SWIFT RESERVOIR FLOATING SURFACE COLLECTOR JUVENILE SALMON COLLECTION EFFICIENCY

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Science Operations Manager

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Regulatory Background

- Lewis River Aquatic Monitoring & Evaluation Plan (Section 2.2.1)

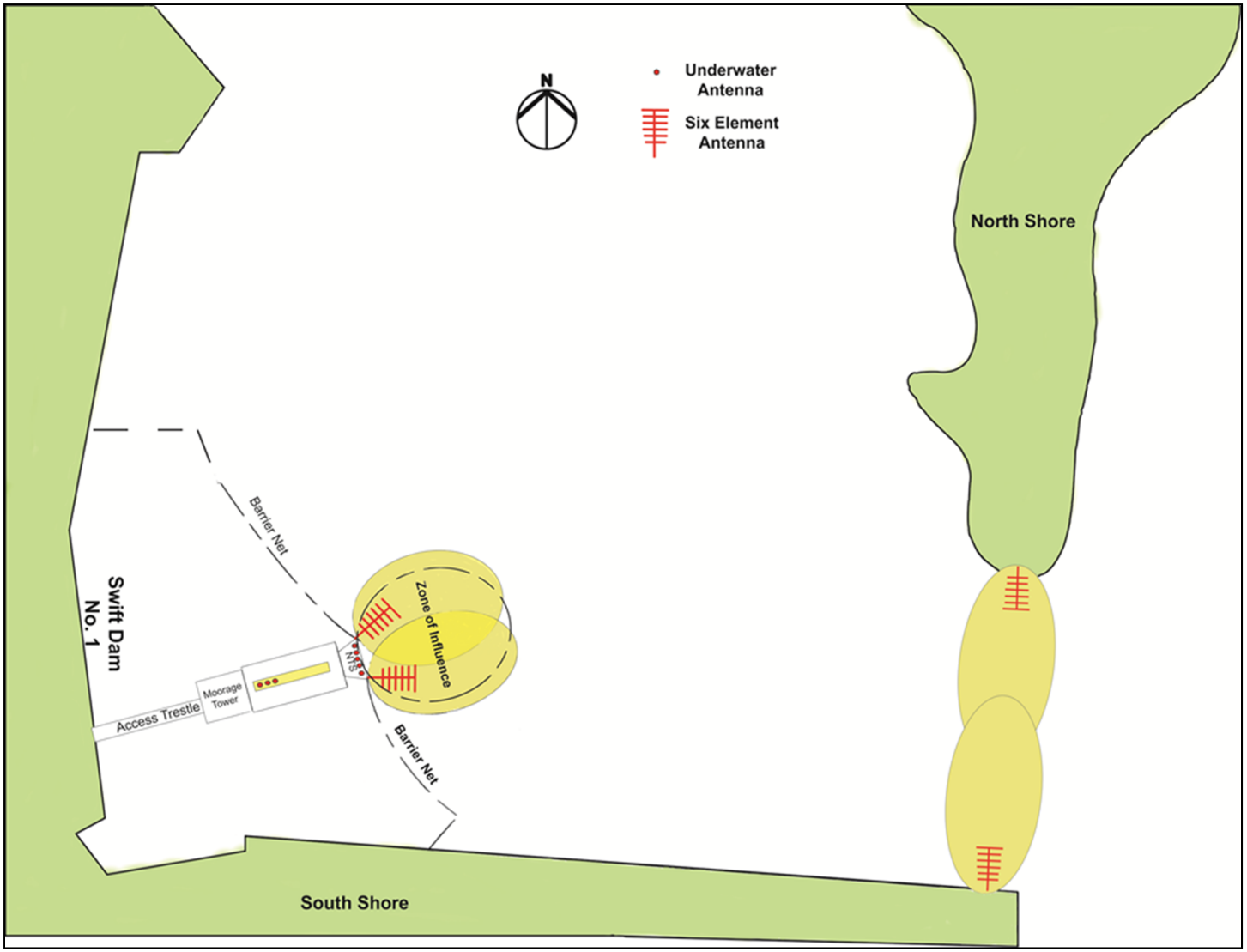
$$P_{CE} = n_{FSC}/n_{ZOI}$$

  - ZOI: ~150ft radius
  - P_{CE} >= 95% as measured by radio-telemetry

Pilot Year - 2013

- Radio-telemetry: Feasible
- P_{CE} not calculable due to exclusion net failure
- Lessons Learned:
  - Detection sites:
    - Mooring Tower – Removed
    - North & South Shore – Established
  - Tag Burst Rates: 7s too infrequent
  - Range Testing
  - Re-program receivers

Study Year - 2014



Study Year – 2014

- Results

Metric	Coho Salmon	Spring Chinook	Steelhead	Total
Total tagged (n)	157	20	16	193
Detected at ZOI	31	3	4	38
P_{RES}	19.7%	15.0%	25.0%	19.7%
Captured at FSC	9	0	1	10
Collection Efficacy (P_{CE})	29.0%	0.0%	25.0%	26.3%

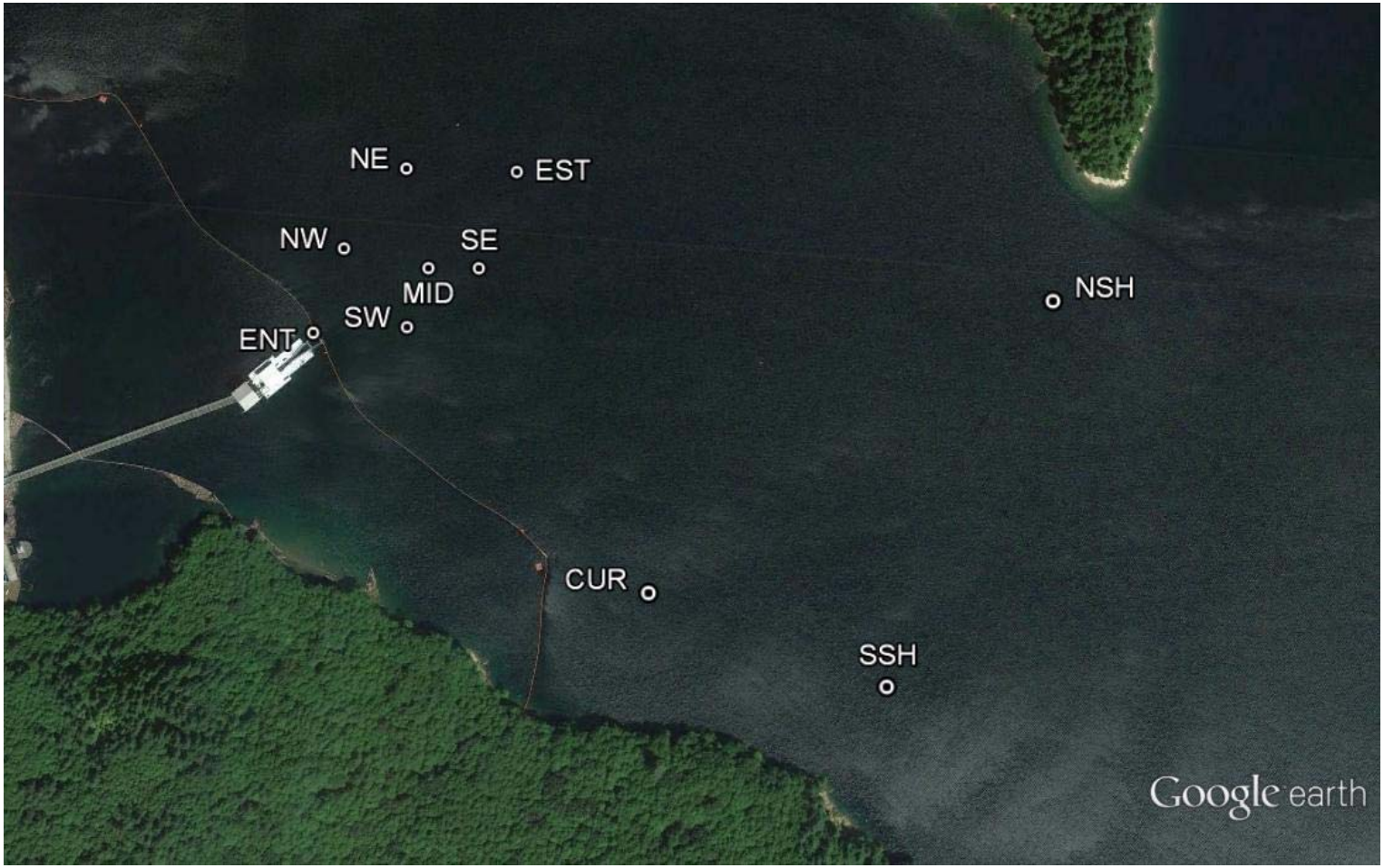
Study Year - 2014

- Conclusions
  - P_{CE} below target but consistent with previous studies
  - Tagging effects and fish stress may have been a factor
- Lessons learned
  - Capture at FSC and release mid-reservoir not optimal
  - RT provides insufficient resolution to document fish behavioral responses to FSC, barrier net, etc.

Study Year - 2015

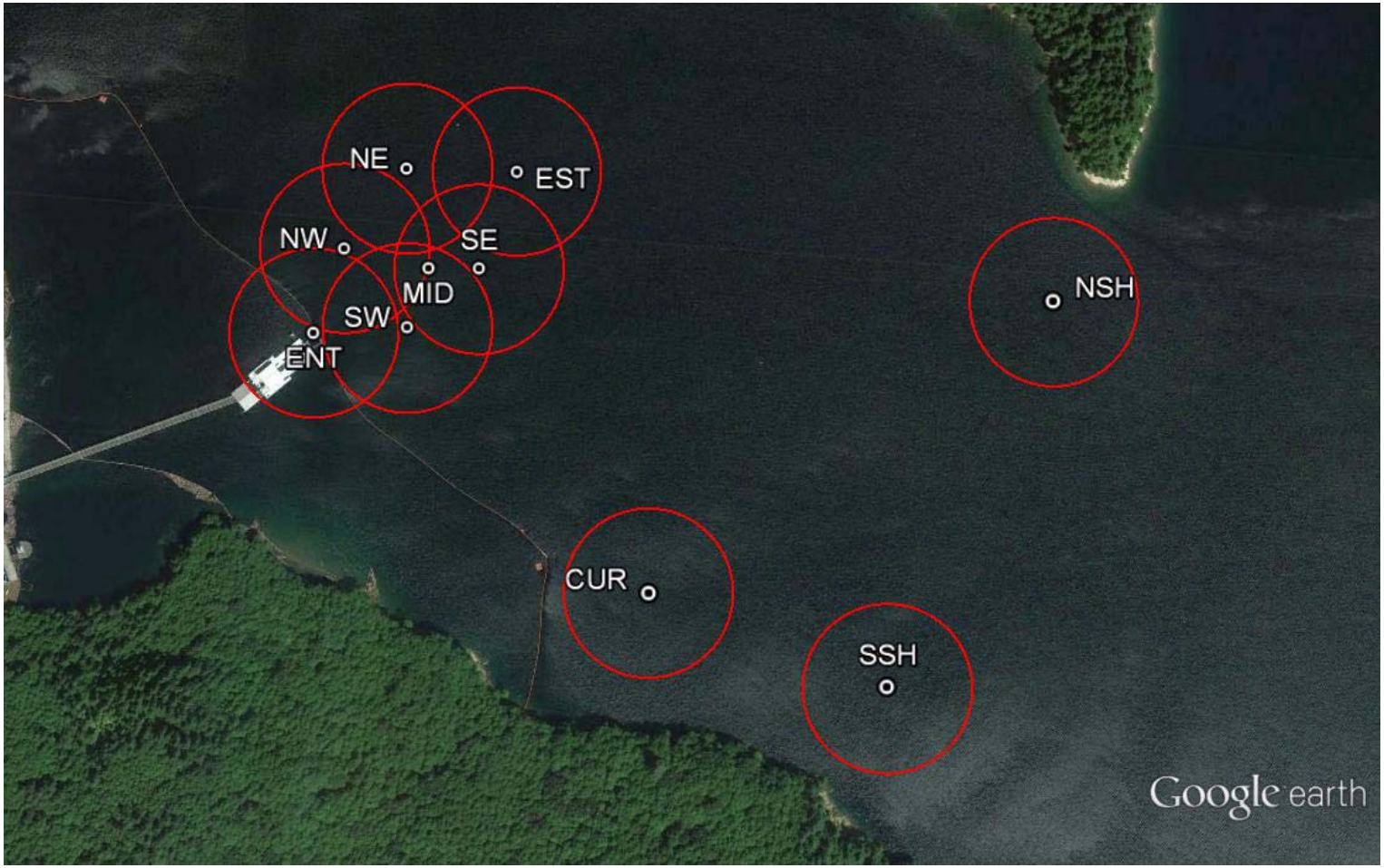
- Methodological Changes
  - Acoustic Telemetry
    - Rationale: Radio-telemetry provided P_{CE} but Acoustic Telemetry can provide behavioral insights driving P_{CE}
  - Fish captured, tagged and released in vicinity of Eagle Cliffs
    - 88% (7/8) for fish inadvertently released at RST were detected in array in 2014

Study Year - 2015



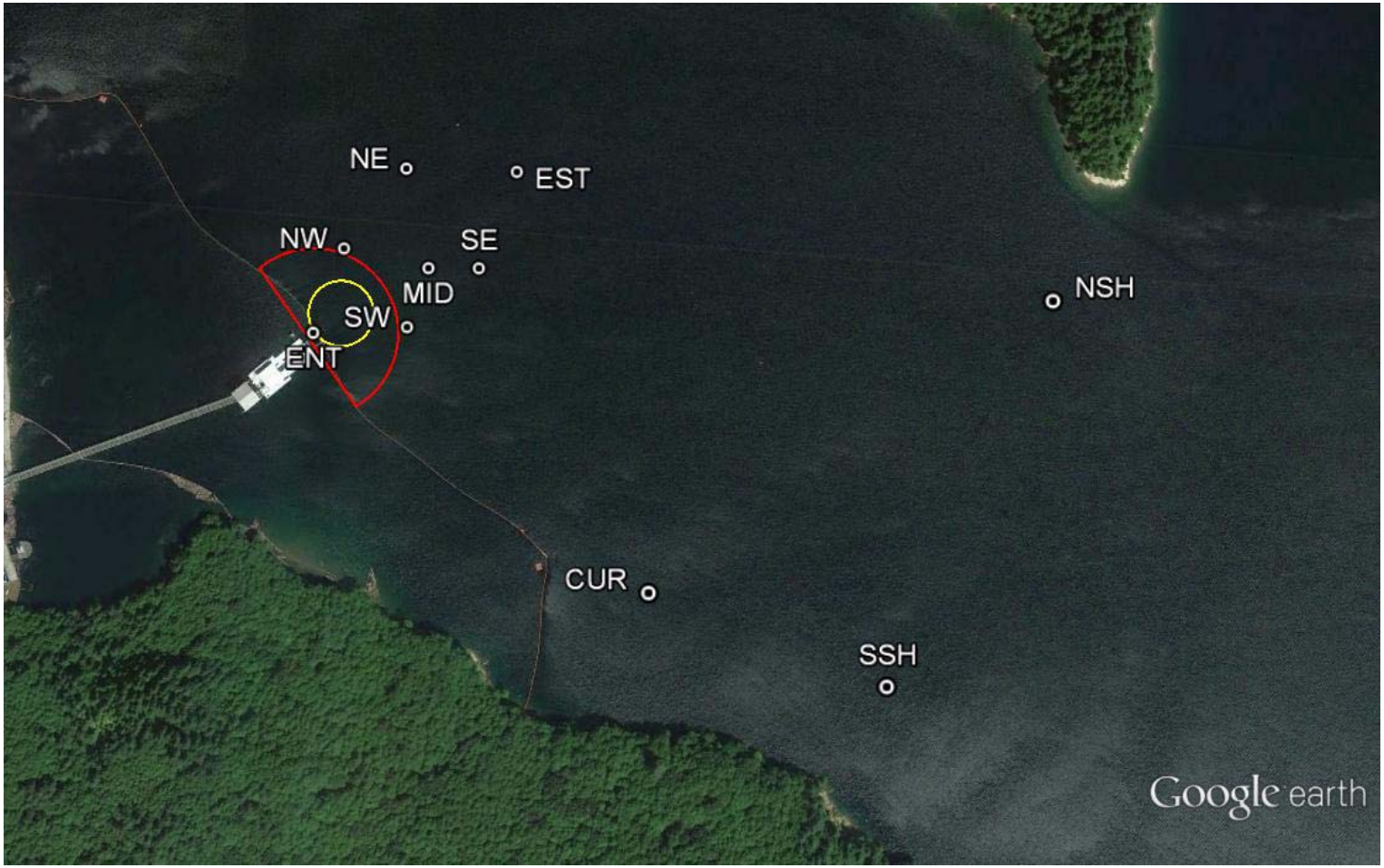
Array Configuration

Study Year - 2015



Detection Range

Study Year - 2015



Zone of Influence

Study Year - 2015

– Results

Metric	Coho Salmon	Spring Chinook	Steelhead	Total
Total tagged (n)	149	14	47	200
Detected at ZOI	100	6	43	159
P_{RES}	67.1%	42.9%	91.5%	79.5%
Captured at FSC	12	0	7	19
Collection Efficacy (P_{CE})	12.0%	0.0%	16.3%	11.9%

– Results: 2014

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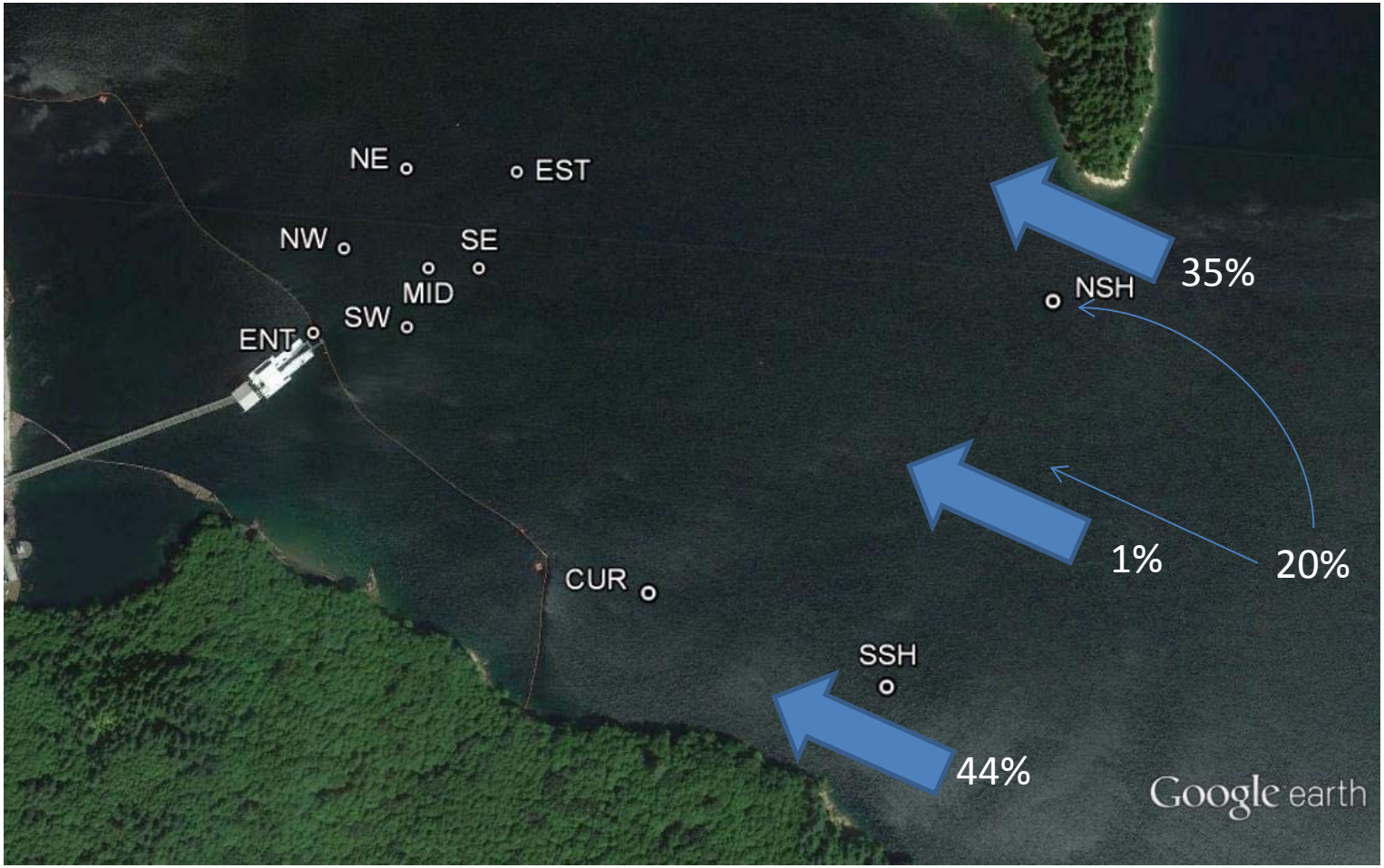
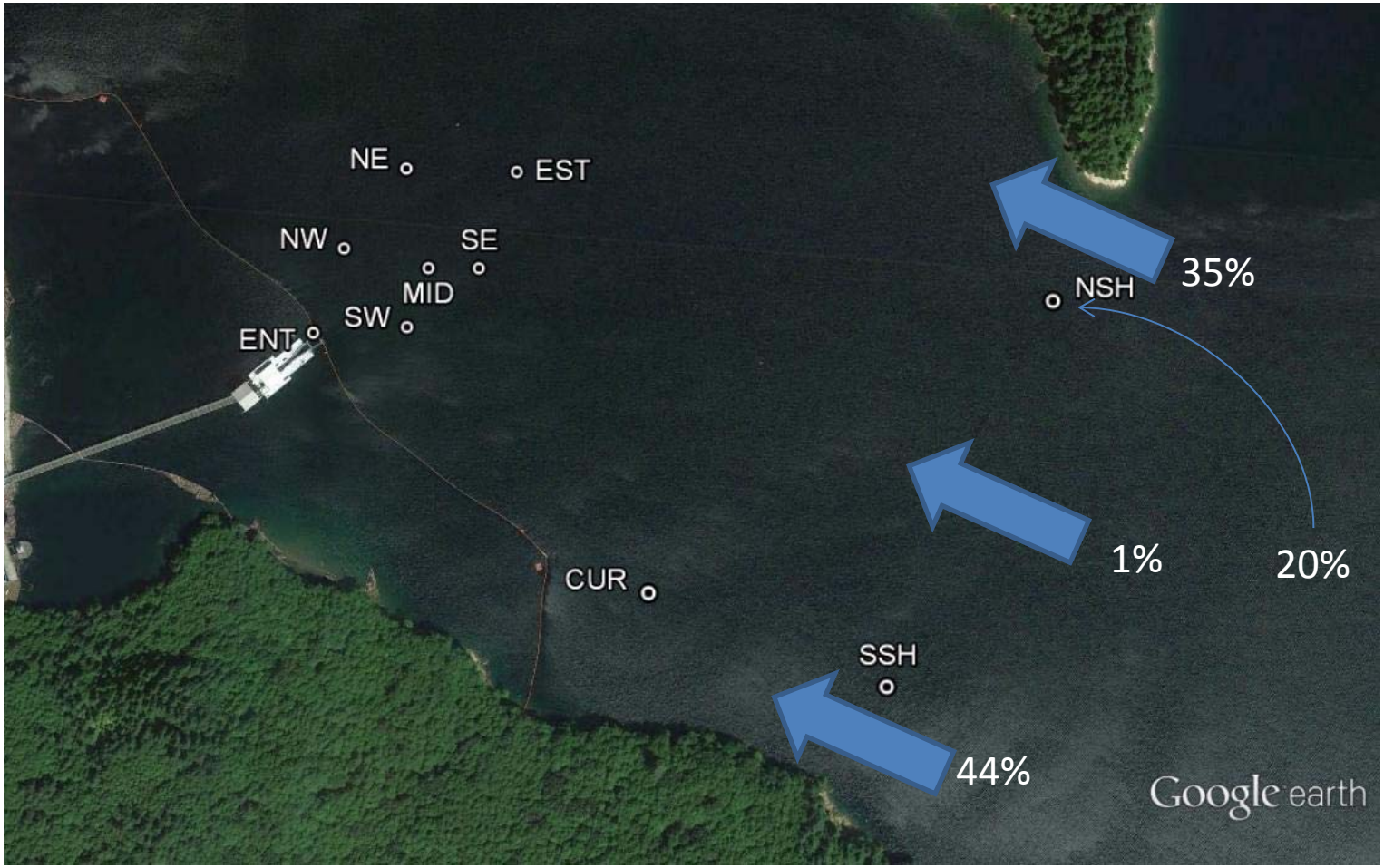
Study Year - 2015



Distribution of 1st Forebay Entrances

Study Year - 2015



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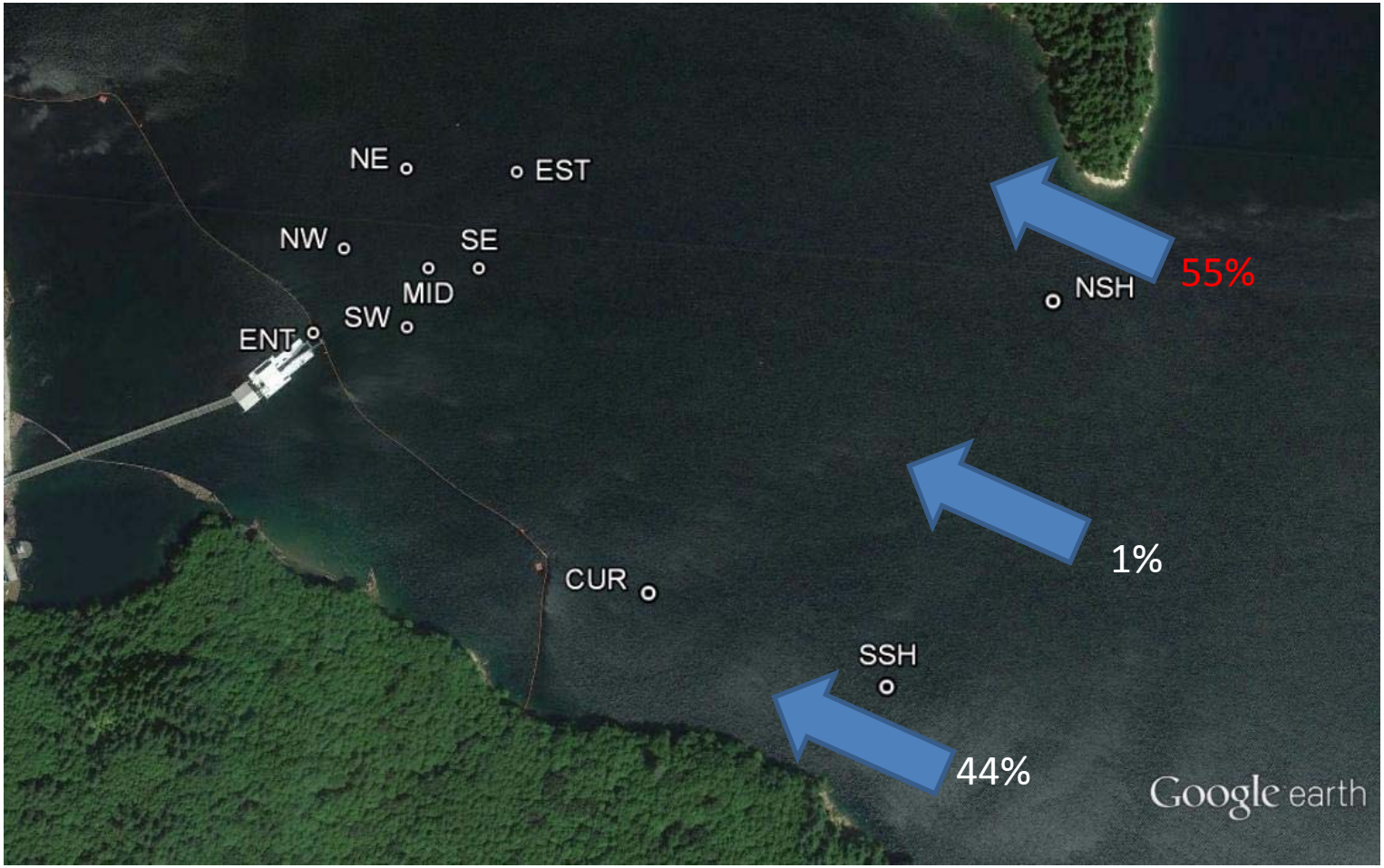

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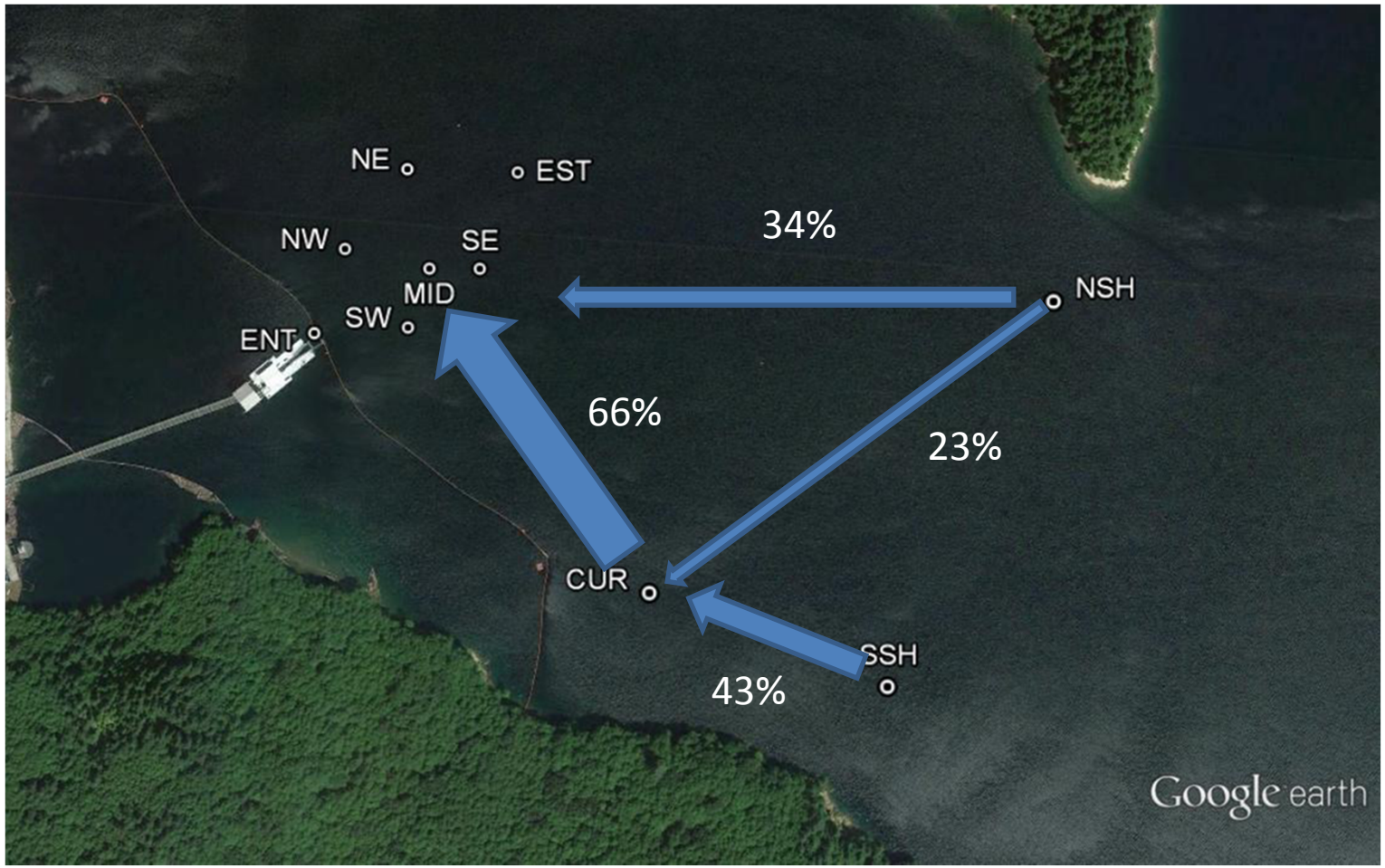
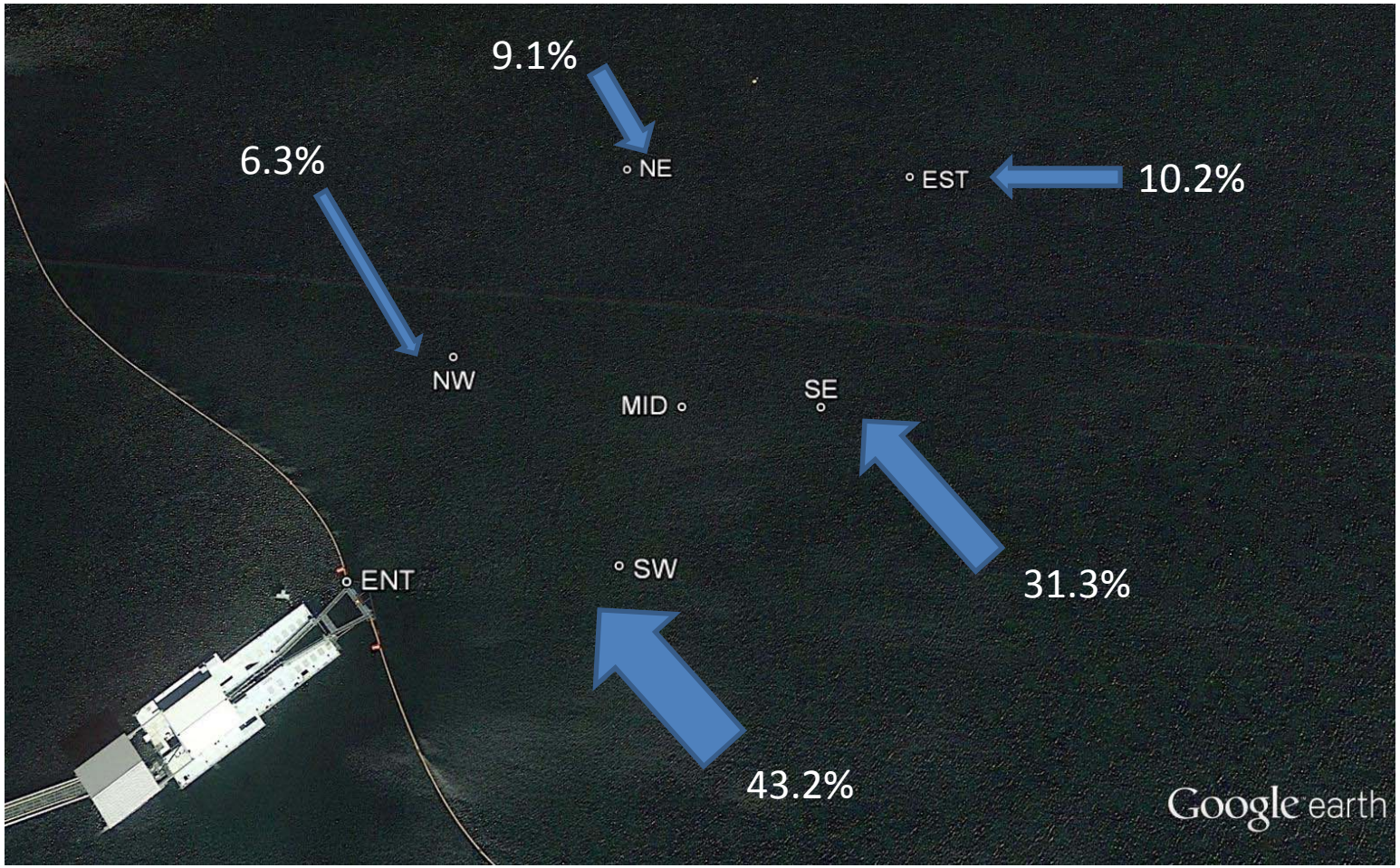


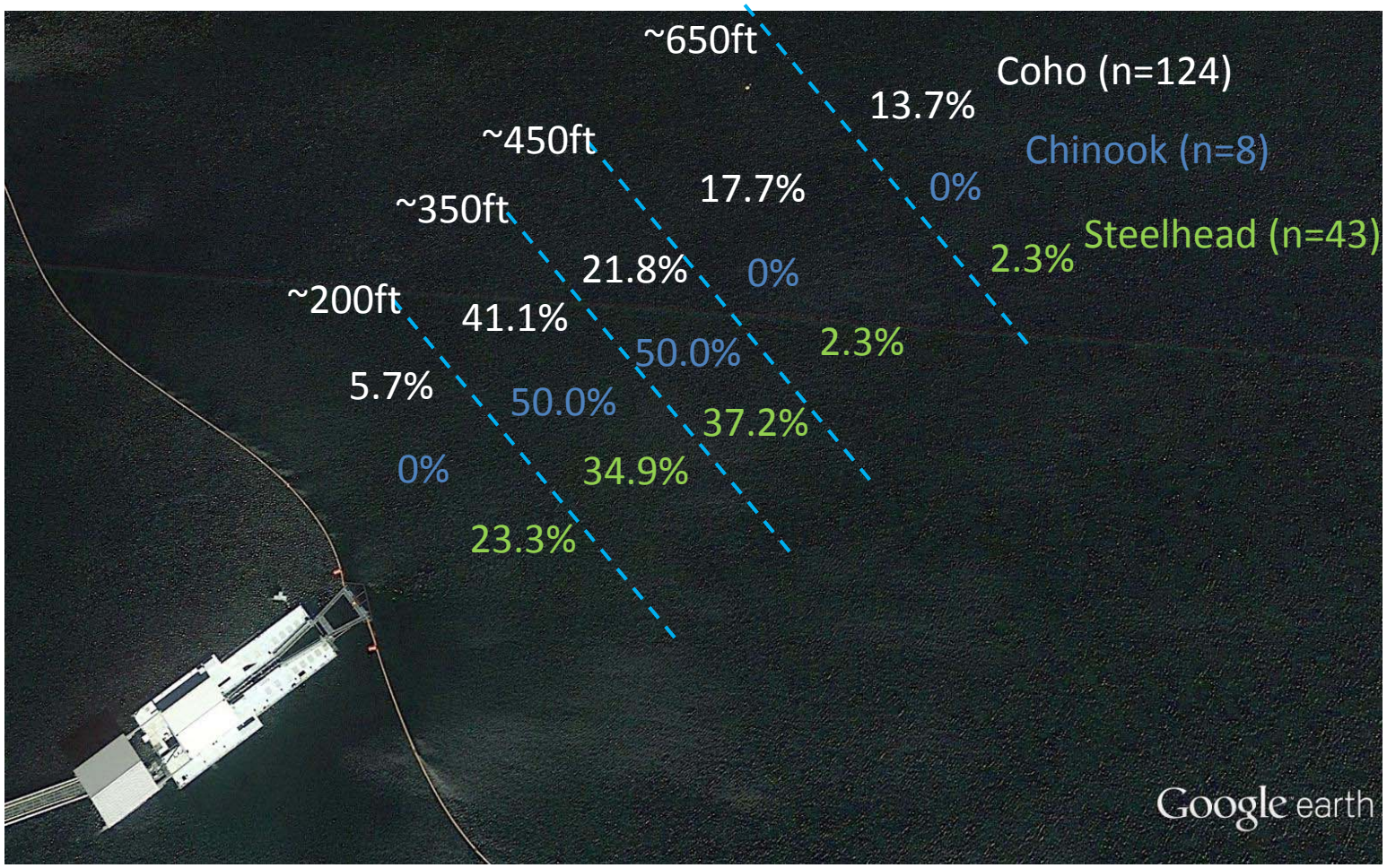
Forebay Travel Path

Study Year - 2015



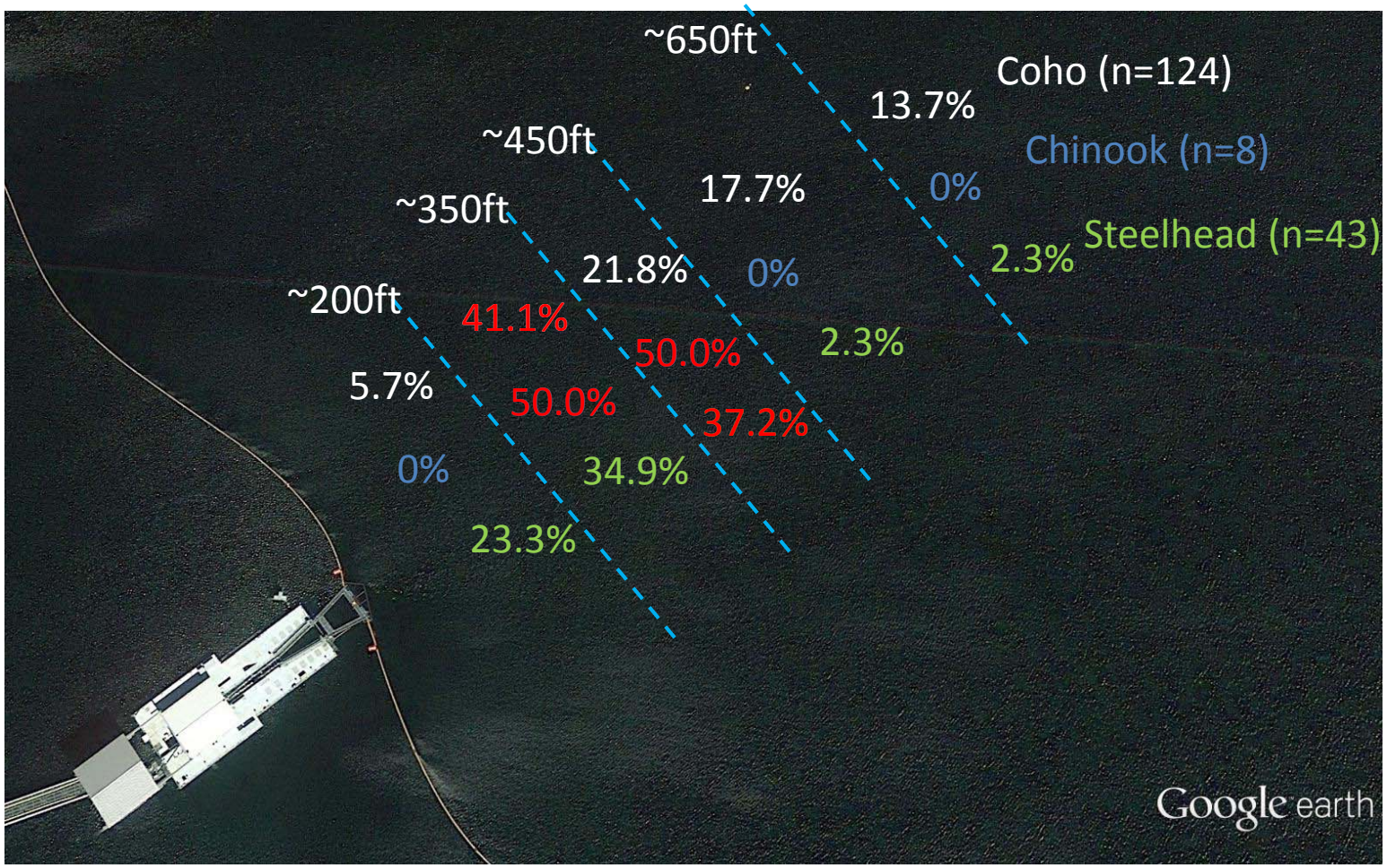
Array Entrance Direction

Study Year - 2015



Distribution of Array Entrances – All Species

Study Year - 2015



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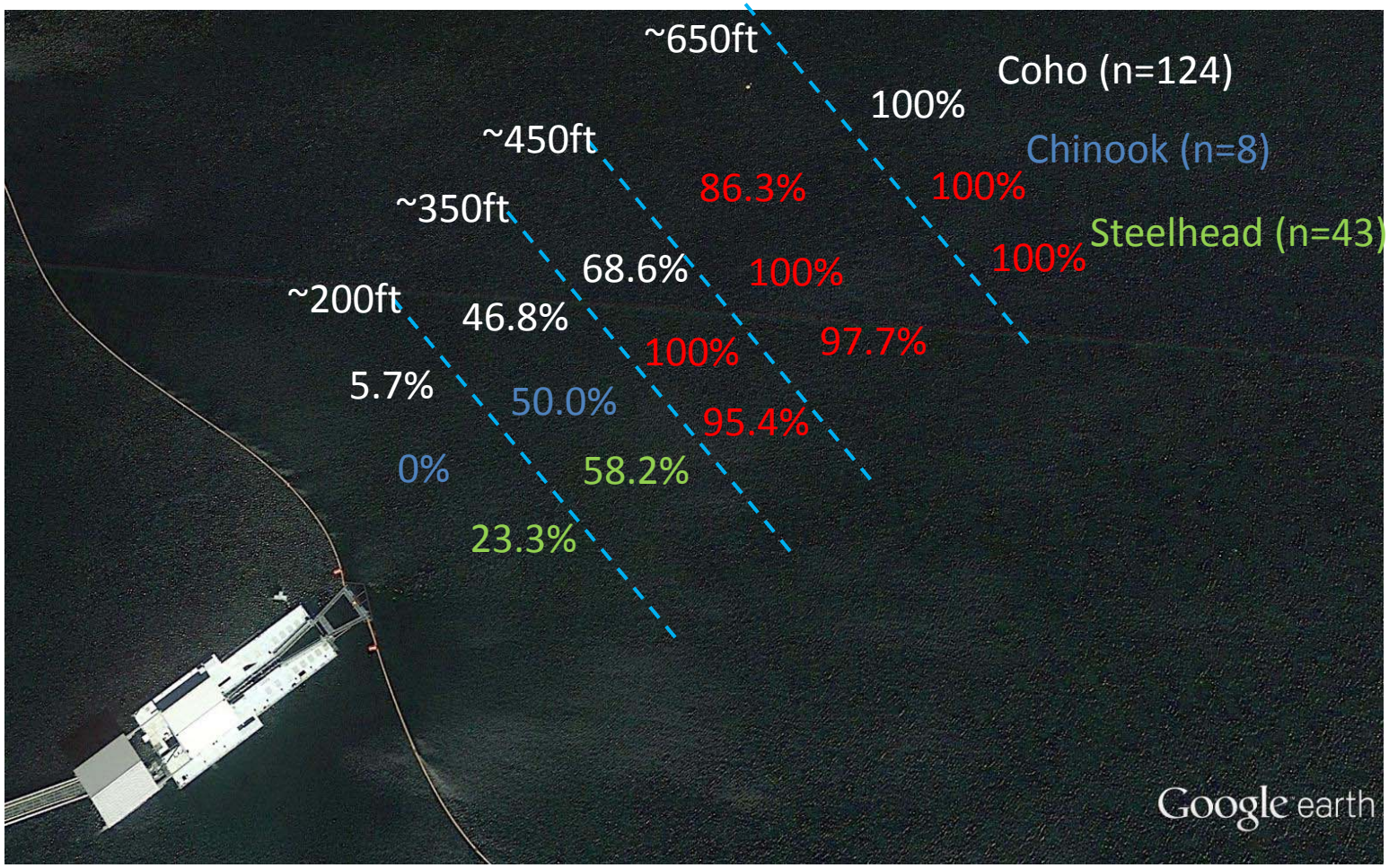

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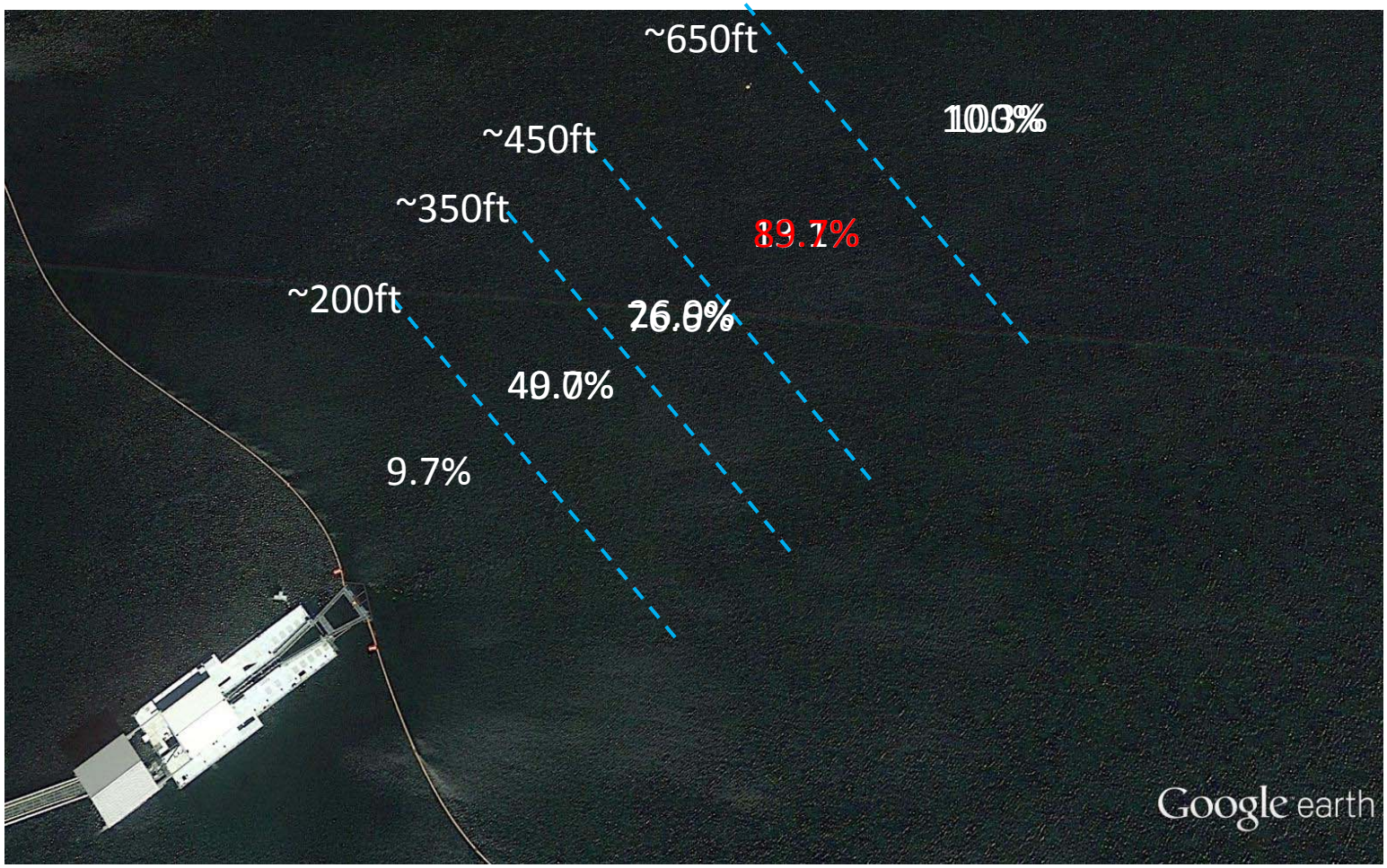


Distribution of Array Entrances – All Species Combined

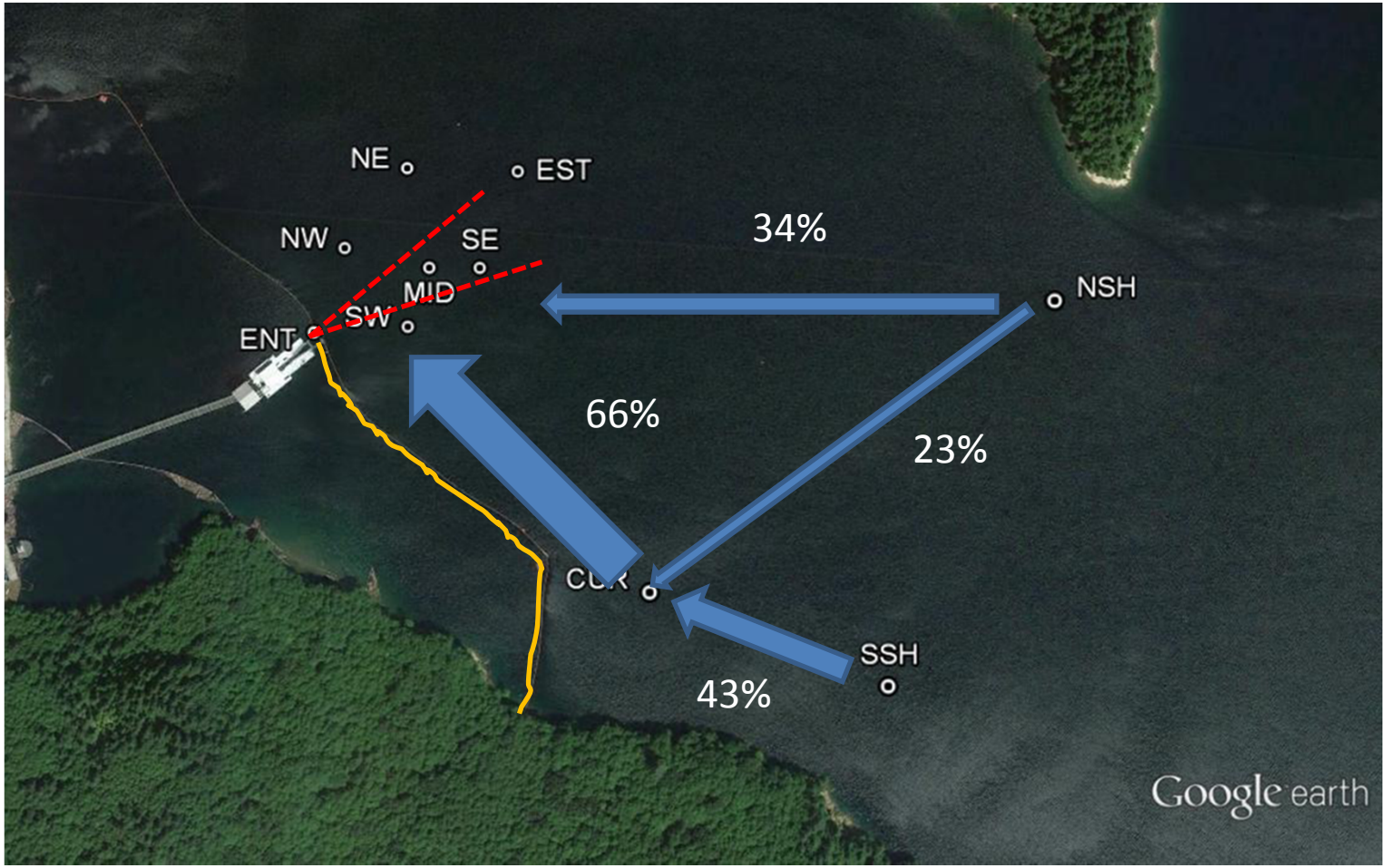
Study Year - 2015

- Preliminary Conclusions
  - Acoustics ZOI is larger but more consistent with M&E
  - P_{CE} was lower in 2015 but more smolts passed
    - Substantially higher P_{RES} due to improved tagging diluted P_{CE}

Study Year - 2015

- Acoustic Behavioral Insights
  - Forebay entrance evenly distributed North v. South
  - Large majority of smolts approach FSC from South
  - All species have peak passage within 450ft of FSC
  - ~90% of fish pass within 650 ft of FSC

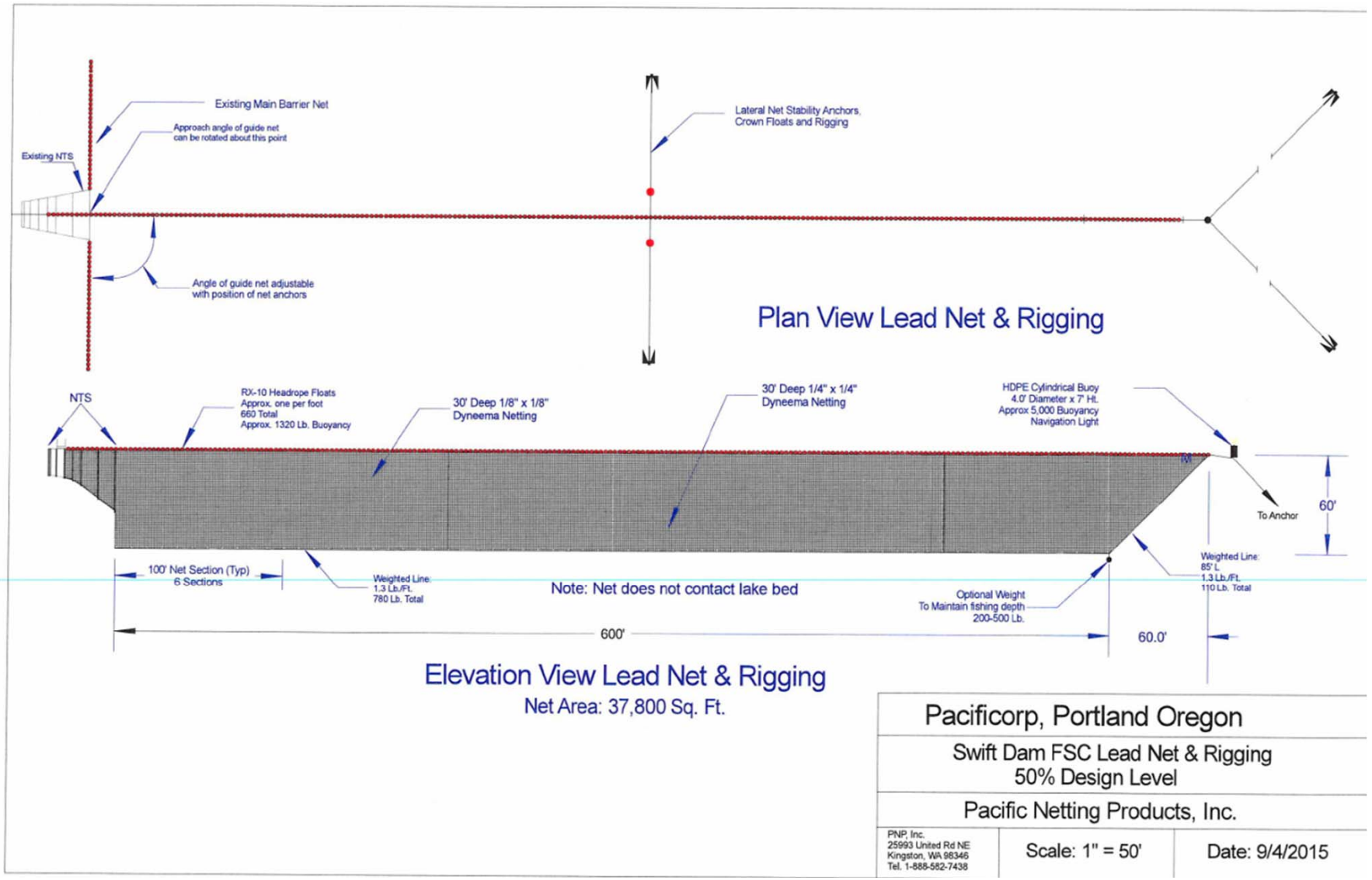
Lead Net Design Features

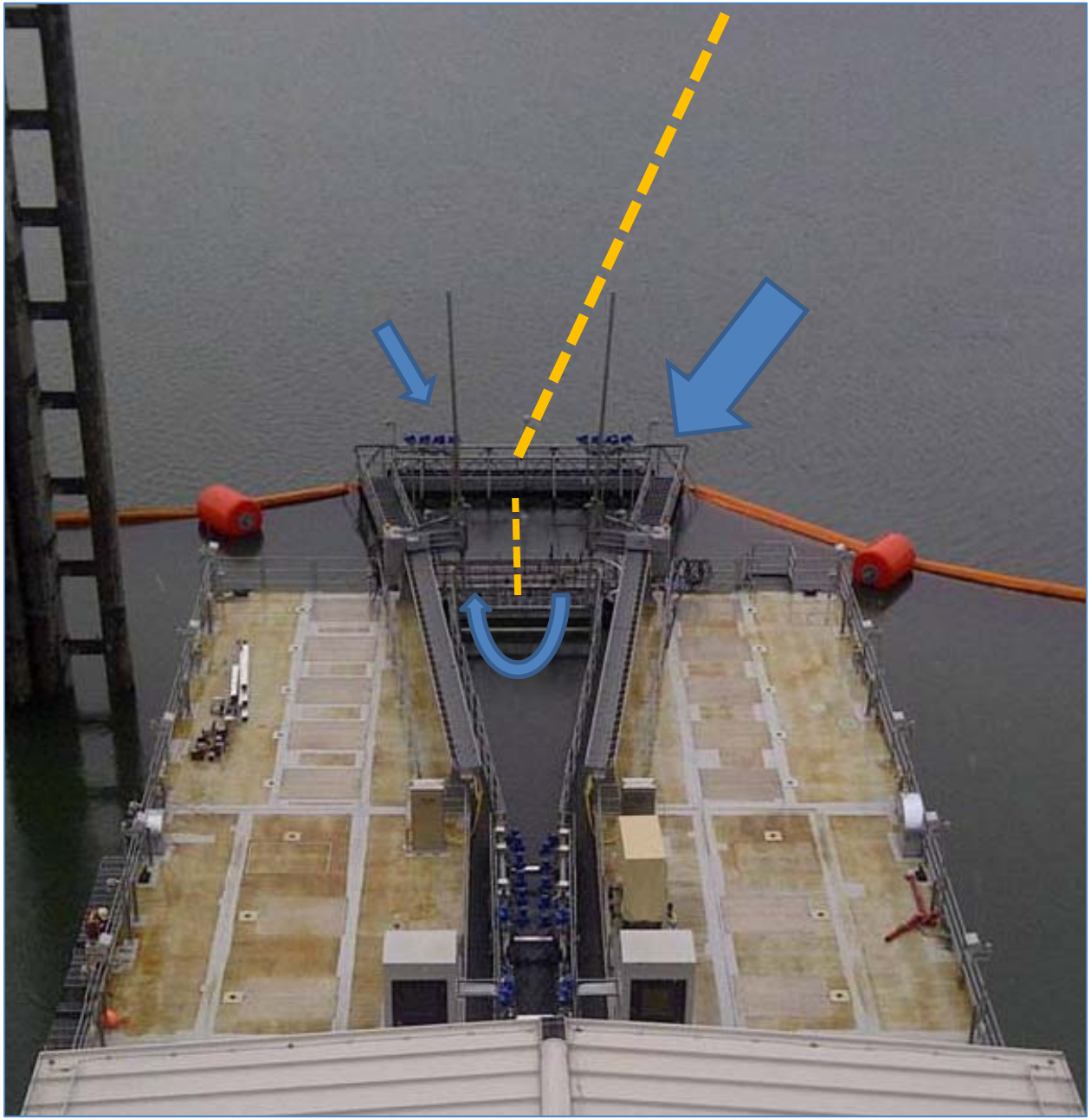


Lead Net Design Features

- Goal: to intercept and guide fish to the entrance of the FSC
  - Vertical length: 650 ft
  - Depth: 60 ft
  - Mesh size:
    - 0 – 30 ft: *3/32" gap*
    - 30 – 60 ft: *1/4" gap*
  - Net terminates inside full extent of NTS

Lead Net Design Features





Future Directions

- Study Year – 2016
  - Capture, Tagging & Release
    - Repeat capture, tagging and release at Eagle Cliffs
  - Acoustic Design modifications
    - May add additional receivers to array
    - Modifications to account for lead net
      - Re-orient array along axis of net
      - Alter receiver geometry or number to account for net


Questions??