Off-road Vehicle (ORV) Stream Crossings in the Matanuska-Susitna Borough: Initial Findings of Impacts on Turbidity Levels and Channel Morphology

Scott J. Graziano

Alaska Pacific University

November 2012

Purpose

- General impacts of ORV stream crossings
  - Trail entrenchment
  - Over-widening
  - Erosion
  - Sediment input
- Increased understanding of impacts is necessary for regulators to address concerns

Why use turbidity?

- Reasonable estimator of both suspended sediment concentrations and light penetration *(Lloyd, 1987)*

- Allows samples to be taken easily and quickly *(Lloyd, 1987)*

- One water quality standards used by the Alaska Dept. of Environmental Conservation

Turbidity and Salmonids

- Compare collected data to existing studies
- Impacts on salmonids
  - Decreased feeding rates
  - Increased stress
  - Egg suffocation
  - Potentially lethal

State	Turbidity (NTU or JTU)[a]
Alaska	25 units above natural in streams 5 units above natural in lakes
California	20% above natural, not to exceed 10 units above natural
Idaho	5 units above natural
Minnesota	10 units
Montana	10 units (5 above natural)[b]
Oregon	10% above natural
Washington	25 units above natural (5 and 10 above natural)[c]
Wyoming	10 units above natural

a Nephelometric (NTU) and Jackson (JTU) turbidity units are roughly equivalent (USEPA 1983).
b Montana places the more stringent limit on waters containing salmonid fishes.
c API (1980) reports different values in Washington for "excellent" and "good" classes of water.

Lloyd, 1987

Questions

- How do ORV stream crossings impact stream turbidity levels and how long to these impacts last?
  - Are the impacts to stream turbidity levels a potential threat to juvenile salmon health?

Project Design Summary

- 9 sites in Knik River Public Use Area
- 2 portable data loggers paired with turbidity probes
- Turbidity readings collected before, during, and after controlled crossing event

Analysis

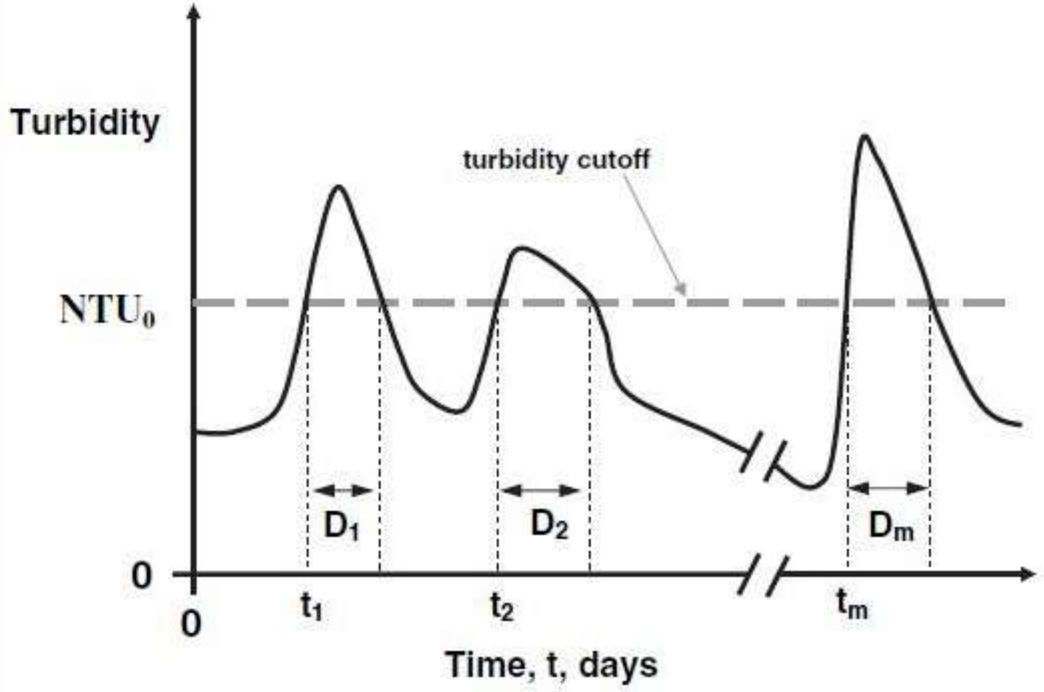
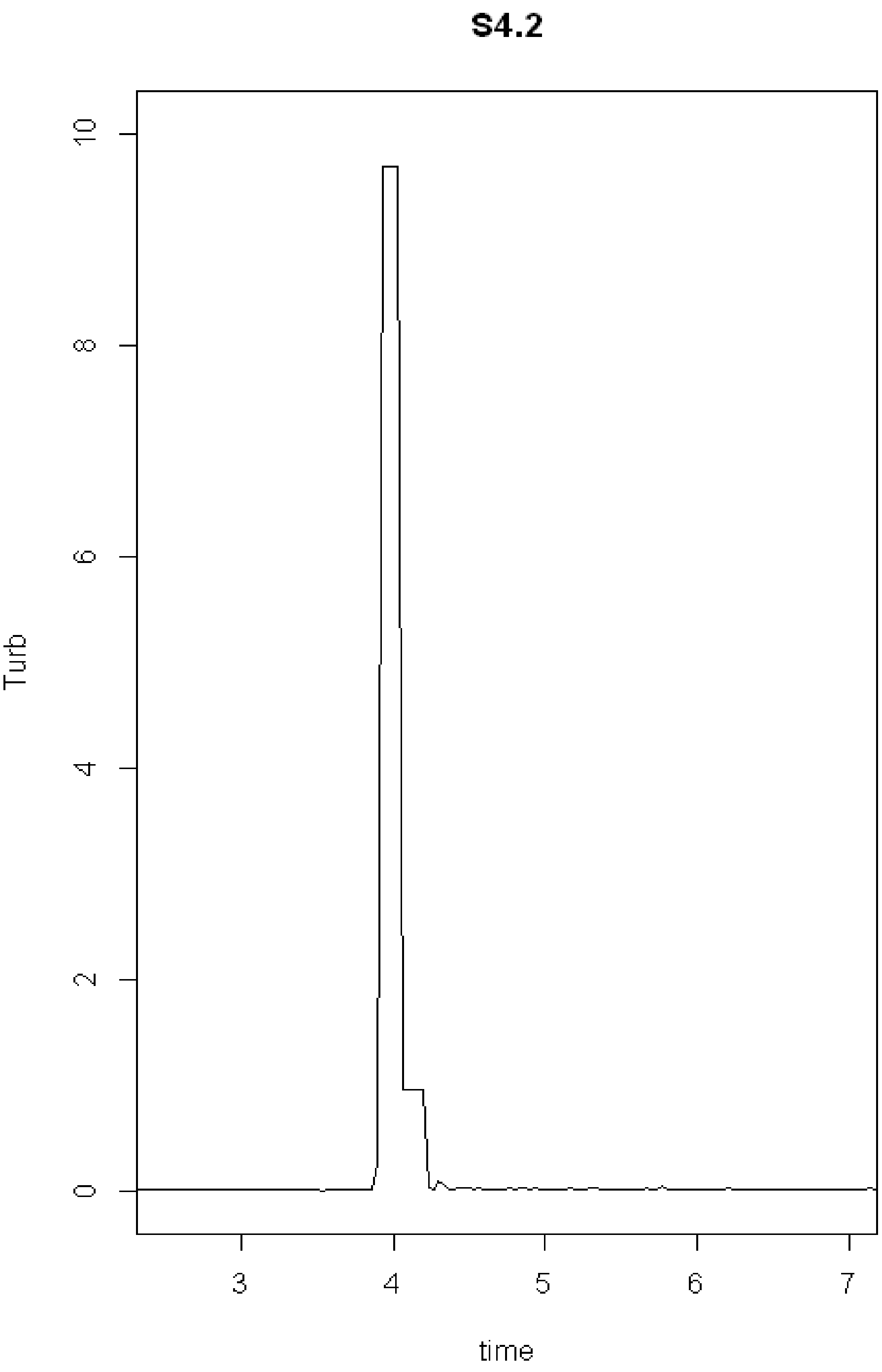
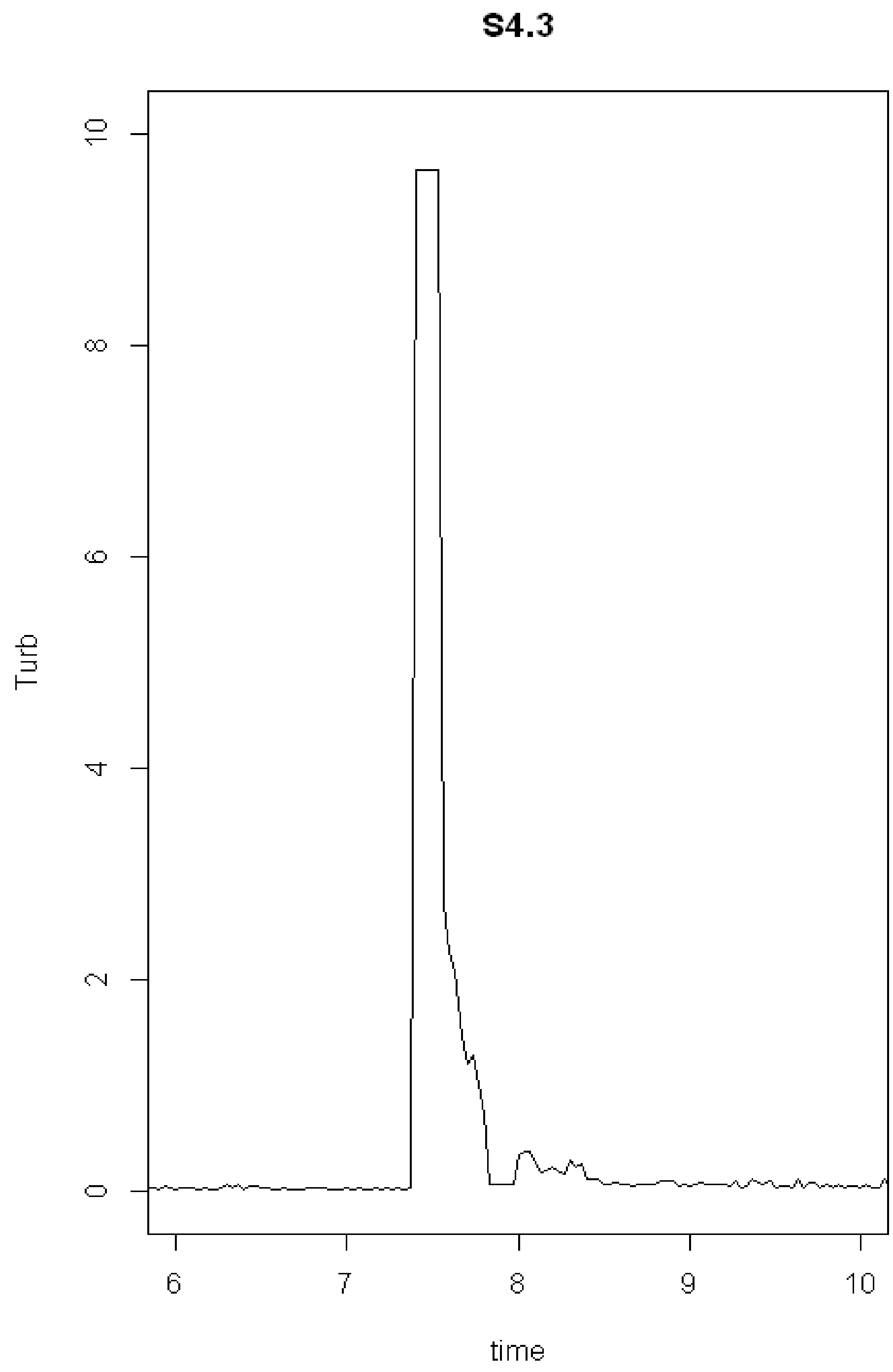


FIGURE 2. Example of Crossings of NTU$_0$ Criterion for a Hypothetical Plot of Turbidity *vs*. Time.

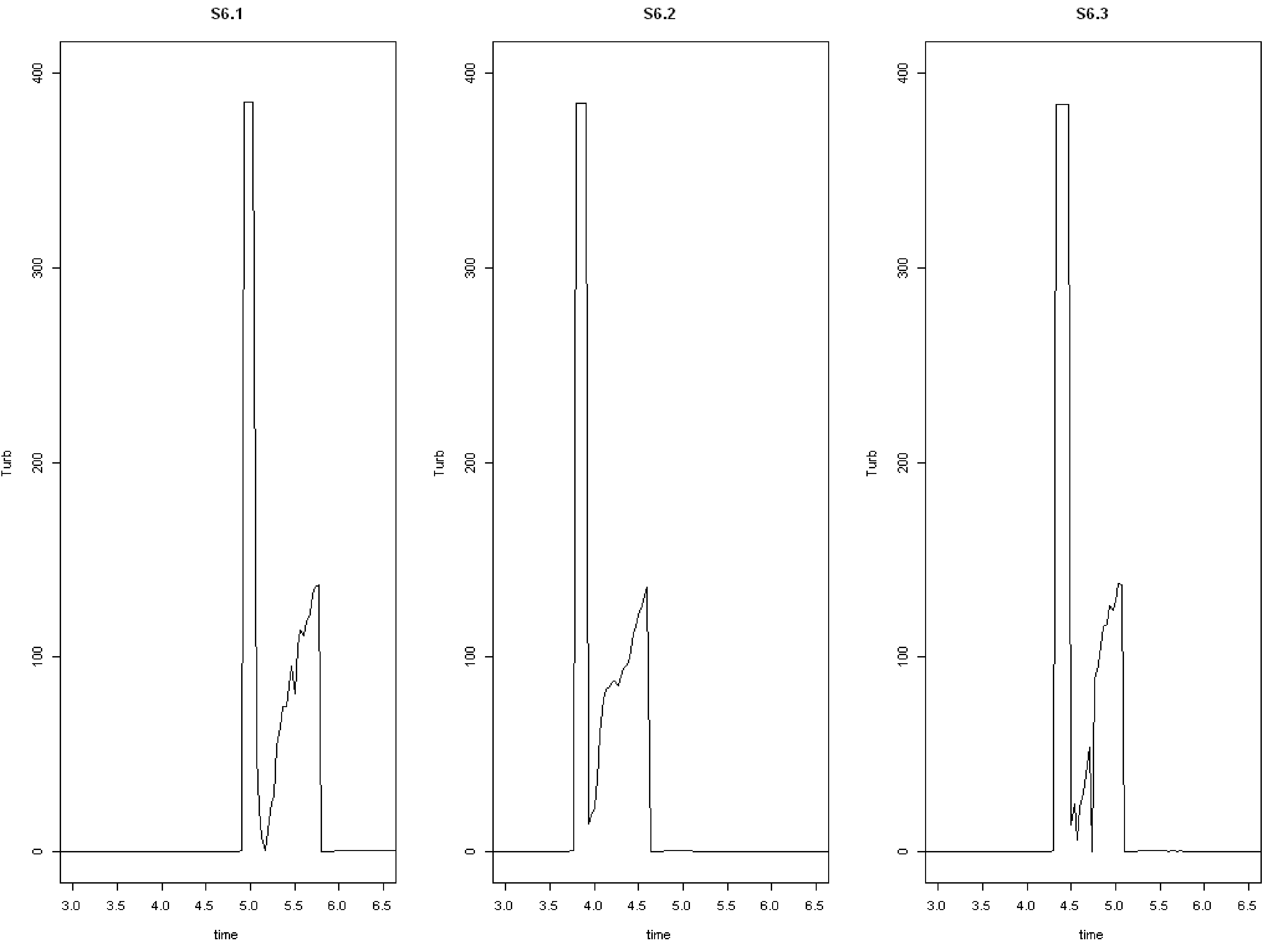
Schwartz et al., 2008



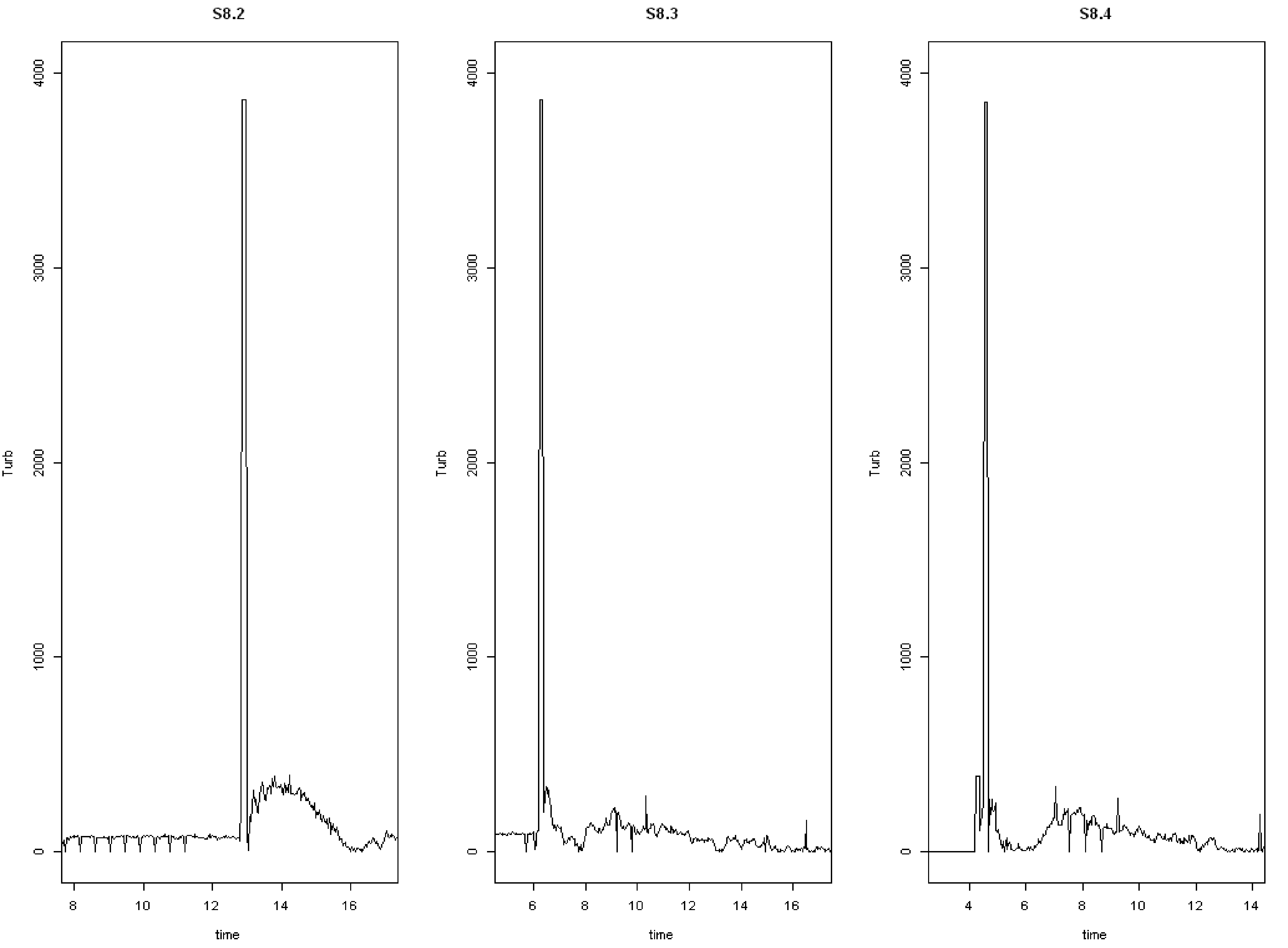
S4.2
Turb
time
0
2
4
6
8
10
3
4
5
6
7



S4.3
Turb
time
0
2
4
6
8
10
6
7
8
9
10



S6.1
S6.2
S6.3
Turb
time
0
100
200
300
400
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5


S8.2
S8.3
S8.4
Turb
time
4000
3000
2000
1000
0
8
10
12
14
16
6
4

Project Partners

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

UAA
UNIVERSITY of ALASKA ANCHORAGE

ALASKA PACIFIC UNIVERSITY

ALASKA
DEPARTMENT OF FISH AND GAME

Acknowledgements

- Meagan Krupa, Ph.D.—APU
- Dan Rinella, Ph.D.—UAA
- Roman Dial, Ph. D.—APU
- Jeff Heys—USFWS
- Bill Rice—USFWS
- Doug McBride—USFWS
- Libby Benolkin—USFWS
- Jon Gerkin—USFWS
- Brad Dunker—ADF&G
- Casey Smith—USFWS