



## Advances in Salish Sea Acoustic Telemetry: 2015 Array Deployments and Promising Transmitter Performance

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A close-up photograph of a person's hand wearing a bright blue nitrile glove. The hand is held palm-up, and resting on the palm are two small objects: a black cylindrical transmitter with a white label and a small grey pill. The background is blurred, showing a blue container and a grey surface.

# Advances in Tracking Juvenile Salmon: 2015 Salish Sea Array Deployments and Promising Performance of VEMCOs New V4 Transmitter

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# Why Smaller is Better

- Early marine survival in the SoG is thought to be critical for determining productivity
- We use tracking data and Cormack-Jolly-Seber models to estimate early marine survival
- Limited to large salmon smolts
- Acoustic tags are ~\$400 each
- If we are testing hypotheses, how does the reduce detection efficiency affect the power analysis?



# Acoustic Transmitter Specs

V9  
9 x 24 mm  
3.6 g

V7  
7 x 20 mm  
1.6 g

V4  
3.6 x 5.7 mm  
0.42 g

# Tag Specs

## V9

Frequency: 69 kHz

Weight in air: 3.6 g

Power output: 151 dB

Range: 300-500 m

Projected Battery Life (Days)		
Nominal Delay (seconds)	V9-2L	V9-2H
60	400	155
120	685	285
180	910	405

## V4

Frequency: 180 kHz

Weight in air: 0.42 g

Power output: 134 dB

Range: ~80 m

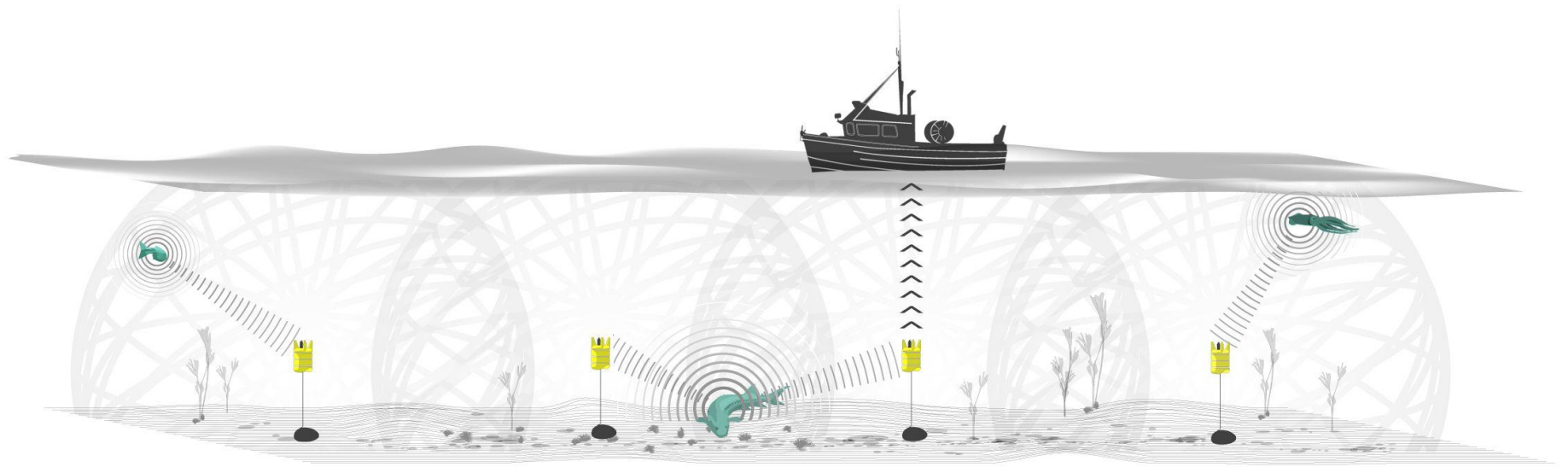
Estimated Battery Life (Days)		
Nominal Delay (secs)	V4-1H	V5-1H
20	34* (41)**	59* (70)**
40	46* (55)**	91* (107)**
60	53* (62)**	113* (131)**

# Array Design (and Recovery) Strategy

- Location
- Detection
- Physical Environment (bathymetry, currents, etc)









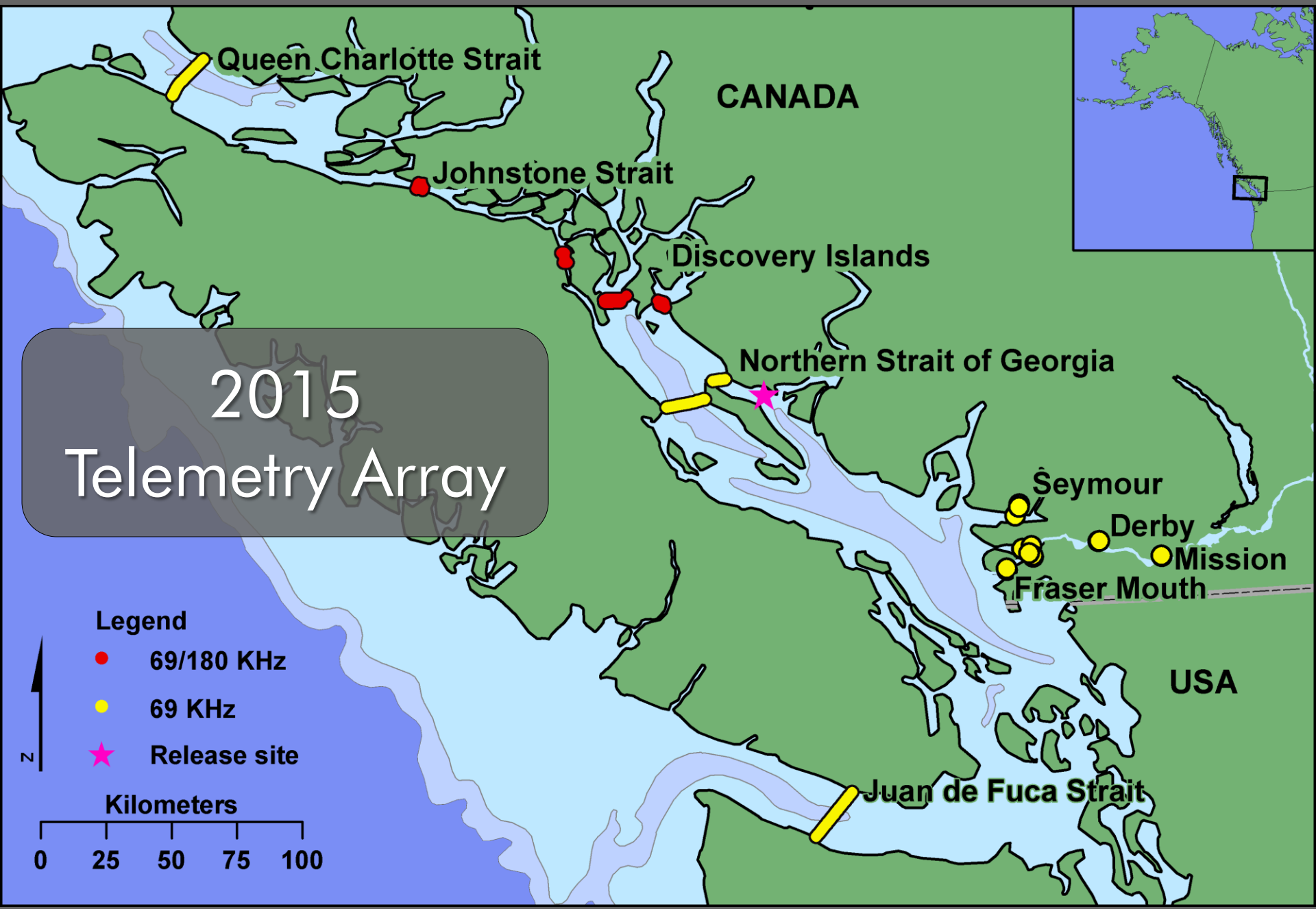
# 2015 Telemetry Array

**Legend**

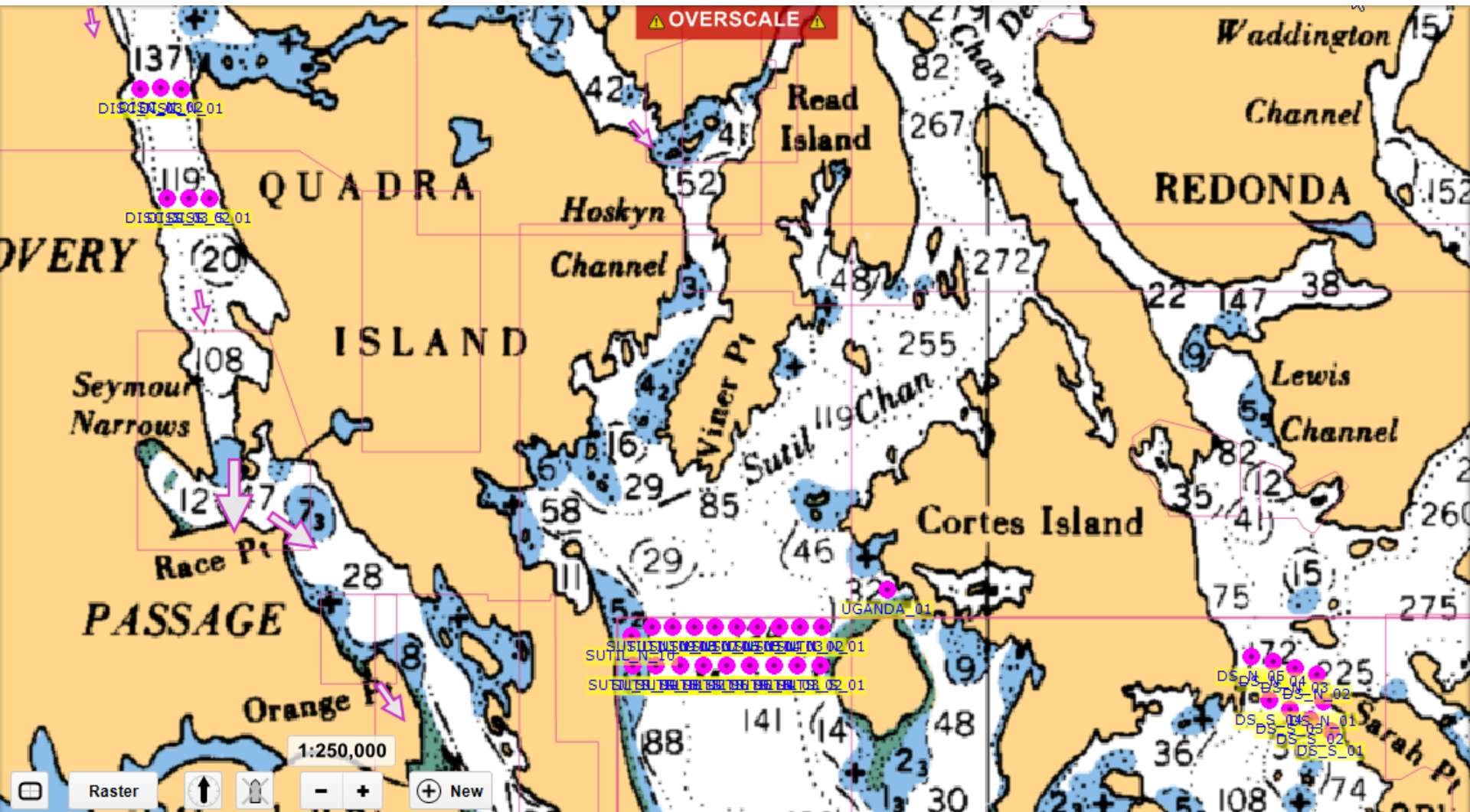
- 69/180 KHz
- 69 KHz
- ★ Release site

**Kilometers**

0 25 50 75 100

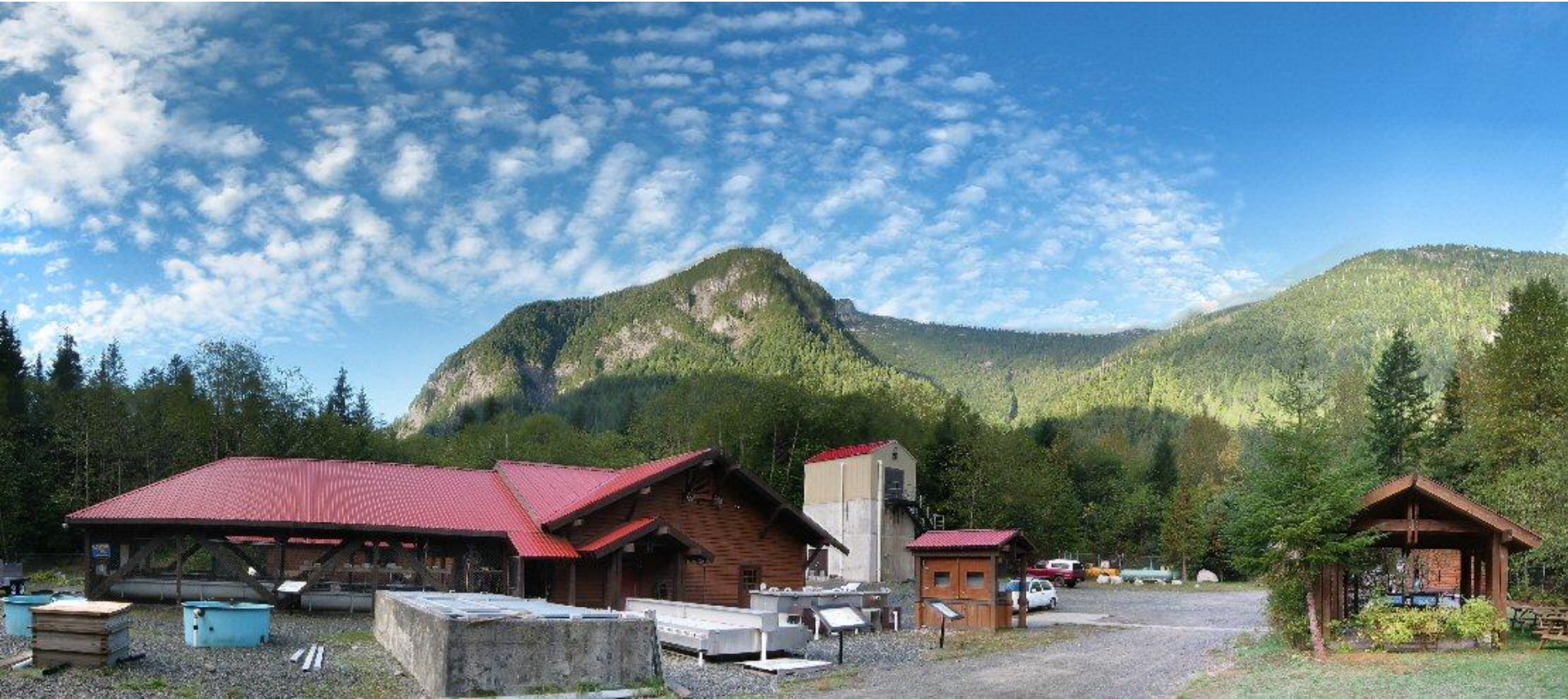


# Dual Frequency Sub-arrays Deployed in 2015: Discovery Islands



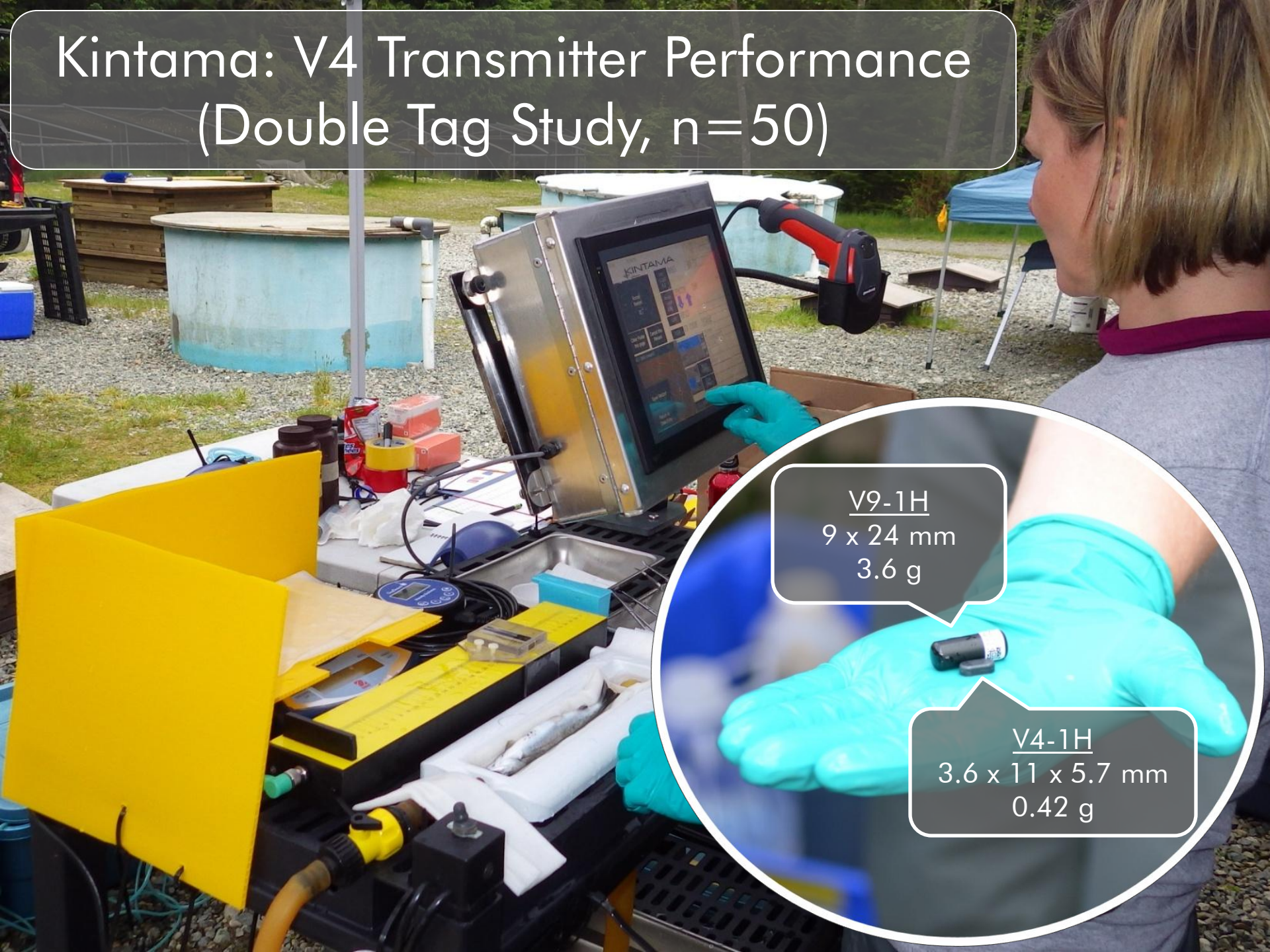


# Seymour River Hatchery (North Vancouver)





# Kintama: V4 Transmitter Performance (Double Tag Study, n=50)



V9-1H  
9 x 24 mm  
3.6 g

V4-1H  
3.6 x 11 x 5.7 mm  
0.42 g

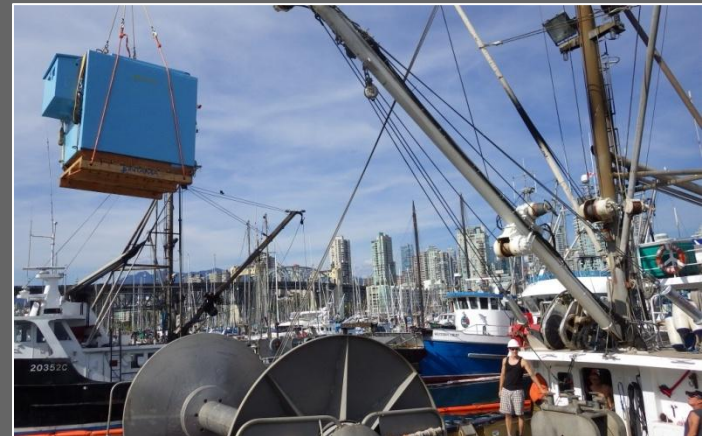




# Transfer



# Transport



# Release

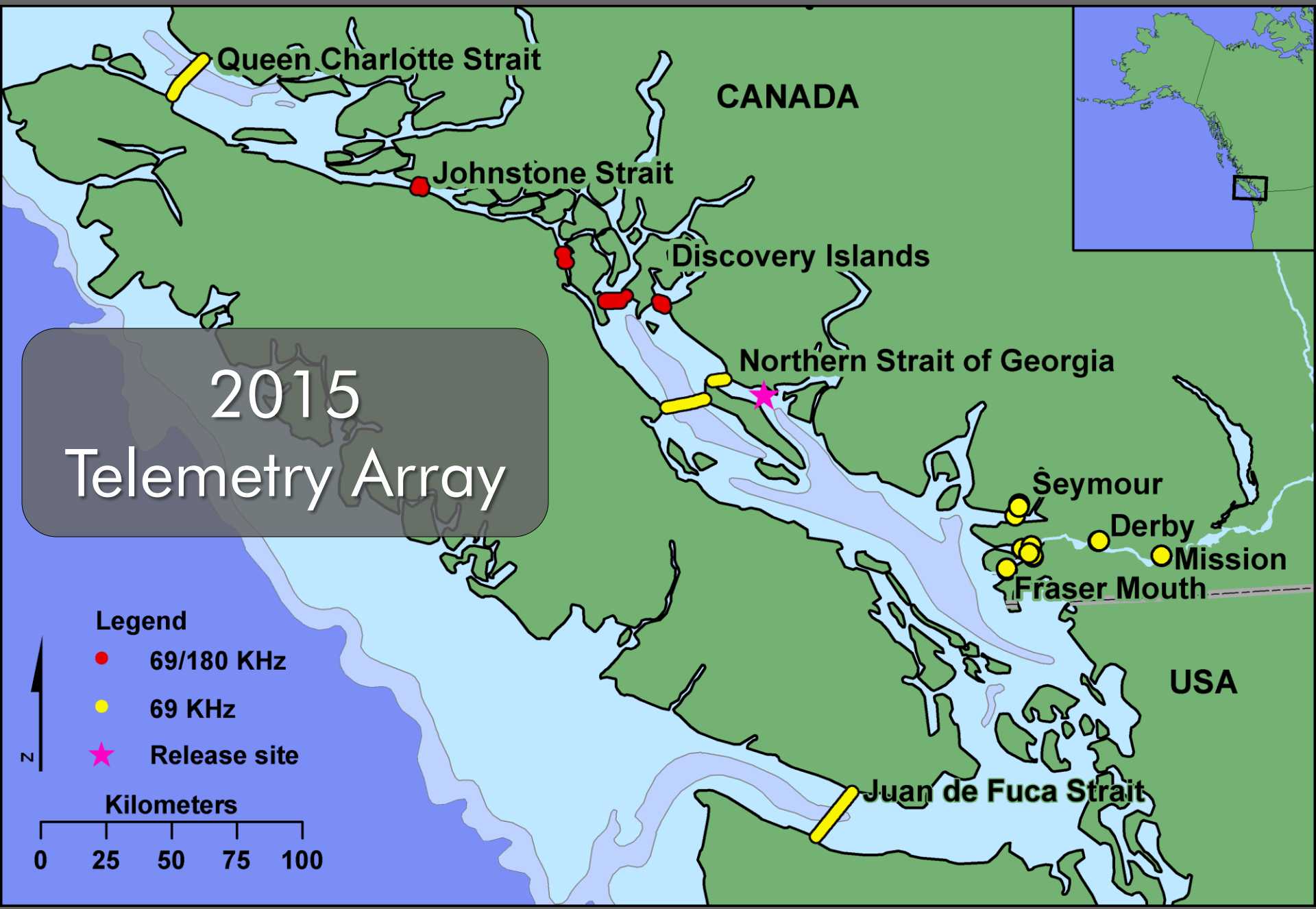
# 2015 Telemetry Array

**Legend**

- 69/180 KHz
- 69 KHz
- ★ Release site

**Kilometers**

0 25 50 75 100



***<http://Kintama Animator/>***

## **Dynamic Animations**

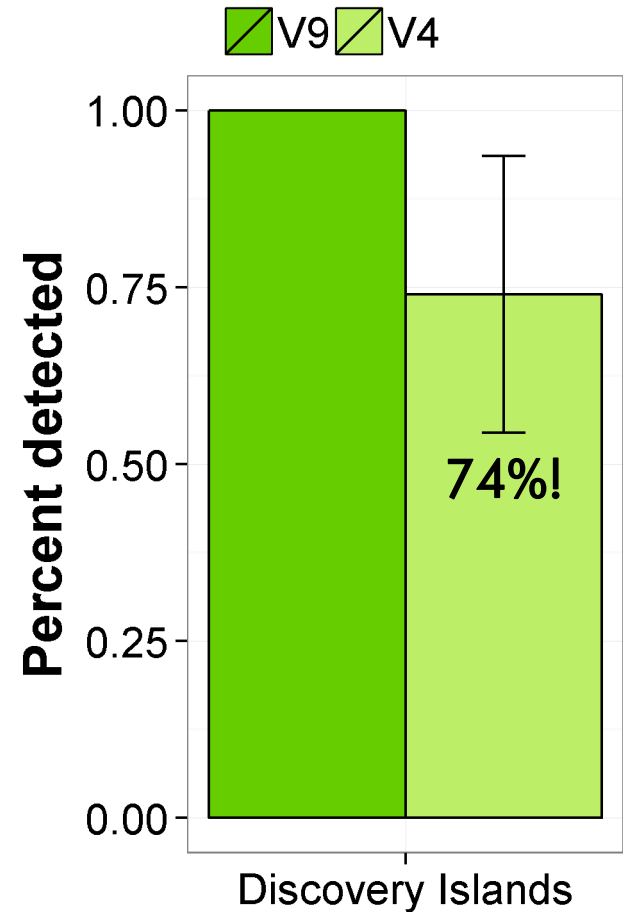
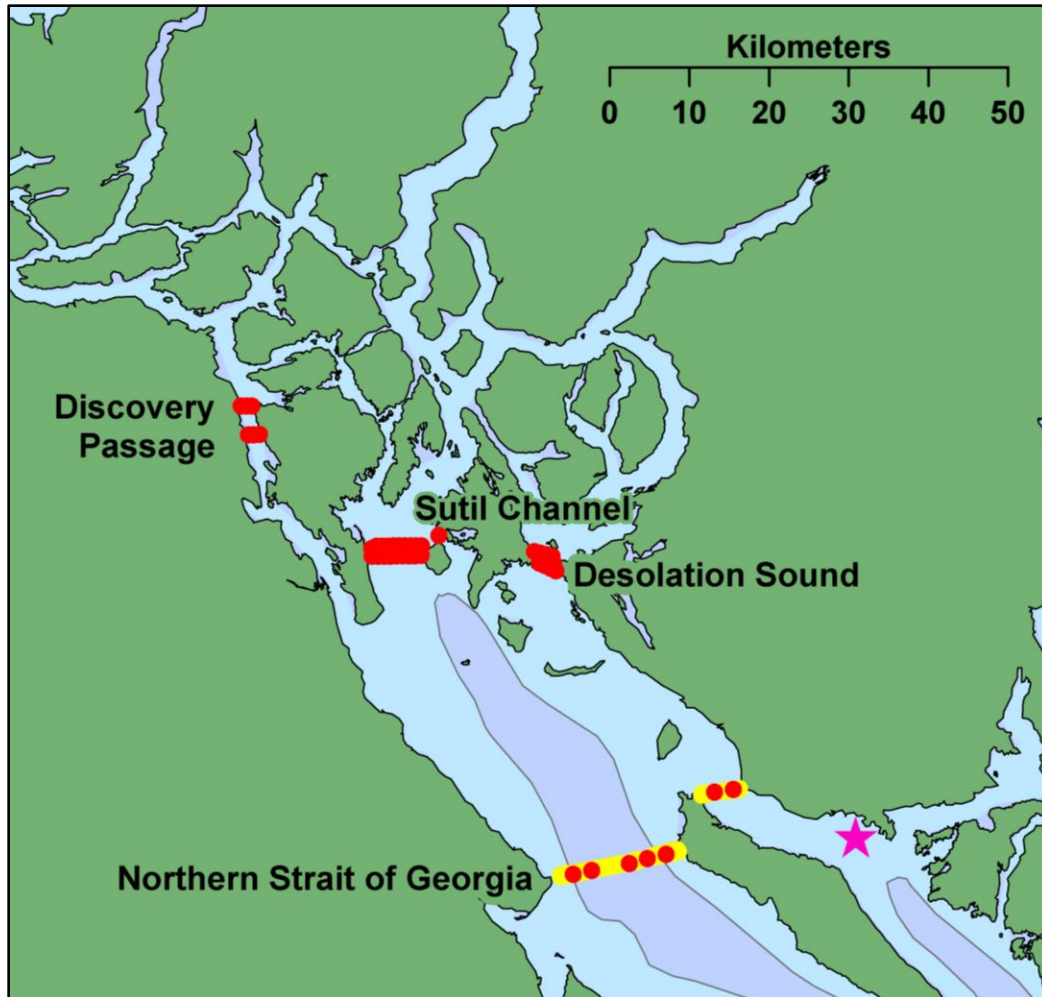
- Seymour River, BC Steelhead (juvenile)
- Chilko Lake, BC Sockeye (juvenile)
- Cook Inlet, AK Chinook and Sockeye (adult)

## **Static Animations**

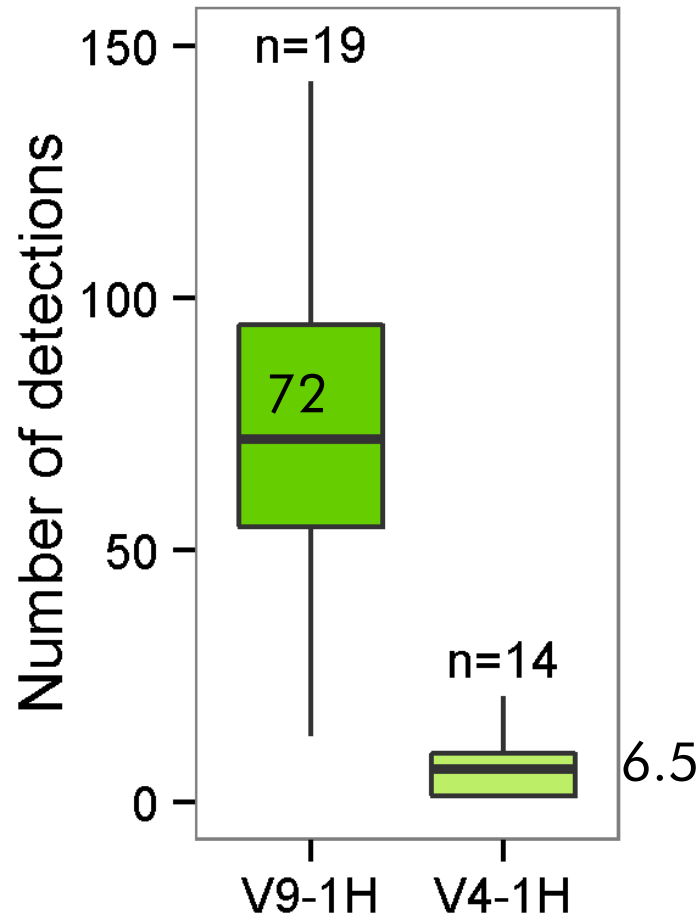
- Cultus Lake, BC Sockeye (juvenile)
- Sakinaw Lake, BC Sockeye (juvenile)
- Columbia River, USA Chinook (juvenile)



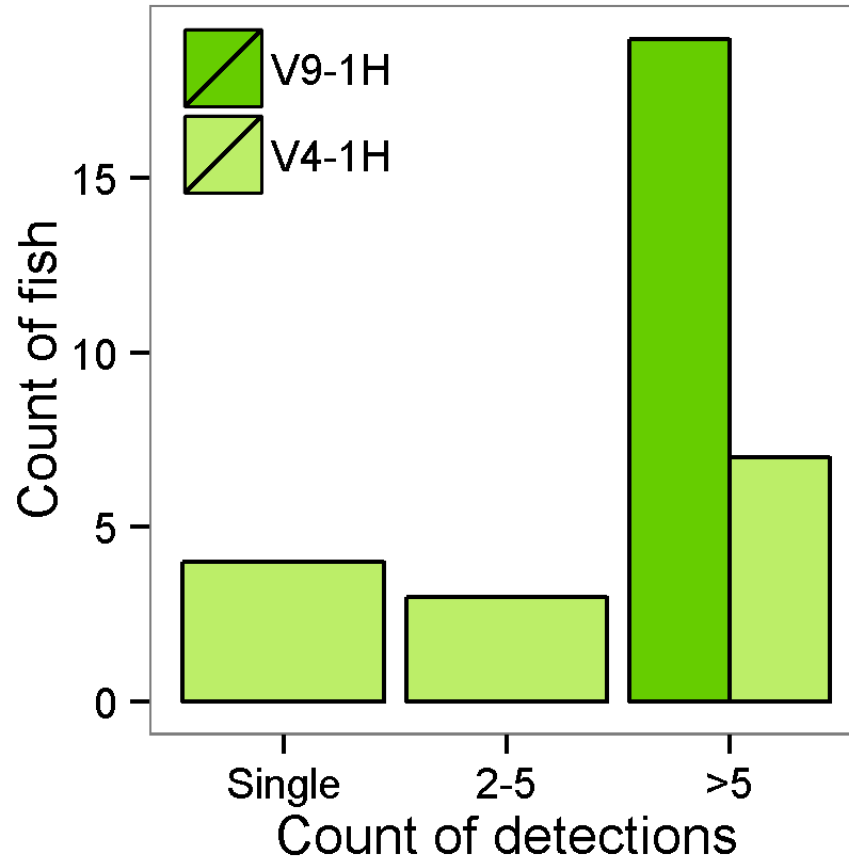
# Transmitter Detection Rate on Discovery Islands Sub-array (Kintama)



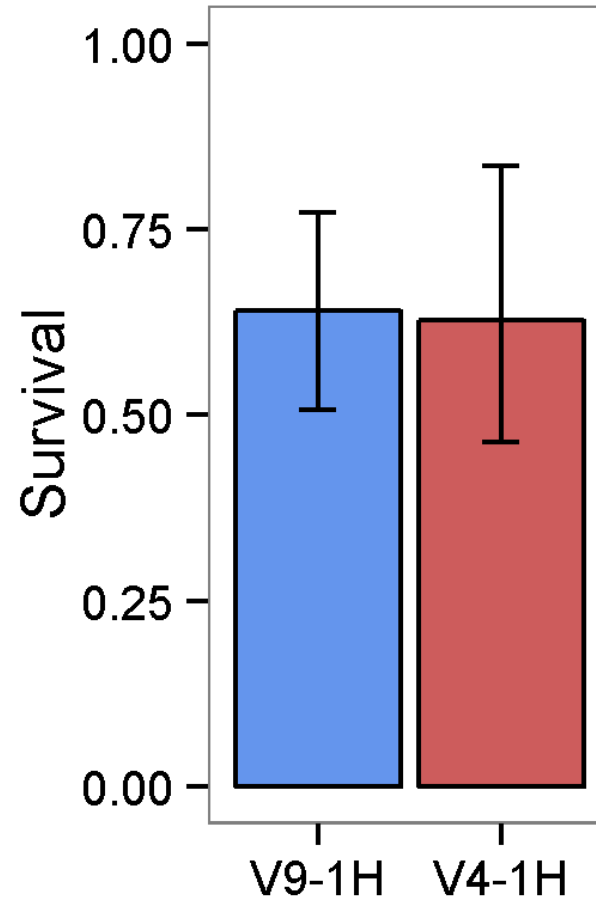
# # of Detections per ID code



# Single Detections



# Survival from release to Discovery Islands





# V4 Tag Considerations

## Pros

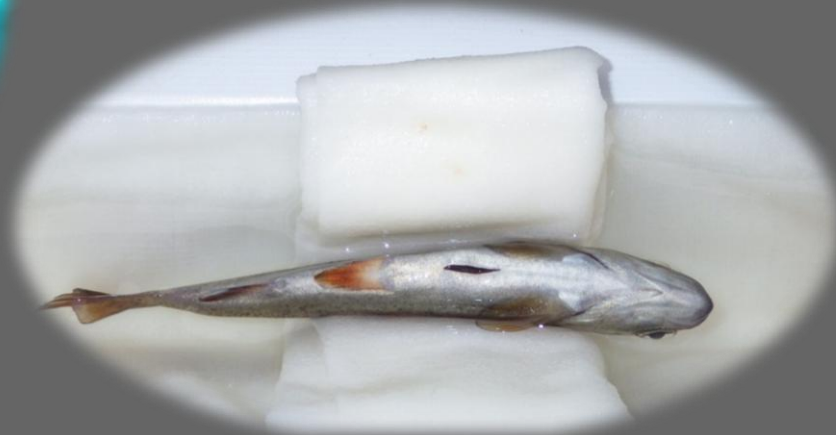
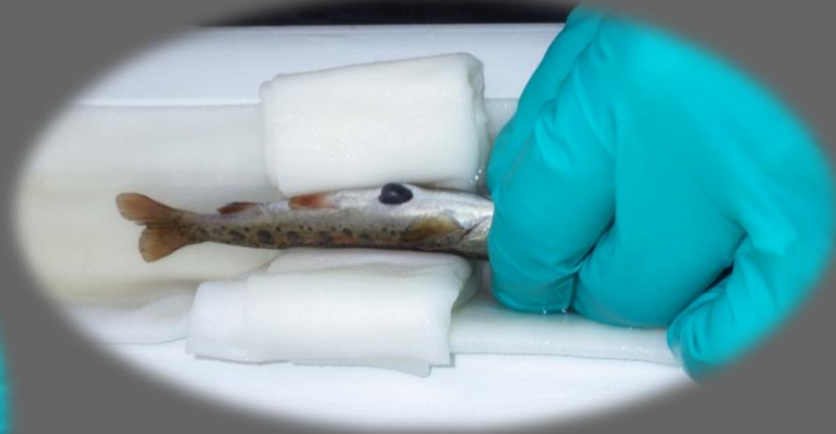
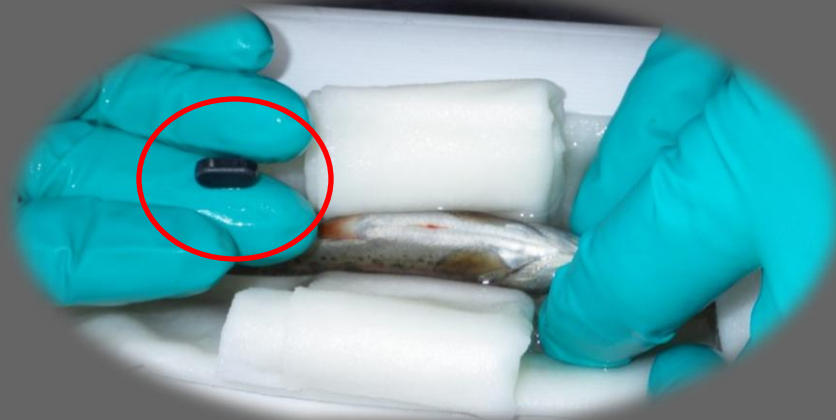
- Small: Size of a Tic Tac
- Light: Weight of a Tic Tac (actually less- only 0.42 grams)
- Reduces tag burden
- Can be used in smaller smolts than previously possible
- Can be used in more populations and species

## Cons

- Reduced range
  - Solution: more receivers
- Reduced battery life
  - Solution: clever tag programming and clearly focused study goals
- Requires 180 kHz acoustic receivers

# Future Telemetry Studies: Smaller Smolts and Reduced Tag Burden

100 mm, 10 g smolt



# Acknowledgements

## Funders

- Pacific Salmon Foundation (SSMSP)
- Ocean Tracking Network
- BC Salmon Farmers Assn.

## Logistics

- Seymour River Hatchery staff
- Canfisco and the Captain and crew of the *Denman Isle*
- Seymour Salmonid Society Board

