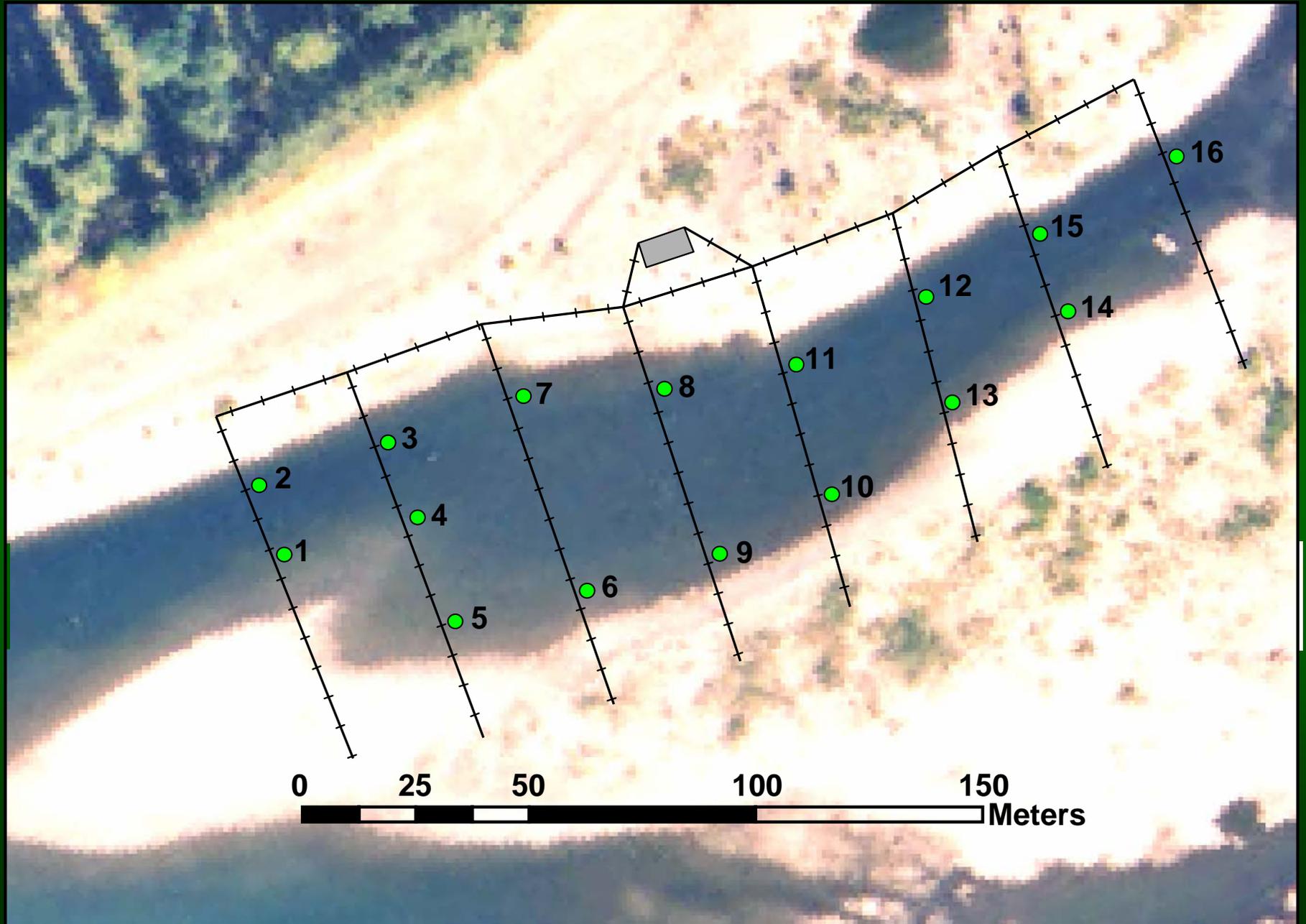


Measuring Behavioral Responses of Spawning Chum Salmon to Elevated River Flows



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Hydrophone Setup at Ives Island - 2005

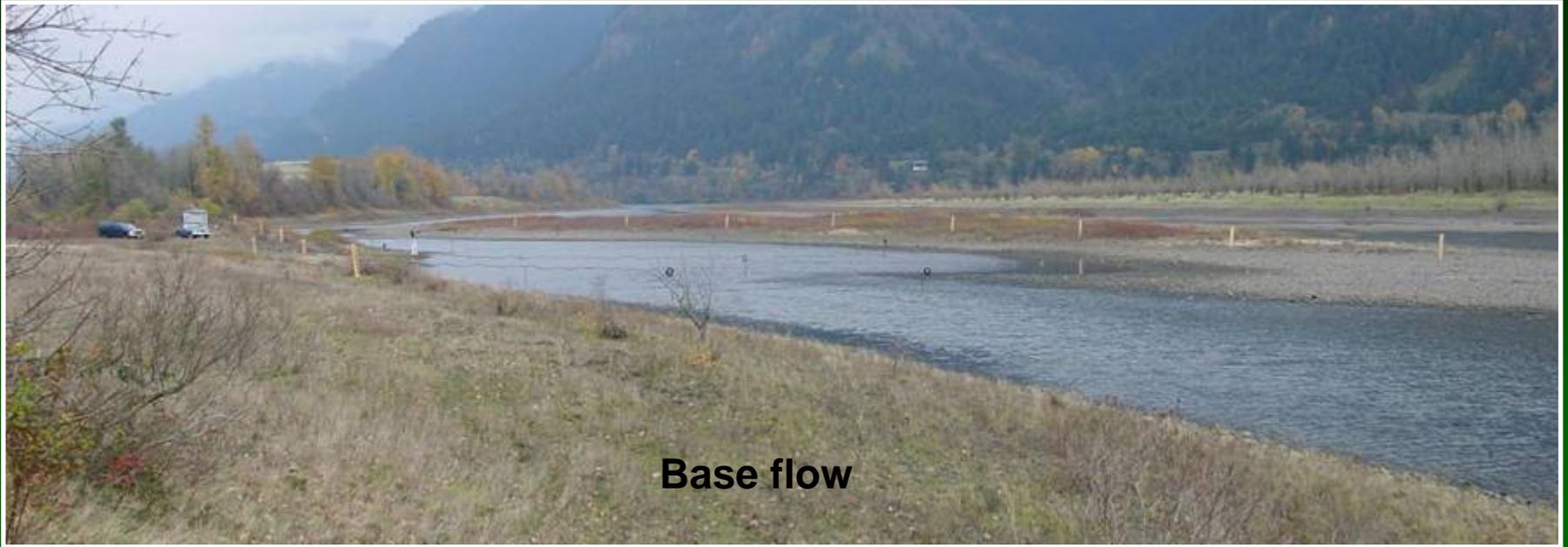


Acoustic Array



Fish Collection and Tagging





Base flow



High flow

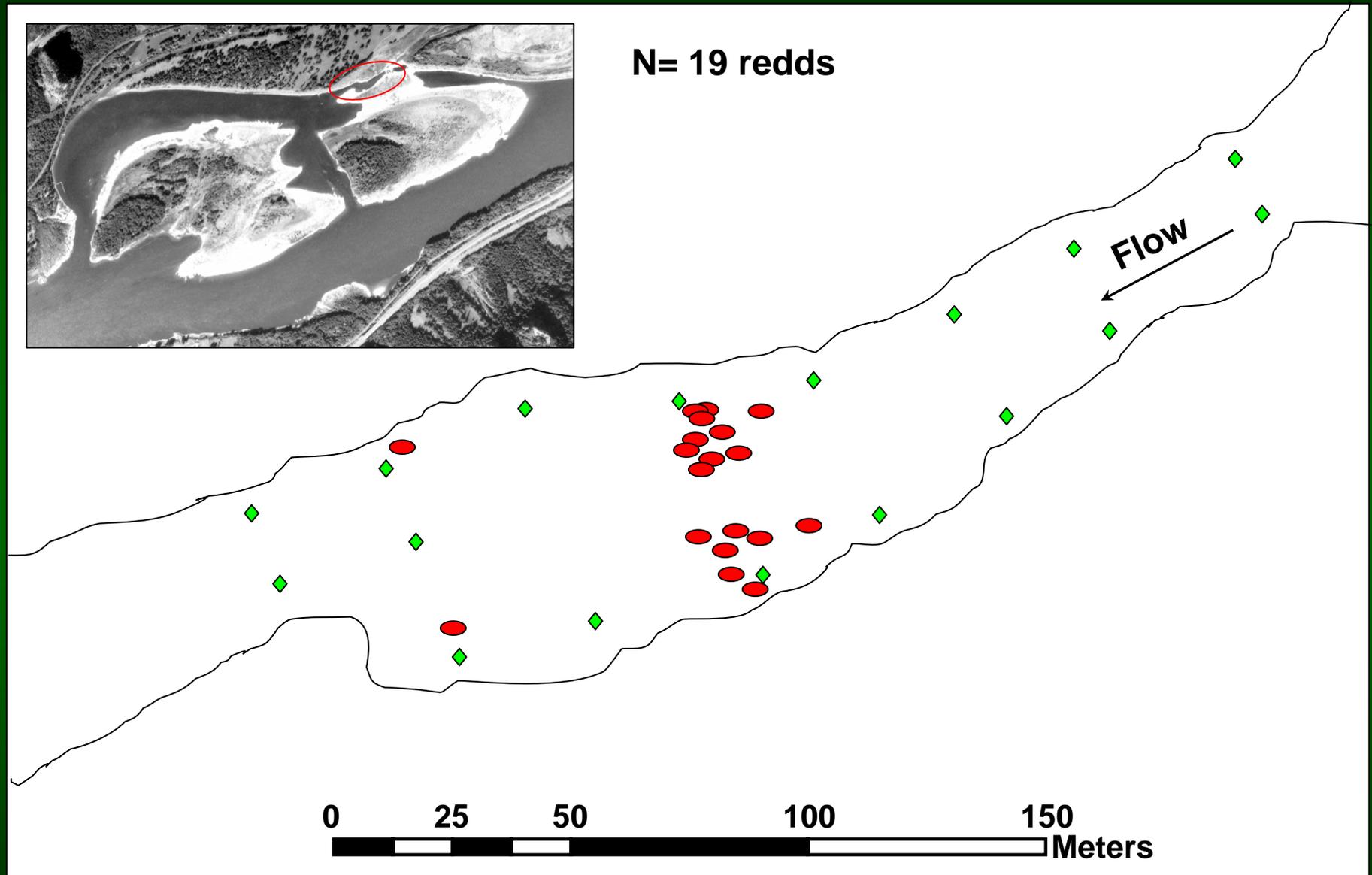
Summary of Test Flows in 2005

Test	Date	Type	Requested elevation	Maximum elevation
1	11/16	Day	13.5	13.5
2	11/17	Night	15.5	14.7
3	11/19	Day	13.5	13.1
4	11/21	Night	13.5	13.5
5	11/22	Cancelled		
6	11/26	Day	15.5	15.5
7	11/30	Night	15.5	15.5
8	12/2	Night	15.5	15.5
9	12/6	Night	15.5	15.5
10	12/8	Night	13.5	13.5

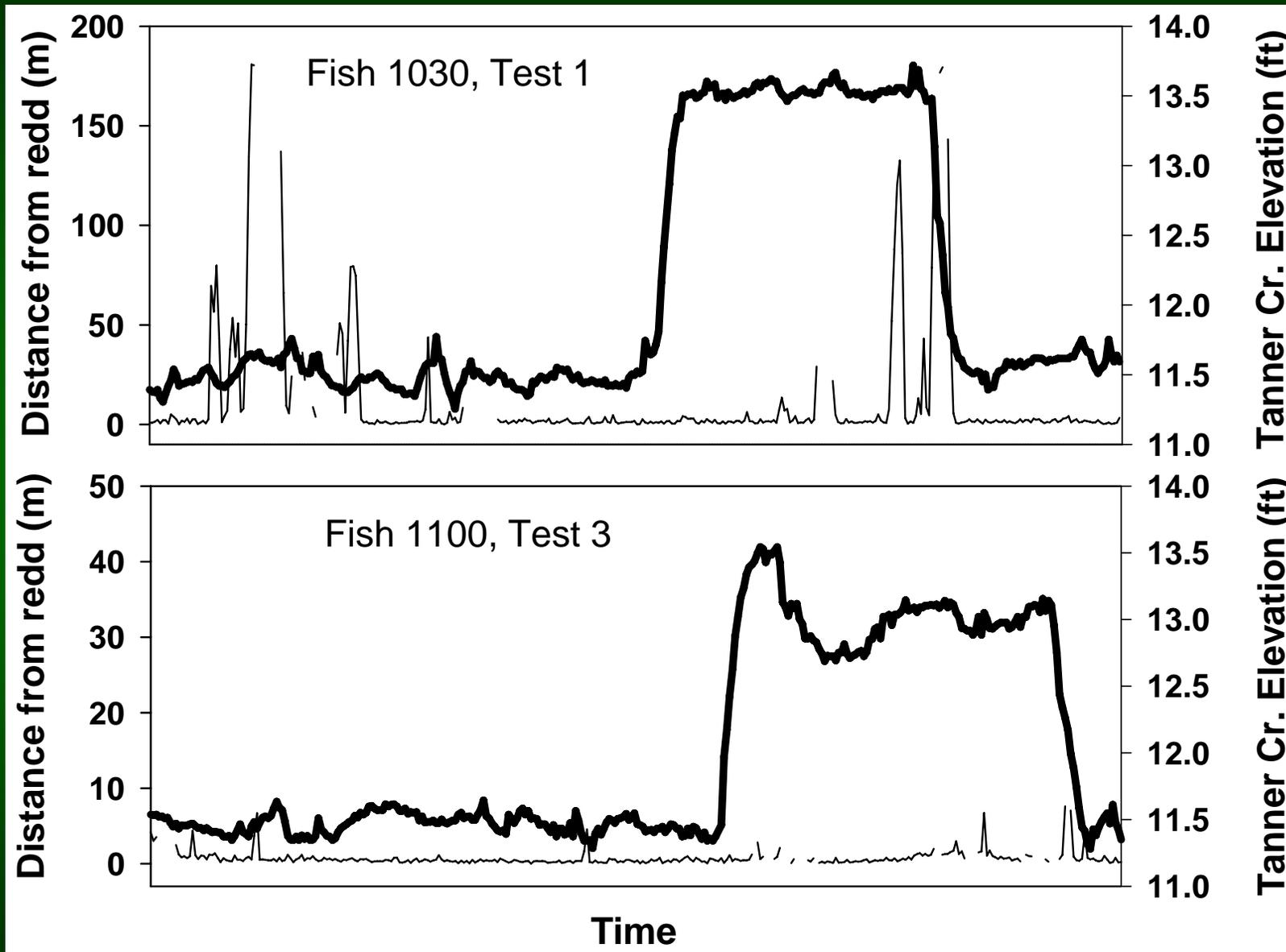
Tests were 8 h

1-h ramp rate from 11.5' to 13.5', 2-h ramp rate from 11.5' to 15.5'

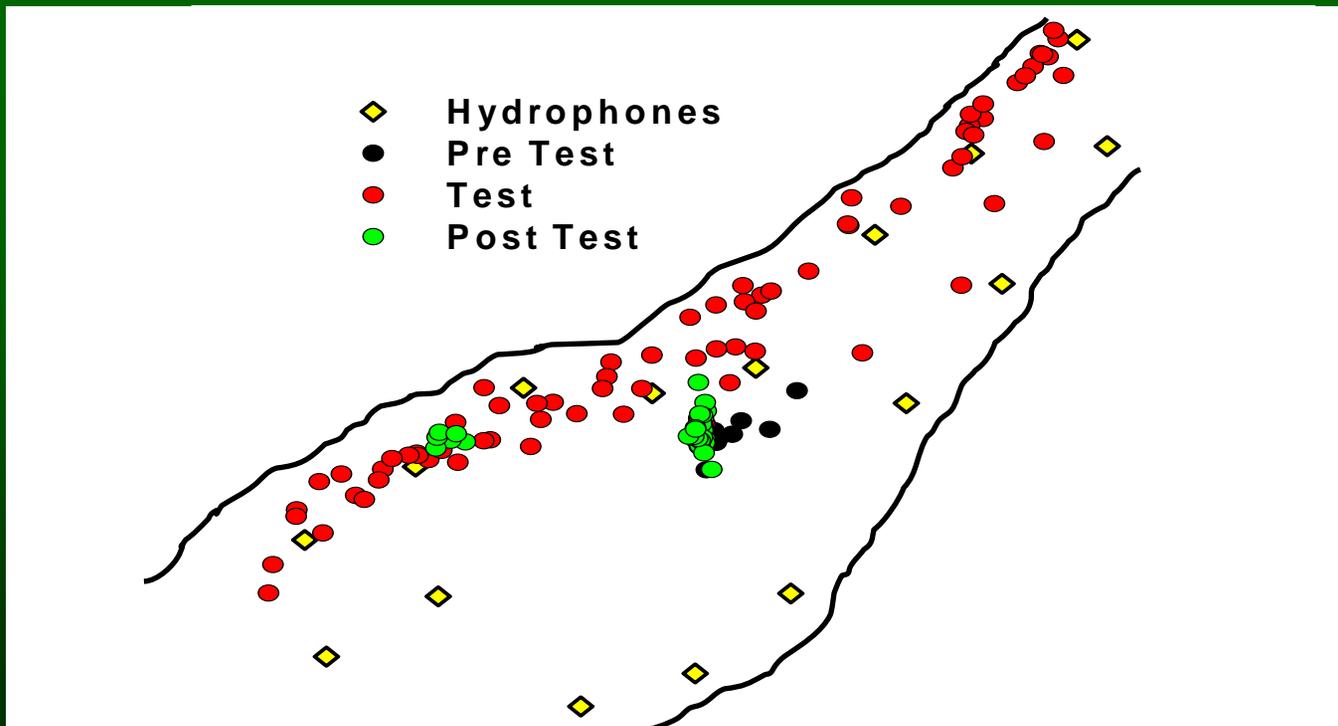
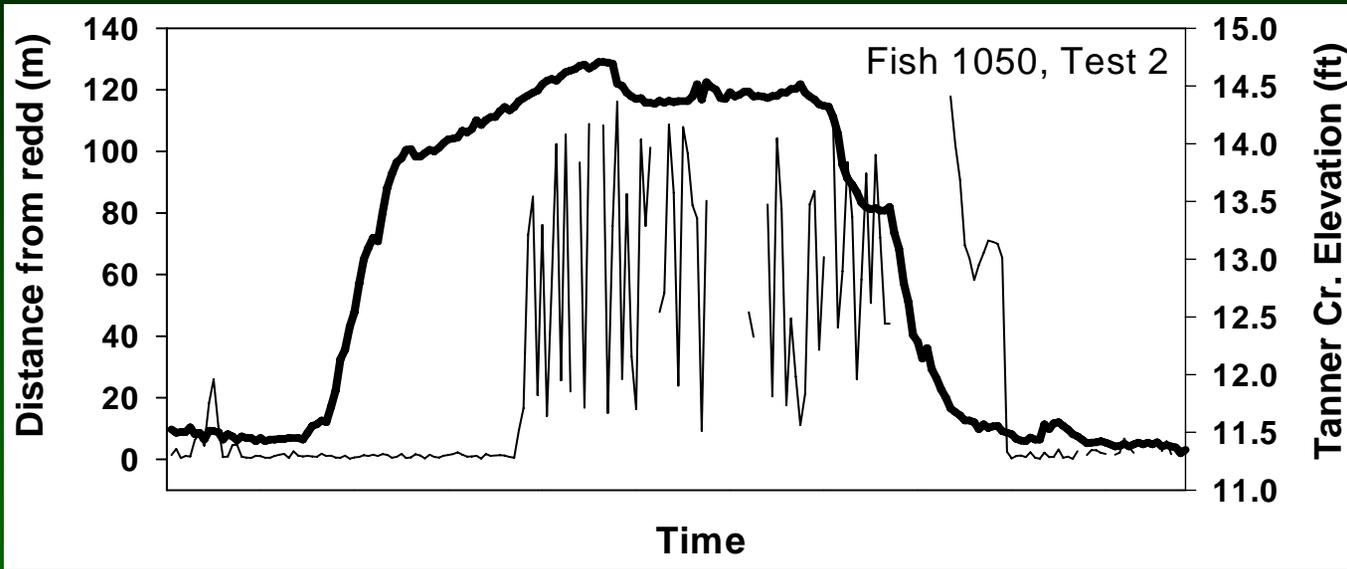
Redd Locations of Tagged Chum - 2005



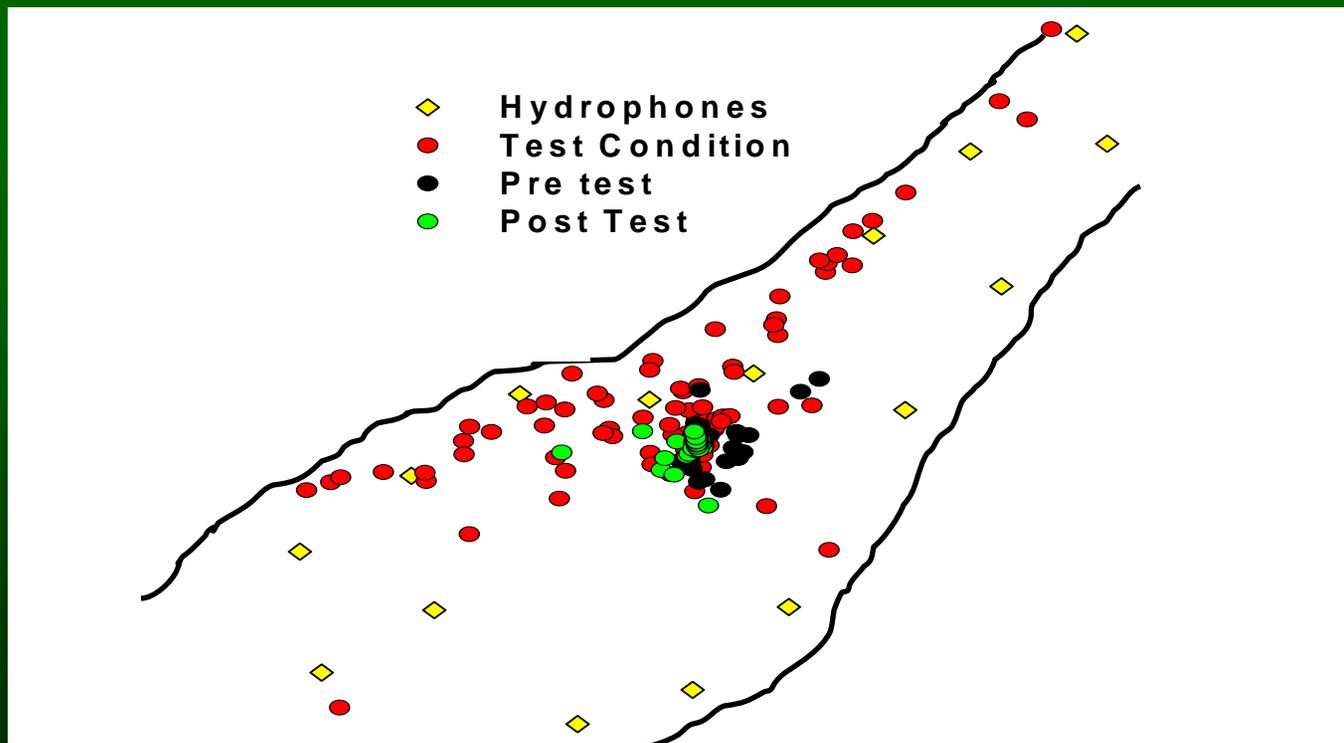
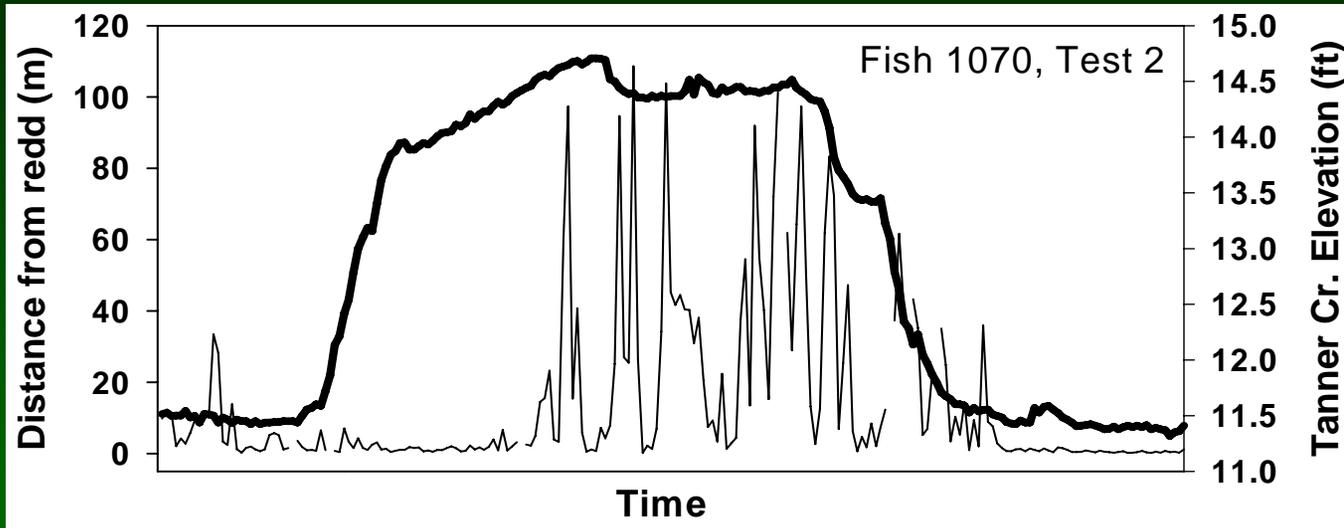
13.5 ft Tailwater Elevation



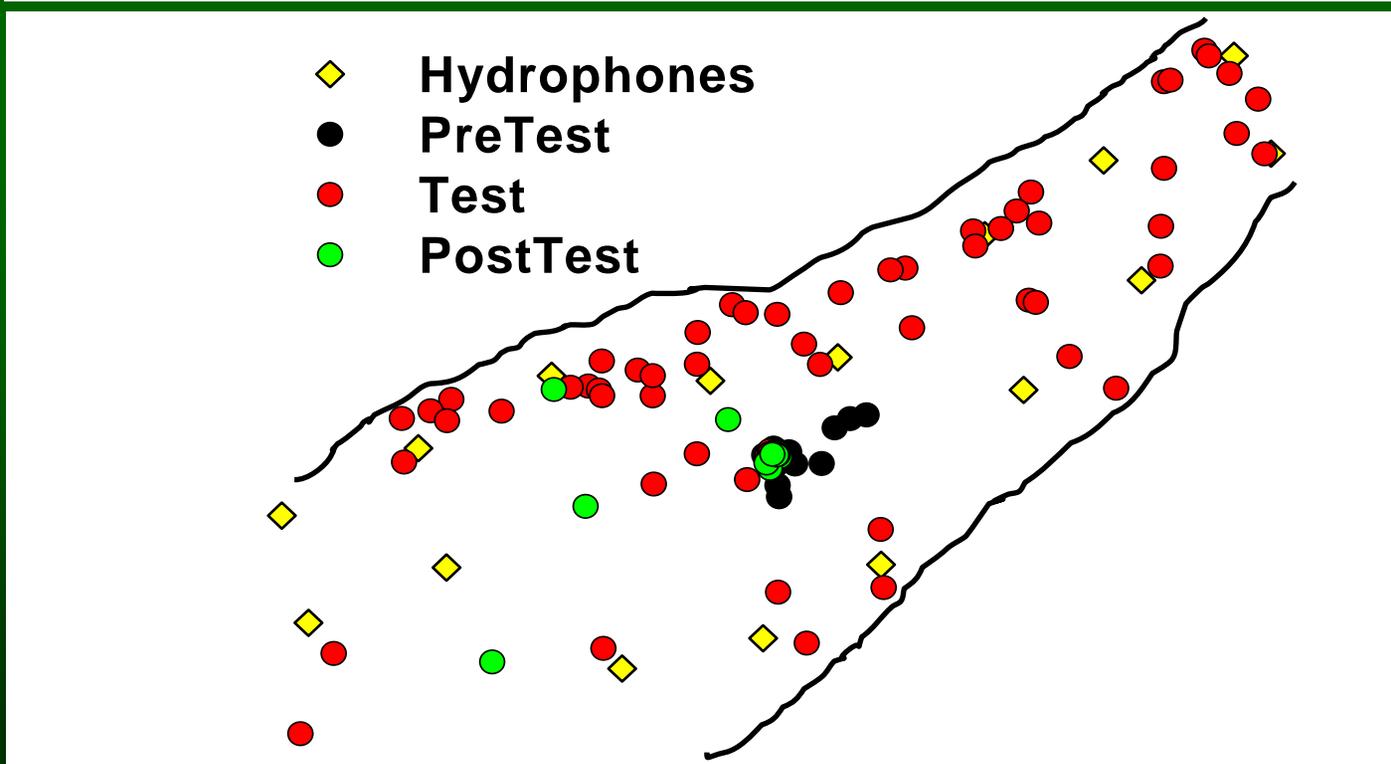
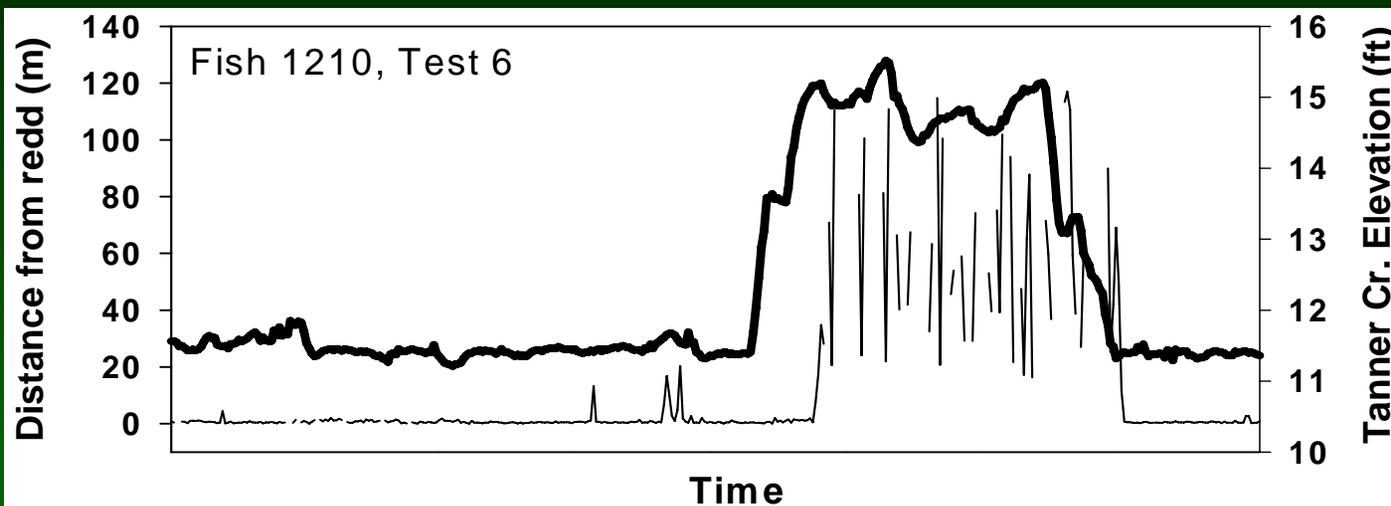
14.7 ft Tailwater Elevation



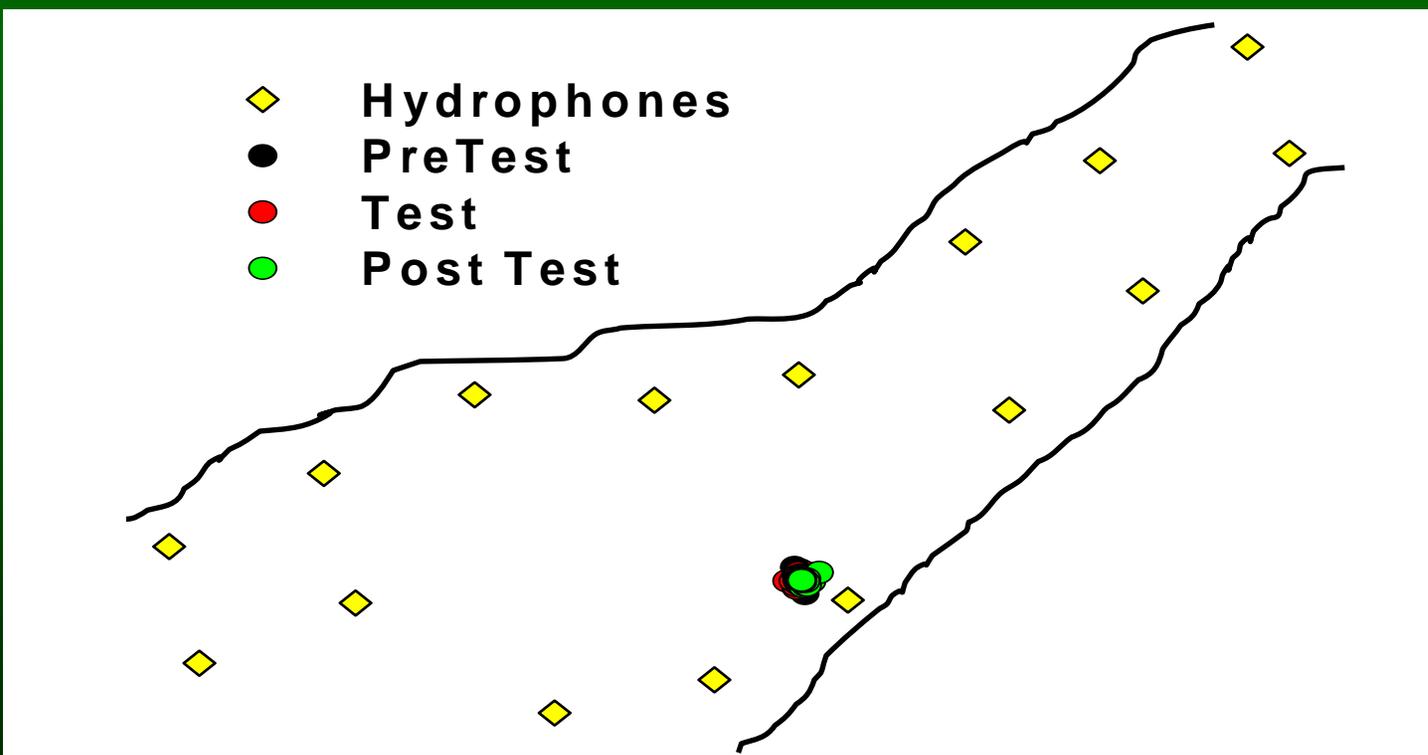
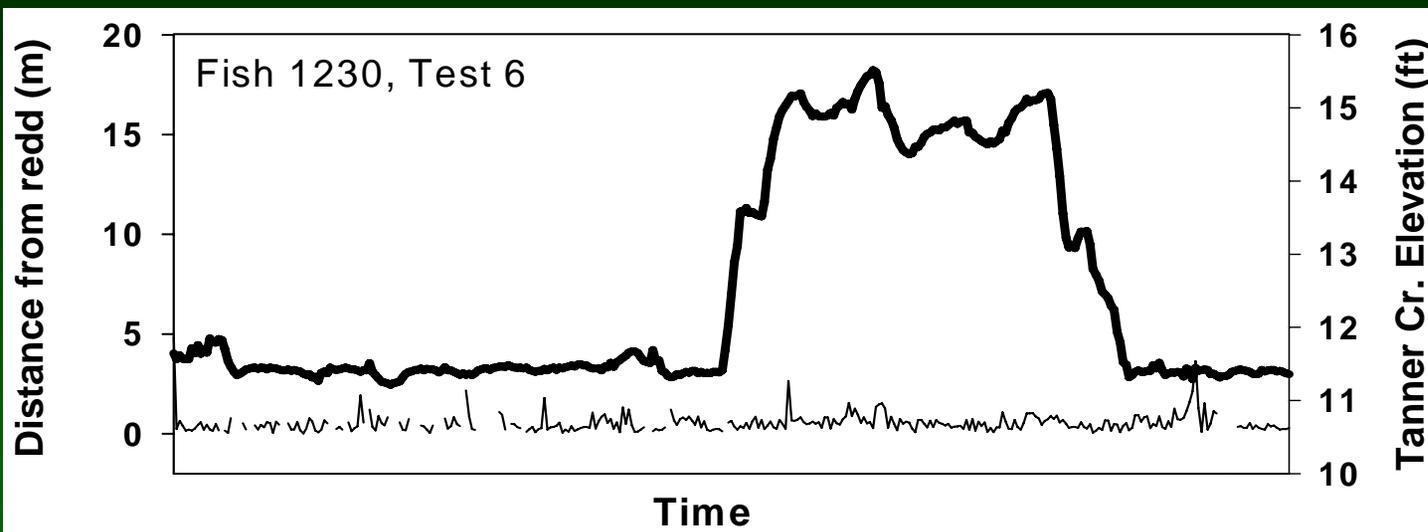
14.7 ft Tailwater Elevation



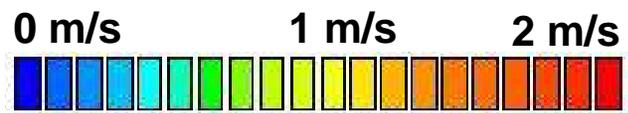
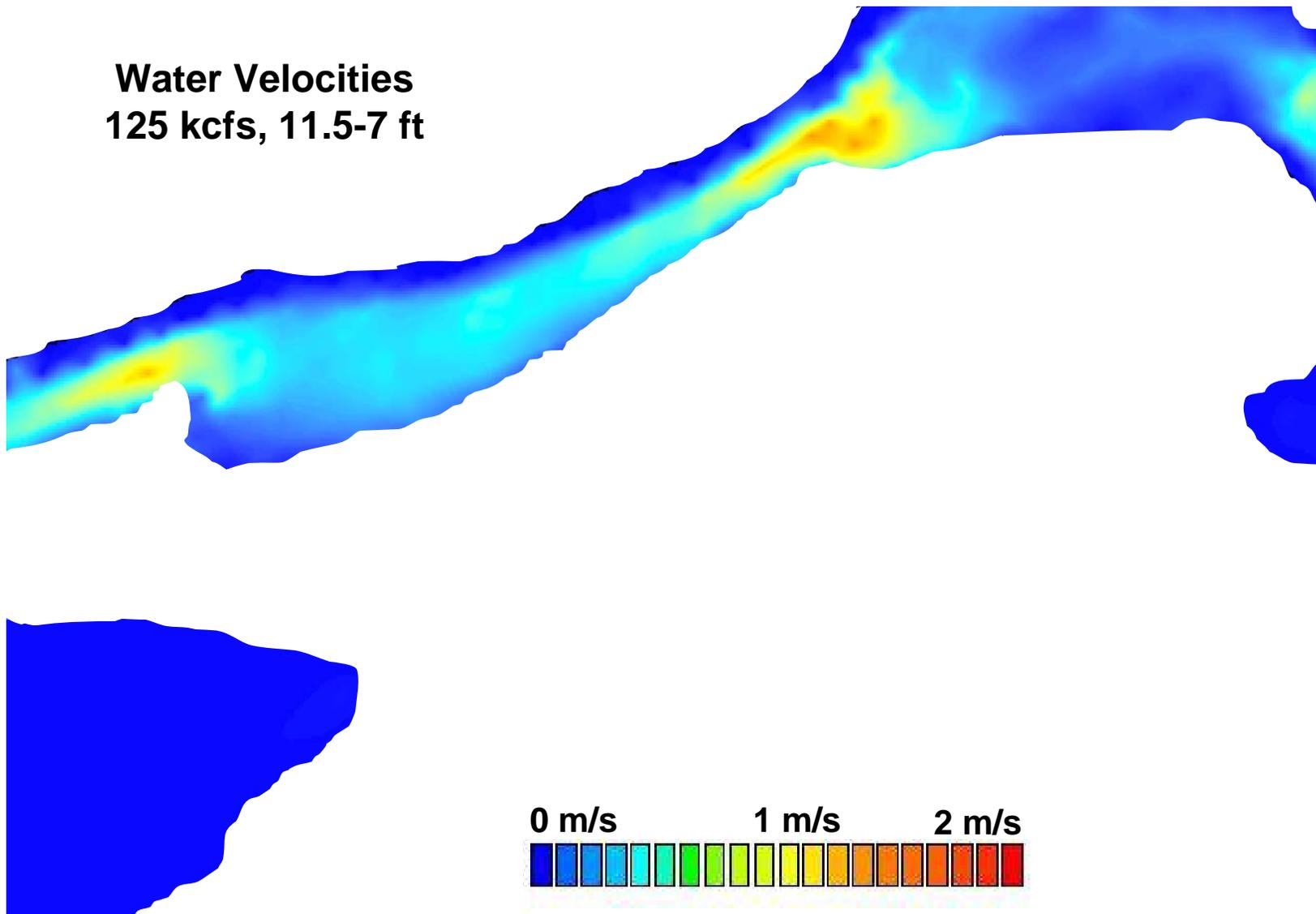
15.5 ft Tailwater Elevation



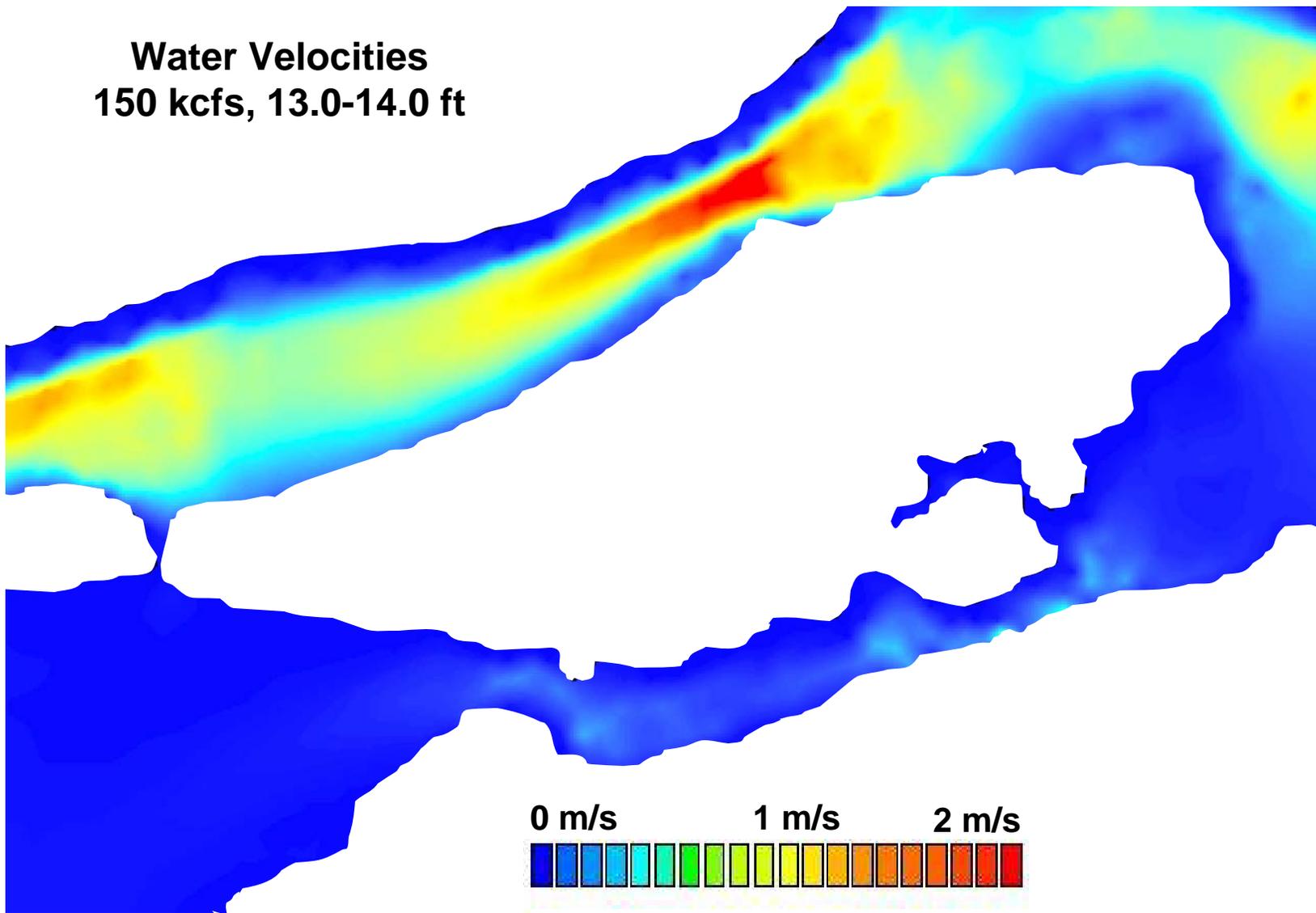
15.5 ft Tailwater Elevation



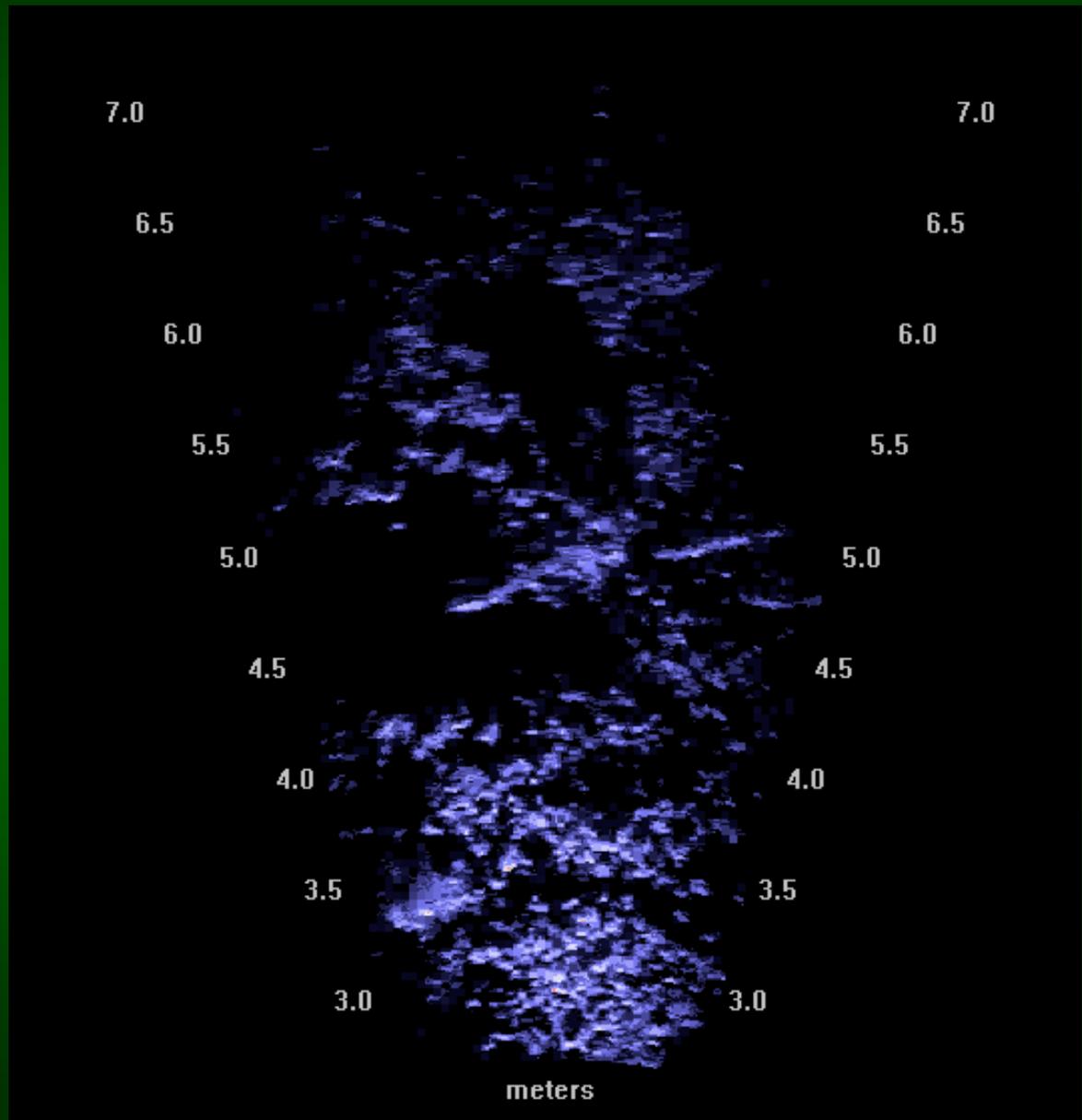
Water Velocities
125 kcfs, 11.5-7 ft



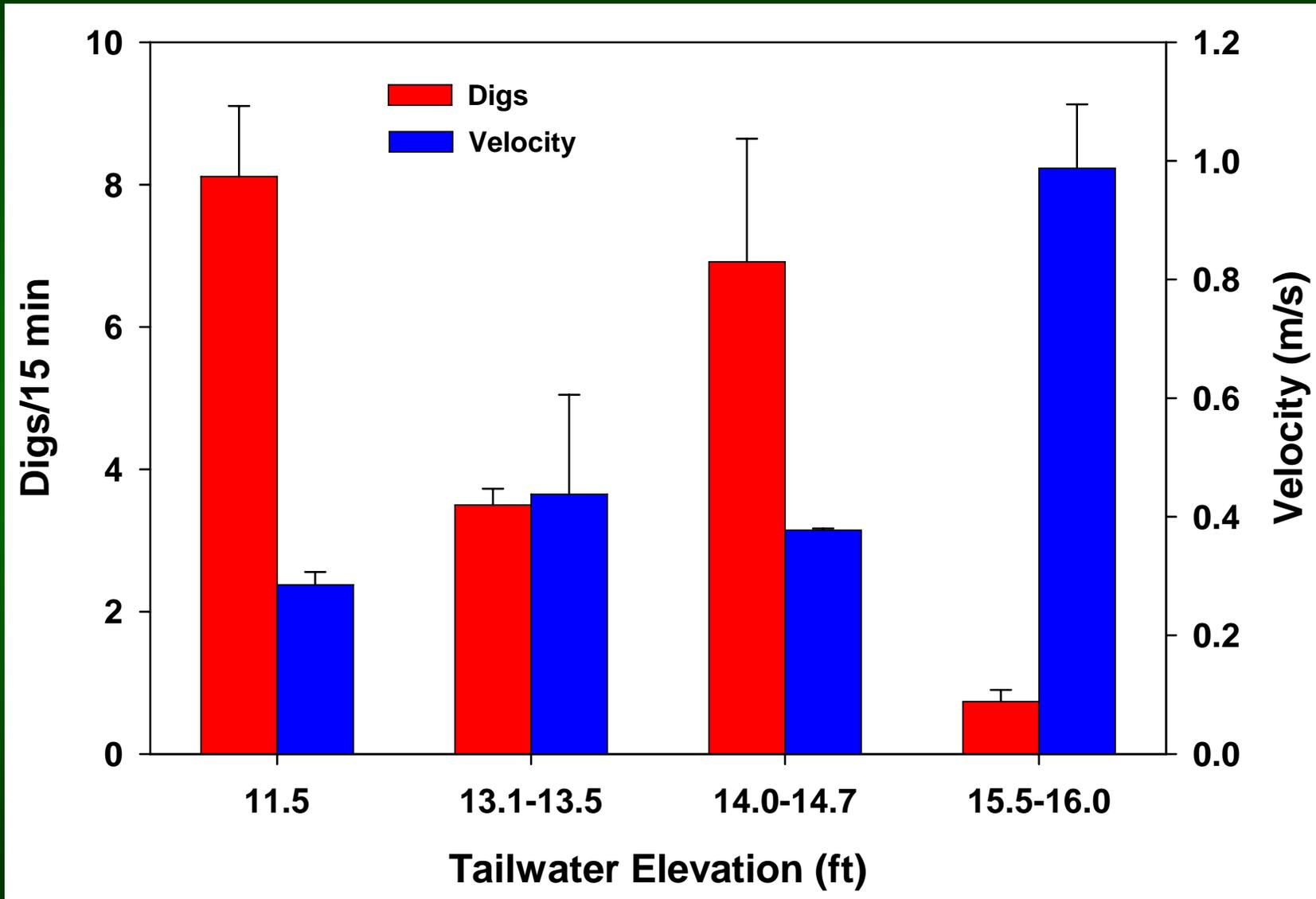
Water Velocities
150 kcfs, 13.0-14.0 ft



Chum Behavior monitored with a DIDSON Acoustic Camera



Digging Activity and Velocity vs Tailwater Elevation



Movement Summary

Acoustic-tagged	Tailwater elevation (ft)		
	13.1-13.5	14.7	15.5
# fish that moved	1	3	4
# fish that stayed	11	0	3

Spawning Summary

DIDSON-monitored fish	Number
Total	10
Spawned prior to test	2
Spawned during test	1
Spawned after test	6

Conclusions:

1. Most movement of chum salmon associated with a redd was observed at tailwater elevations of 14.7-15.5 ft . Almost no movement occurred at a tailwater elevation of 13.5 ft.
2. Fish that left their redd during a test moved substantially, often along shore in slower velocities. Some exited the study array at either the up or downstream ends for varying lengths of time. All tagged fish returned after flows returned to base levels.
3. Digging activity by female chum salmon generally declined at higher flows, most noticeably at a 15.5' tailwater elevation, when velocities increased to 1 m/s. Effects of flow tests appeared to be short-term as 6 fish spawned after tests.
4. Sample sizes were small, which limit conclusions and inferences.

