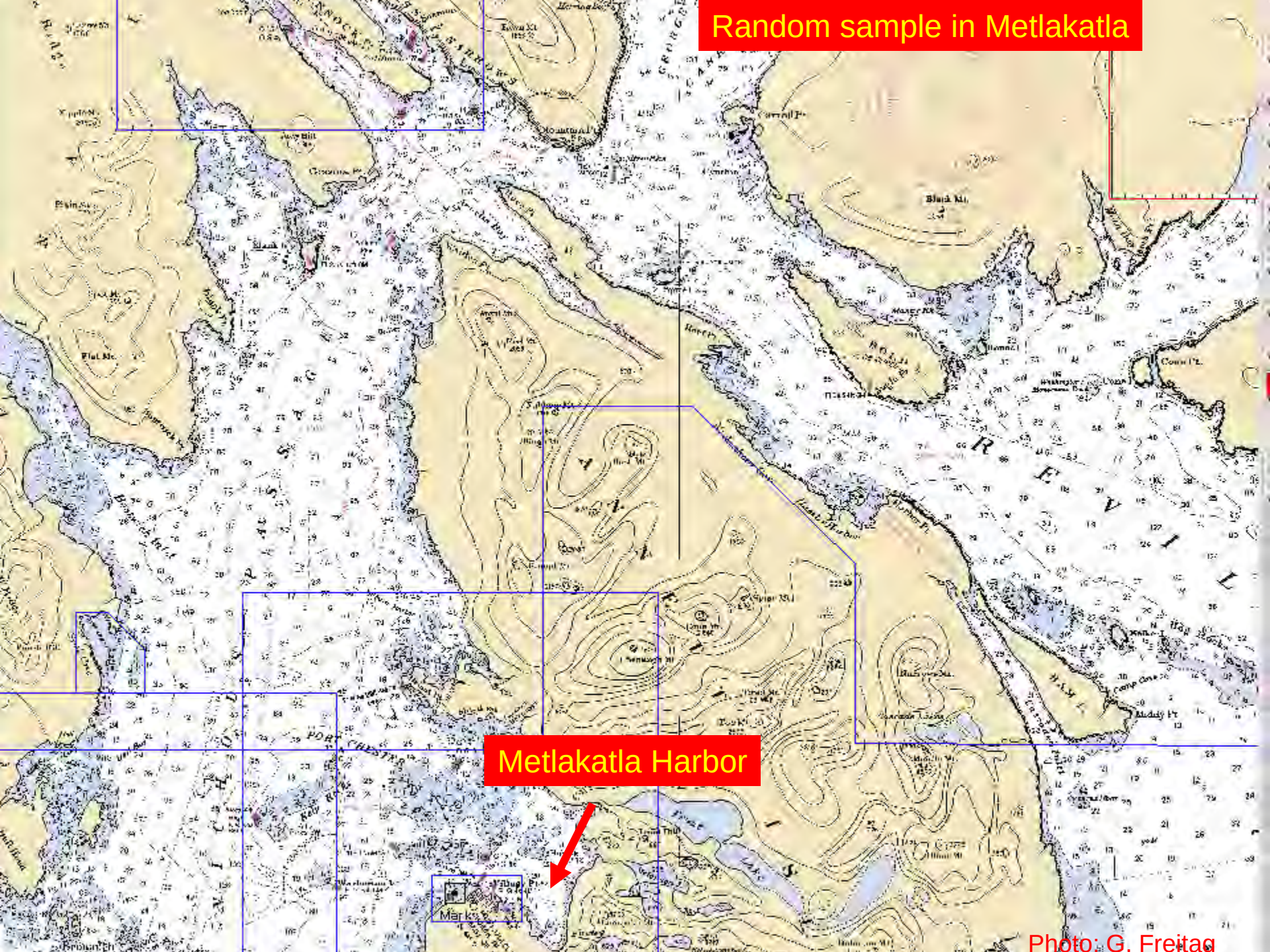
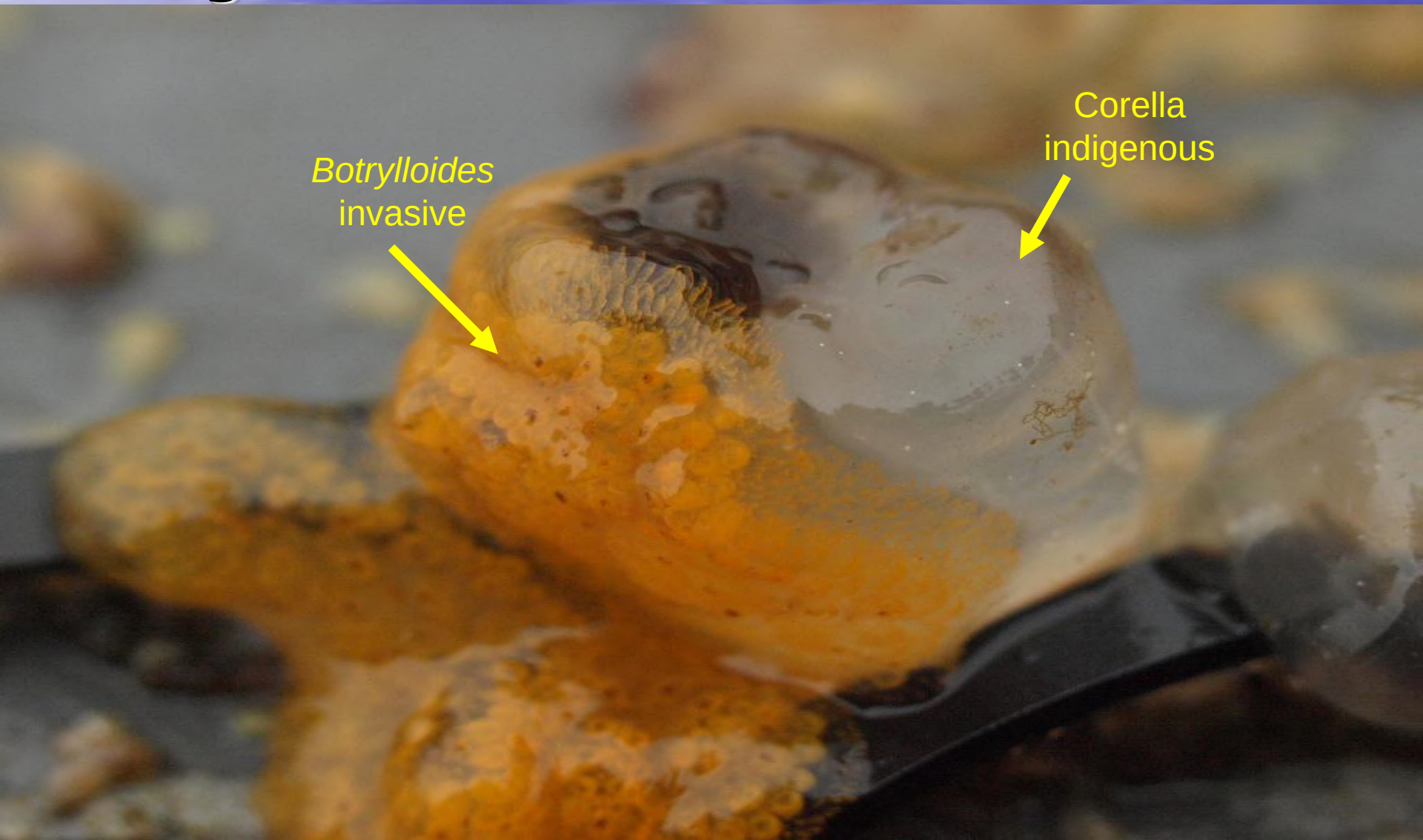
NOAA VHF-FM WEATHER BROADCASTS
KETCHIKAN


Random sample in Metlakatla
Metlakatla Harbor
Photo: G. Freitag


P9225374.JPG (120%)
1024x768 pixels; RGB; 3MB
Plate 8 Sept 22
Botrylloides
Plate # C-8
Collector's name FREITAG
Date 9/22/11
Photo: G. Freitag

Close-up of invasive growing on indigenous



What can you do to help keep from moving invasive tunicates into or around Alaska?

MANAGEMENT of TUNICATES:

- If you acquire used gear be sure to examine it for tunicates. Either dry thoroughly or rinse all surfaces and interstial space with fresh water on land. If gear appears to be contaminated call **1-877-INVASIV**.

- If you believe you've got any of the species discussed here:
  - please take a picture of the organism you believe to be an invasive tunicate and send it ADF&G by e-mail or postal service.
  - Be very careful when pulling your gear. Remove colonial tunicates manually and place in garbage receptacle or let them thoroughly dry away from saltwater.
  - If you must pressure wash colonial tunicates off equipment, only do so on land and make sure the outflow does not go into saltwater. These colonies can re-grow from small fragments.
  - Completely dry boat(s), boating gear, and aquaculture equipment before placing colonial tunicates back in the water or moving between sites.
- HOT DIP YOUR PRODUCT

What's next?

Implement rapid response efforts including:

- Dive surveys of Whiting Harbor, and top-side surveys of all harbors to assess distribution of *D. vexillum* in Sitka.
- Working with state and federal agencies and experts in the field, evaluate potential mechanisms to reduce threat of spread, options for removal, control and/ or eradication.
- Continue monitoring in Alaska.
- Continue communicating with stakeholders and the public to educate and close pathways that result in introduction and spread.

Solitary tunicates native to Alaska

Ascidea callosa

Corella inflata

Halocynthia aurantium

Styela truncata

Molgula pacifica

Photos Chela Zabin

Thank You:
•Greg Ruiz and Linda McCann of Smithsonian Environmental Research Center
•C. Sarah Cohen, San Francisco State University
•Linda Shaw, NOAA, National Marine Fisheries
•Heather Meuret-Woody, Sitka Tribe
•Marnie Campbell, UAS-Sitka
•Gary Freitag, Sea Grant and UAS-Ketchikan
•Grant Miller, Whiting Harbor Aquafarm
•Lynn Wilbur, Sitka Sound Science Center

Photo: G. Freitag