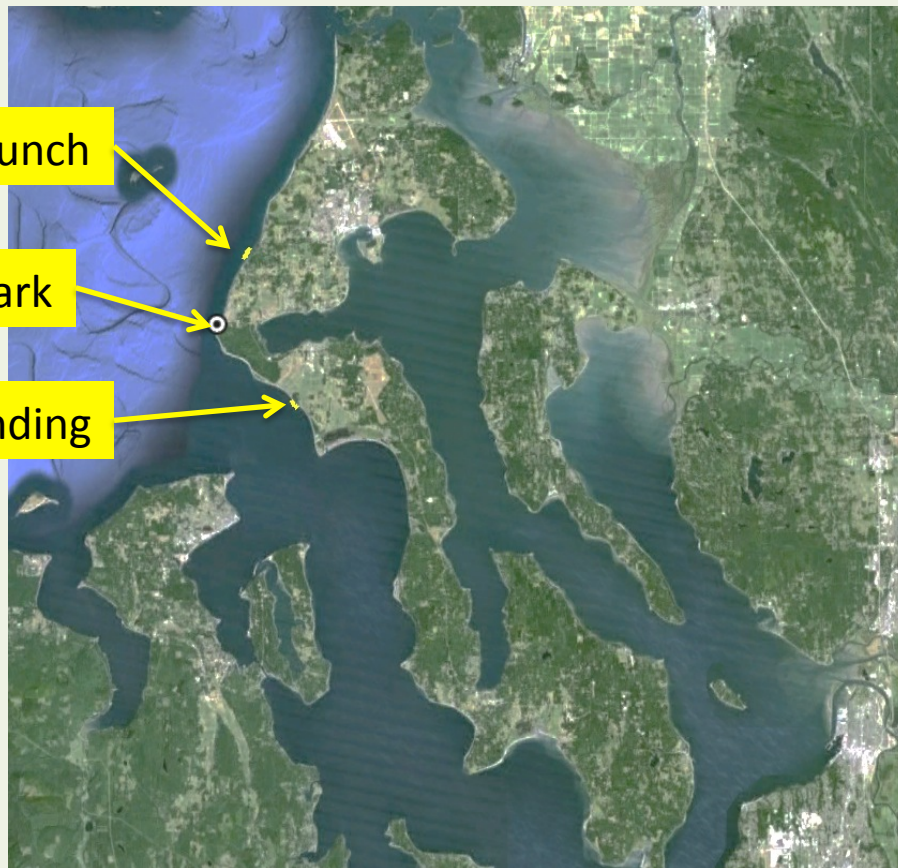


# ISLAND MRC BULL KELP SURVEYS 2015



Hastie Lake



Libbey Beach



Ebey's Landing

- 3 beds along west side of Whidbey Island
- selected by Leal Dickson & Tom Mumford
- beds present on T-sheets
- 2 beds shifted to 5' rising tide > June (safety)

# LIBBEY BEACH



## Tide Perimeters

June: 3,000 m<sup>2</sup> (0')

July: 2,437 m<sup>2</sup> (5')



# HASTIE LAKE LAUNCH



## Tide Perimeters

June: 53,716 m<sup>2</sup> (0')

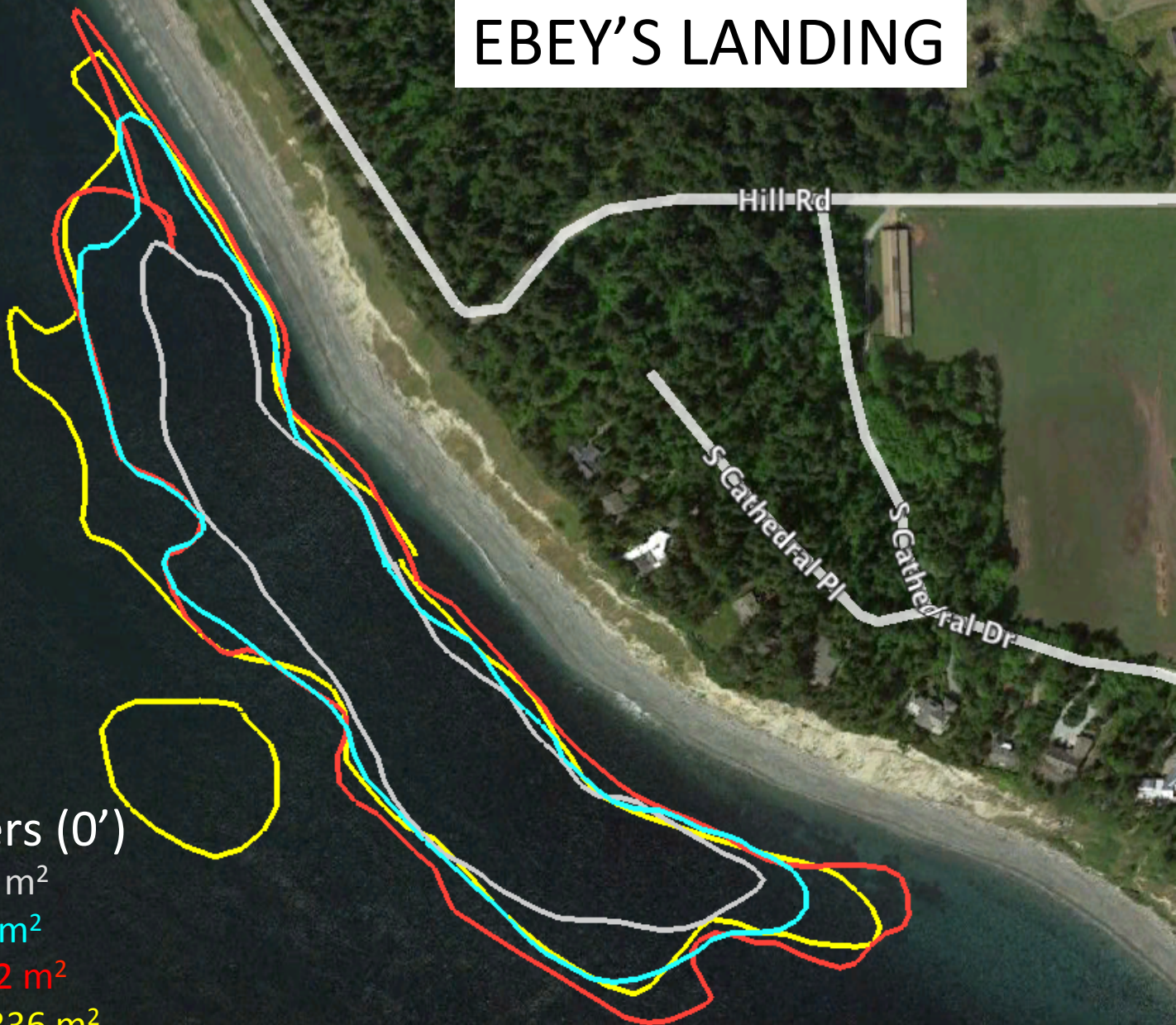
July: 49,601 m<sup>2</sup> (5')

August: 58,746 m<sup>2</sup> (5')

September: 40,181 m<sup>2</sup> (5')



# EBEY'S LANDING



## Tide Perimeters (0')

June: 38,384 m<sup>2</sup>

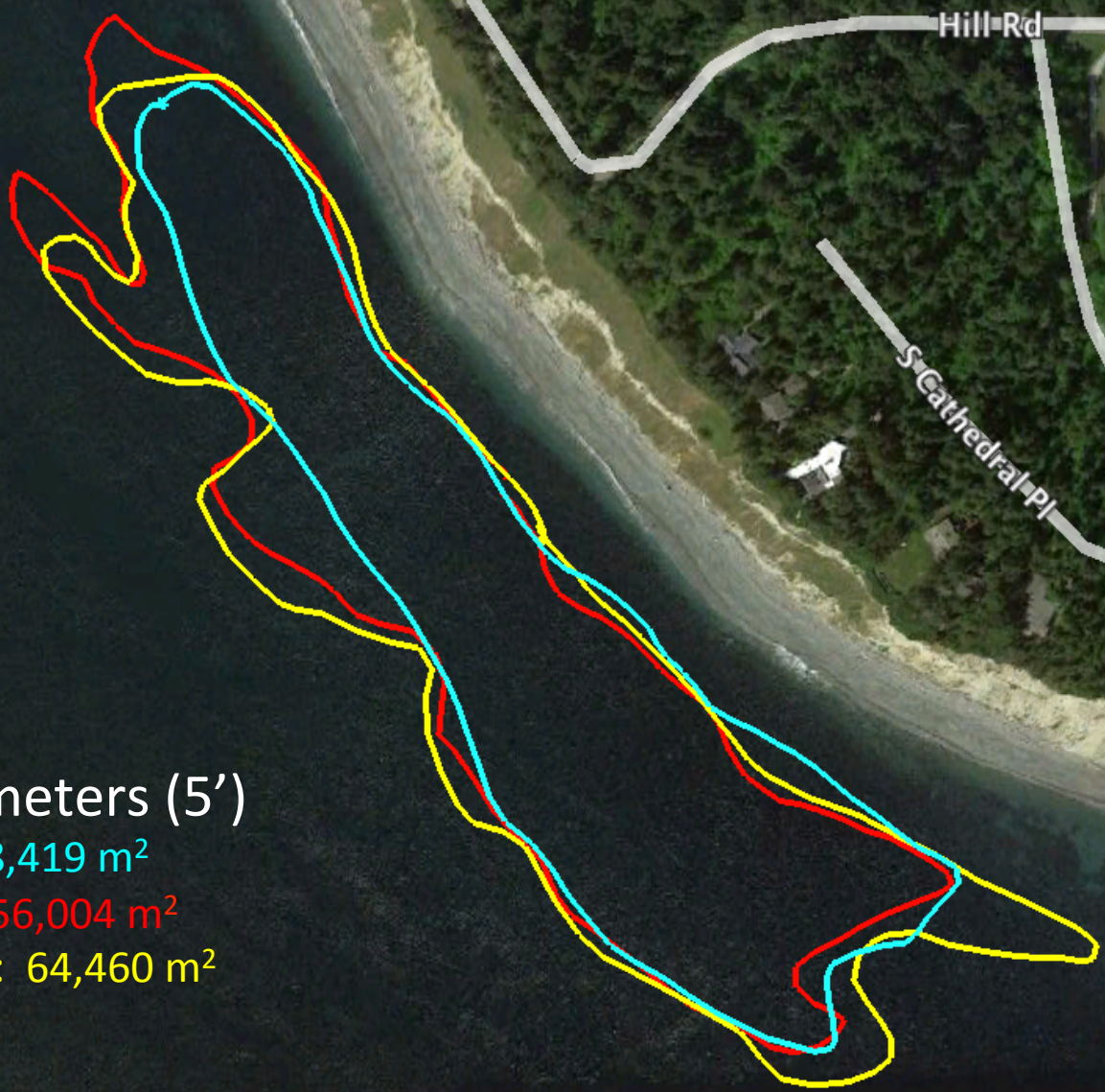
July: 59,151 m<sup>2</sup>

August: 74,302 m<sup>2</sup>

September: 72,336 m<sup>2</sup>



# EBEY'S LANDING



## Tide Perimeters (5')

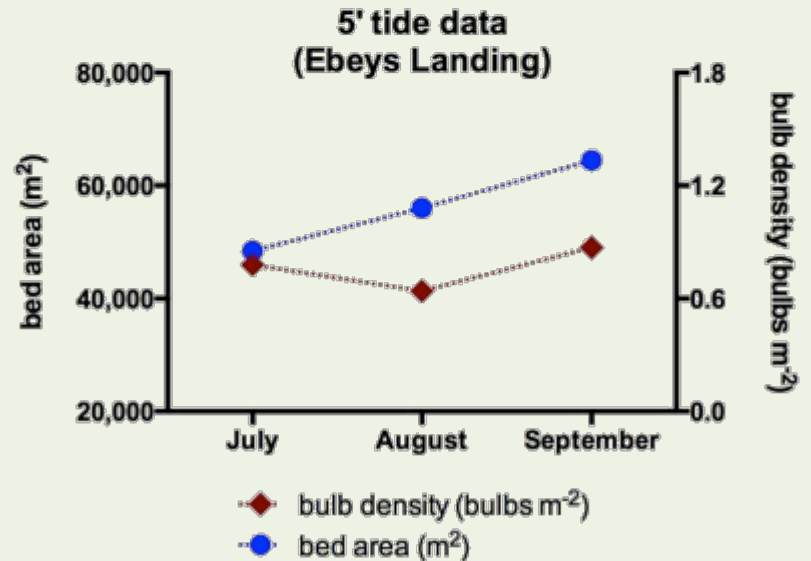
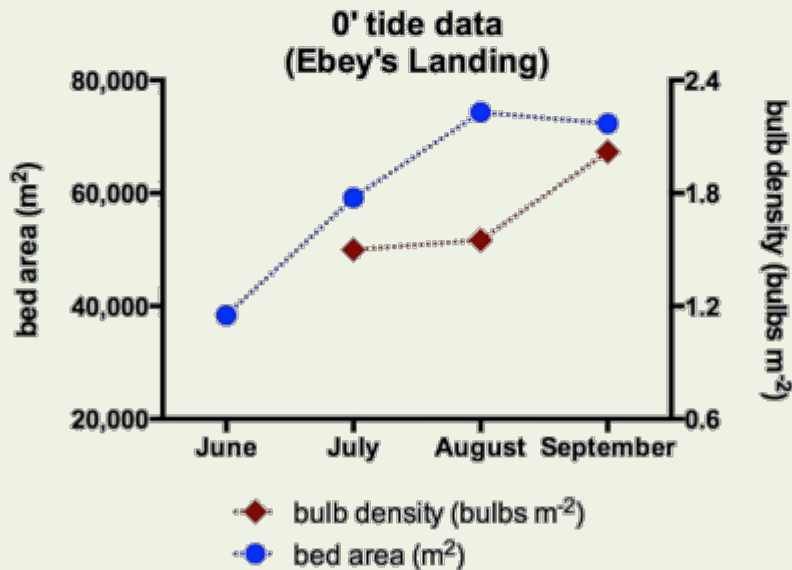
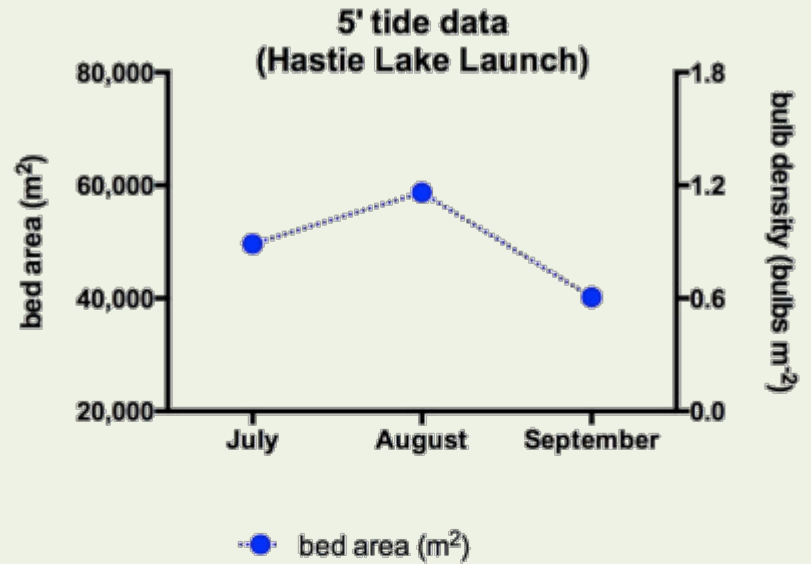
July: 48,419 m<sup>2</sup>

August: 56,004 m<sup>2</sup>

September: 64,460 m<sup>2</sup>

# MONTHLY PATTERNS

- Bed areas peak in August or September
- Bulb density peaks in September
- Bulb density at 5' tide is 40-50% density at 0' tide



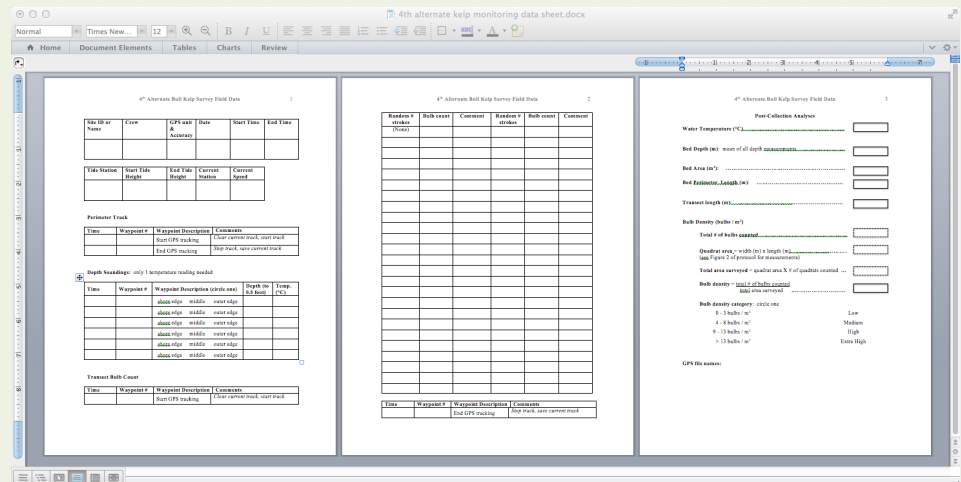


# ISLAND MRC BULL KELP SURVEYS 2015

**Bulb density:**  
 “Low” (0 – 3 bulb m<sup>-2</sup>) for  
 all sites throughout the  
 survey season



Designed a field & data report sheet



# CONCLUSIONS & KEY OBSERVATIONS

- Site selection criteria should include ocean hazards & launch conditions
- Height of tide for surveys & frequency of surveys should be driven by scientific questions
- Scaling transect length to bed size may allow quantitative results
- Field data sheet should lead crew through protocol
- Subjectivity of perimeter: high person-to-person variation (30%)



## 2015 IC MRC Volunteers

Vernon Brisley

Lenny Corin

Leal Dickson

Linda Kast

Don Meehan

Debra Paros

Linda Rhodes



## Kayak Safety/ Training Considerations for Kelp Monitoring Program in Strait of Juan de Fuca – Discussion

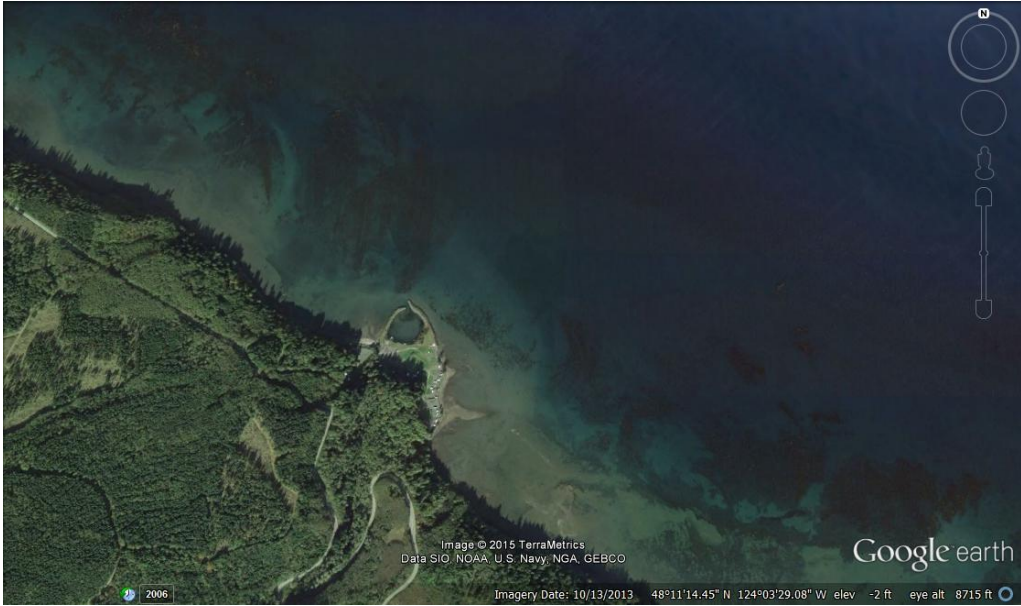
Alan Clark, Clallam County MRC



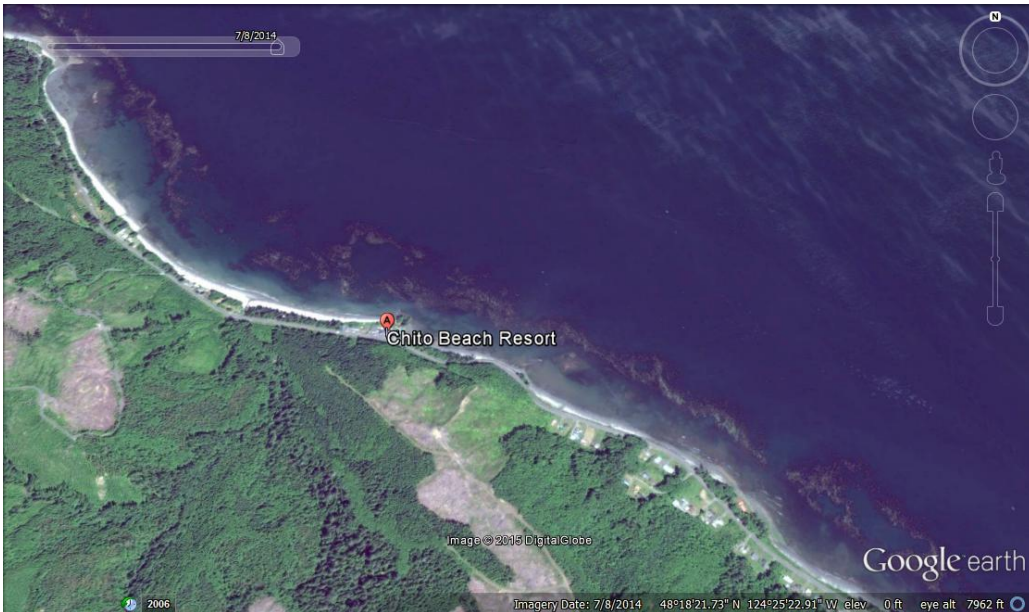
Rationale for a kayak safety/training components in the kelp monitoring program.

- Summertime weather conditions along the Strait of Juan de Fuca are challenging for small boats and human-powered craft. Small Craft Warnings and Gale warnings are frequently posted on summer afternoons due to strong Westerly winds (15 to 35 knots).
- Paddlers may have to contend with 1' to 3' waves due to wind chop, current, tide rips, and ocean swell.
- Conditions can change very quickly along the Strait, requiring paddlers to check the weather/conditions before launching, and to continually assess their situation for personal and group safety.
- Training in trip planning, kayak stroke, launching, and rescues can avoid or mitigate the challenges of maintaining a kelp monitoring program along the Strait.
- A group is only as strong as its least skilled member.





Extensive kelp beds near Silver King Resort. Relatively unprotected water and thick kelp beds will make this a challenging and interesting site for the Clallam County MRC kelp monitoring program. A potential plus for the site may be the ability to launch from a protected marina.



Open water near the proposed kelp monitoring site off of Chito Beach Resort. Note presence of beaches which indicates wave action

## Safety and Skills Training for Citizen Scientists involved in the Kelp Monitoring Program:



### Basic Kayak Stroke Training:

- Forward Stroke
- Maneuvering Strokes
- Support Strokes- the Low Brace and Sculling

### Rescue Skills:

- Assisted rescues are an integral part of kayak safety. A reliable Eskimo Roll, while an important part of a skilled kayaker's tool kit, should not be relied upon in a paddling setting which combines expert, intermediate, and novice paddlers. Paddlers may come out of their kayak for a variety of reasons, deck gear may interfere with the completion of a roll, and novice or intermediate paddlers may not know how to roll. Mature paddlers may have physical issues which prevent rolling.
- Two boat (or more) rescues are emphasized as they are the most reliable way to get paddlers back into their boats in challenging conditions.
- It is crucial to practice two boat rescues many times in advance of actual use. The "T" rescue, the assisted "Scramble" rescue, or the "Side by Side" are all good rescues which work to get paddlers out of the water and back in their boats quickly. Rescue practice also lets you assess your on-the-water clothing.





- Rescues are facilitated by having lines on the kayak and the paddler being able to perform a “paddle clamp” to stabilize the kayak(s) of the “wet” paddler or to assist the rescuer. Rescue techniques need to be worked out prior to going out in challenging conditions. Even if you or other Kelp Project group members never need to do a rescue, you will be a valuable resource for the wider community of paddlers in the Northwest.



Where do we go from here? I am seeing this as a collaborative effort between interested MRCs, to develop and implement a kayak skills/rescue curriculum for the Kelp Monitoring Program. Each MRC monitoring program is unique and has its own particular needs. What do we want to do next?

Alan Clark

Clallam County MRC

[alankayaks@q.com](mailto:alankayaks@q.com)

(H) 360 683 5199

© 360 912 2081

# Whatcom MRC Kelp Survey Excursion and Recon

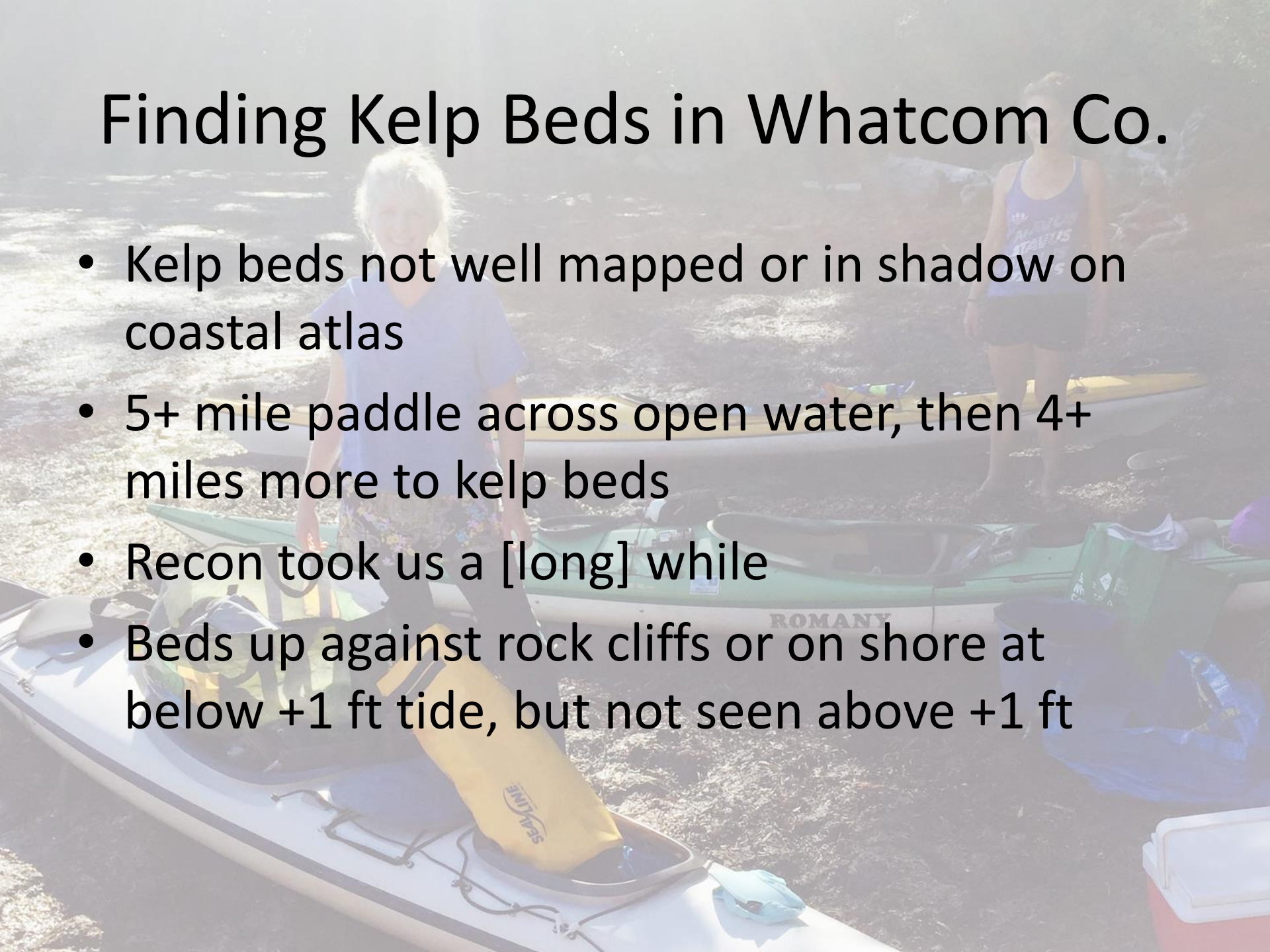
Eleanor Hines  
Rachel Benbrook



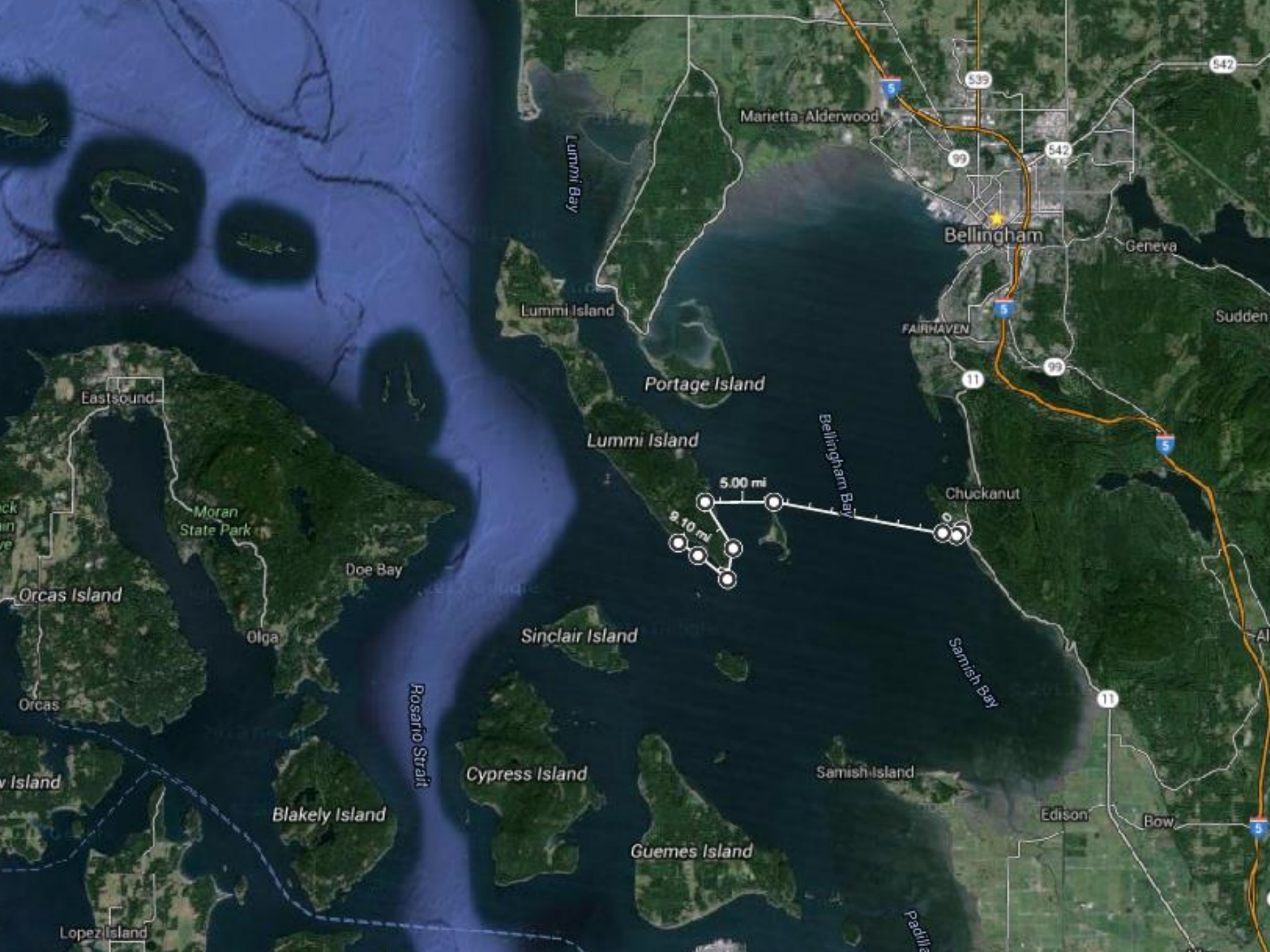


# Finding Kelp Beds in Whatcom Co.

- Kelp beds not well mapped or in shadow on coastal atlas
- 5+ mile paddle across open water, then 4+ miles more to kelp beds
- Recon took us a [long] while
- Beds up against rock cliffs or on shore at below +1 ft tide, but not seen above +1 ft







Marietta-Alderwood

Bellingham

Geneva

Sudden

FAIRHAVEN

Portage Island

Lummi Island

Bellingham Bay

Chuckanut

Eastsound

Moran State Park

Doe Bay

Orcas Island

Olga

Sinclair Island

Samish Bay

Rosario Strait

Cypress Island

Samish Island

Blakely Island

Edison

Bow

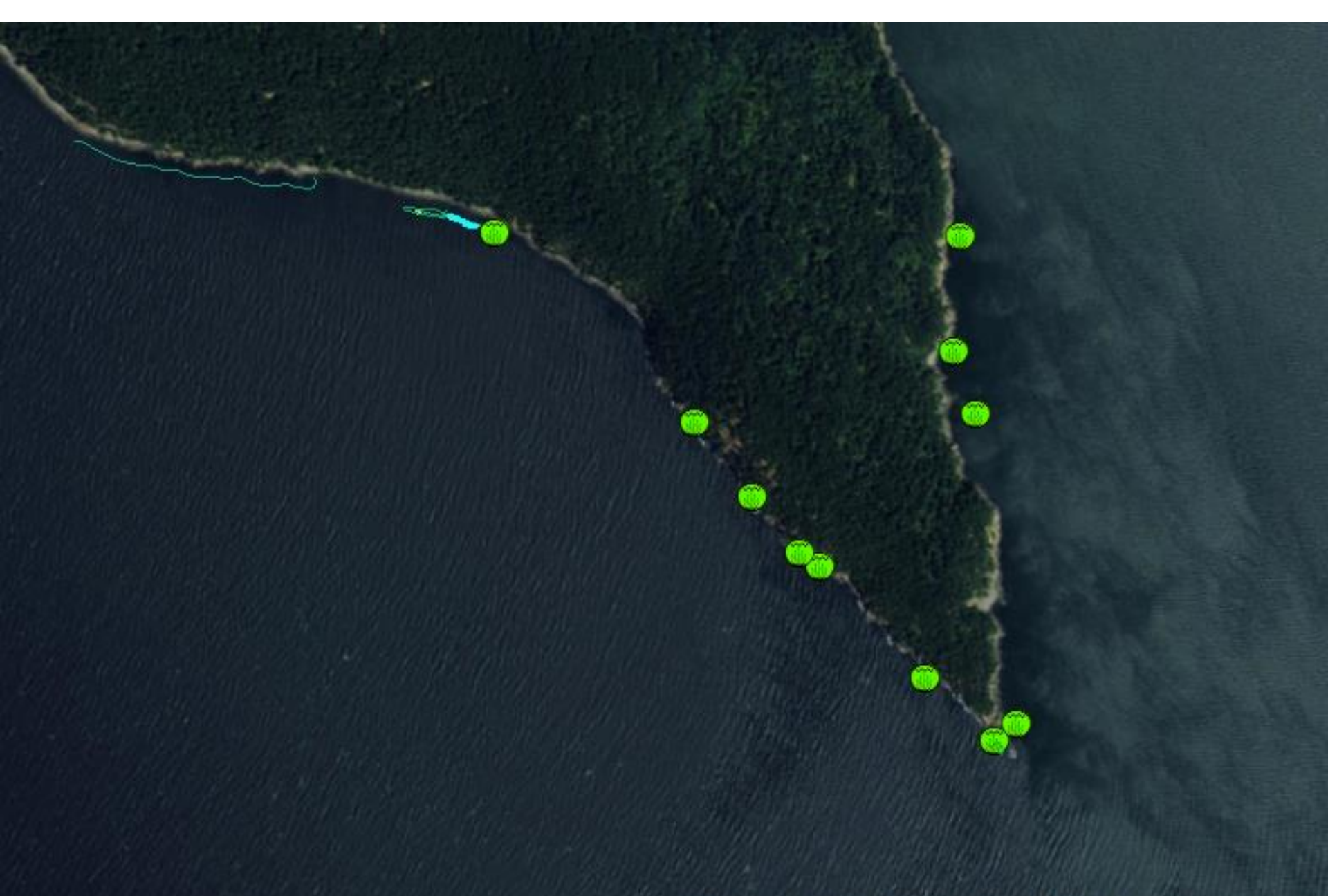
Guemes Island

Lopez Island

5.00 mi

9.10 mi





Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community







# Make a Weekend of it!

(Or get a motor boat to help)



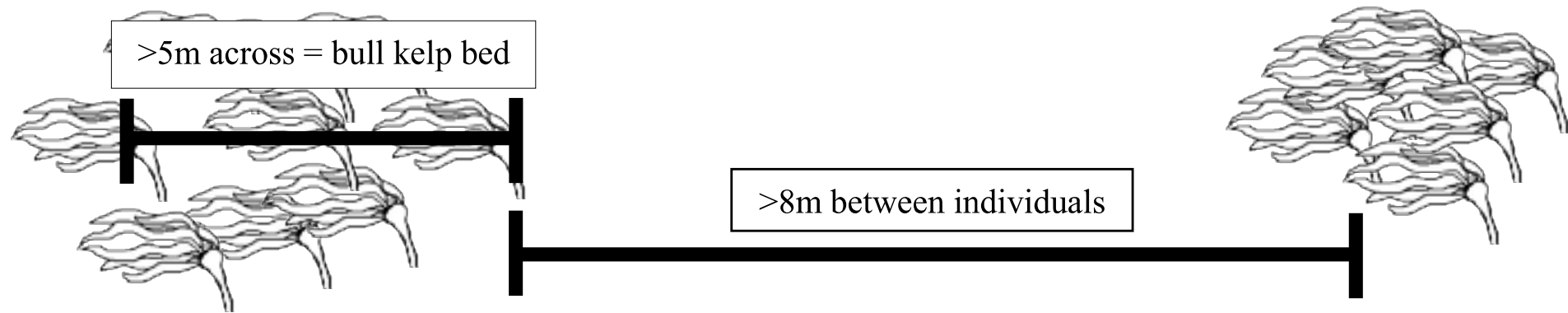
# Protocols





# Protocol Clarifications

- Bulb to bulb?
- At least 5 m across in the largest area or smallest?
- Break down protocols into distinct sections by task
- Do we care about wind/current direction?



# Protocol Clarifications

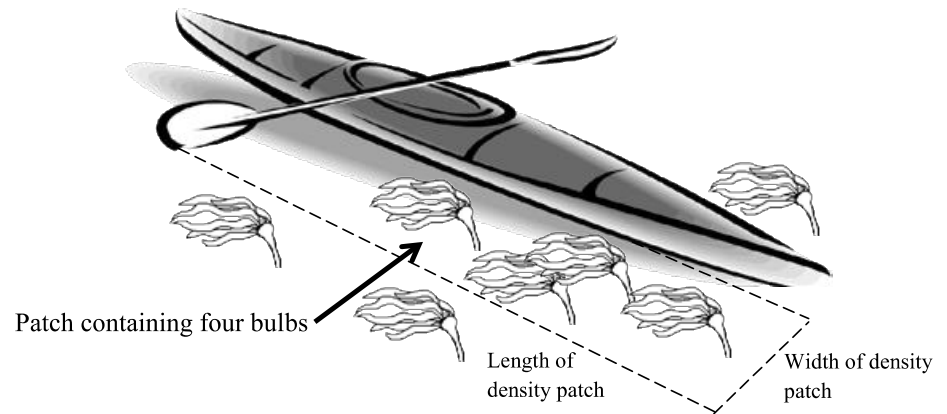


Figure 2. Image of quadrat.

- Measurements-

- Should we always measure on the same side to avoid bias?
- Could we measure on both sides?
- Maybe measure whole length of paddle extended?
- What if we have sparse beds? Can we just count total and estimate the area instead?
- Issues with “stopping” while counting density
  - Do we backtrack?
  - Do we just do the best we can given whatever conditions we have? Would be nice to have some explanation of best practices in the protocol







# GPS

- GPS Units are NOT Created Equally
- Sometimes challenging to get a decent track between wind and current and hard to go as slow as needed
- Seems like 10 seconds is really spread out for accurate track on small beds
- What to do with beds that are partially onshore?





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community

# Data Sheets

- Consolidate!

## Bull Kelp Survey Data Sheet

Names of observer/collector: \_\_\_\_\_

Date: \_\_\_\_\_ Location: \_\_\_\_\_

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Water Temp. (°C): \_\_\_\_\_

Tide height (ft): Start \_\_\_\_\_ End \_\_\_\_\_ Tide station: \_\_\_\_\_

Current (knots): \_\_\_\_\_ Station/source: \_\_\_\_\_

Name of GPS unit or phone app \_\_\_\_\_ Accuracy of GPS: +/- \_\_\_\_\_ ft

Distance from you to tip of paddle (m) \_\_\_\_\_ (width of quadrat)

Distance from you to bow of boat (m) \_\_\_\_\_ (length of quadrat)

Provide a sketch of the area surveyed, including approx. location of GPS point (including kelp bed boundary line, transect line and depth measurements):

Kelp Bed No. \_\_\_\_

	Depth (m)	GPS point
Center of bed		
Edge closest to shore		
Edge furthest from shore		
Add'l inside bed		
Add'l edge of bed		
Mean depth:		

	Number of bulbs/patch	Paddle strokes
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
Total bulbs (sum 1-10):	A)	
Width of quadrat (m):	B)	
Length of quadrat (m):	C)	
Area of quadrat (B×C):	D)	
Total Area Surveyed (m <sup>2</sup> ) (D×10)	E)	
Total bulbs/m <sup>2</sup> (A÷E):		
Density category*:		

\*Low (0-3), Medium (3-8), High (8-13), Extra High density (13+)

Observations: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## GPS Point Log

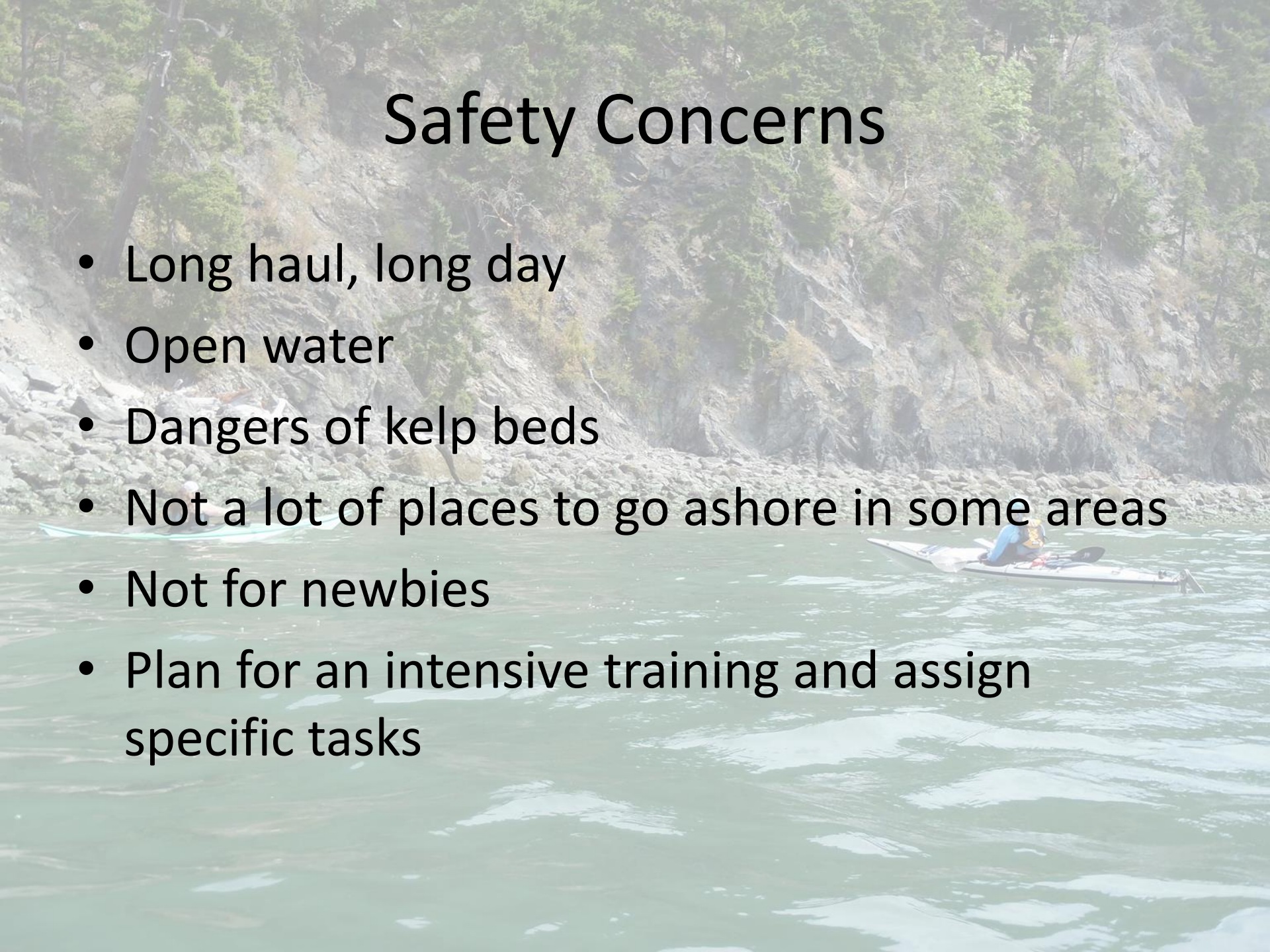
Naming convention for GPS points: BL## (for boundary line), BP## (for boundary point), TL## (for transect line), or DM## (for depth measurement).

	Name	Description
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
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20		
21		
22		
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24		
25		
26		
27		
28		
29		
30		



# Safety Concerns

- Long haul, long day
- Open water
- Dangers of kelp beds
- Not a lot of places to go ashore in some areas
- Not for newbies
- Plan for an intensive training and assign specific tasks





# What's Next?

We had a blast and can't wait till next year!





# What's Next?

- Find a better/faster way out there
- Narrow down which beds we want to keep and more recon
- Narrow down our goals and objectives
- Schedule out our sampling dates and plan out trainings
- Plankton surveys – what are our research objectives and who can we partner with?

Thanks!





# KELP MAPPING AND MONITORING: MRC PROGRESS TO DATE

Moderator: Dr. Tom Mumford

- Jefferson MRC/NW Straits Commission–Lucas Hart
- Island MRC – Linda Rhodes
- Snohomish MRC - Traci Sanderson
- San Juan MRC – Marta Branch
- Clallam MRC – Alan Clark
- Whatcom MRC – Eleanor Hines
- Kelly Andrews-NOAA-  
rockfish biologist
- Suzanne Shull- SoundIQ

17th Annual MRC Conference

Bellingham, November 7, 2015

# A boat-based survey protocol for Bull Kelp in Puget Sound

Prepared for the Northwest  
Straits Commission

Emily Bishop  
NOAA Hollings Scholar



October 2014

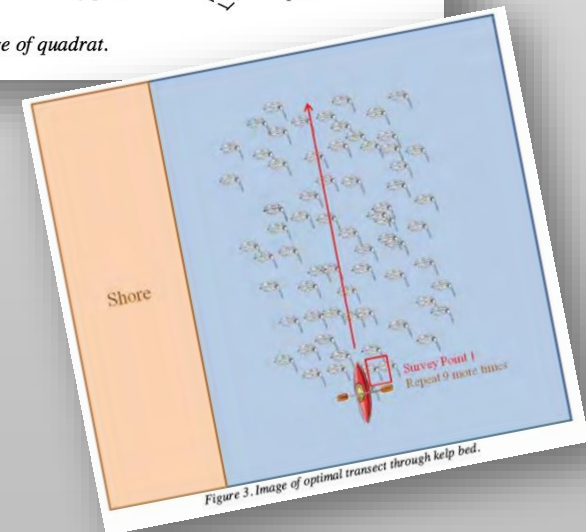
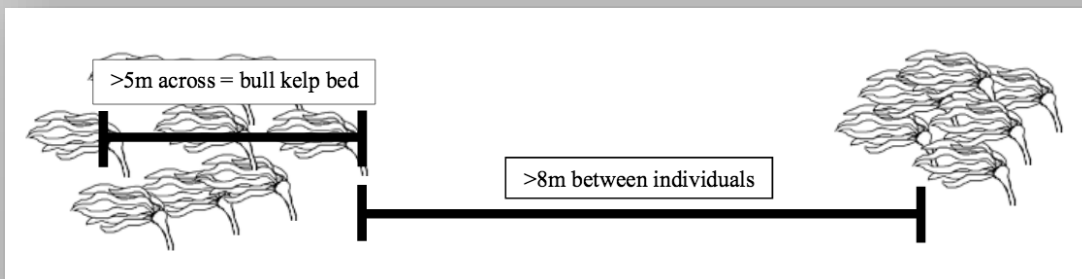
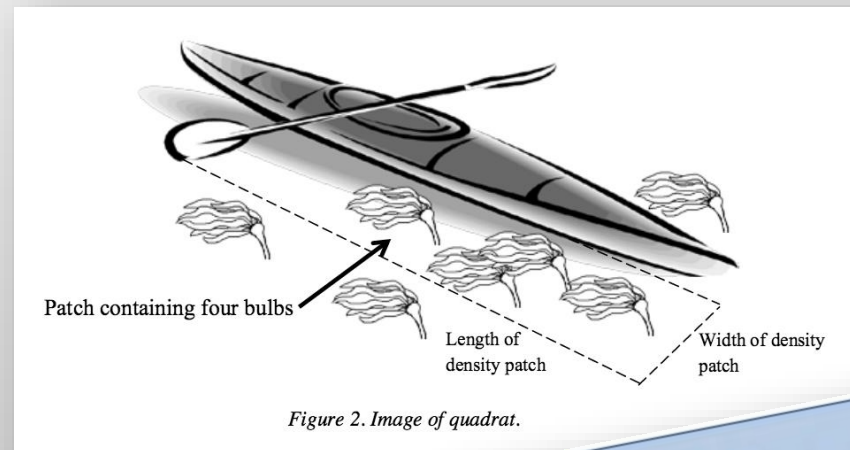


This report was funded in part through a cooperative agreement  
with the National Oceanic and Atmospheric Administration.



# Survey Protocols

- Outlining bull kelp beds
- General guidelines for selecting areas to map
- Density
- Current speed
- Depth
- Temperature



# Jefferson County

## Lucas Hart

- **GPS use is not intuitive** for volunteers. Some kind of training is needed.
- I created a set of step by step GPS instructions for volunteers but some found it difficult to read instructions, record data, communicate with partners, maintain kayak course and avoid flipping their boat all at the same time.
- The communication and transfer of GPS data needs a protocol and instructions. For example, what format do we send the data in? What if we have a mac computer and/or no access to GPS software? Are volunteers responsible for sending the data before it is potentially deleted by the next group who uses the GPS?
- **Kelp bed perimeter is not easily defined.** Do we count random bulbs that are within 8 meters of the main bed?
- **Weather information** should be added to the data sheets.
- **High tides** result in submerged bulbs at North Beach (lesson: don't survey at high tide at North Beach)
- **A data sheet that separates each component of the survey in a logical order** would be helpful. For example - bed perimeter data followed by transect data followed by depth measurement data etc.



# Island County

Linda Rhodes

- Site selection and criteria should include ocean hazards and launch conditions
- Height of tide for surveys and frequency of surveys should be driven by scientific questions
- Scaling transets length to bed size may allow for quantitative results
- Field data sheet should lead crew through protocol
- Subjectivity of perimeter: High person-to-person variation (30%)

# Snohomish County

Tracey Sanderson

## • Methodology Suggestions

- Record the time with each depth measurement and **correct the depth for the tide** when back in the office (make the depths relative to consistent 0 mllw datum).
- **Measure in-situ current** rather than use local station current speeds.
- **xin kelp beds** with variable density.
- For small kelp beds, consider option of **counting all the bulbs** instead of the random paddle stroke approach.
- **Recognize that random number generators** from 1 to 10 used for paddle strokes may work two different ways. One way will always make a random selection between the 10 numbers. Another will remove a number from the selection when it is used and only draw from the remainders. Both are random. Ponder whether need to specify one or the other method, and what difference, if any, that it makes.
- Consider **using geo-referenced photos** to document site conditions.

## • Difficulties

- **Access areas**, a large bed in Snohomish is within the Edmonds dive park where we cannot paddle.
- Equipment should be **strapped on**, we lost a GPS.





# San Juan County

## Marta Branch

- Consider piloting use of motorized craft for these surveys
- In high energy tidal environments, tidal shift will cause Bull Kelp bed to shift, and the individual kelp stipes to move 6-10 feet
- With 408 miles of shoreline in San Juan County, kayaks may not be the best surveying tool
- Change of tide in narrow passage made measuring of depth difficult—kayak drift in current was large. Safety, especially in tidal rip zones
- Carefully choose sites to begin, gradually expand program
- Borrowing GPS units—and transport back and forth from island to Bellingham

# Clallum County

Alan Clark

- come up with a **training program** that educates paddlers new to ocean paddling, as well as giving more experienced paddlers materials for training new kayakers.
- training program with short segments that emphasize:
  - pre-launch considerations (weather, current, launch site, equipment {kayaks, clothing, equipment security}),
  - on the water skills (forward stroke, bracing, launching) and
  - rescue skills.
- My hope is that the kayak safety/instruction program would be collaborative in nature.



# Whatcom County

## Eleanor Hines

- the uniqueness of Whatcom Co kelp bed surveys (or what we perceive as unique things to the kelp beds and surveys in our area b/c maybe I'm wrong, but it's a **minimum 5 hour paddle** just to get to the kelp beds, we experienced some struggle with finding kelp beds to survey and how we want to improve, how we'd probably have to make a weekend camping trip out of it or **hire a motor boat to drop off/pick up**, and how some of our kelp beds are on shore or up against rock cliffs with pounding waves)
- tidying up protocols to make sure that they are **repeatable** and **not bias** (we encountered some squishy areas that weren't very clear) or simplifying in cases where the kelp bed is sparse enough that it would take less time and be more accurate to just count the bulbs rather than paddle through and count
- **GPS accuracy issues**- we found phone and other lower to regular caliber GPS units unfit to take tracks around the beds as they simply were not sensitive enough
- would love to also **tidy up those data sheets**- there doesn't seem to be any reason to have each bed require 3 pages that become difficult to navigate as the tide carries you away and the wind is howling and you're trying to write down data and not let any sheets fly away
- **safety issues** - it sounds like other folks will talk about, so maybe I won't if it's all covered. We will NOT be taking any newbies to our locations as we feel it requires knowledge and experience due to the length of time and distance the surveys are and other factors such as the potential to dump and get tangled in kelp as well as being far away from any sources of help
- And lastly - **what a blast** we had out there making a full weekend out of it and what we hope to accomplish for next summer

# Issues/ Problems

- **Kayak safety**
- **Access to distant sites**
- **GPS accuracy issues**
- **GPS training**
- **Tidy up protocols to make sure that they are repeatable and not biased**
  - **Record the time with each depth measurement and correct the depth for the tide**
  - **Measure in-situ current**
  - **Run multiple transects**
  - **For small kelp beds, consider option of counting all the bulbs**
  - **using geo-referenced photos to document site conditions**
  - **Recognize that random number generators from 1 to 10 used for paddle strokes may work two different ways**
- **Tidy up those data sheets**



# To-do list

Workshop???

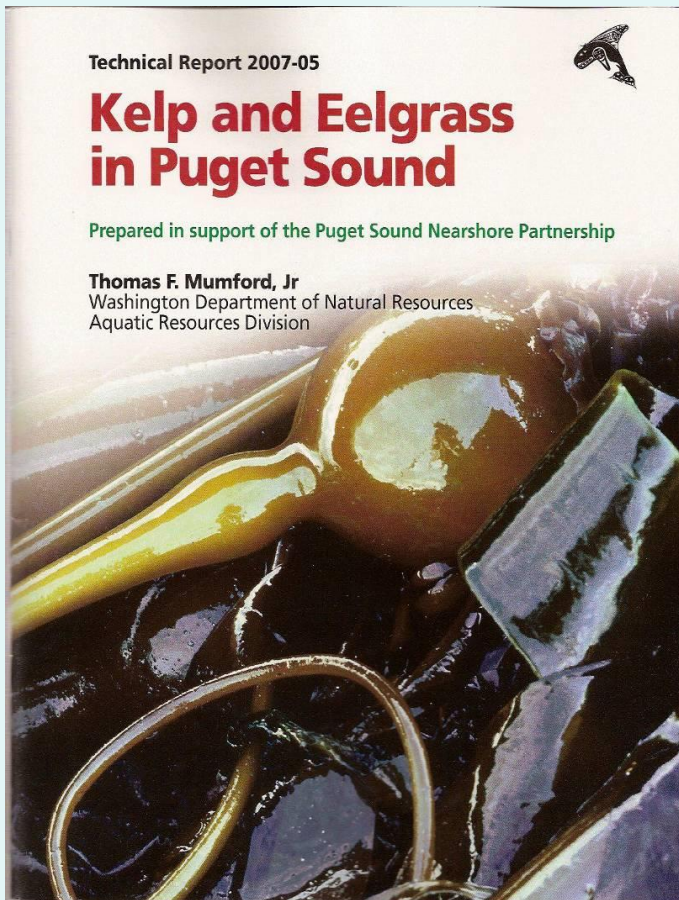
- **Develop kayak safety program**
- **Develop GPS training**
- **Make step-by-step instruction manual and data sheets**
- **Work of accuracy and precision**
  - **Compare results of multiple surveys between and among volunteers and different times**
  - **Compare results to aerial surveys**
- **Collaborate with aerial surveys and WDNR**
- **Make sure data is QA/QC'd**
- **Get feedback from SoundIQ**
- **Get feedback from end-users (who are they?)**

# Kelp Protection and Recovery



- 24 species in Washington State
- Designated critical habitat
- Initial focus on bull kelp (*Nereocystis luetkeana*)





Kelp carbon is a big deal

Dramatic changes in floating kelp abundance in some areas

Need a better idea of where non-floating kelps are in the Sound

Critical habitat designation for ESA-listed rockfish soon to be implemented



Monitor changes in local kelp populations

Foster awareness - ecological and cultural importance of kelp

Promote citizen science contributions to research

Exchange information and ideas



# Northwest Straits Region



# North Beach, Jefferson County





# Partridge Point, Island County



# West Beach, Island County





# Ebey's Landing, Island County



# Hat Island, Snohomish County





# Edmonds, Snohomish County

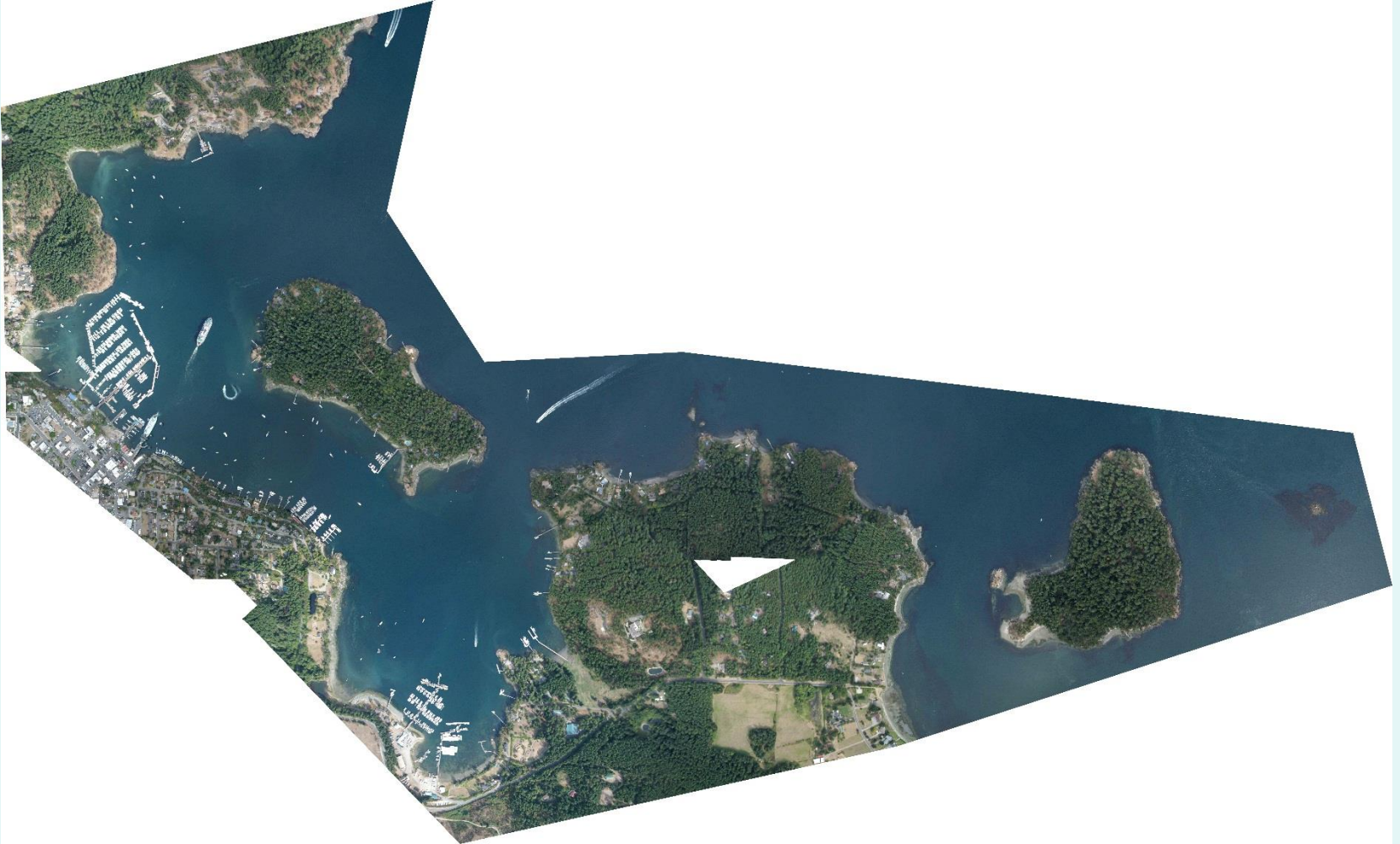


# Deer Harbor, San Juan County

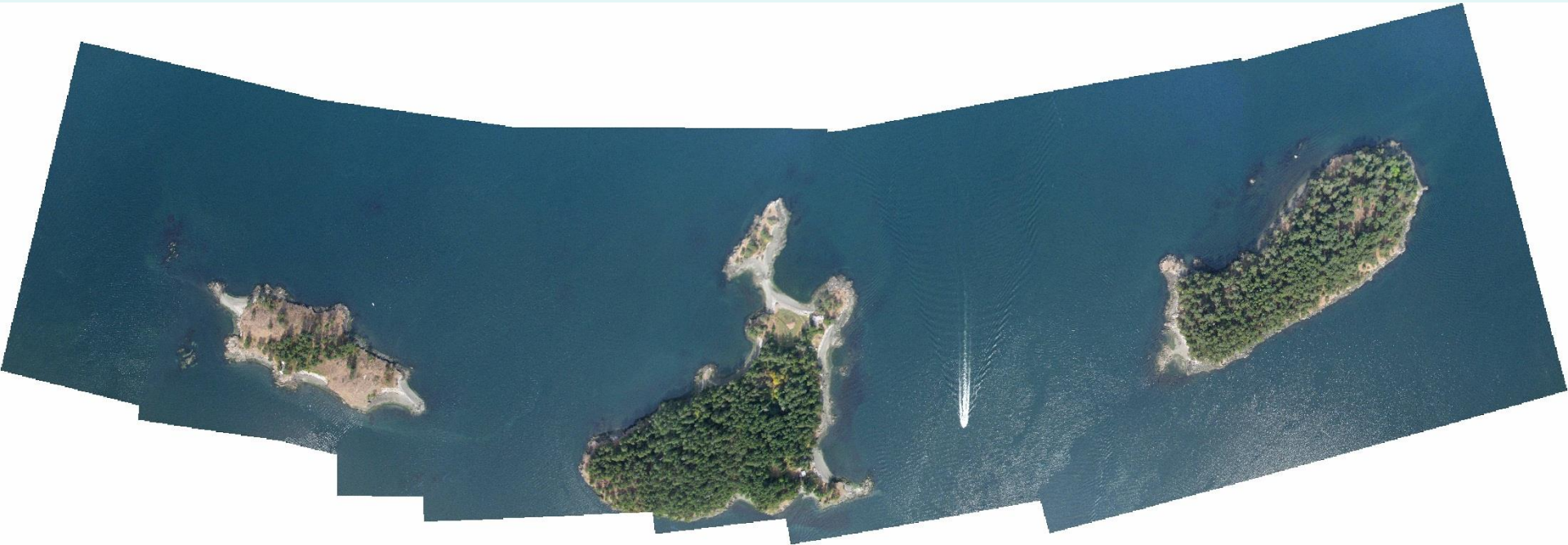




# Friday Harbor, San Juan County

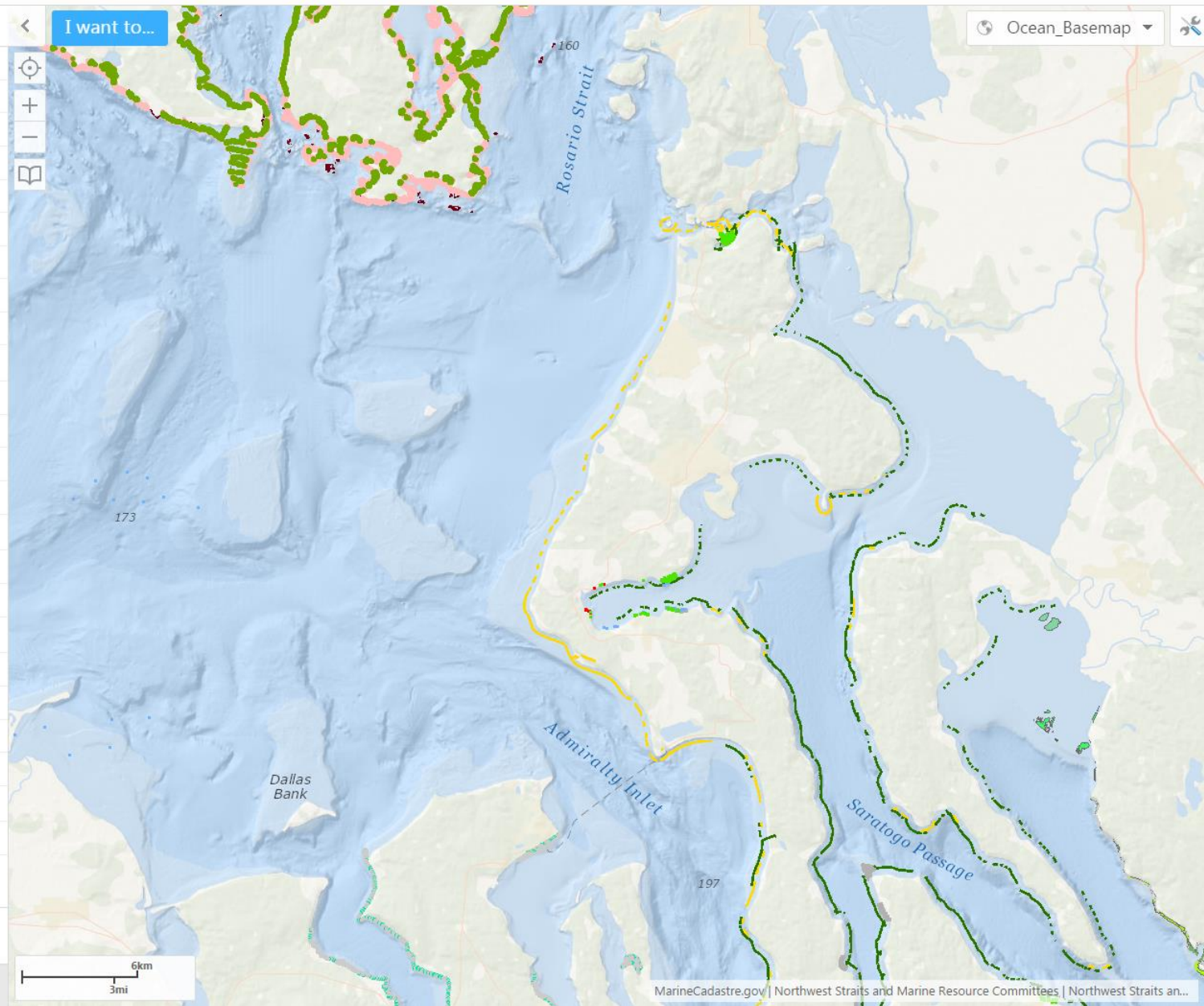


# Yellow Island, San Juan County





- Map Legend
- Intertidal - Tulalip (SnoCo)
    - Vegetation Type
  - Intertidal - Port Susan (SnoCo)
  - MRC\_Eelgrass
    - Eelgrass Species (SnoCo)
      - Zostera japonica (non-native species)
      - Zostera marina (native species)
      - Zostera sp. (unidentified species)
      - Zostera spp. (mixed species)
  - Plants And Animals
    - Eelgrass Prescense (SJC)
      - Unknown
      - Absent
      - Present
    - Eelgrass Presence (DNR)
    - Eelgrass Video Points (JC)
      - Eelgrass Outer Extent (SJC)
    - Eelgrass (DNR)
    - Kelp (IC)
      - Continuous
      - Patchy
      - Floating Kelp (SJC)
  - Ocean\_Basemap
    - Ocean\_Basemap





# BOAT-BASED BULL KELP SURVEY

SAN JUAN COUNTY PILOT 2015

Data provided by Phil Green, Marta Branch & Wes  
Heinmiller

Slide presentation provided by Jacob Hansen



# SAFETY AND EQUIPMENT CHECK 0700 HOURS

- We met early in morning to check and load equipment 1 ½ hours in advance of low tide.



# REMOTE LOCATIONS OF THE SJI'S



Traveled approximately five miles (RT) to survey one location.

Entire voyage took over three hours—even with boat support.

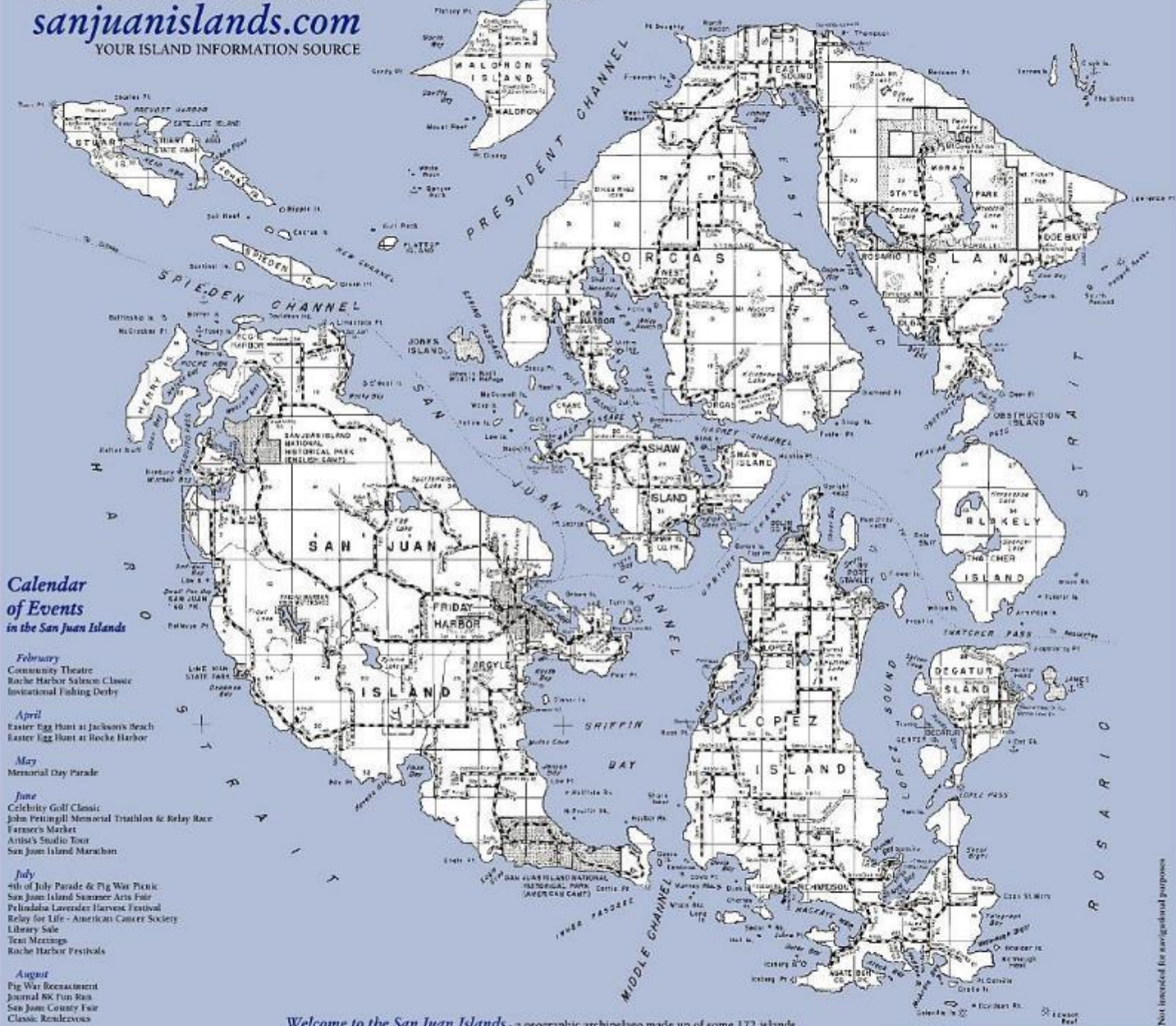




# SURVEY SITE: POLE PASS







**Calendar of Events in the San Juan Islands**

- February**  
 Community Theatre  
 Roche Harbor Salmon Classic  
 Invitational Fishing Derby
- April**  
 Easter Egg Hunt at Jackson's Beach  
 Easter Egg Hunt at Roche Harbor
- May**  
 Memorial Day Parade
- June**  
 Celebrity Golf Classic  
 John Peittingli Memorial Triathlon & Relay Race  
 Farmers Market  
 Artists Studio Tour  
 San Juan Island Marathon
- July**  
 4th of July Parade & Pig War Picnic  
 San Juan Island Summer Arts Fair  
 Pellandine Lavender Harvest Festival  
 Relay for Life - American Cancer Society  
 Library Sale  
 Teat Meetings  
 Roche Harbor Festivals
- August**  
 Pig War Reenactment  
 Journal 8K Fun Run  
 San Juan County Fair  
 Classic Residences
- September**

Welcome to the San Juan Islands - a geographic archipelago made up of some 172 islands. About 50 accommodate residents, while just four are served by the Washington State Ferry System.





# DIFFICULTIES OF PROCESS

- 408 miles of shoreline to survey: many different expeditions will be required.
- Depending on site, kayaks may sometimes not be all that is needed.
- Experienced kayakers with access to safety/support can be hard to come by.
- Weather can be unforgiving and often deny access for kayakers to survey specific locations.
- Rip tides and currents are an issue



# DEALING WITH THE TIDES



- A safety/support boat was used during our pilot.
- Tides and currents must be very accurately timed out in order to guarantee safety of kayakers and accuracy of survey.



# DEALING WITH THE TIDES

- Some locations can be very dangerous to kayak in the San Juan Islands.
- Two very experienced kayakers piloted this survey protocol.



# CONCERNS TO ADDRESS PRIOR TO 2016 BULL KELP SURVEYS IN SAN JUAN COUNTY

With 408 miles of shoreline in San Juan County, kayaks may not be the best surveying tool





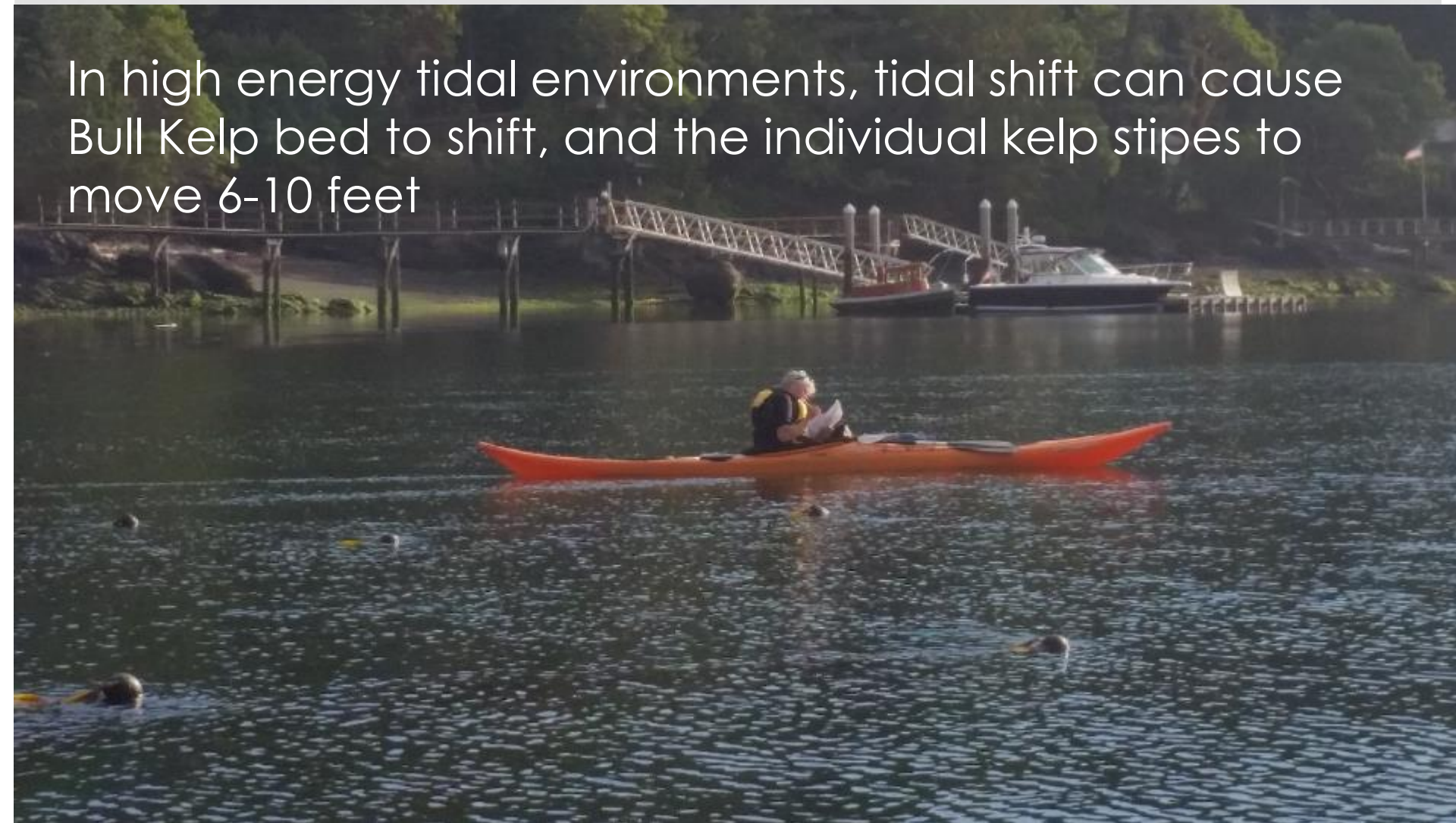
# CONCERNS TO ADDRESS PRIOR TO 2016 BULL KELP SURVEYS IN SAN JUAN COUNTY



Consider piloting use of motorized craft for these surveys

# CONCERNS TO ADDRESS PRIOR TO 2016 BULL KELP SURVEYS IN SAN JUAN COUNTY

In high energy tidal environments, tidal shift can cause Bull Kelp bed to shift, and the individual kelp stipes to move 6-10 feet





# CONCERNS TO ADDRESS PRIOR TO 2016 BULL KELP SURVEYS IN SAN JUAN COUNTY



Consider safety first in tidal rip zones

Change of tide in narrow passage made measuring of depth difficult—kayak drift in current was large

# Snohomish MRC Kelp Monitoring

Traci Sanderson Golder Associates, Snohomish MRC Vice-Chair



November 2015

SNOHOMISH  
COUNTY 444

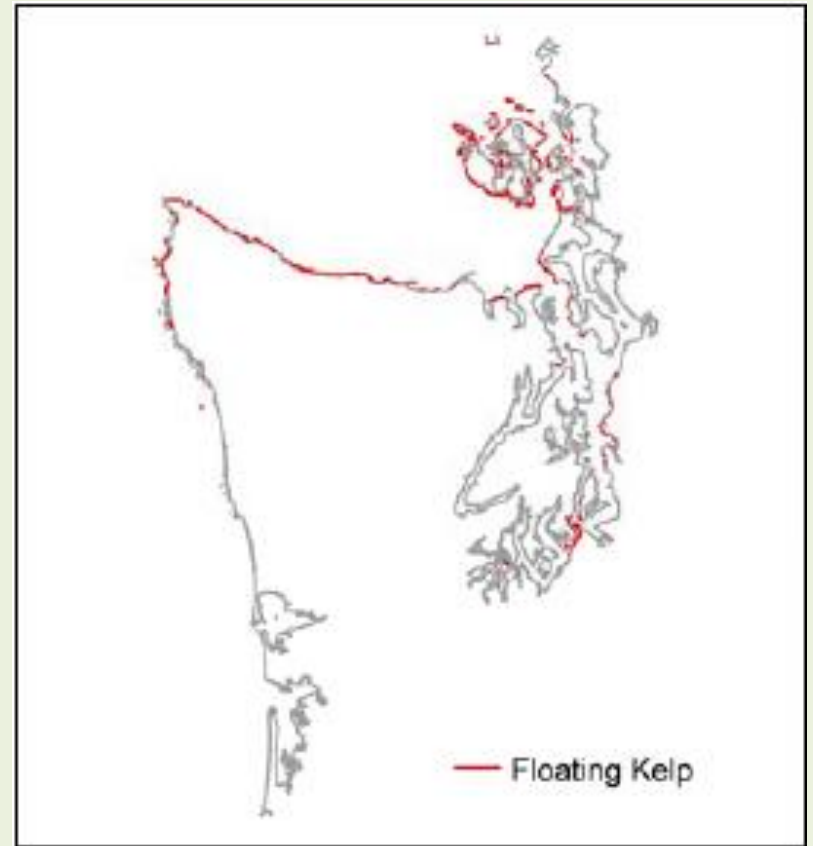
**MARINE**  
RESOURCES COMMITTEE





# Kelp in Snohomish County

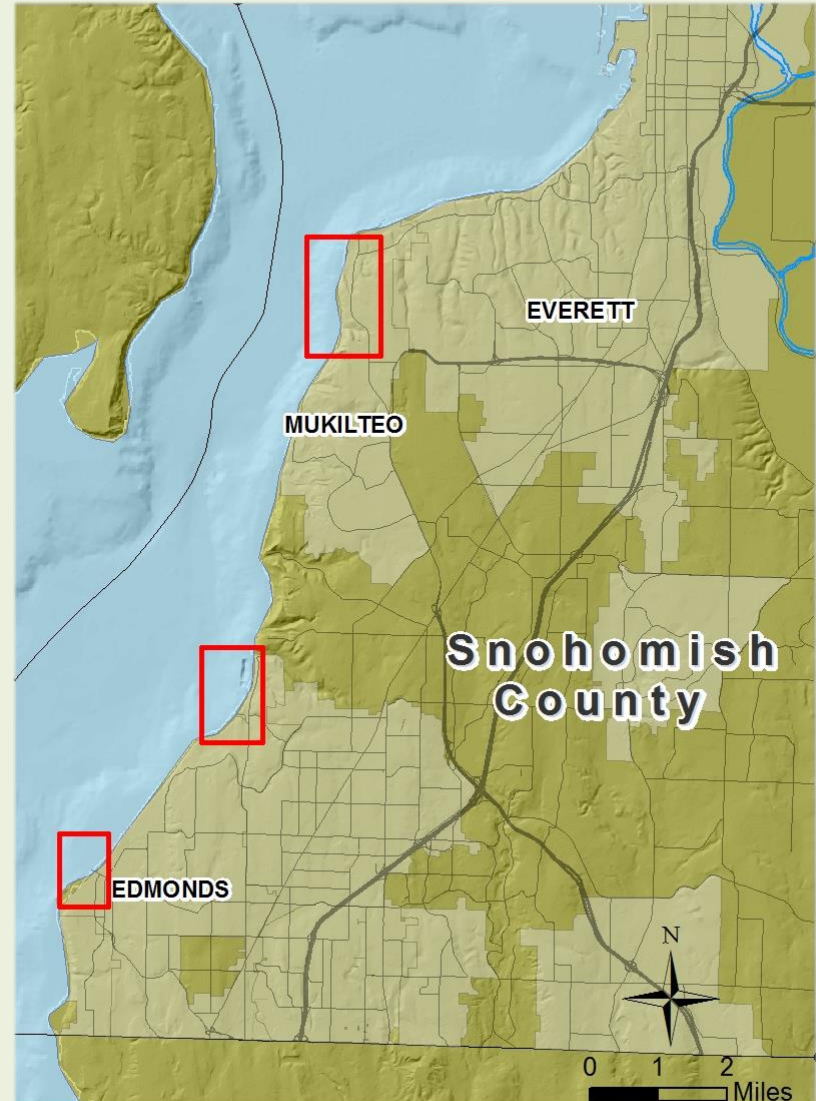
- Sparse data on kelp abundance and distribution in Snohomish County
  - Course scale WA DNR aerial surveys
- “Floating kelp beds are more rare, and occur near Edmonds and the south tip of Hat Island”
  - Snohomish County Planning and Development Services 2006



WA DNR 2001

# Initial Kelp Surveillance

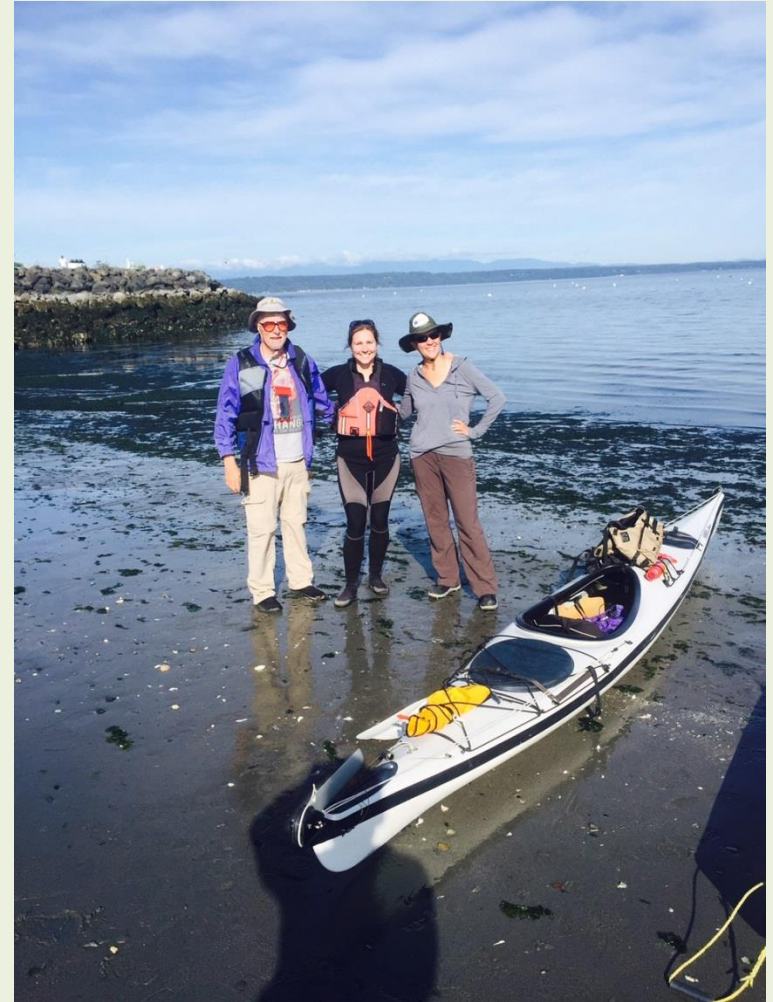
- Scouted for kelp from the commuter train
- Three locations:
  - Edmonds Ferry
  - Mukilteo
  - Meadowdale Beach





# Surveys

- July 13<sup>th</sup>: Mukilteo
- July 14<sup>th</sup>: Edmonds
- July 16<sup>th</sup>: Mukilteo (resurvey)
- July 17<sup>th</sup>: Meadowdale
- Surveyors:
  - Kathleen Herrmann
  - Traci Sanderson
  - Alyson Rae
  - Taylor McDowell
  - Lincoln Loehr



# Mukilteo





# ***NEAR***shore Kelp in Mukilteo





# Edmonds















# Meadowdale










unsurveyed)

0 0.1 0.2





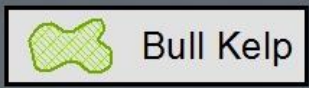
 Bull Kelp

Miles  
0 0.1 0.2

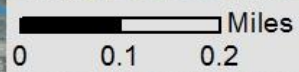
**DRAFT**



**MUKILTEO**



**DRAFT**





# Protocol Discussion

- Record the time with each depth measurement and correct the depth for the tide when back in the office (make the depths relative to consistent 0 mllw datum).
- Measure in-situ current rather than use local station current speeds.
- Run multiple transects in kelp beds with variable density.
- For small kelp beds, consider option of counting all the bulbs instead of the random paddle stroke approach.
- Recognize that random number generators from 1 to 10 used for paddle strokes may work two different ways. One way will always make a random selection between the 10 numbers. Another will remove a number from the selection when it is used and only draw from the remainders. Both are random. Ponder whether need to specify one or the other method, and what difference, if any, that it makes.
- Consider using geo-referenced photos to document site conditions.

