Eyes on the Beach,
Boots in the Mud

European Green Crab on Our Coastline

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@WAGreenCrab
WSG Green Crab
“One of the world’s worst invasive species…”

**European green crab**

*Carcinus maenas*
World’s 100 worst invasive species

European green crab
(*Carcinus maenas*)

WA Sea Grant Crab Team
Monitoring and early detection

2016 Sightings and Rapid Assessments

Protecting our shared shorelines
The European green crab (*Carcinus maenas*)

Stevens et al. (2014)

P. Sean McDonald
The European green crab (*Carcinus maenas*)

Stevens et al. (2014)
What makes this crab a “bad” invasive?

“Bad” ≠ Evil ≠ Meanspirited

“Bad” ≅ “Problematic”

- More likely to establish
- More difficult to control
- More likely to cause damage
What makes green crab successful

Small

Up to 80mm (3”)

100 um (0.004”)

~ 1mm (~ 0.04”)

© Gregory C. Jensen
What makes green crab **successful**
What makes green crab successful

- Small
- Prolific

Up to 250,000 eggs
What makes green crab successful

- Small
- Generalist
- Prolific

Favorite foods:
- Oysters
- Cockles
- Snails
- Mussels
- Small crabs
- Scallops
- Polychaete worms
- Clams
- Barnacles
What makes green crab *successful*

**Small**

**Generalist**

**Prolific**

Favorite foods:
- Oysters
- Cockles
- Snails
- Mussels
- Small crabs
- Scallops
- Polychaete worms
- Clams
- Barnacles

Also eats:
- Anything else
What makes green crab successful

- Small
- Generalist
- Prolific
- Estuarine
What makes green crab *successful*

- Small
- Generalist
- Cryptic
- Prolific
- Estuarine
What makes green crab **successful**

- **Small**
- **Generalist**
- **Cryptic**
- **Prolific**
- **Estuarine**
- **Tolerant**

Temperature range: 0-35°C

Salinity range: 5-35 PPT

5-35 PPT
31-34 PPT
A global invasive…

By 1817

By 1989
... on our doorstep...

May 1989

1990s

1998

2000s

2012
... and into the parlor.
Green Crab: Potential impacts

**Eelgrass**
- Damage to existing beds
- Reduced restoration effectiveness

**Shellfish**
- Direct consumption
- Displacement of juvenile Dungeness

**Ecological**
- Broad diet could have food web and ripple effects
- Altered shoreline structure/function

Figure from McDonald et al. 2001

Photos: Hillary Neckles USGS
Green Crab: Past Success

Survival?

Yamada 2015
Green Crab: Past Success

Survival?

Yamada 2015

Green crabs per 100 trap days

Yamada 2015
Green Crab Monitoring: Salish Sea

Historical
WDFW
MISM
DFO
Yamada

Renewed interest
Support from WDFW, PSMFC and West Coast Green Crab Committee
Funding from EPA through the Puget Sound Marine & Nearshore Protection & Restoration Grant Program
World’s 100 worst invasive species

European green crab (Carcinus maenas)

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Protecting our shared shorelines
Green Crab Monitoring: Approach

- Suitable habitat
- Outreach plan (Eyes on the Beach)
- Monitoring (Boots in the Mud)
- Protocol
- Permits
- Gearing up
- Training
- Site access
Eyes on the Beach

Targeting shoreline users
Media to general audiences
Eyes on the Beach

What to do:

1. Photos

2. Location

3. Report

crabteam@uw.edu
www.InvasiveSpecies.wa.gov
www.for.gov.bc.ca/hra/invasive-species
Eyes on the Beach
Eyes on the Beach
Boots in the Mud

- Trained volunteers
- High risk sites
- April - September
- Baited trapping
- Molt Hunt
- Shoreline Features
Boots in the Mud: Protocol Summary

Site establishment

Monitoring
  Baited traps (10 m apart)
    3 Fukui
    3 Minnow
  Shoreline survey (50 m)
  Molt survey

Equipment cleaning and maintenance

Data submission/QA
1. Greatest chance of finding green crab early
2. Learn about effects of green crab invasions
3. Track the health of pocket estuaries
Boots in the Mud

- 2015 Pilot Year
- No European green crabs @ 7 sites

- 2016 @ 26 sites
- 108 volunteers
- Green crabs found at one Crab Team site
- 2nd found by colleague at Padilla Bay
World’s 100 worst invasive species

European green crab (Carcinus maenas)

WA Sea Grant Crab Team Monitoring and early detection

2016 Sightings and Rapid Assessments

Protecting our shared shorelines
2016: Rapid Assessment (San Juan Island)

- Westcott Bay marsh
- 74 mm male
- 2014 or 2015
- 1 of 2 sites on SJI
- August capture: 5th month of sampling

March 2016

April 2016

August 2016
2016: Rapid Assessment (San Juan Island)

- September 12-14
- WDFW Coordination
- Crab Team expertise
- 194 traps
2016: Rapid Assessment (San Juan Island)
2016: Rapid Assessment (Padilla Bay)

- 13 Staff:
  - 4 WSG
  - 4 WDFW
  - 5 PBNERR
- 31 Sites
- 6 Traps per site
- 2 Trap sets
- 368 traps set total
2016: Rapid Assessment (Padilla Bay)

- 3 Additional live crabs captured
- 1 Male, 3 Females
- All Young of the year
- Indicates 2016 arrival of larval cohort
Citizen Science is highly cost effective, but not free

WSG is committed to Crab Team and seeking outside support to sustain State partners WDFW WISC

Possible Federal partners USFWS, EPA
World’s 100 worst invasive species

European green crab (Carcinus maenas)

WA Sea Grant Crab Team Monitoring and early detection

2016 Sightings and Rapid Assessments

Protecting our shared shorelines
A head start...

<table>
<thead>
<tr>
<th>Invasive presence</th>
<th>Time</th>
<th>Cost of Management $</th>
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<tbody>
<tr>
<td>First arrival</td>
<td></td>
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<tr>
<td>Public Awareness</td>
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<tr>
<td>Eradicate</td>
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<tr>
<td>Contain</td>
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<tr>
<td>Protect Resources</td>
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Prevent

Resources
A head start...

Prevention

**Prohibited Species:**
- May not be possessed, imported, purchased, sold, propagated, transported, or released into state waters
  - 1st violation = gross misdemeanor
  - 2nd within 5 years = Class C felony (!!!)

**Aquaculture:**
- Chlorine treatment for shellfish seed and broodstock from infested areas
- Inspection of products and equipment before transfers to crab-free areas

**Shipping**
- Ballast waters management

**Public Awareness**
- Preventing accidental transfer
- Reporting and volunteering
Salish Sea Green Crabs’ Present
Salish Sea Green Crabs’ Future?: Find
Salish Sea Green Crabs’ Future?: Control
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