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Passage and Survival of Chinook Salmon at Lookout Point Dam, Fall 2017 and Spring 2018

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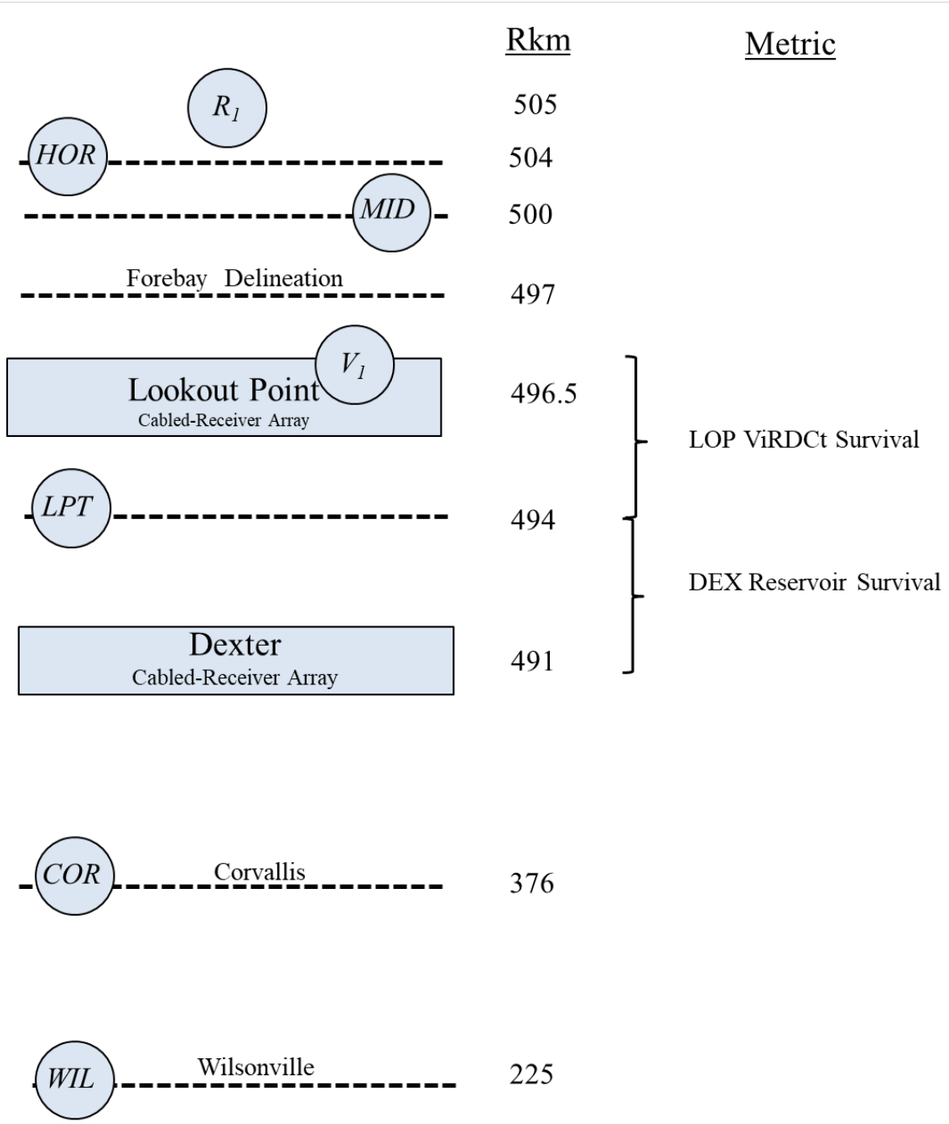
STUDY CODE: JPL-15-04-LOP

Background

- **Lookout Point Dam**
  - Storage Project
  - 3 Turbine Units
  - 5 Spill Bays
  - 4 Regulating Outlets
- **Dexter Dam**
  - Run-of-River Project
  - 1 Turbine Unit
  - 7 Spill Bays

Objectives

1. **Distribution, Behavior, and Movement**
   - Lookout Point Reservoir
   - Lookout Point Forebay
2. **Survival and Passage Metrics**
   - Lookout Point Dam
     - ✓ Virtual Release with Dead Fish Correction (ViRDCt)
3. **Survival and Travel Times**
   - Lookout Point Tailwaters



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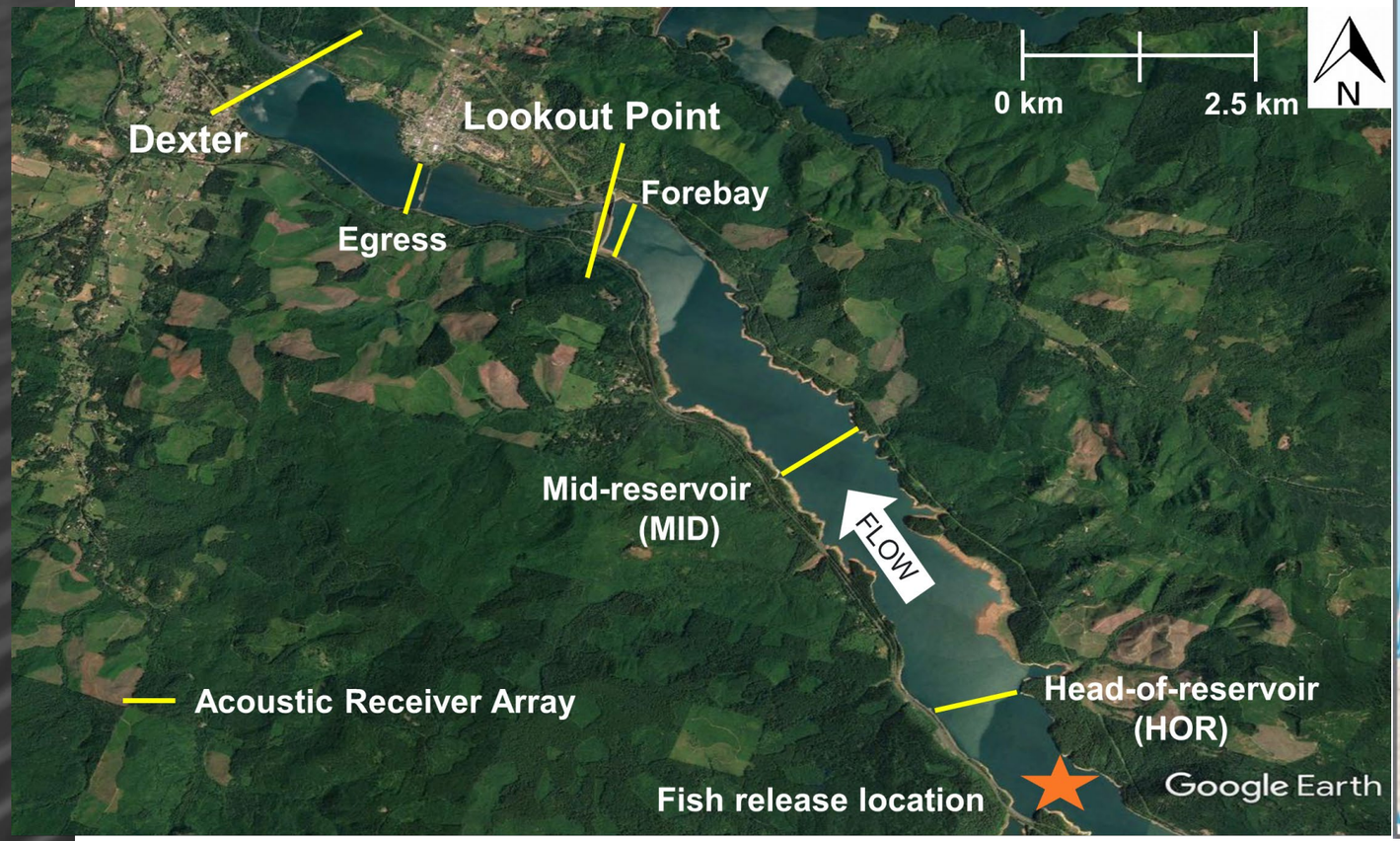
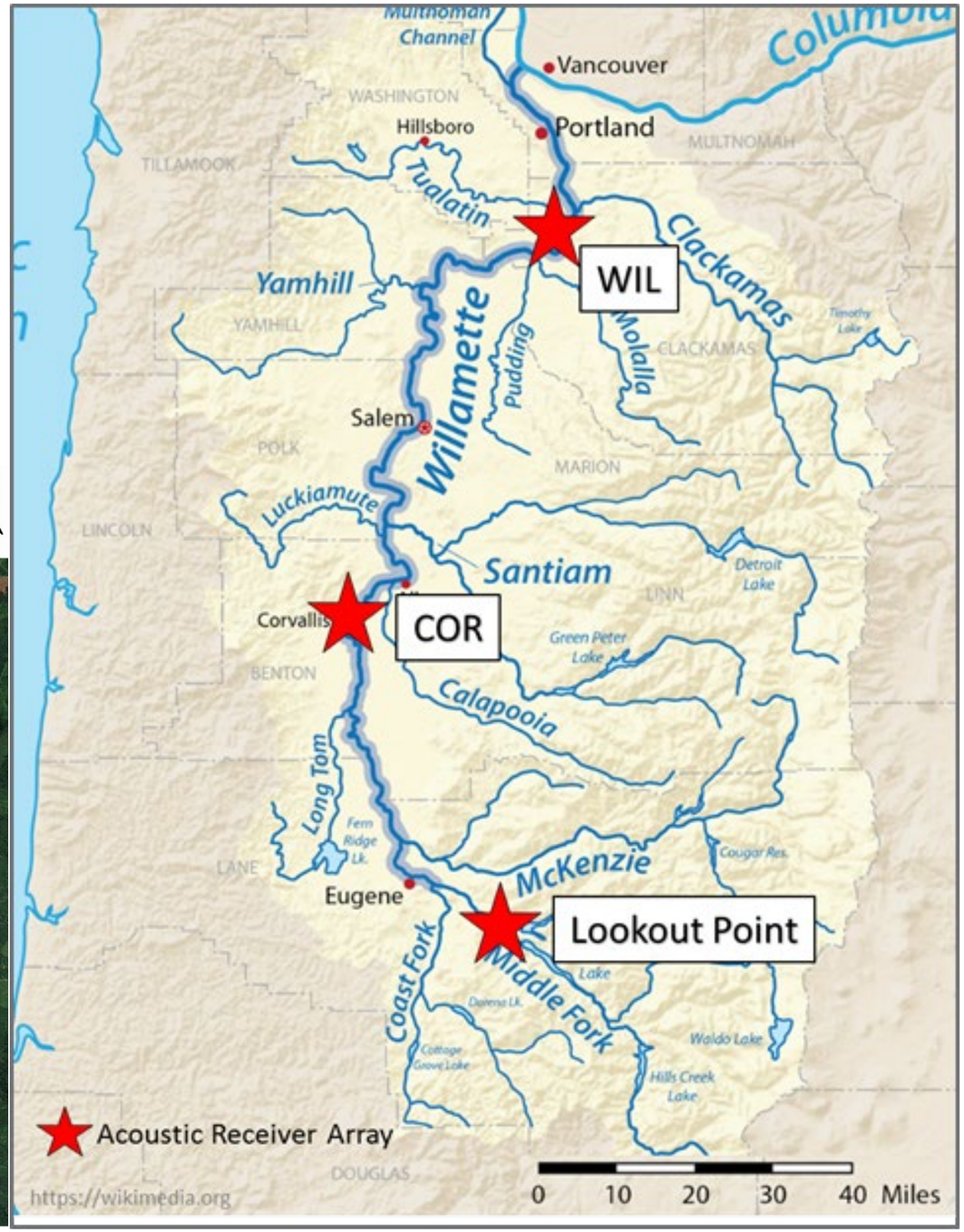
Study Area



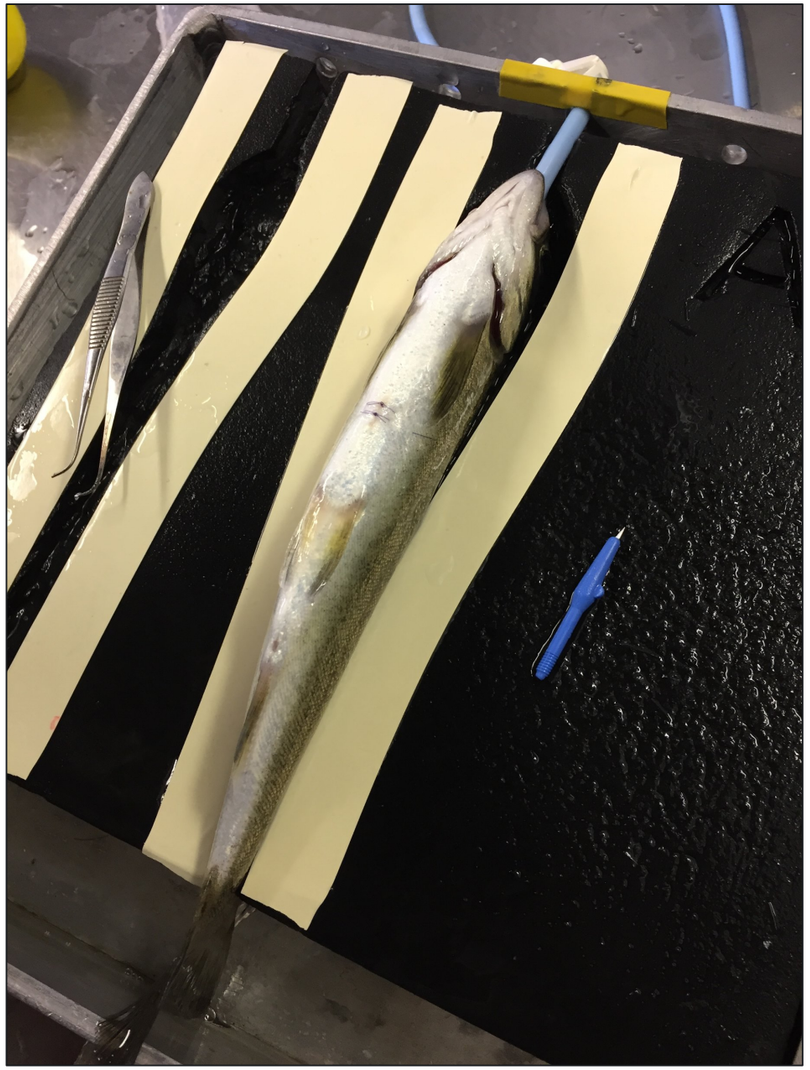


Tagging

- **OSU Wild Fish Surrogate Program**
- **Fish Tagging**

Season	Release Group	N	Size (mm)	Weight (g)
Fall 2017	October	742	158	44
	December	765	177	63
Spring 2018	February	750	183	69
	April	777	184	64

- **Tags**
  - Passive Integrated Transponder (PIT)
  - Juvenile Salmon Acoustic Telemetry System (JSATS)
    - ✓ 0.42 grams (in air)
    - ✓ ~71 day battery life



This research was conducted in compliance with a protocol approved by PNNL's Institutional Animal Care and Use Committee

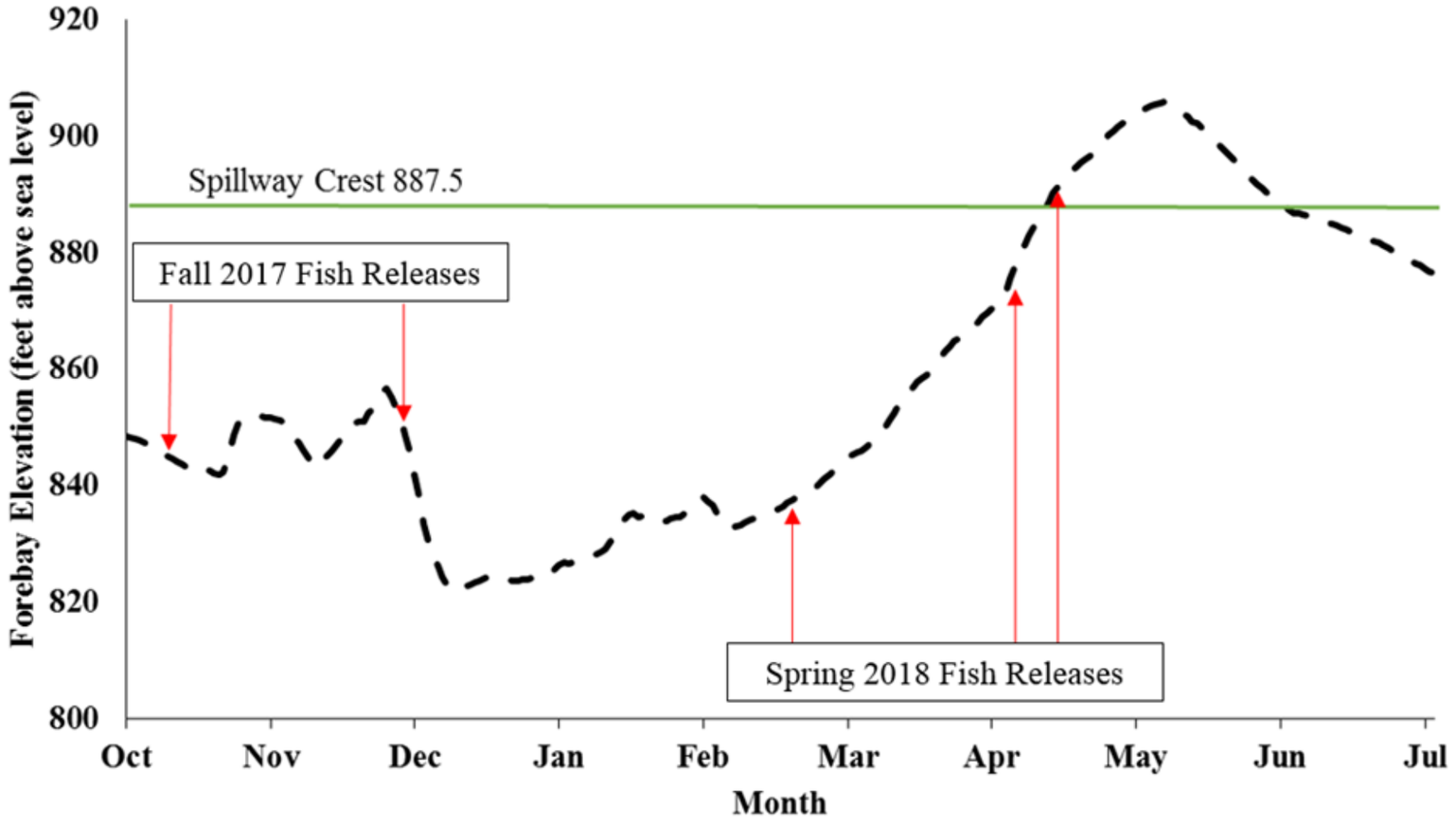
Fish Releases

Fall 2017

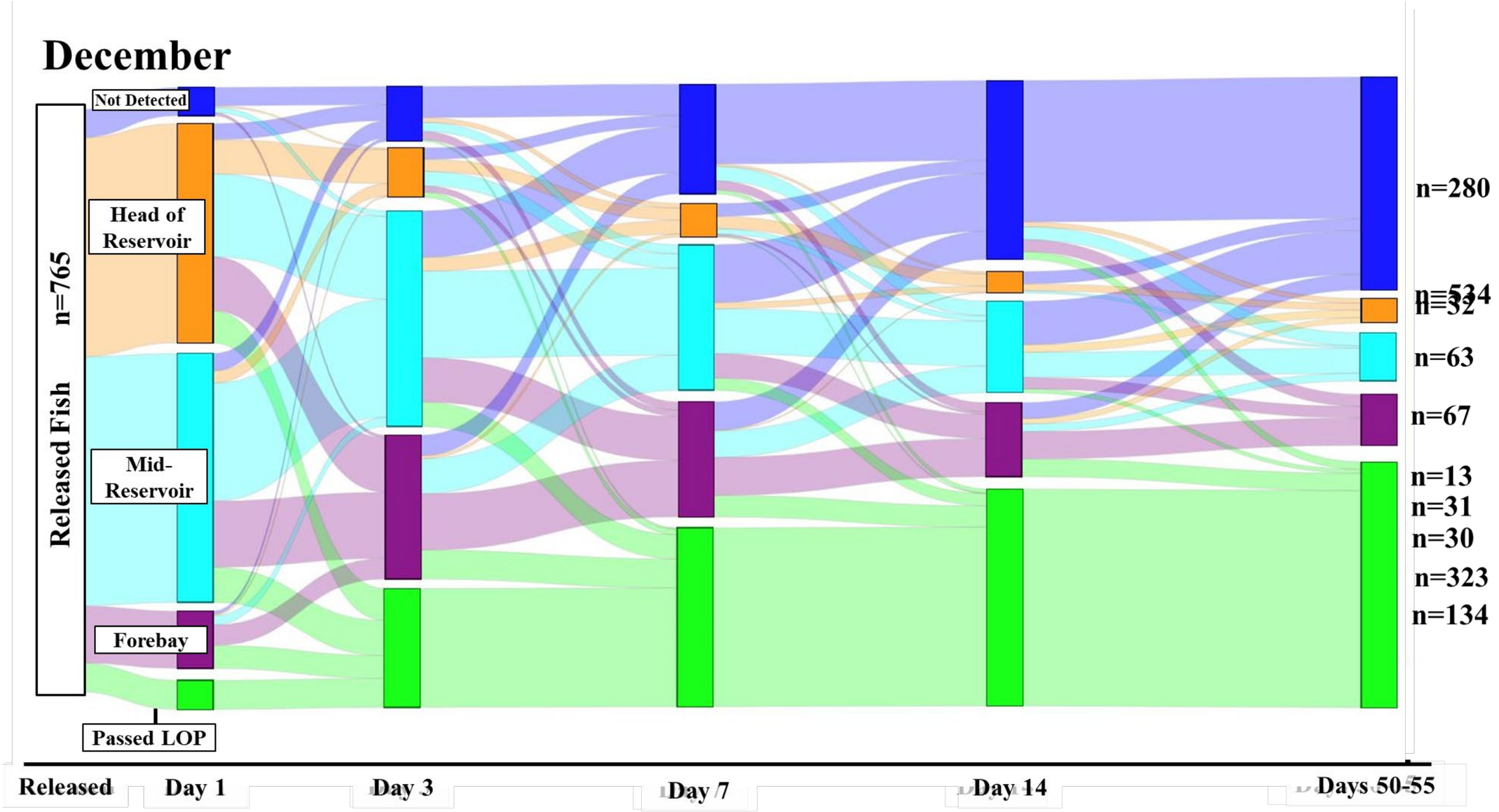
- Early October
- Early December

Spring 2018

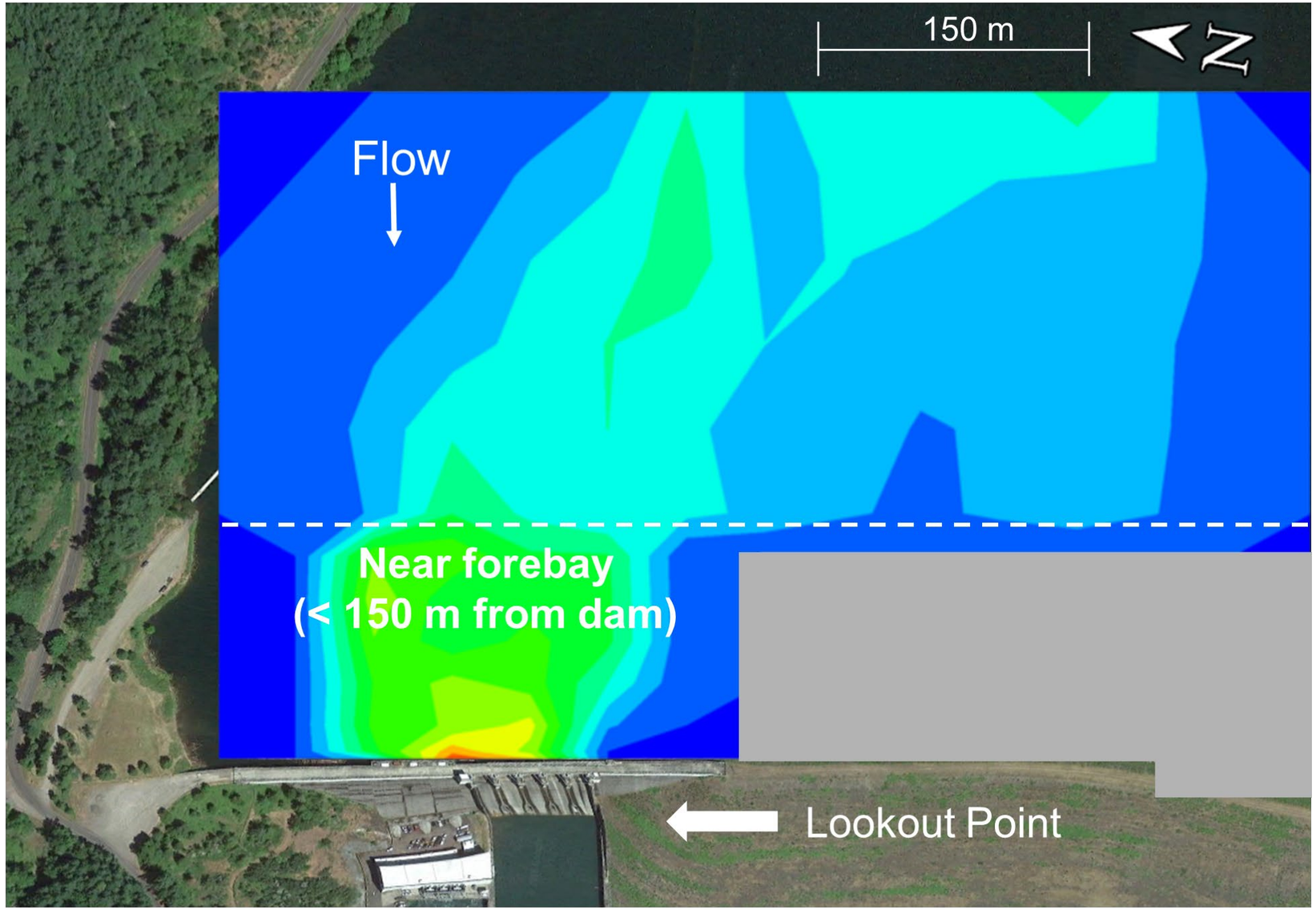
- Mid-February
- Early April
- Mid-April



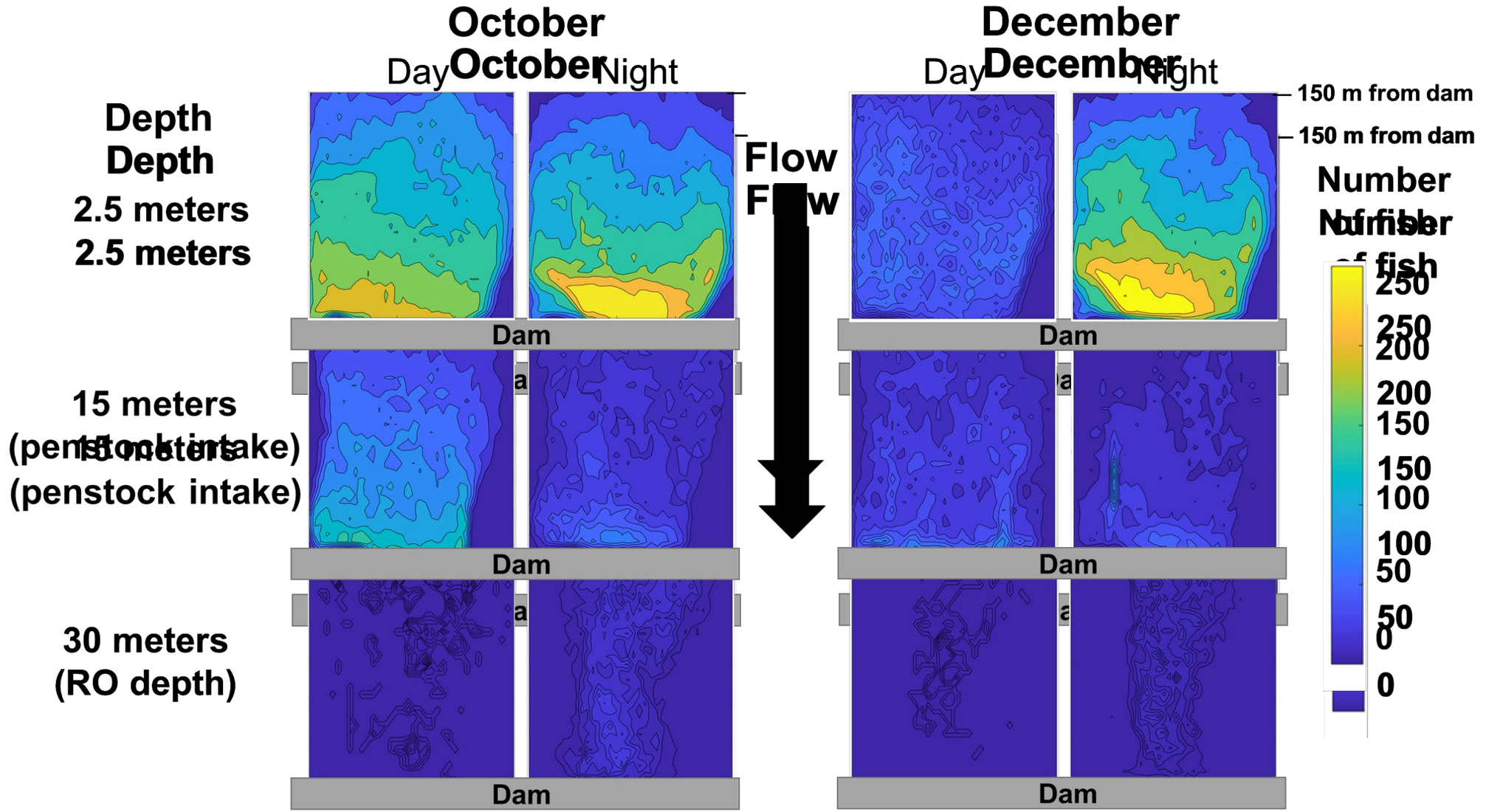
Fall Reservoir Movement



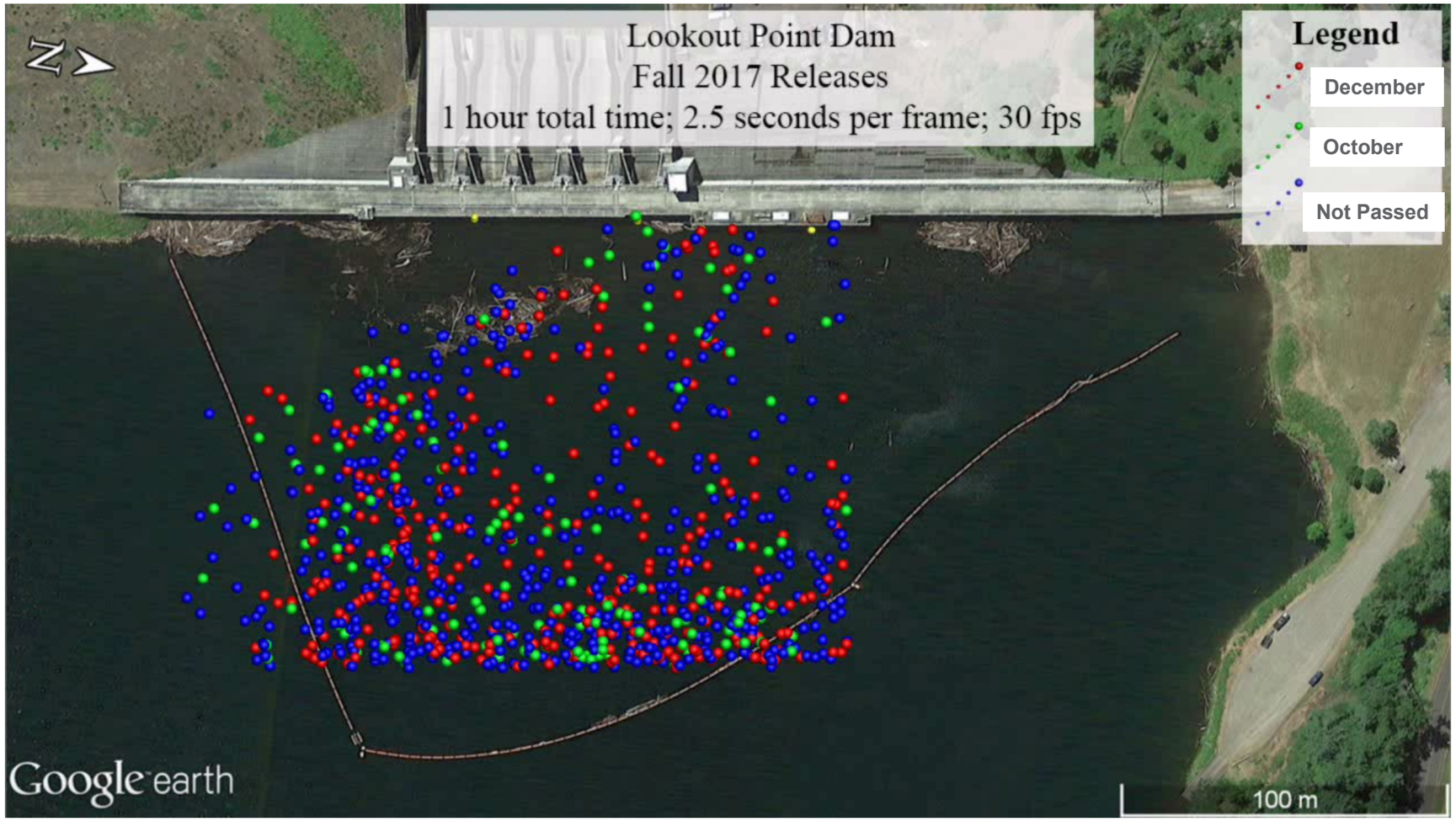
Fall Forebay First Approach



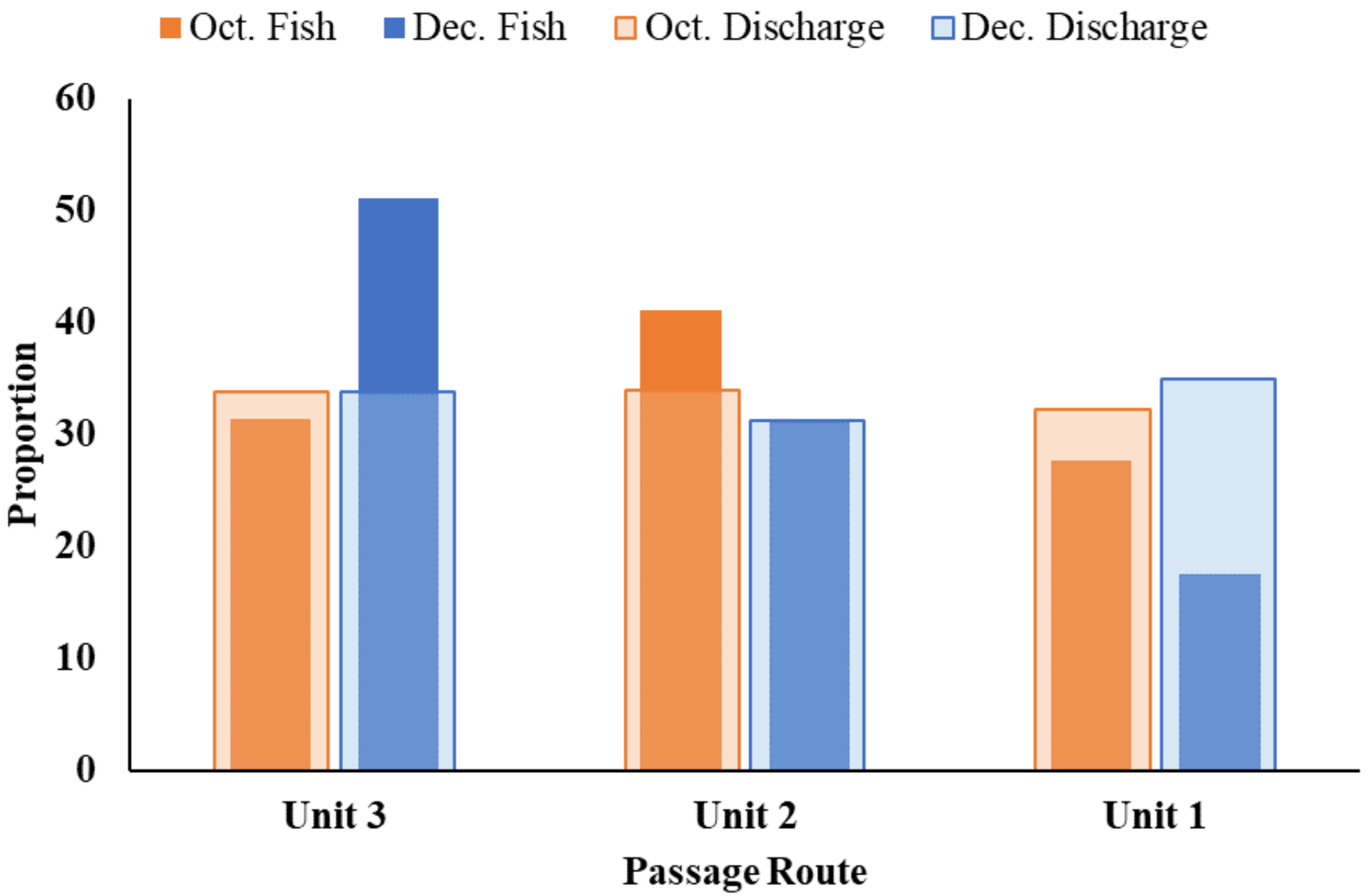
Fall Forebay Vertical Distribution



Fall Forebay Movement



Fall Passage



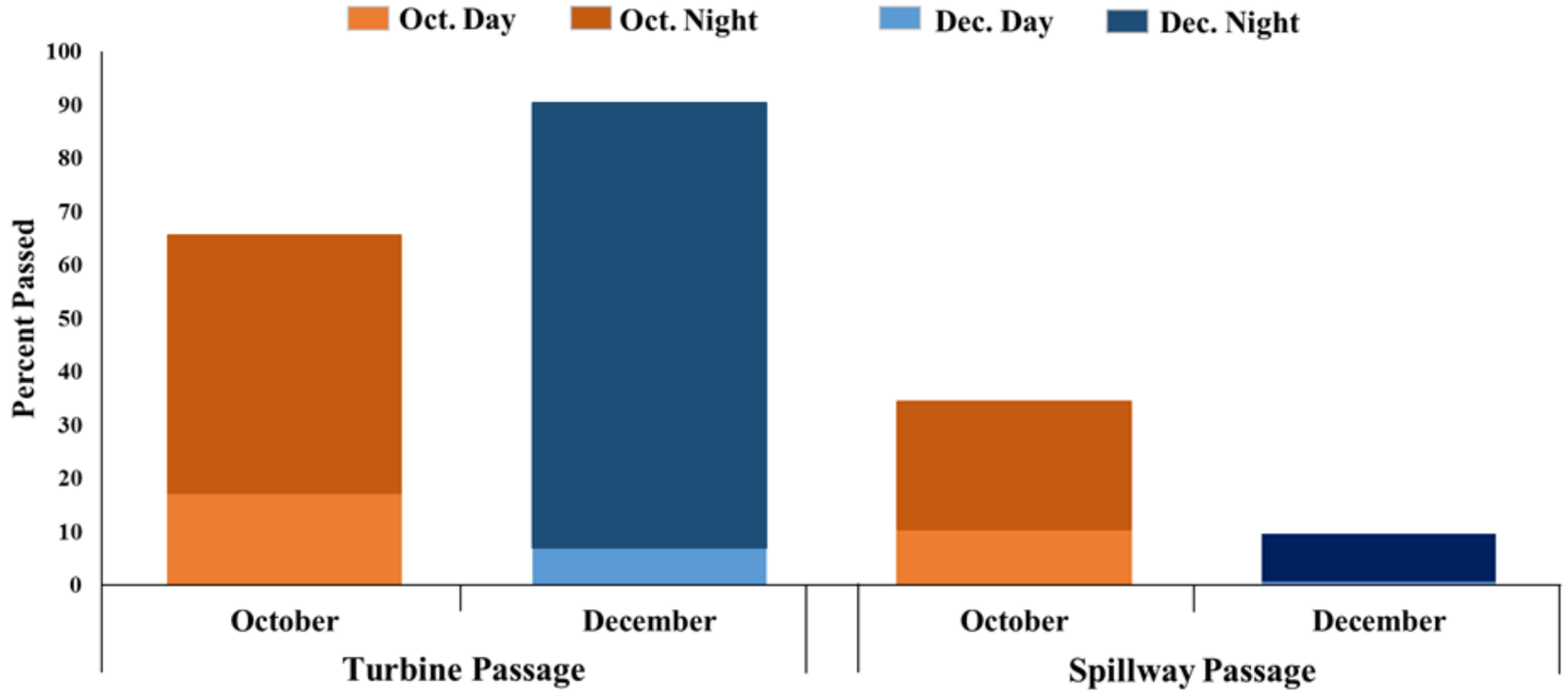
Fall Lookout Point Dam Survival

		Lookout Point to Egress	
V_1 group	N	$\hat{S}$ (SE)	p
Oct. turbines	134	0.779 (0.039)[a]	0.99
Dec. turbines	331	0.823 (0.024)[a]	1.00

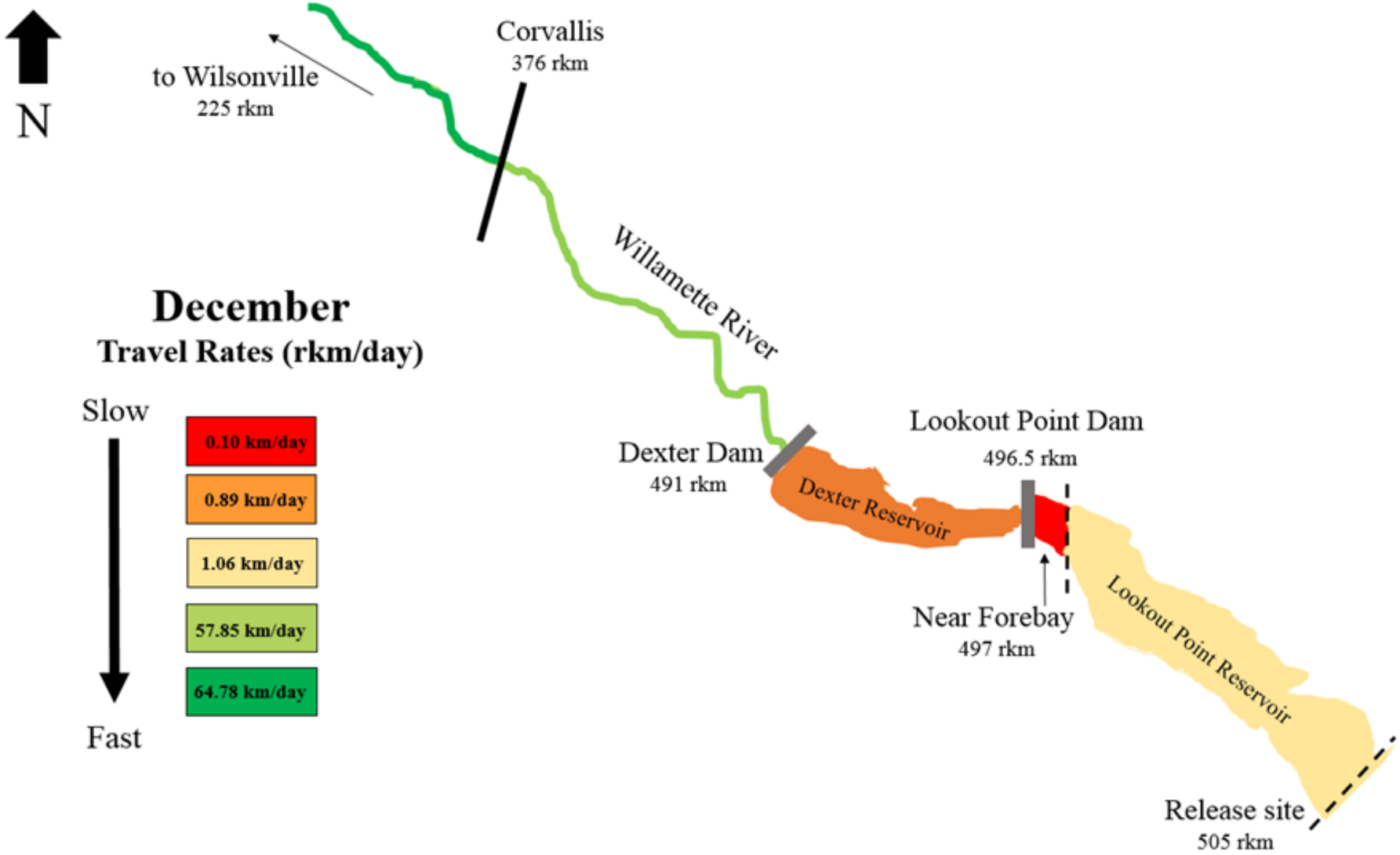
(a) ViRDCt model

Fall Dexter Passage and Survival

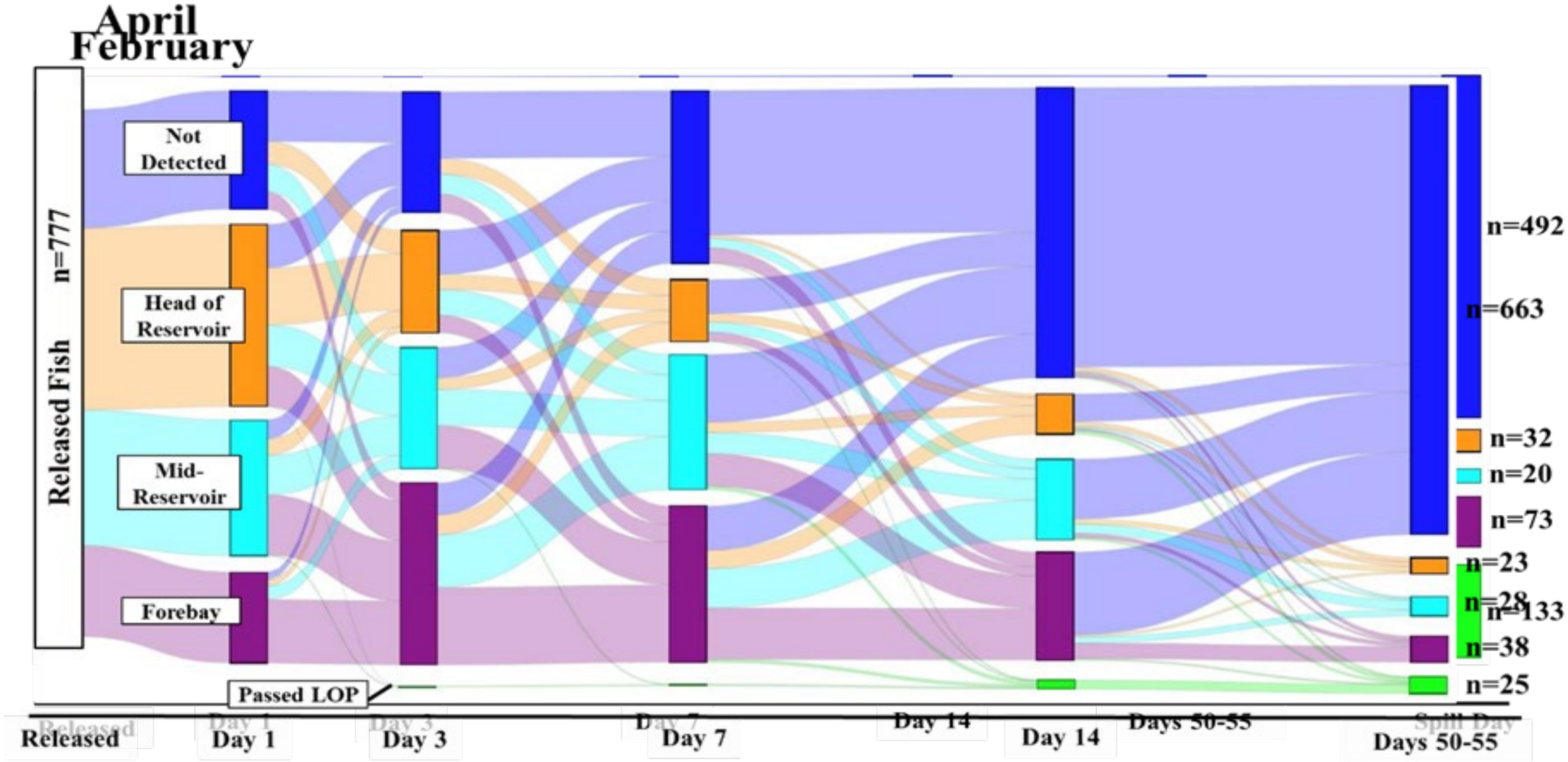
V_1 Group	N	Dexter Reservoir Survival $\widehat{S}$ (SE)
October turbines	134	0.930 (0.068)
December turbines	331	0.885 (0.043)



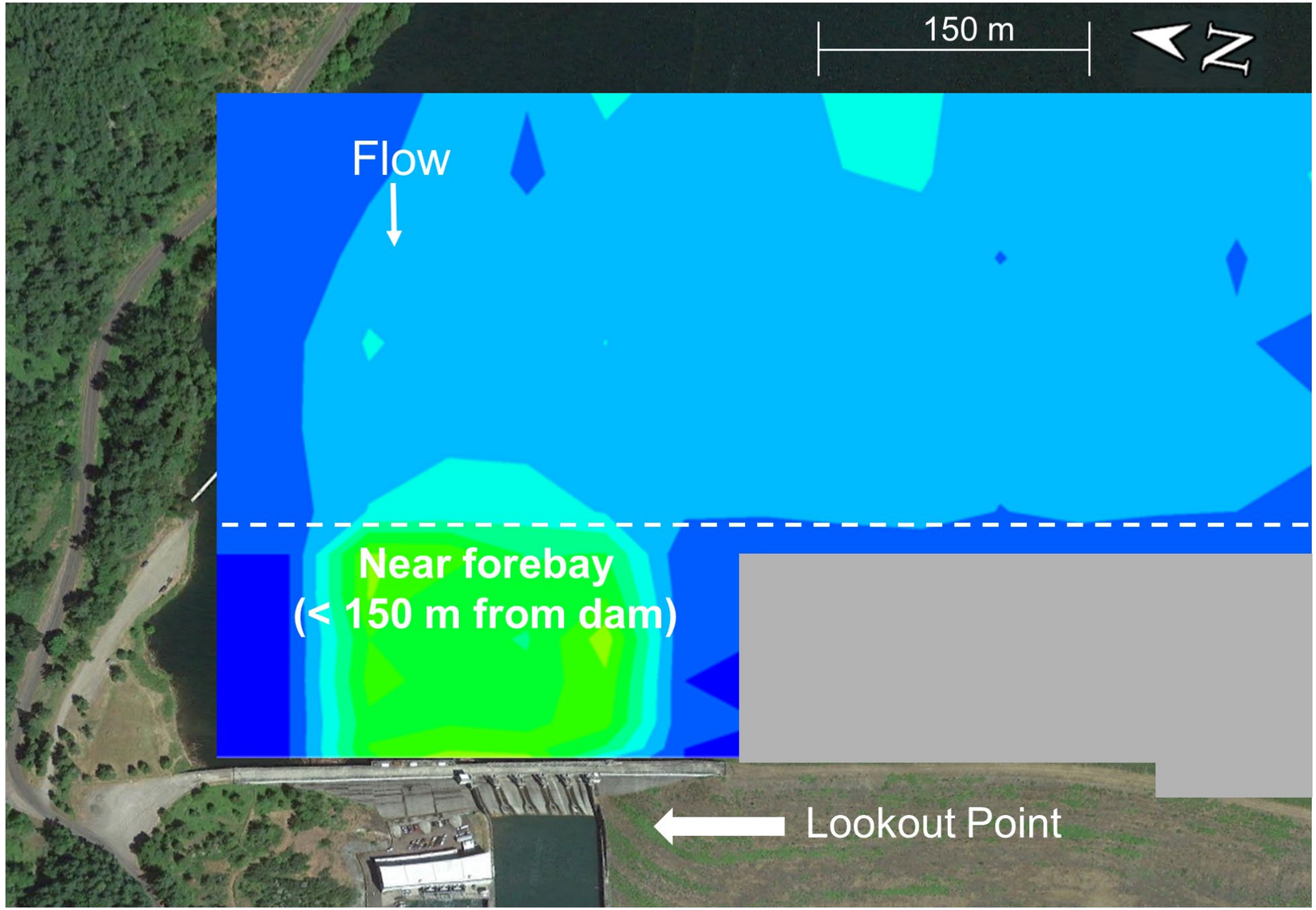
Fall Travel Times



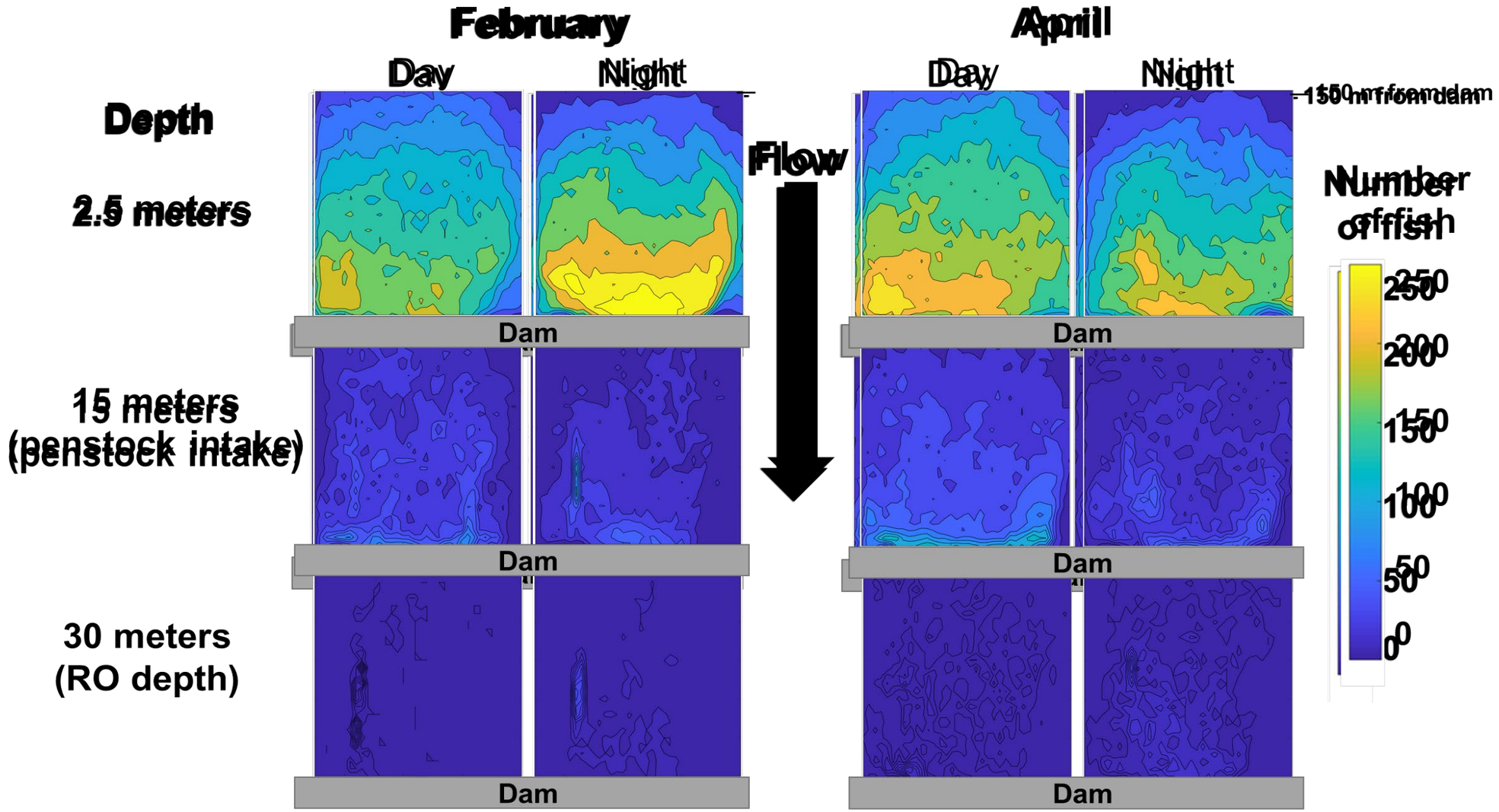
Spring Reservoir Movement



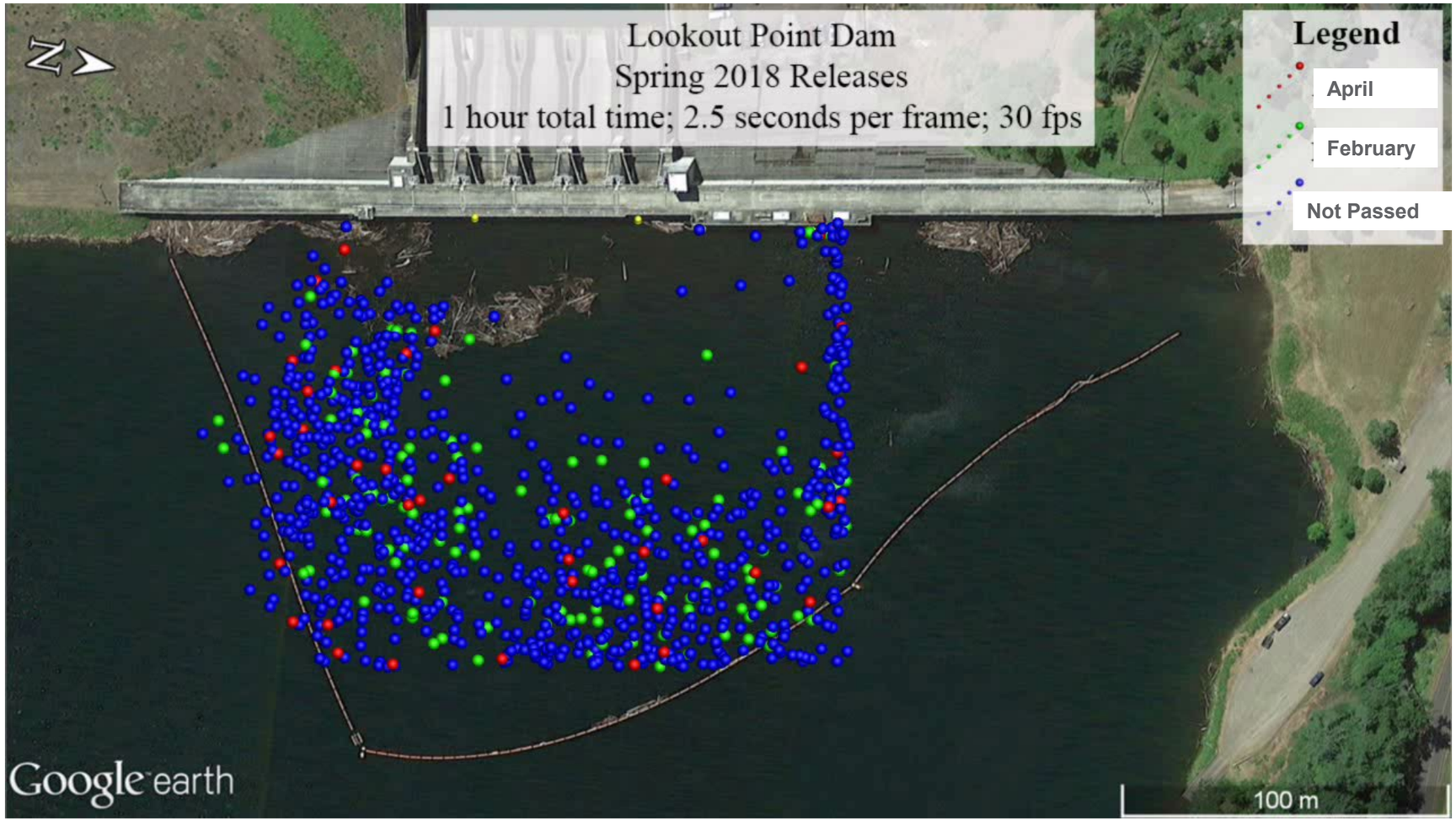
Spring Forebay First Approach



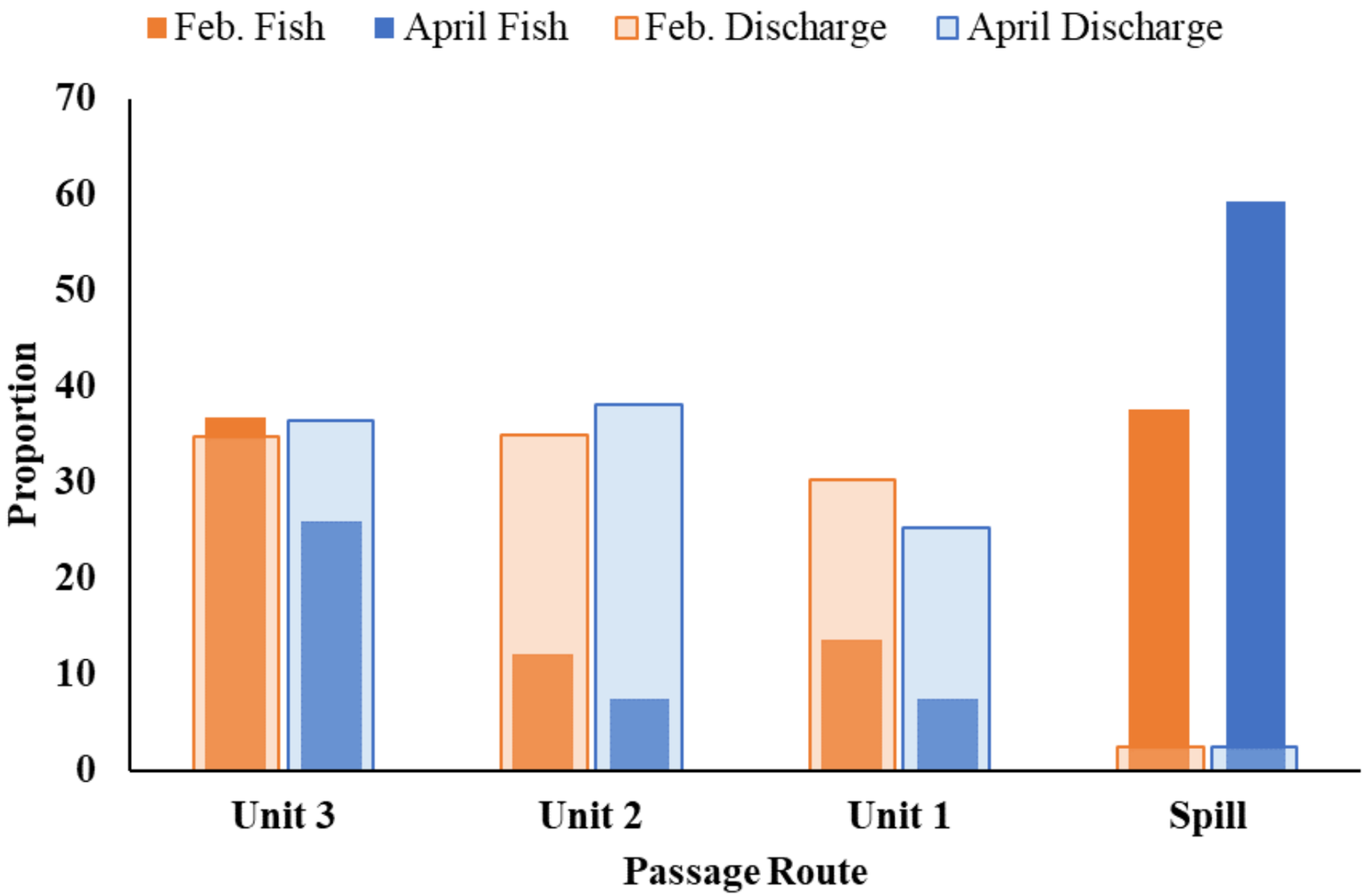
Spring Forebay Vertical Distribution



Spring Forebay Movement



Spring Passage

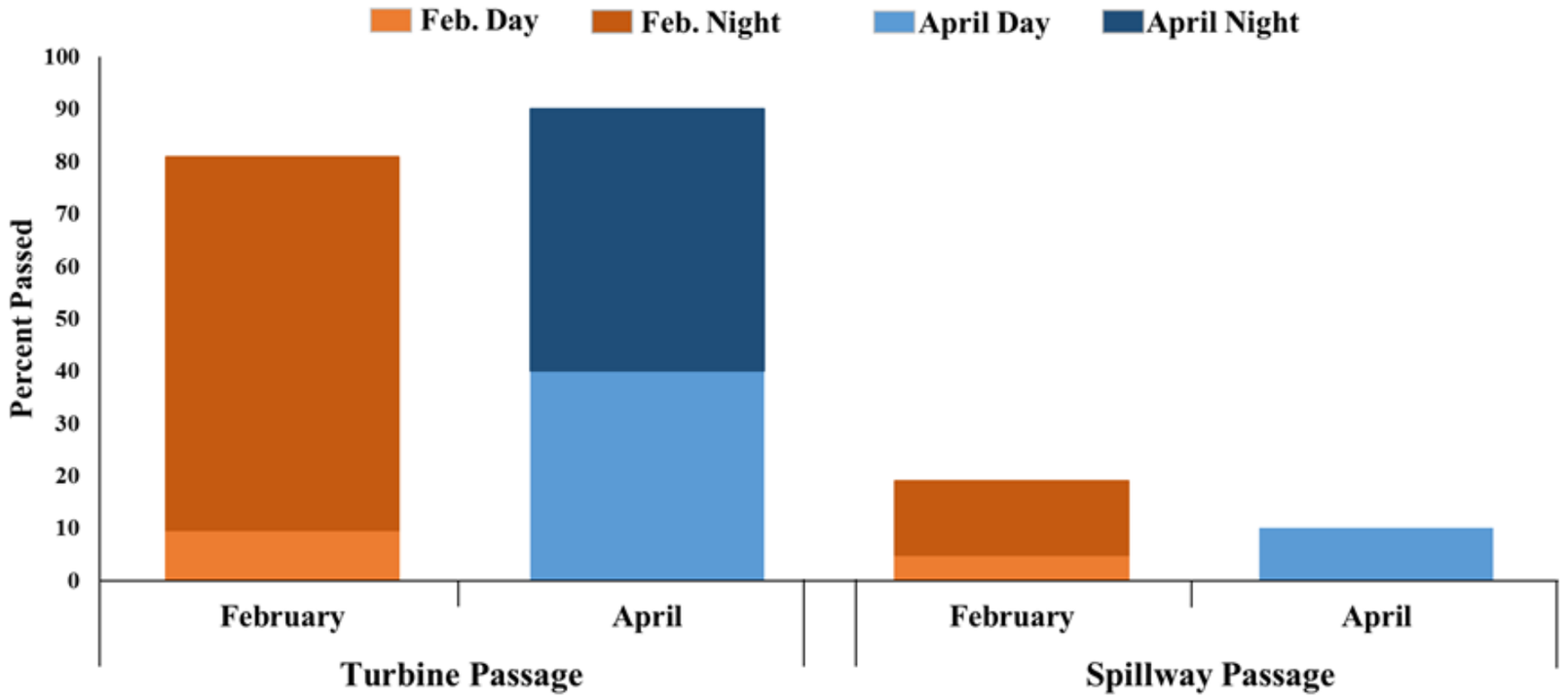


Spring Lookout Point Dam Survival

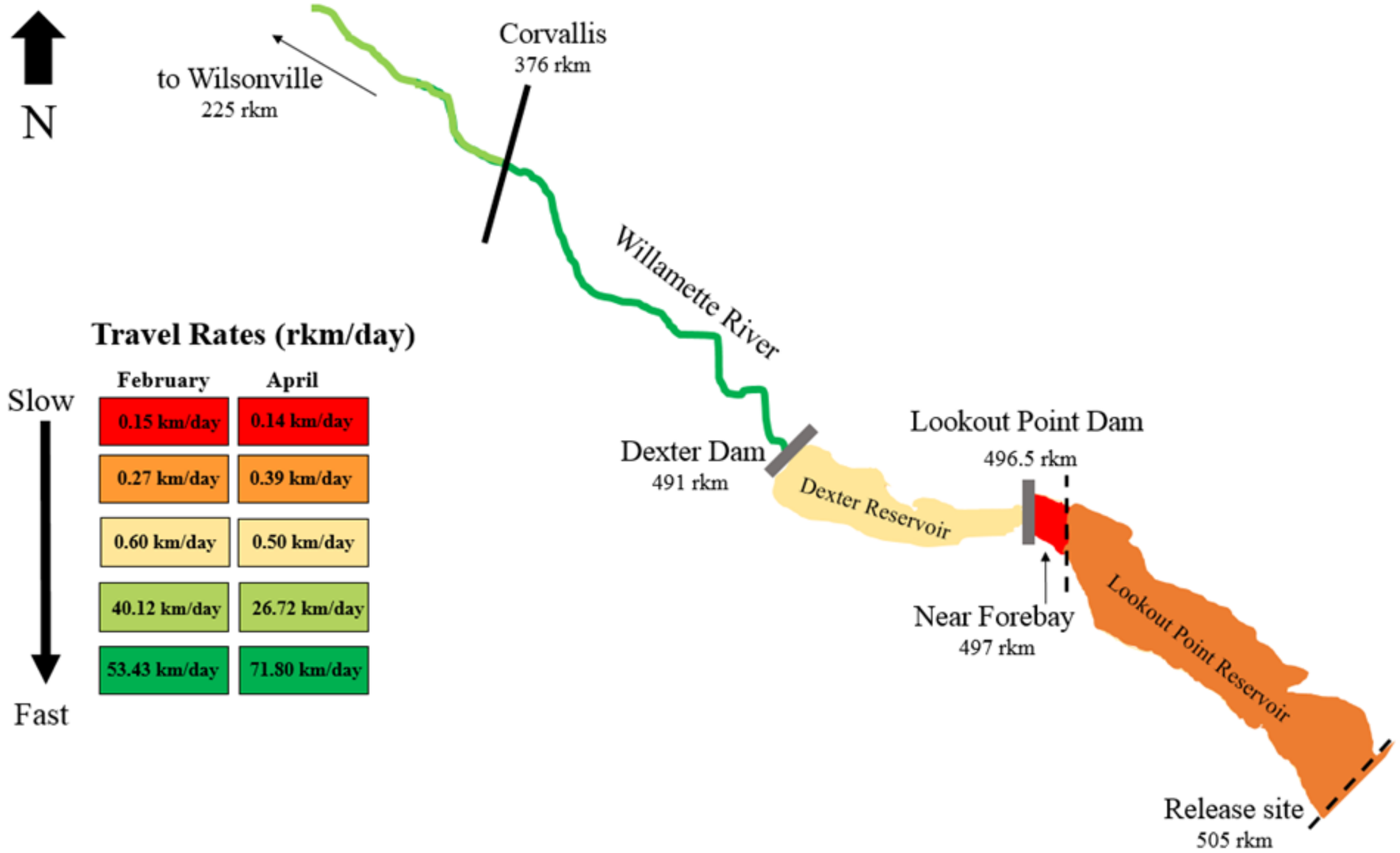
		Lookout Point to Egress	
V_1 Group	N	$\widehat{S}$ (SE)	p
February turbines	83	0.784 (0.047)[a]	1.00
April turbines	*	Insufficient Data to estimate Survival	
Combined Spillway	66	0.987 (0.055)[a]	1.00
(a) ViRDCt model			

Spring Dexter Passage and Survival

V_1 Group	N	Dexter Reservoir Survival $\widehat{S}$ (SE)
February turbines	83	0.891 (0.084)
April turbines	*	Insufficient Data to estimate Survival
Combined Spillway	66	0.896 (0.087)



Spring Travel Times



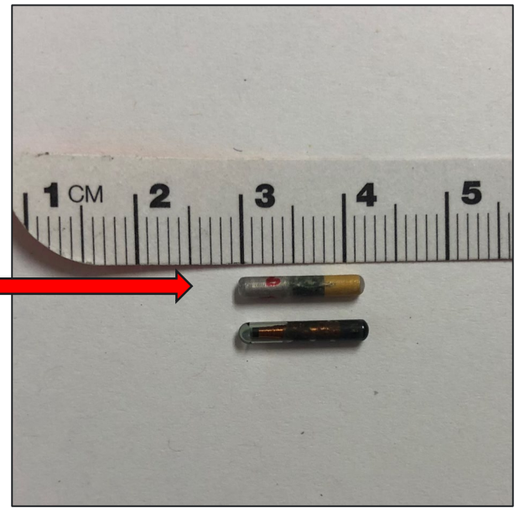
Summary

- Chinook salmon migration behavior was erratic through the Lookout Reservoir
- Study fish that approached Lookout Point were surface oriented
- Low to moderate proportions of study fish passed Lookout Point during all study seasons
- Turbine survival was moderate (78-82%)
- Spillway survival was high (98%)
- Dexter Reservoir mortality was notable (~10%)
- Travel Rates indicate delayed migration in the Lookout Point and Dexter Reservoirs

Management Implications

- **Investigate passage alternatives**
  - Prioritize spill if feasible
  - Potential surface collector

- **Recommended future research**
  - Evaluate fry-sized fish passage and survival
  - Eel-Lamprey Acoustic Tag (ELAT) – still in development for salmonids



Acknowledgements

- **USACE**
  - F Khan, Engineering, and Reservoir Control staff
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Thank you