

Juvenile Salmon Use of Knik Arm Estuaries

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Literature Review

- Function of estuaries for juvenile salmon
 - Migration pathway
 - Pink salmon use estuaries as a neutral pathway (Simenstad 1982)
 - Sockeye, coho, chum and Chinook all spend some amount of time feeding in estuaries (Healy 1982, Chamberlin 2011)
 - Pink and chum migrate in the spring as fry, sockeye, Chinook and coho throughout the spring and summer usually as fingerlings or age 1+

Literature Review

- Function of estuaries for juvenile salmon
 - Feeding and refuge
 - Chinook and chum spend the most time feeding in estuaries and share a similar diet (Dunford 1975)
 - Chinook exhibit steady increases in growth throughout the summer season and may feed in estuaries until late fall
 - All species use estuaries as refuge from larger predators that are found at sea
 - Osmoregulation

Literature Review

- Function of the Cook Inlet and Knik Arm
 - Northern Cook Inlet studies (Moulton 1997)
 - Sampled from the Susitna River mouth to the Foreland, on shores and in open water
 - Found all five species throughout the sampling area with higher abundances near the Susitna River mouth
 - Pink and chum were most abundant
 - Chinook and chum were found to have a strong inverse correlation with salinity
 - Stomach contents showed a diet of mostly copepods, fish larvae and other zooplankton

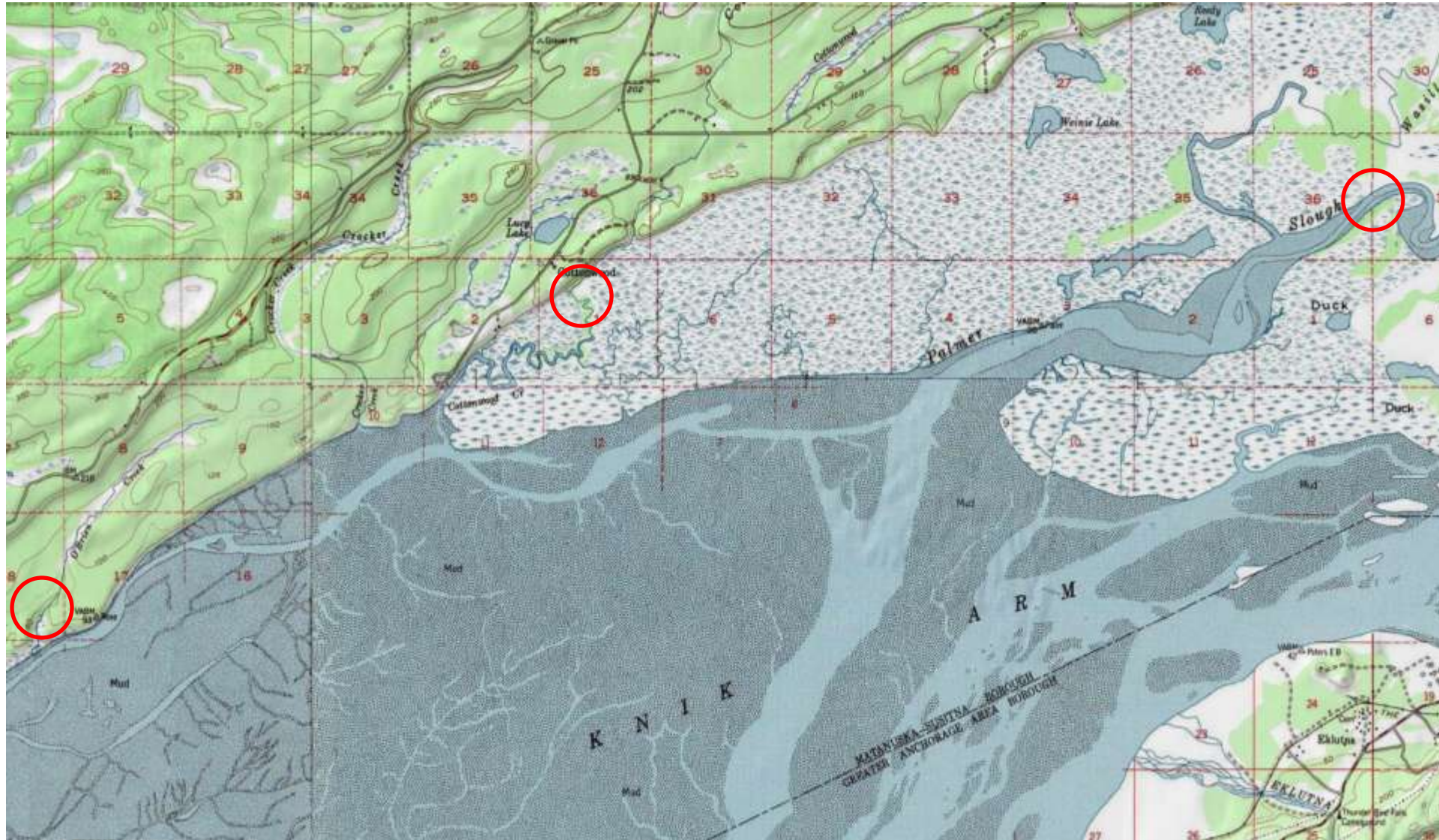
Literature Review

- Function of the Cook Inlet and Knik Arm
 - Knik Arm Studies (Houghton et al. 2005)
 - Beach seining and open water tow netting were conducted
 - Pink salmon move through the arm quickly with one short peak abundance in late May
 - Some Chinook and coho were found to reside in the arm until late fall
 - Multiple age classes of sockeye, coho and Chinook were present
- No Studies in eastern portion of Knik arm within transition zones between streams and the estuary

Project Objectives

- Conduct a literature review of previous juvenile salmon studies within estuaries to produce an annotated bibliography
- Locate access points to tidally influenced stream mouths
- Test and develop methods for sampling within different habitat types
- Measure relative abundances of juvenile salmon (if present) in different habitat types

Sites Sampled



Palmer Slough



Palmer Slough

Sampling Reach #1



Palmer Slough

Sampling Reach #1



Palmer Slough

Sampling Reach #1

July 10th

Haul #1:

3 stickleback

Haul #2:

4 stickleback

Haul #3:

12 stickleback

Turbidity:

115.6 NTU

Specific Conductivity:

411.5 $\mu\text{S}/\text{cm}$

Salinity:

0.2 ppt

Palmer Slough

Sampling Reach #2



Palmer Slough

Sampling Reach #2



Palmer Slough

Sampling Reach #2

July 10th

Haul #1:
35 stickleback

Haul #2:
3 stickleback*

Haul #3:
47 stickleback

Turbidity:
11.14 NTU

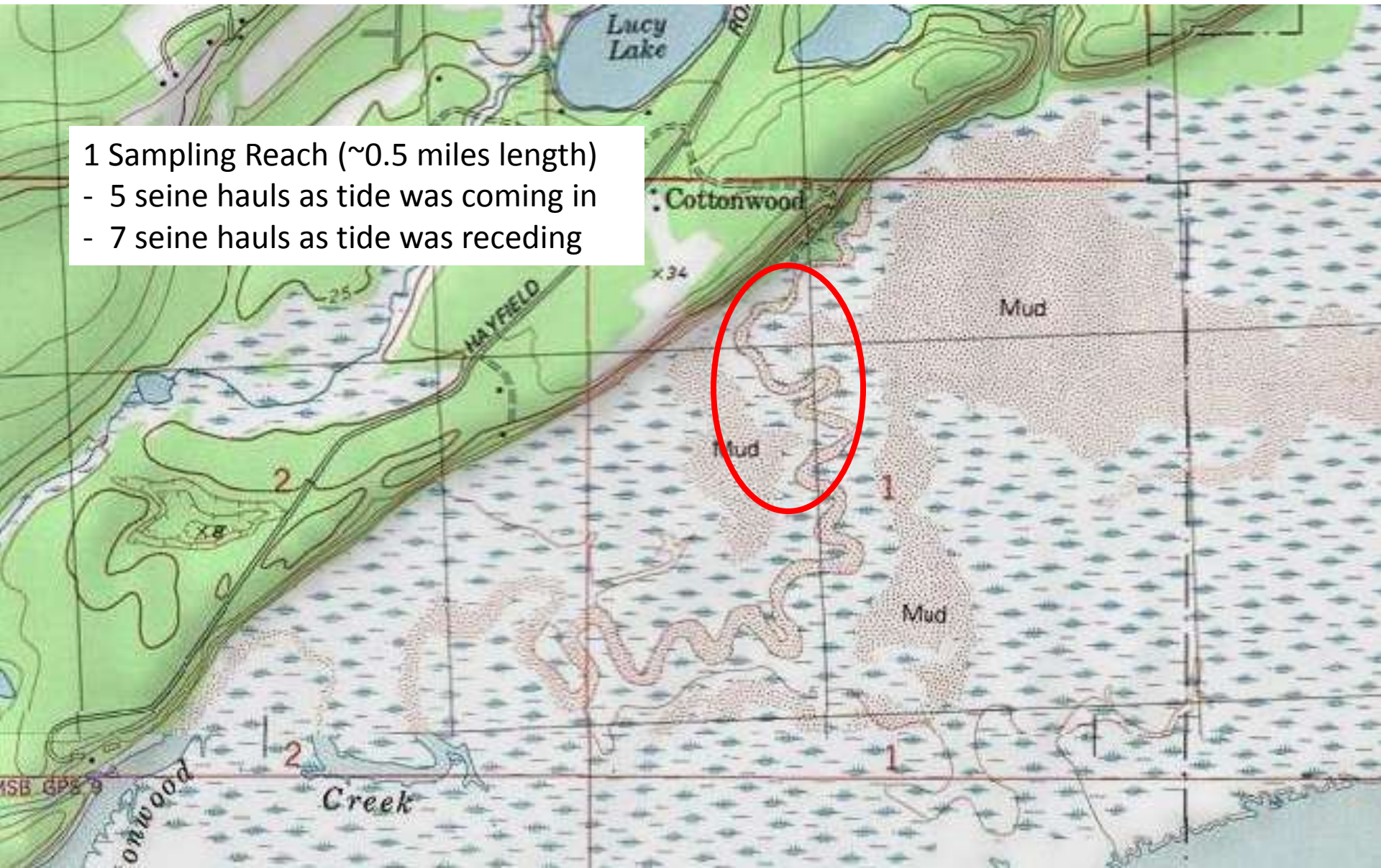
Specific Conductivity:
366.8 $\mu\text{S}/\text{cm}$

Salinity:
0.2 ppt

*Many stickleback smaller than mesh size (1/8") and fell through net

Cottonwood Creek

- 1 Sampling Reach (~0.5 miles length)
- 5 seine hauls as tide was coming in
 - 7 seine hauls as tide was receding



Cottonwood Creek

At low tide



Cottonwood Creek



Cottonwood Creek

July 23rd

Haul #1:

Coho salmon – 48mm

Haul #2:

Ninespine stickleback

Burbot – 100 mm (TL)

Sockeye salmon – 44 mm

Chum salmon – 43 mm

Haul #3:

Sculpin

Ninespine stickleback

Sockeye salmon – 56 mm



Haul #4:

Coho salmon – 53 mm

Haul #5:

Burbot – 78 mm (TL)

Ninespine stickleback

Turbidity:

110.83 NTU

Specific Conductivity:

243.6 $\mu\text{S}/\text{cm}$

Salinity:

0.1 ppt

Cottonwood Creek

At high tide



Cottonwood Creek

July 23rd

Haul #1:

Chum salmon – 44mm
Threespine stickleback

Haul #2:

2 Ninespine stickleback
Rainbow trout – 95mm

Haul #3:

No fish

Specific Conductivity:

1132 $\mu\text{S}/\text{cm}$

Salinity:

0.6 ppt



Haul #4:

12+ Marine crustaceans
(*Crangon* spp.)

Haul #5:

3 Ninespine stickleback
Threespine stickleback

Haul #6:

Ninespine stickleback

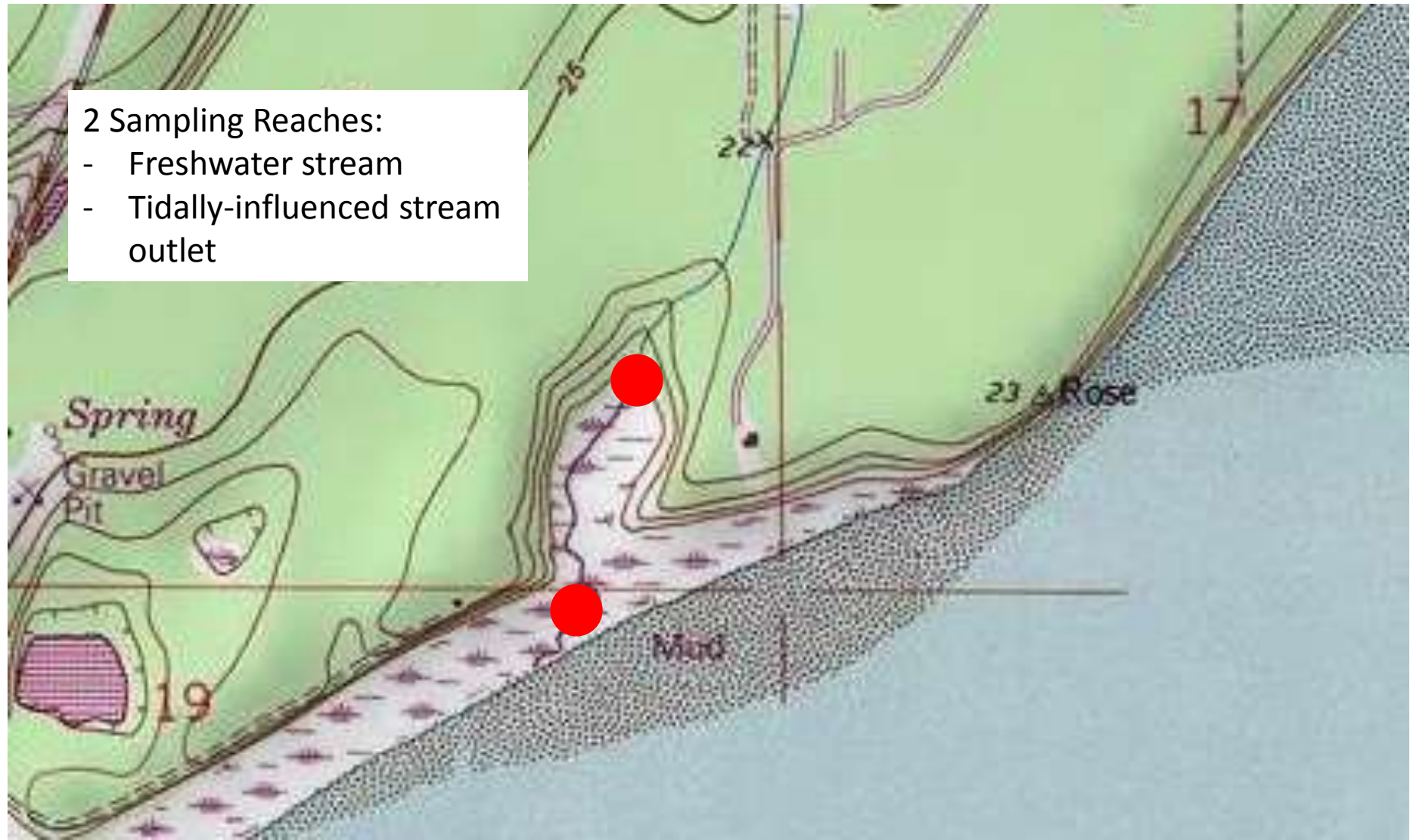
Haul #7:

Threespine stickleback

O'Brien Creek

2 Sampling Reaches:

- Freshwater stream
- Tidally-influenced stream outlet



O'Brien Creek

Narrow Transition zone:

- Mostly freshwater
- Sampled with baited minnow traps



O'Brien Creek



O'Brien Creek

July 24th

Trap 1:
Sculpin

Trap 2:
No Fish

Trap 3:
No Fish

Trap 4:
No Fish

Trap 5:
Threespine stickleback

Turbidity:
7.74 NTU

Specific Conductivity:
333 $\mu\text{S}/\text{cm}$

Salinity:
0.2 ppt

O'Brien Creek

Wide Outlet:

- Tidally Influenced
- Sampled with beach seine and baited minnow traps



O'Brien Creek



O'Brien Creek

July 24th

Trap #1:

No Fish

Haul #1:

Coho salmon – 50 mm

Turbidity:

131 NTU

Trap #2:

No Fish

Haul #2:

2 Threespine stickleback

1 Ninespine stickleback

Specific Conductivity:

4600 $\mu\text{S}/\text{cm}$

Trap #3:

Coho salmon – 85mm

Haul #3:

No fish

Salinity:

2.5 ppt

Trap #4:

Coho salmon – 79mm

Coho salmon – 102mm

Haul #4:

6 Threespine stickleback

Trap #5:

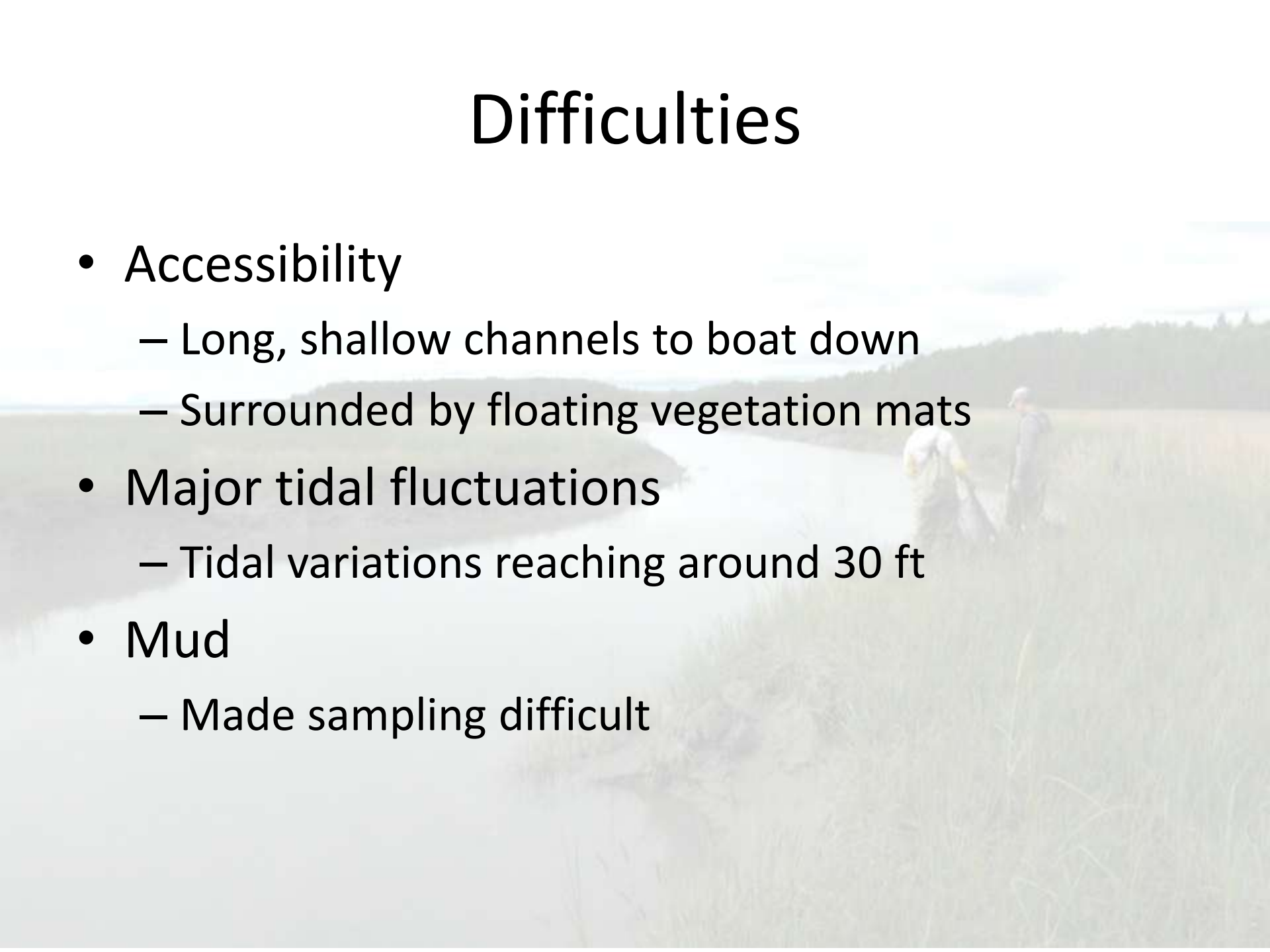
No Fish

Haul #5:

2 Threespine stickleback

Difficulties

- Accessibility
 - Long, shallow channels to boat down
 - Surrounded by floating vegetation mats
- Major tidal fluctuations
 - Tidal variations reaching around 30 ft
- Mud
 - Made sampling difficult



Accessibility



Mud



Plans for next year

- Focus sampling efforts on habitat at edge of freshwater and estuarine
 - Sites may have been too extreme for rearing (large tidal fluctuations, high turbidity)
 - Juvenile salmon may move between freshwater and estuarine habitats with tides to take advantage of inflowing food sources
- Sample during spring outmigration

Acknowledgements



GREAT LAND TRUST

Working with willing landowners and other partners to conserve Southcentral Alaska's lands and waterways

Mat-Su
salmon
PARTNERSHIP



Acknowledgements

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Works Cited

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