# MOLT SEARCH

An early detection program for European green crab in the Salish Sea

**Today @ 10:30 am**
**Presented by Sound Water Stewards**
**Via Zoom**

- Invasive European green crabs
- Molt Search survey protocol
- Crab molt identification
- Next Steps

Emily Grason/WSG

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# MOLT SEARCH

## Introduction to European green crab

Alex Stote/WSG

Alex Stote/WSG

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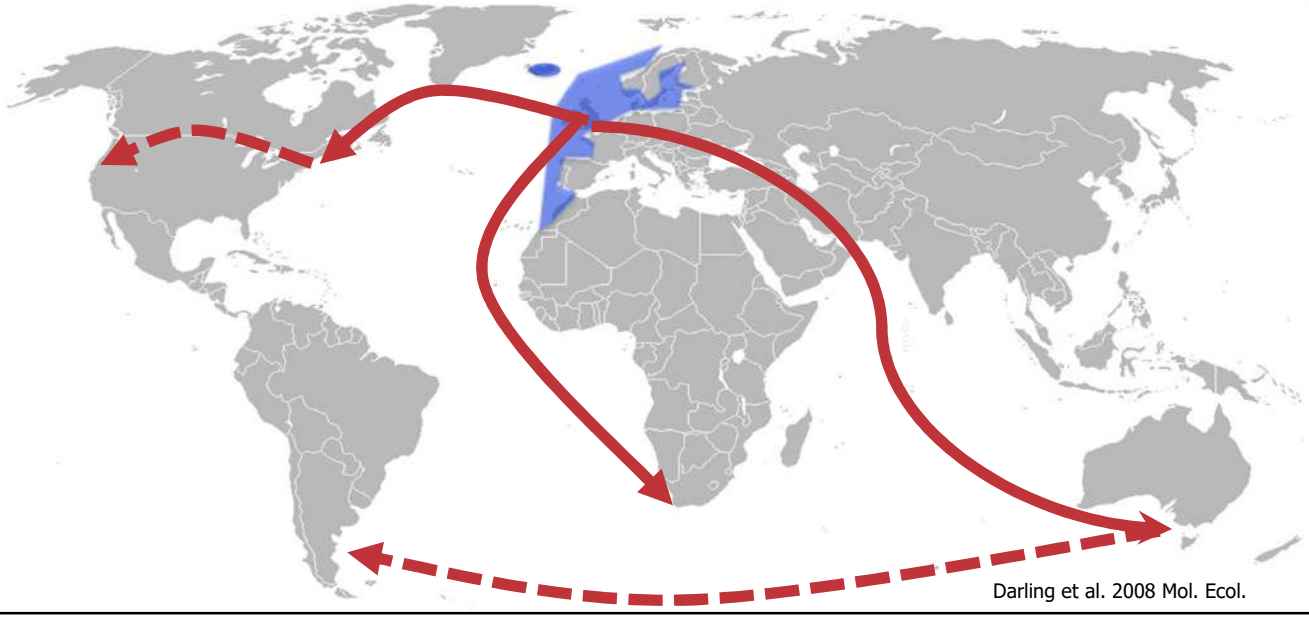
# A globally damaging invasive

European green crab
*Carcinus maenas*

3

# Global pathways of green crab

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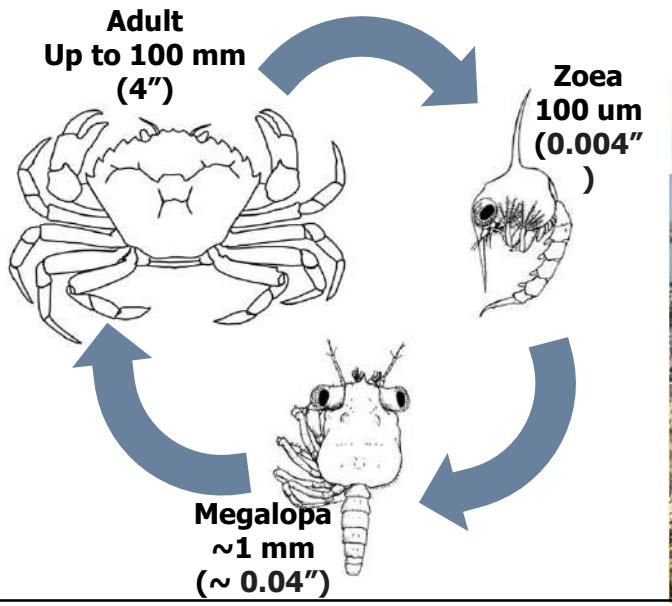
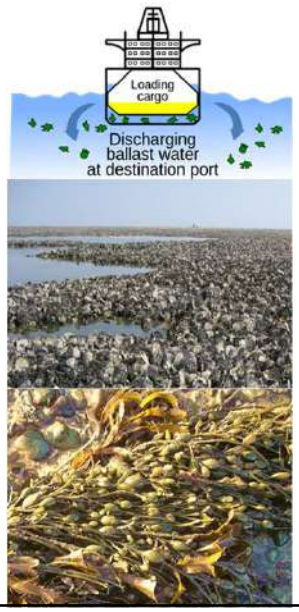
# What makes green crab successful?

Small

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# What makes green crab successful?

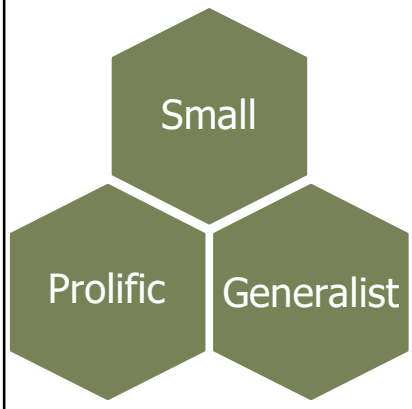
Small

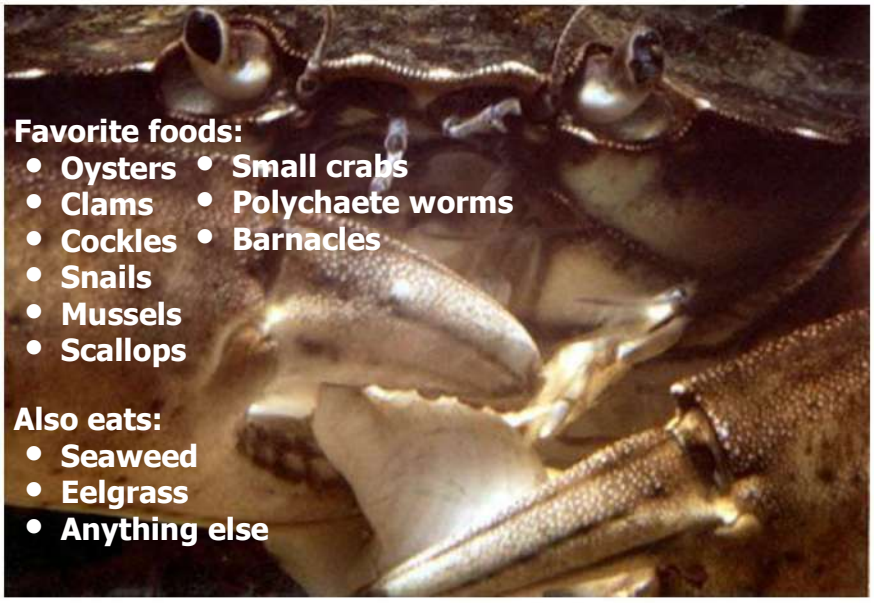
Prolific

**As many as 250,000 eggs!**

6

# What makes green crab successful?

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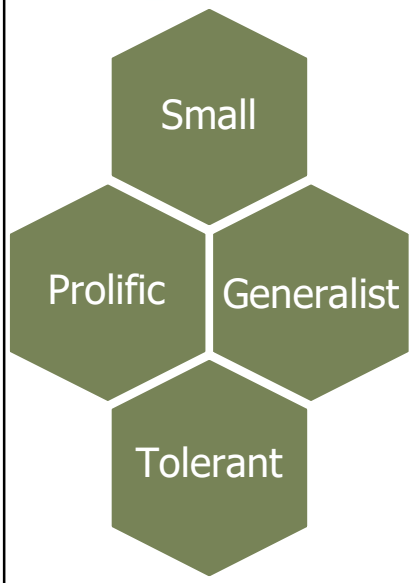
# What makes green crab successful?



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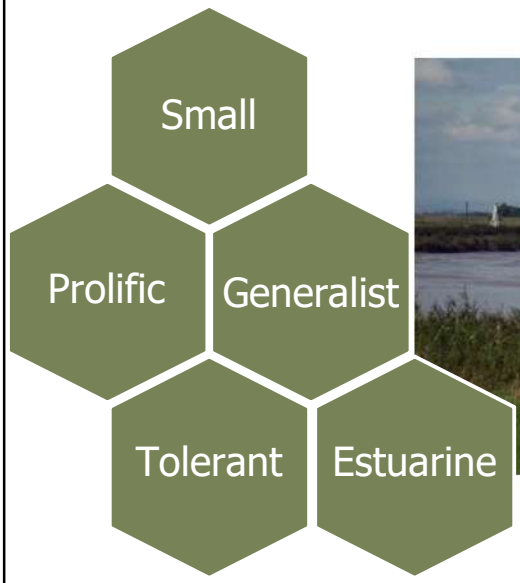
# What makes green crab successful?



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# What is at risk?

Abundance could lead to dramatic ecological impacts

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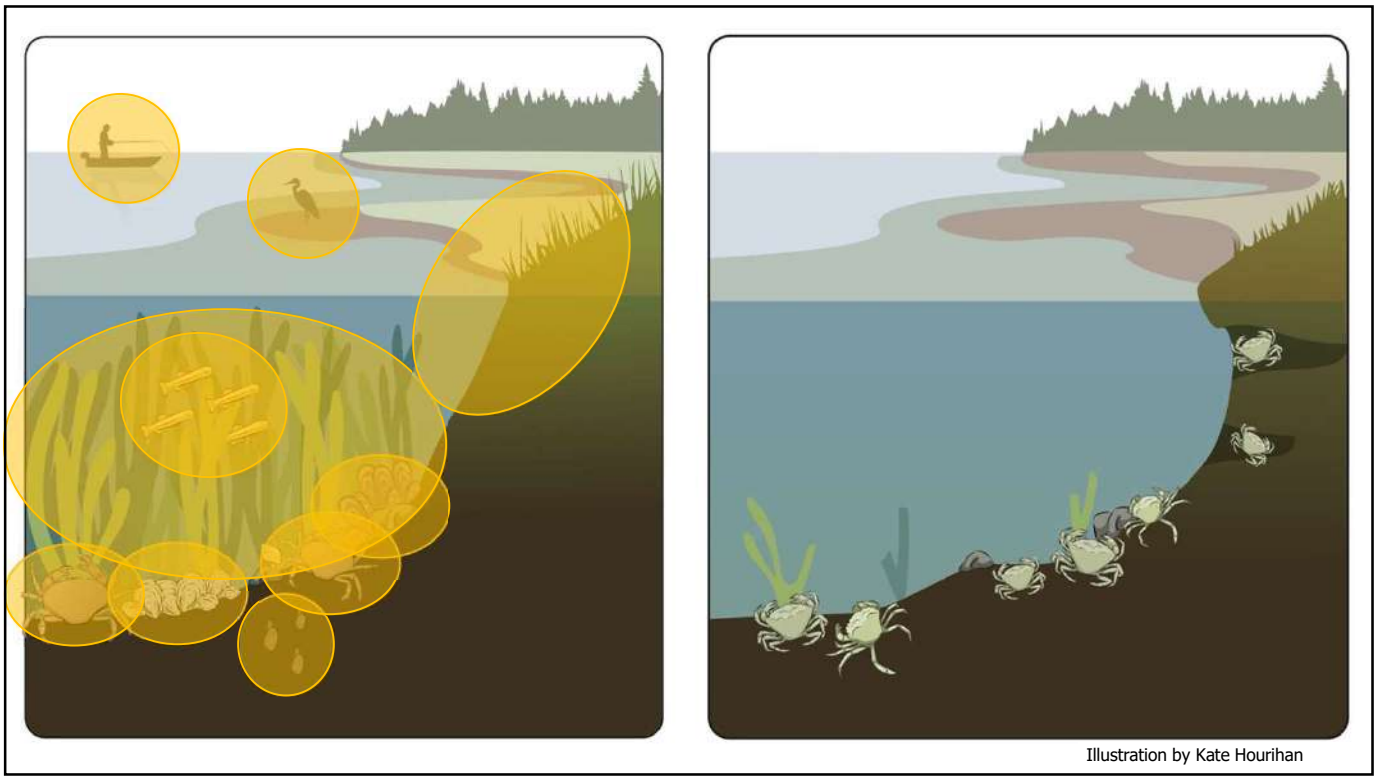


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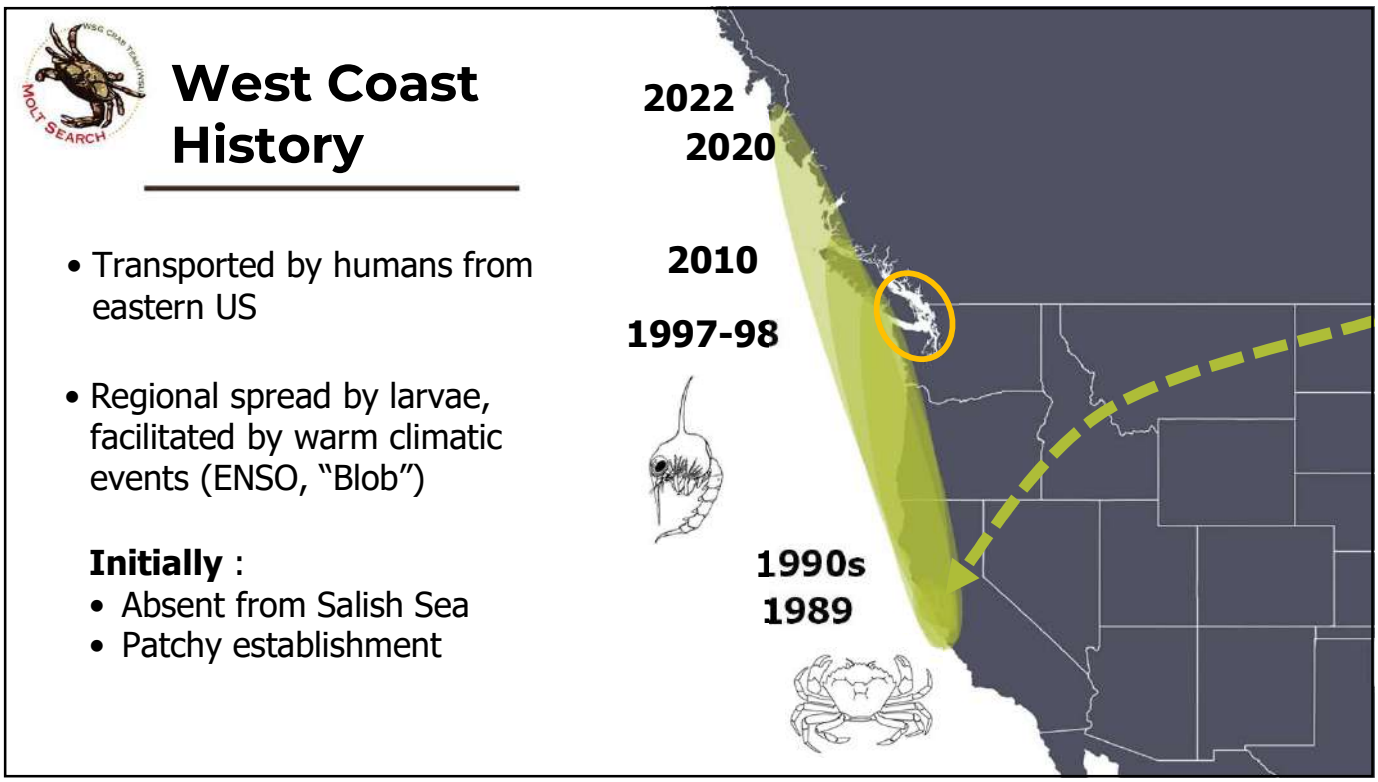
## West Coast History

- Transported by humans from eastern US
- Regional spread by larvae, facilitated by warm climatic events (ENSO, "Blob")

**Initially** :
- Absent from Salish Sea
- Patchy establishment

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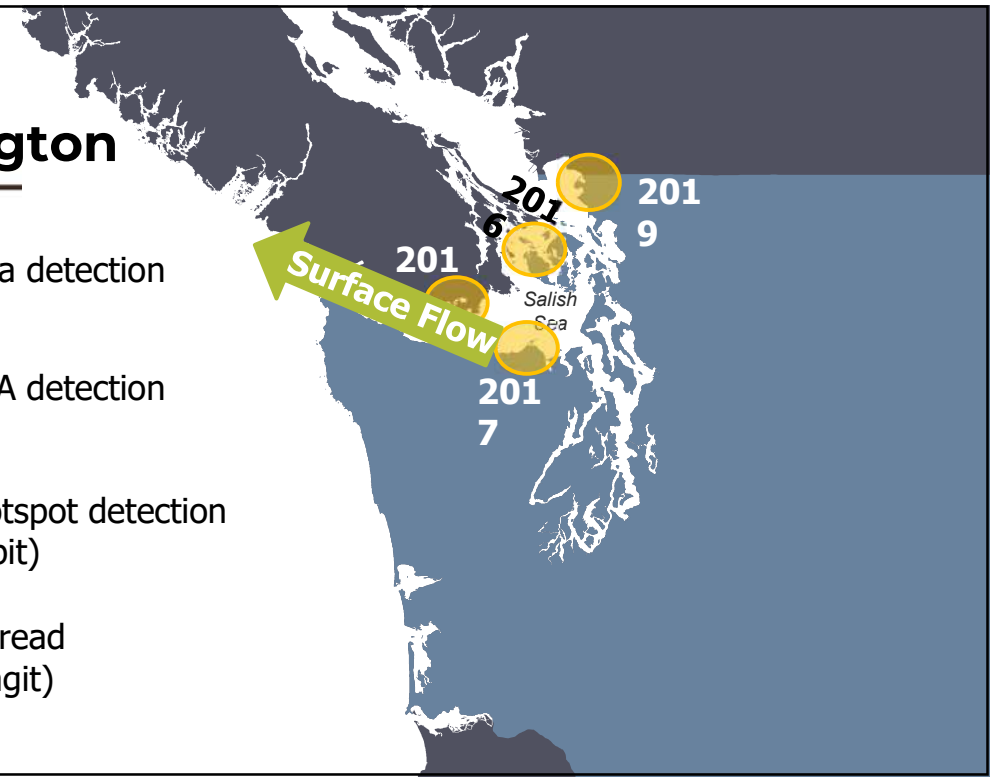
# Inland Washington

2012: First Salish Sea detection (Sooke, BC)

2016: First inland WA detection (SJI)

2017: First inland hotspot detection (Dungeness Spit)

2019: Substantial spread (Whatcom/Skagit)

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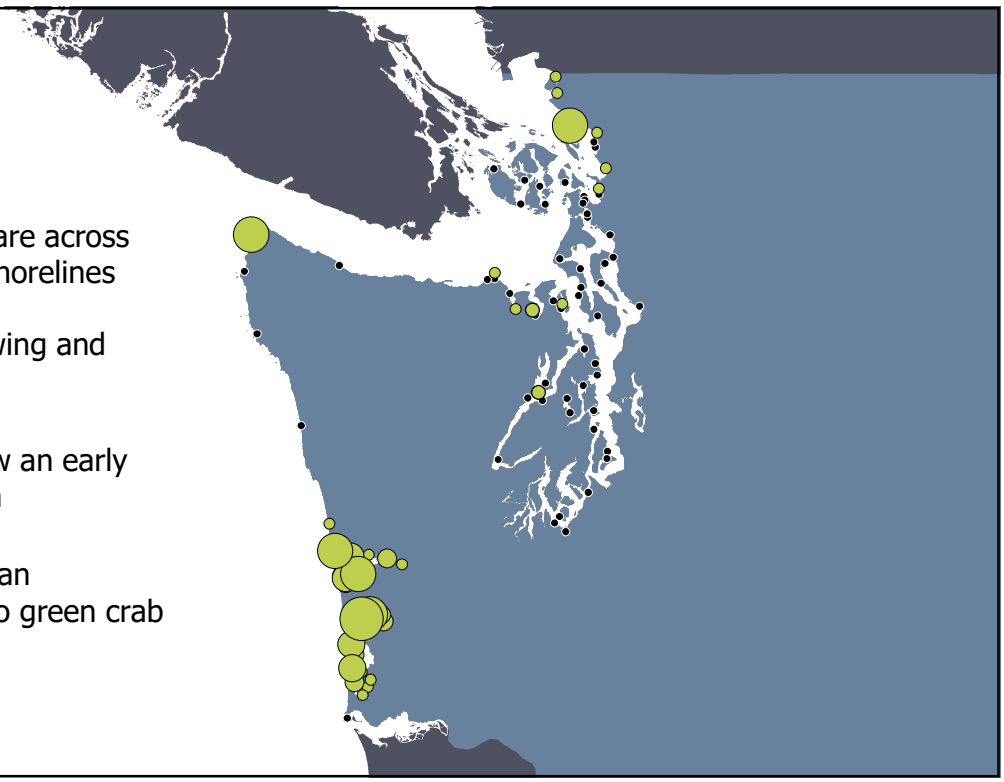
# The Big Picture

- Green crab remain rare across *inland* Washington shorelines
- Populations are growing and spreading statewide
- We are trying to slow an early stage of the invasion
- Gov Inslee declared an Emergency related to green crab in 2022



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# What's being done about it?

## Who:

Washington Department of FISH & WILDLIFE — **State Lead**

**Tribes**

**Federal & State Agencies**

**Shellfish Growers**

## What:

**Early Detection - Rapid Response:**

Find European green crab at the earliest possible stages of invasion and trap aggressively to reduce the chance they could

**Early detection techniques**

- Trapping
- Beach surveys
- *Environmental DNA (in development)*

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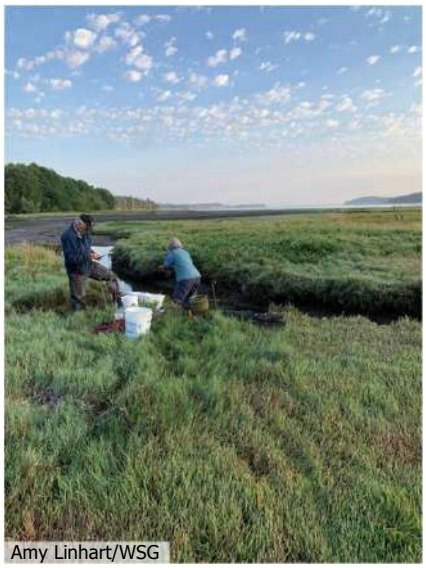
# Early Detection

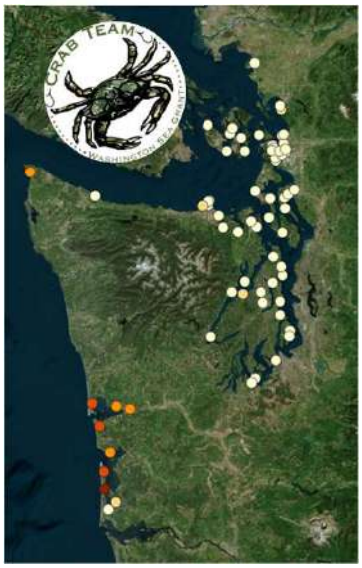
**Trappin g**



Amy Linhart/WSG

Emily Grason/WSG

Emily Grason/WSG



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# Early Detection

## Beach Surveys

Linda Sollars

Jonathan Robinson/WSU

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Broad engagement

Short protocol

Anywhere

Any time

1. Cast a wide net for evidence of green crab presence

*2. Capture a bit of info about Dungeness crabs - optional*

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# What happens after early detection?

**Early detection surveillance**

- Trapping network of 58 sites
- Agency and tribal manager training
- Beachgoers etc. to expand network

Green crab

**Assessment of population**

- Intensive trapping to determine extent of population

Washington Department of FISH & WILDLIFE

0 to few

**Continued monitoring**

- Monthly small scale monitoring
- Annual repeat assessment

many

**Ongoing management**

- Intensive trapping to remove as many as possible

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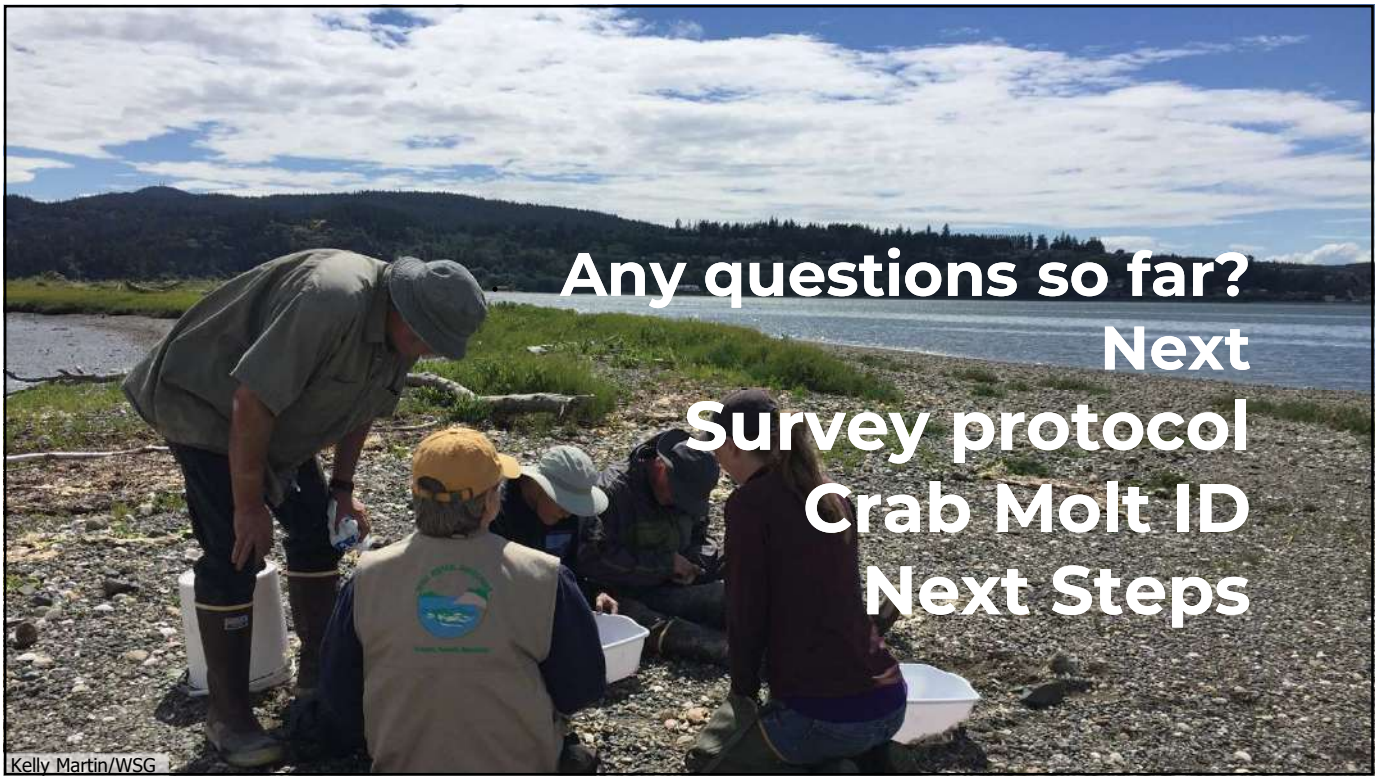


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# MOLT SEARCH

## Survey protocol for European green crab early detection

Sea Grant Washington

Washington State University Extension

Alex Stote/WSG

Alex Stote/WSG

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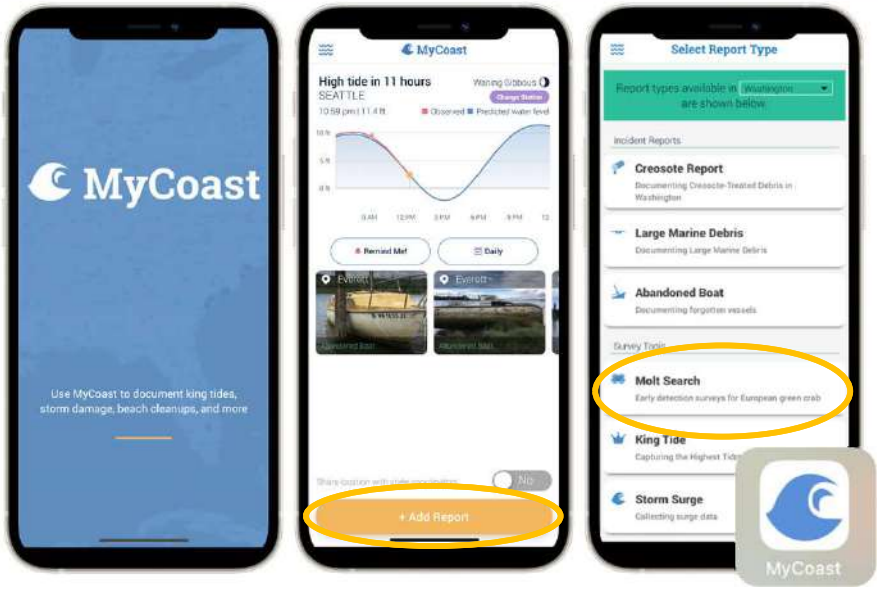
# Molt Search

## Molt Search

- *Consistent survey technique.*
- *Report presence or absence of evidence.*
- *Optional: Dungeness crab population data.*

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# 1. Prepare for your molt survey

- Choose a location where you have safe and legal access to the shoreline
- Don't forget to dress for the weather!

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# Have Handy

- A phone/device that can take photos
- 1 collection container per person
- A measuring device (ideally, calipers)
- Molt Search ID Guide (or digital access)

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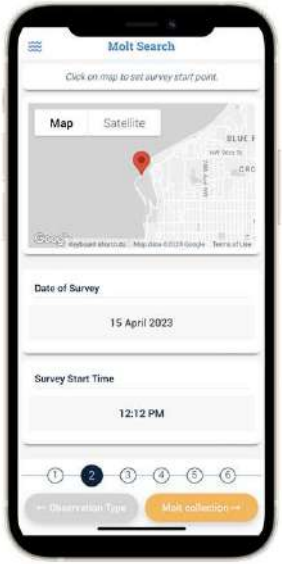
# 2. Conduct your survey

- Open the MyCoast app at your selected starting point and identify your location
- Note your survey start time
- Use a timer with an *alarm*
- Total of 20 person-minutes

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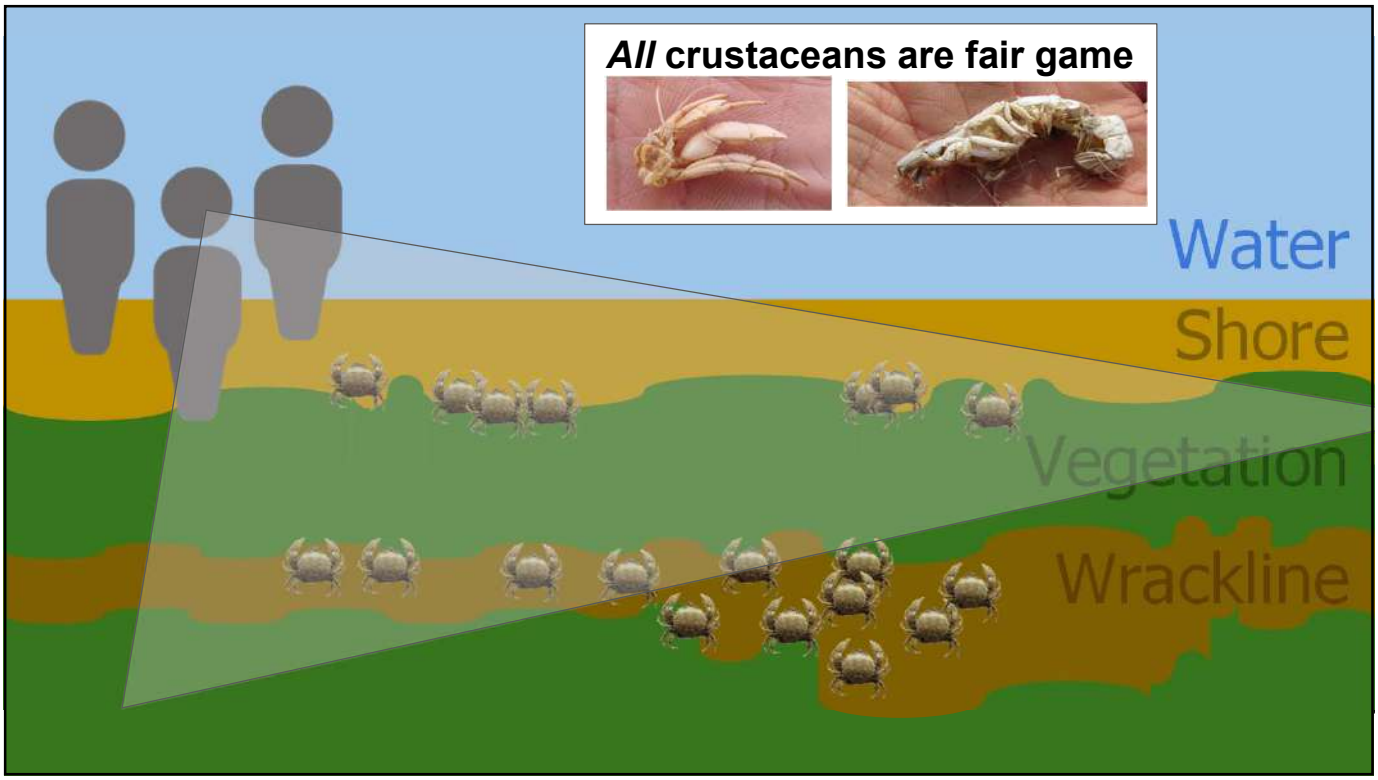


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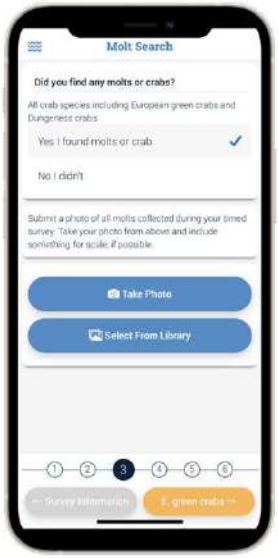
# 3. Record your molt survey



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# 3. Record your molt survey: Half carapace rule

| Counted | Not Counted |
|---|---|
| | |
| >50% carapaces<br>All can be ID'ed | Partial body molt,<br>difficult to ID |

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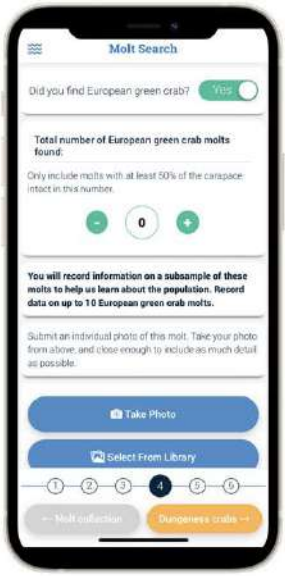
# If you find European green crab molts



- Report your findings following the prompts in the MyCoast app

Taylor Shellfish

- Total # found
- Individual information for a subsample of up to 10
  - Photo
  - Condition
  - Sex
  - Size

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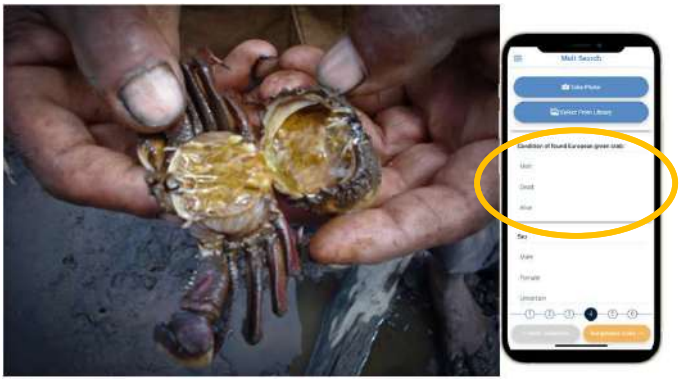
# 3. Record your molt survey:

**Molt**

Empty shell including gills

**Dead crab**



Stinky, heavy, wet, gray dead crabs

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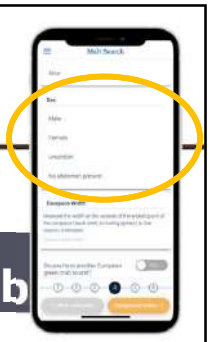
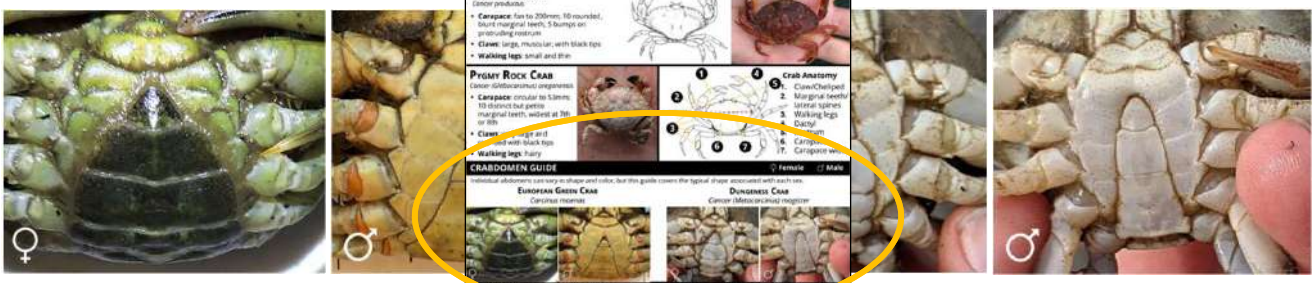
# Male vs. Female



European green c ungeness crab

Female M ale Male

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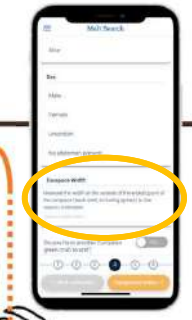
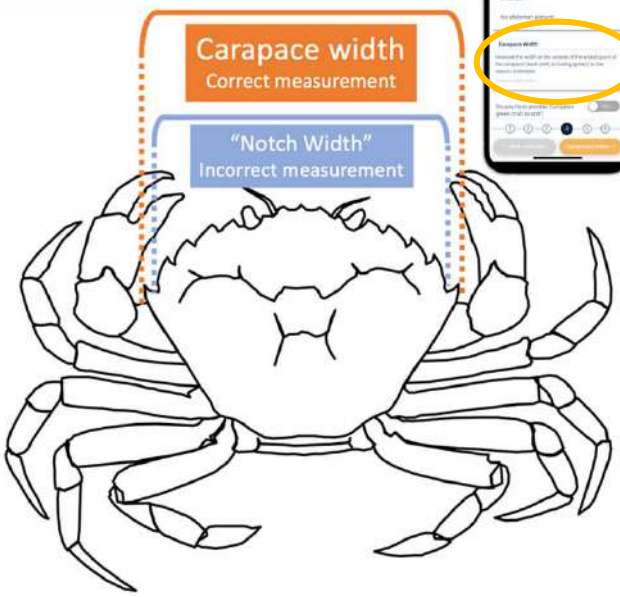
# Measuring – European green crab



**Carapace width (mm)**

Width of the back shell at the **w i d e s t** point

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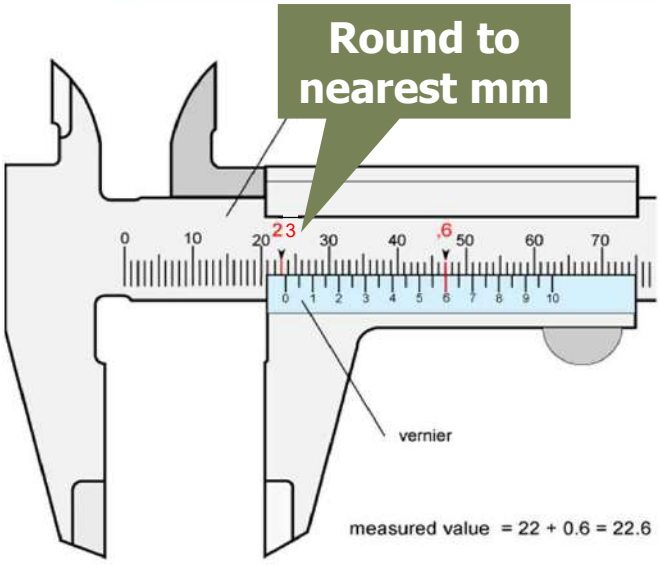
# Measuring



Wendy Feltham

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# If you are submitting Dungeness data

- Report your findings following the prompts in the MyCoast app
  - Total # found
  - Individual information for a subsample of up to 10
    - Sex
    - Size

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# 4. After your molt survey

- Submit survey on MyCoast
- Dispose of molts
- If you found a European green crab molt:
  - We will follow up with you after you submit your report!
  - If you can, please hold onto the molt
  - We may request additional photos/details

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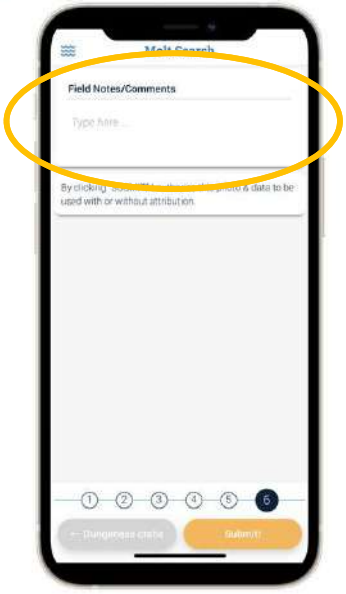
# What to do if you find…




- A live or dead green crab?
- A molt you can't confidently rule out as a green crab?
- A molt or molt fragment smaller than half a carapace that appears to be a green crab?

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# MOLT SEARCH

## Molt Identification

Emily Grason/WSG

Emily Grason/WSG

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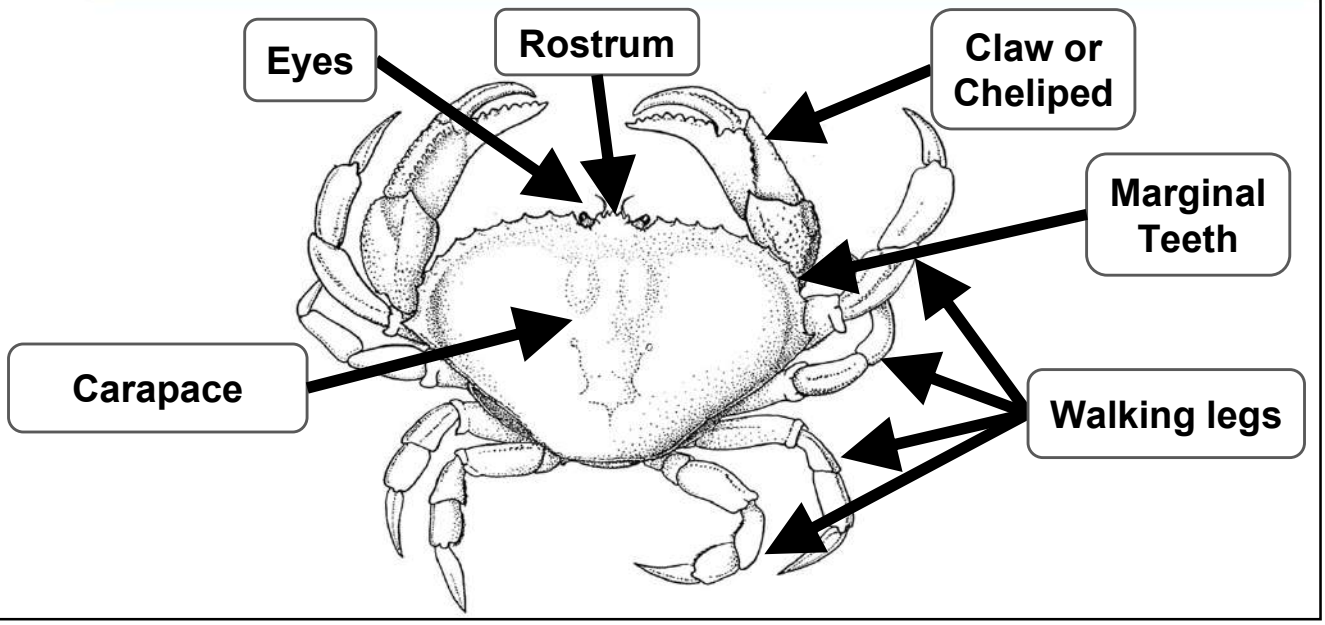
## Crab Anatomy

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# What *not* to look for: a "green crab"

European green crabs are not always green

Emily Grason/WSG

Photos: Stephens et al. 2014

Molts lose their color over time

Alex Stote/WSG

USGS

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# What *not* to look for: a "green crab"

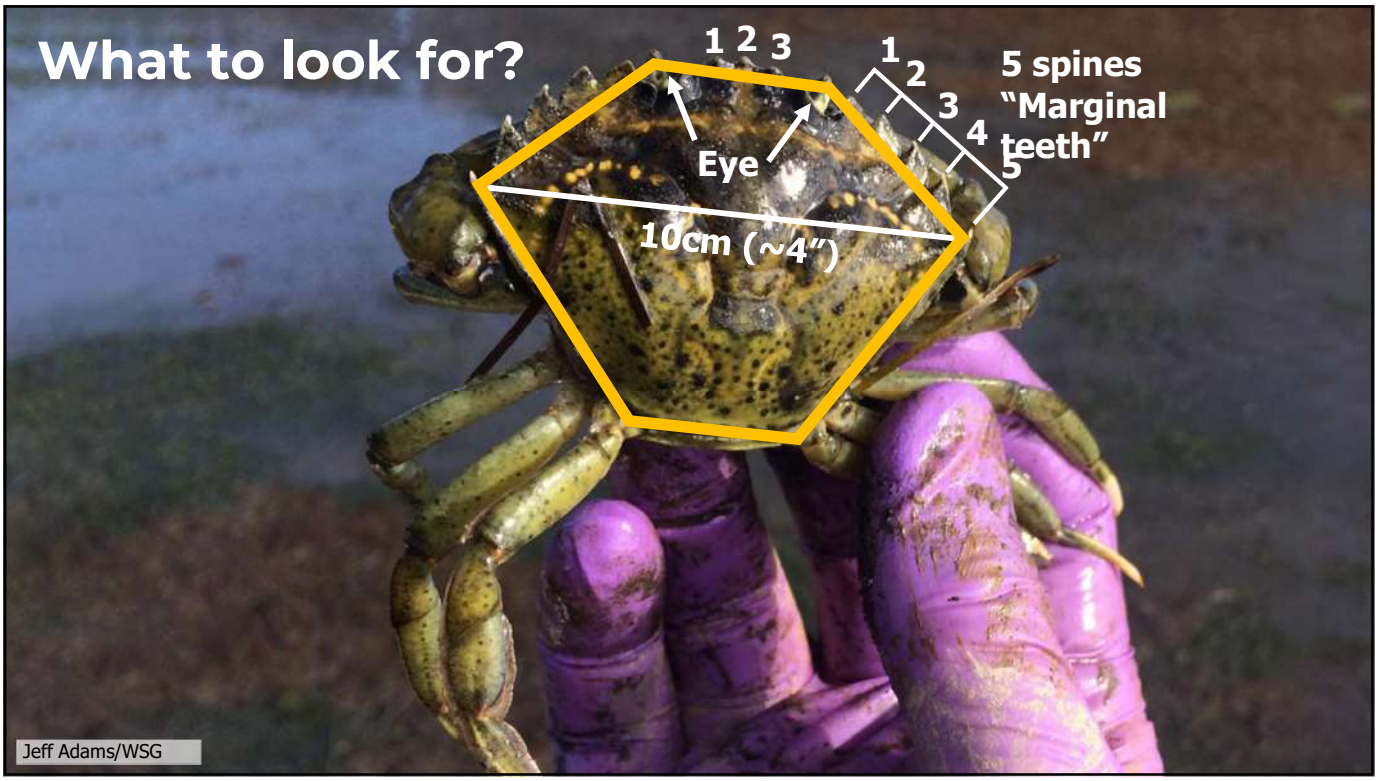
Many native crabs are also "green"

Emily Grason/WSG

Jeff Adams/WSG

DFO Canada

40

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## What to look for: 5 marginal teeth

Staci McMahon/WSG

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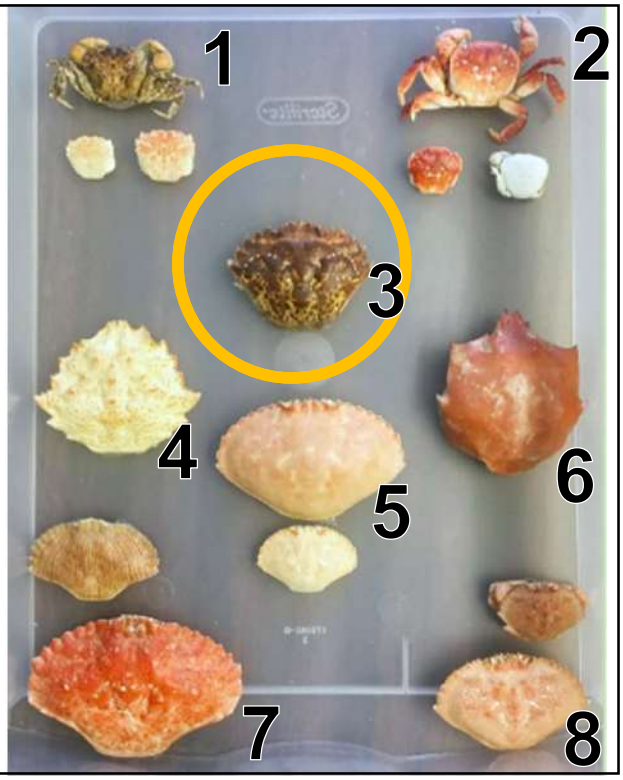
# Which is a green crab?

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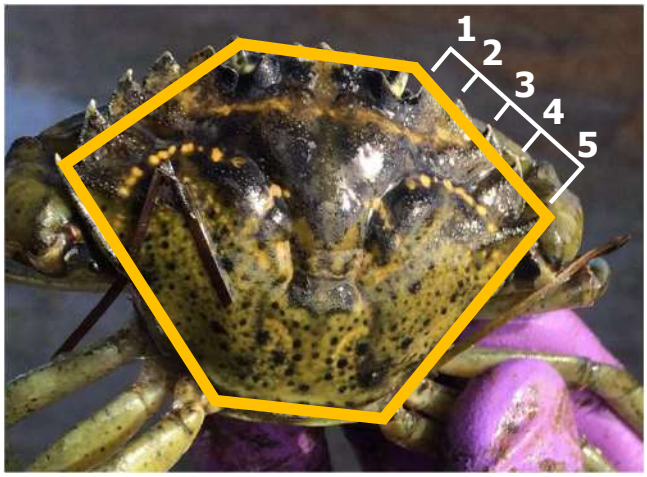
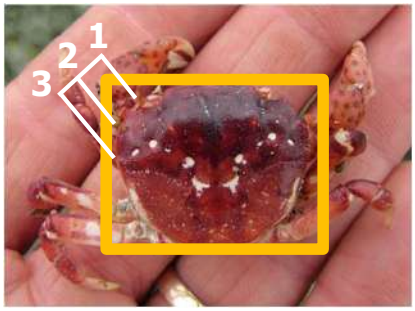
## Green crab ID




Native shore crabs
*Hemigrapsus* spp.

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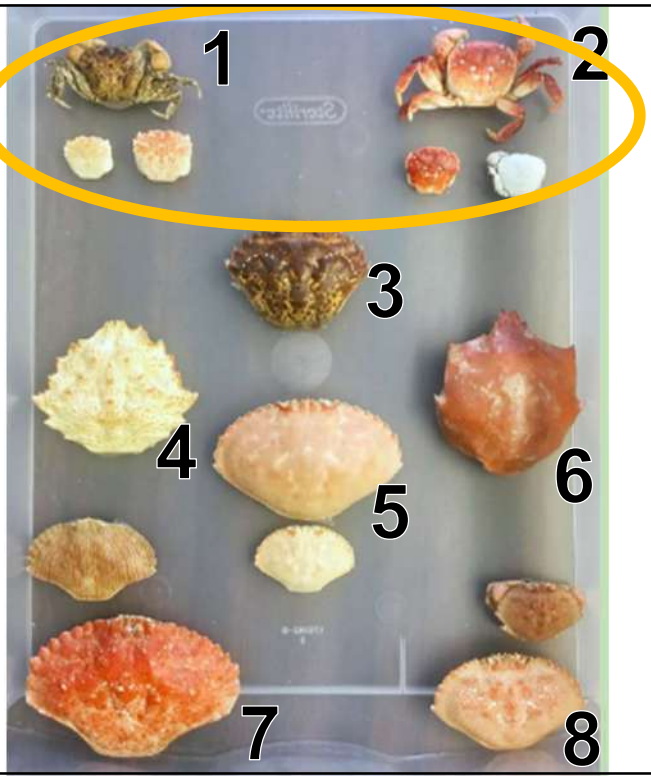
## Which are shore crabs?

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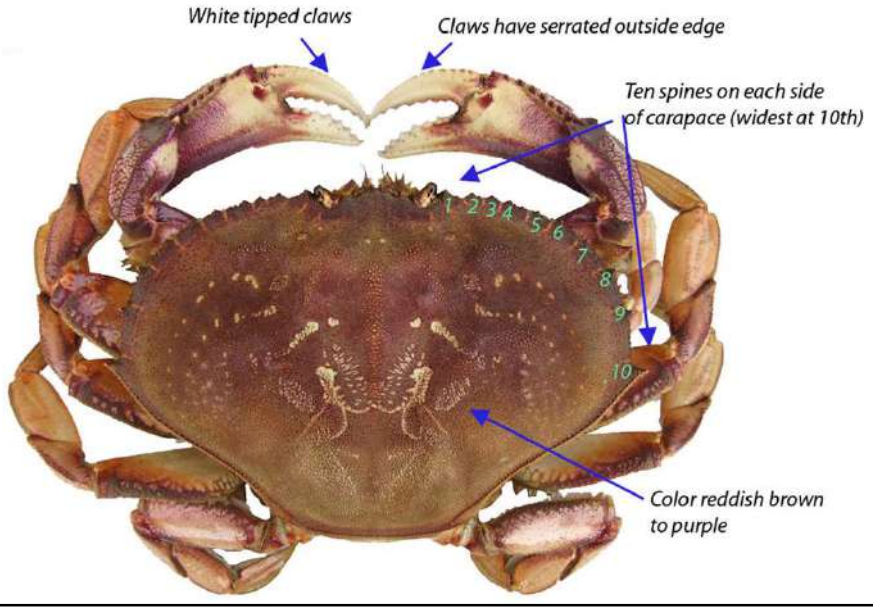
## Dungeness crab ID

*Metacarcinus (Cancer) magister*

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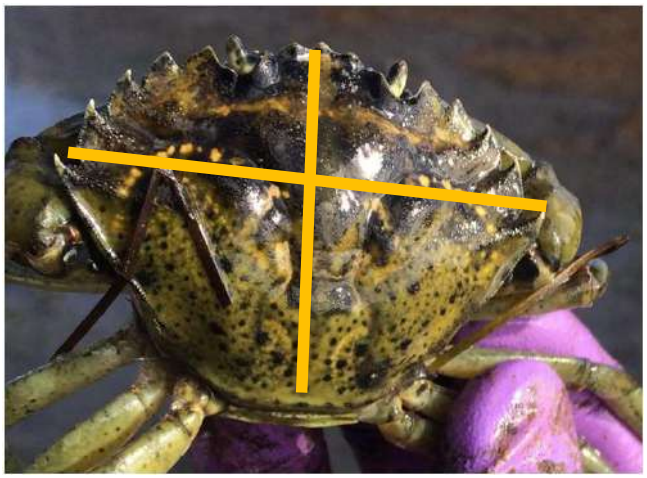
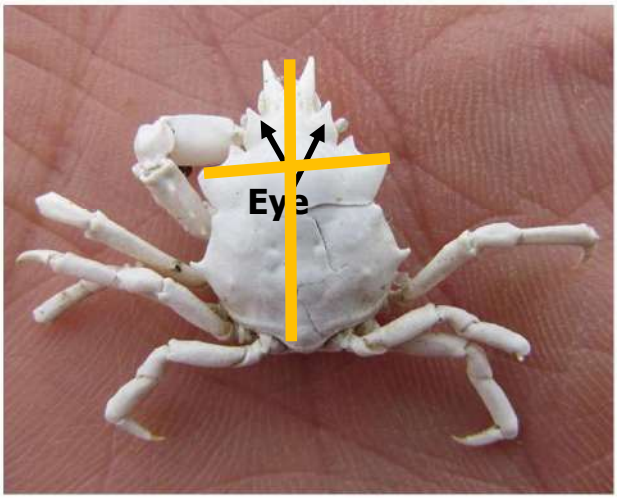
# Green crab ID



**Native kelp and spider crabs**
*Majidae*

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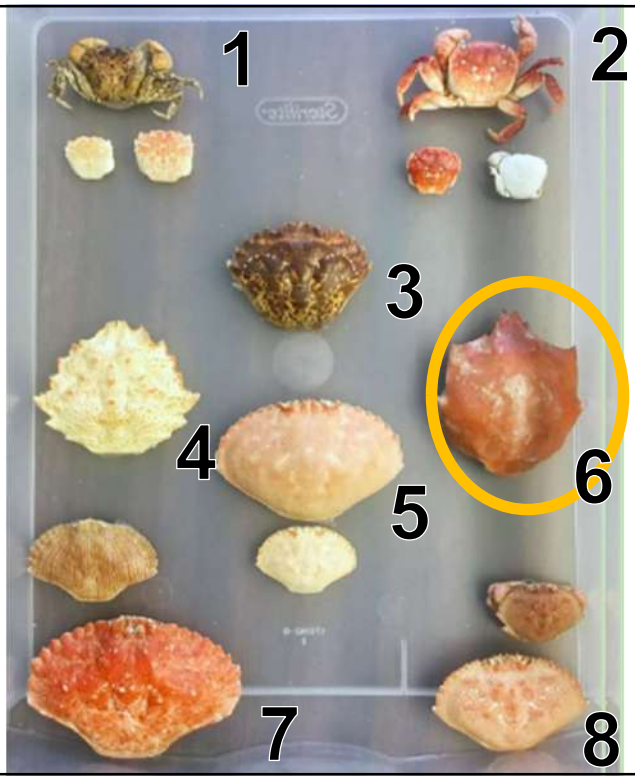
## Which is a spider crab?

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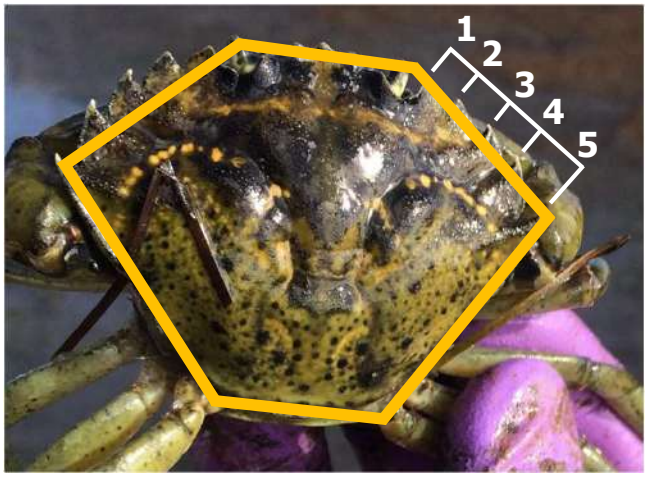
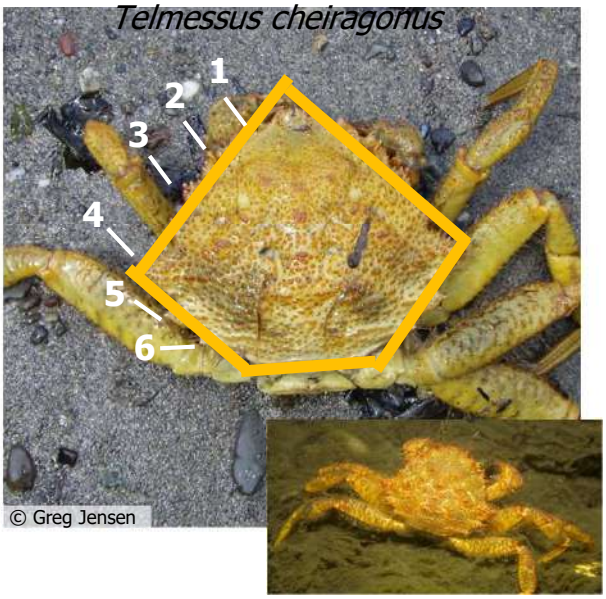
# Green crab ID




**Native Hairy Helmet crabs**

*Telmessus cheiragonus*

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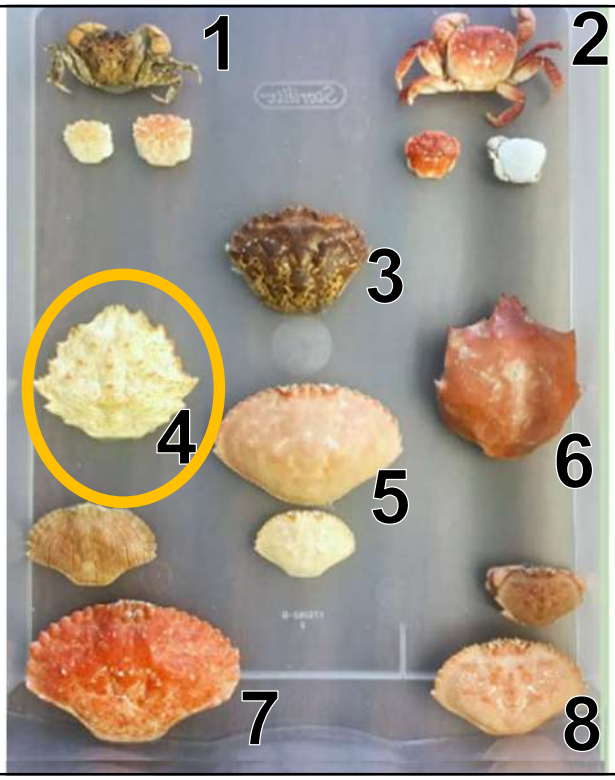
# Which is a helmet crab?

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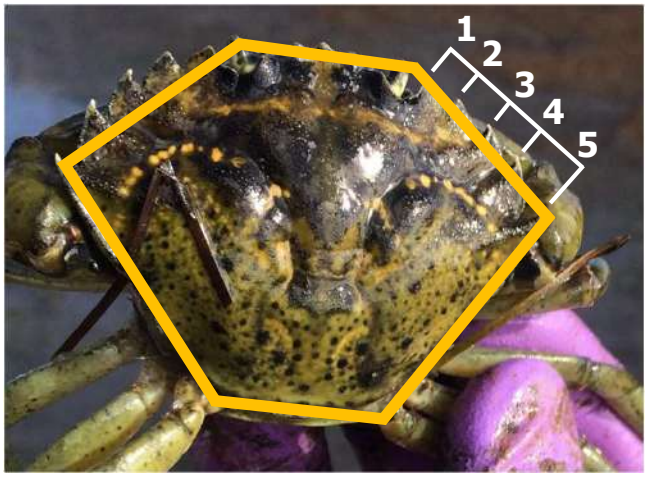
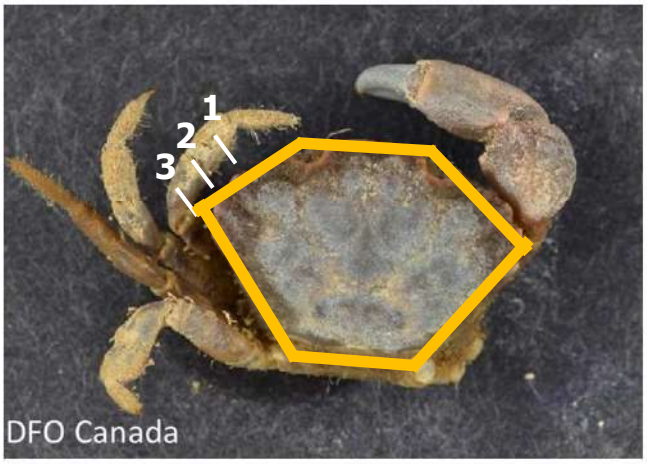
# Green crab ID




**Black-clawed crab**
*Lophopanopeus bellus*

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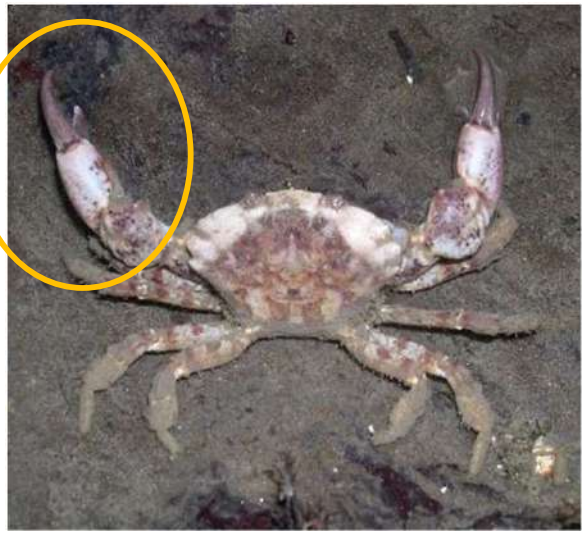
# Green crab ID

**Black-clawed crab**
*Lophopanopeus bellus*



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# Which is a black clawed crab?

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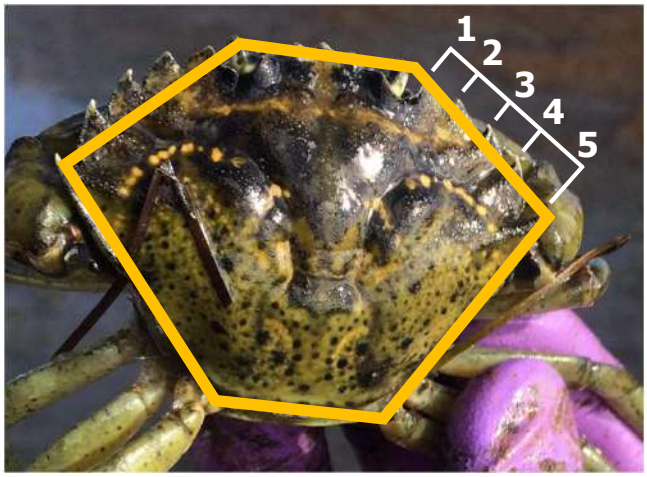
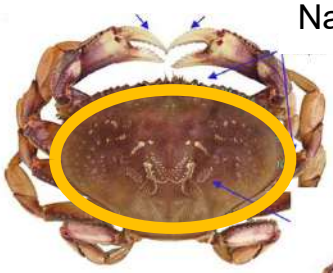
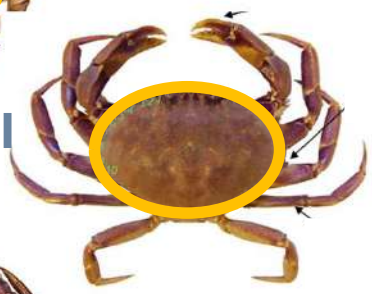
## Green crab ID

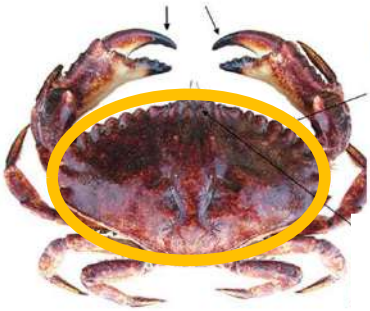



Native "Cancer" crabs



10 marginal teeth





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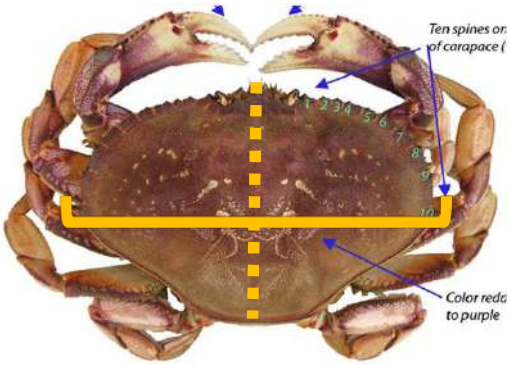
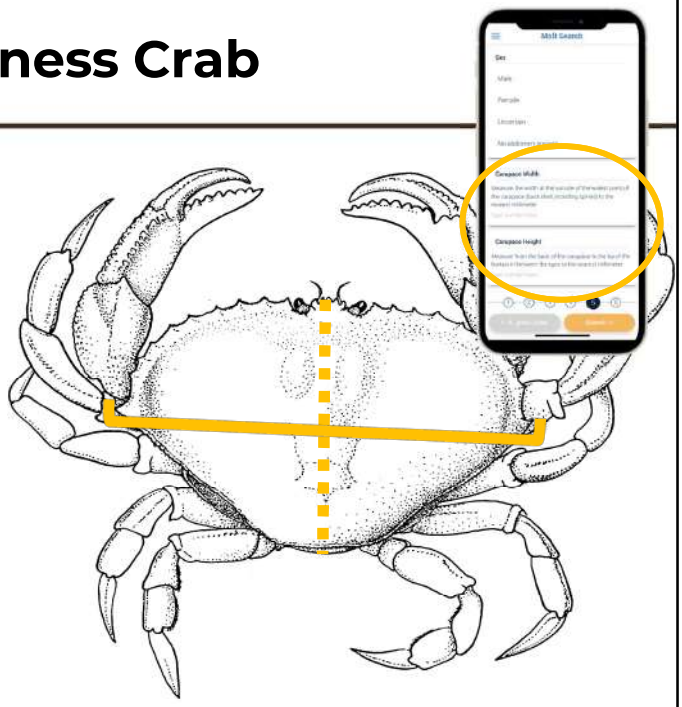
# Measuring – Dungeness Crab

**Carapace width (mm)**
***AND* Carapace height (mm)**
Length of carapace from tip of rostrum.



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# Dungeness crab ID

*Metacarcinus (Cancer) magister*

**Graceful crab**
*Metacarcinus (Cancer) gracilis*

Staci McMahon/WSG

Jeff Adams/WSG

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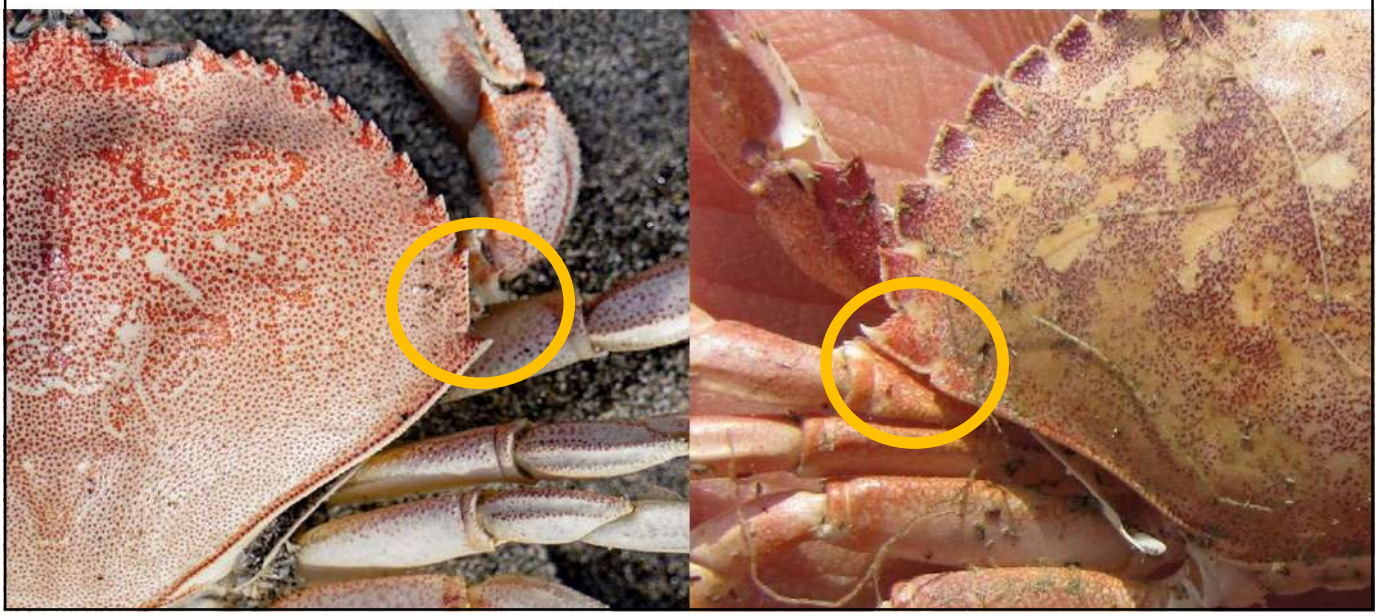
# Dungeness crab ID

*Metacarcinus (Cancer) magister*

**Graceful crab**
*Metacarcinus (Cancer) gracilis*



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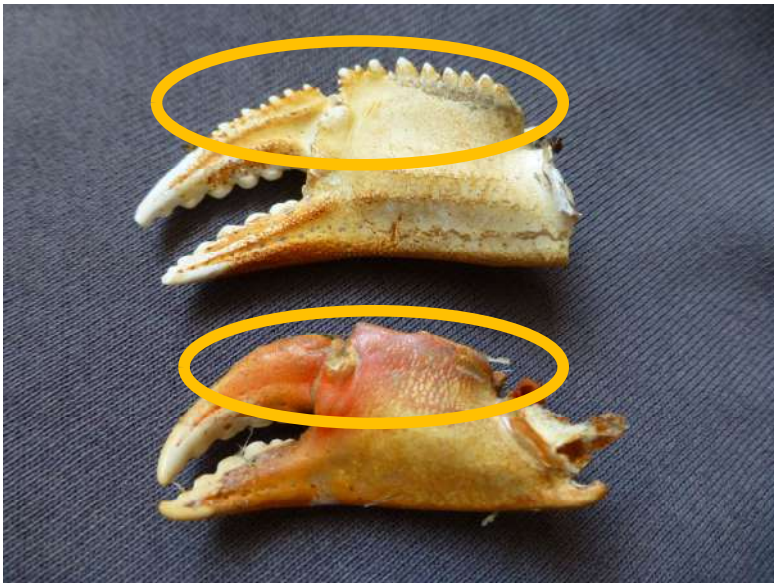
# Dungeness crab ID

**Dungeness crab**
*Metacarcinus (Cancer) magister*

**Graceful crab**
*Metacarcinus (Cancer) gracilis*



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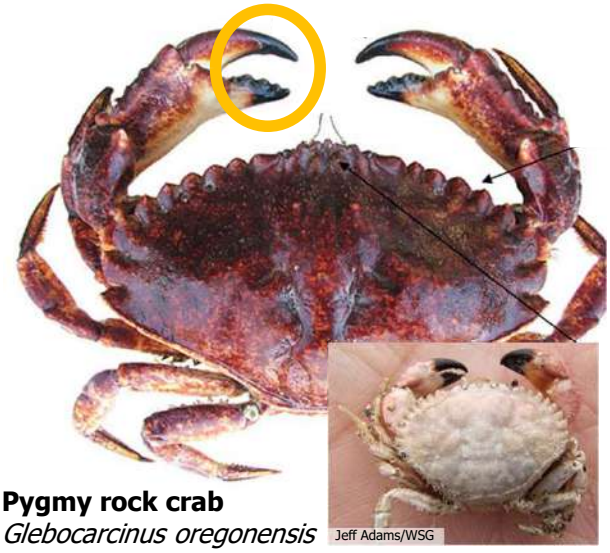
# Dungeness crab ID

Staci McMahon/WSG

**Red rock crab**
*Cancer productus*



**Pygmy rock crab**
*Glebocarcinus oregonensis*


Jeff Adams/WSG

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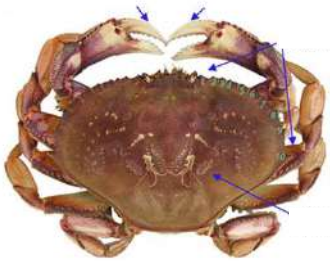
# Which Cancrid is which?



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# MOLT SEARCH

## What Comes Next?

- Next steps: Bioblitzes, individual surveys
- Join Sound Water Stewards on the Beach
- Camano – July 8th, August 10th
- Whidbey- August 19th

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# MOLT SEARCH

## Thank You!

Contact
Camano-coord@soundwaterstewards.org
-Or-
Whidbey-coord@soundwaterstewards.org

Recording will be posted
www.soundwaterstewards.org/event/monthly-member-mtg-june-2023/

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