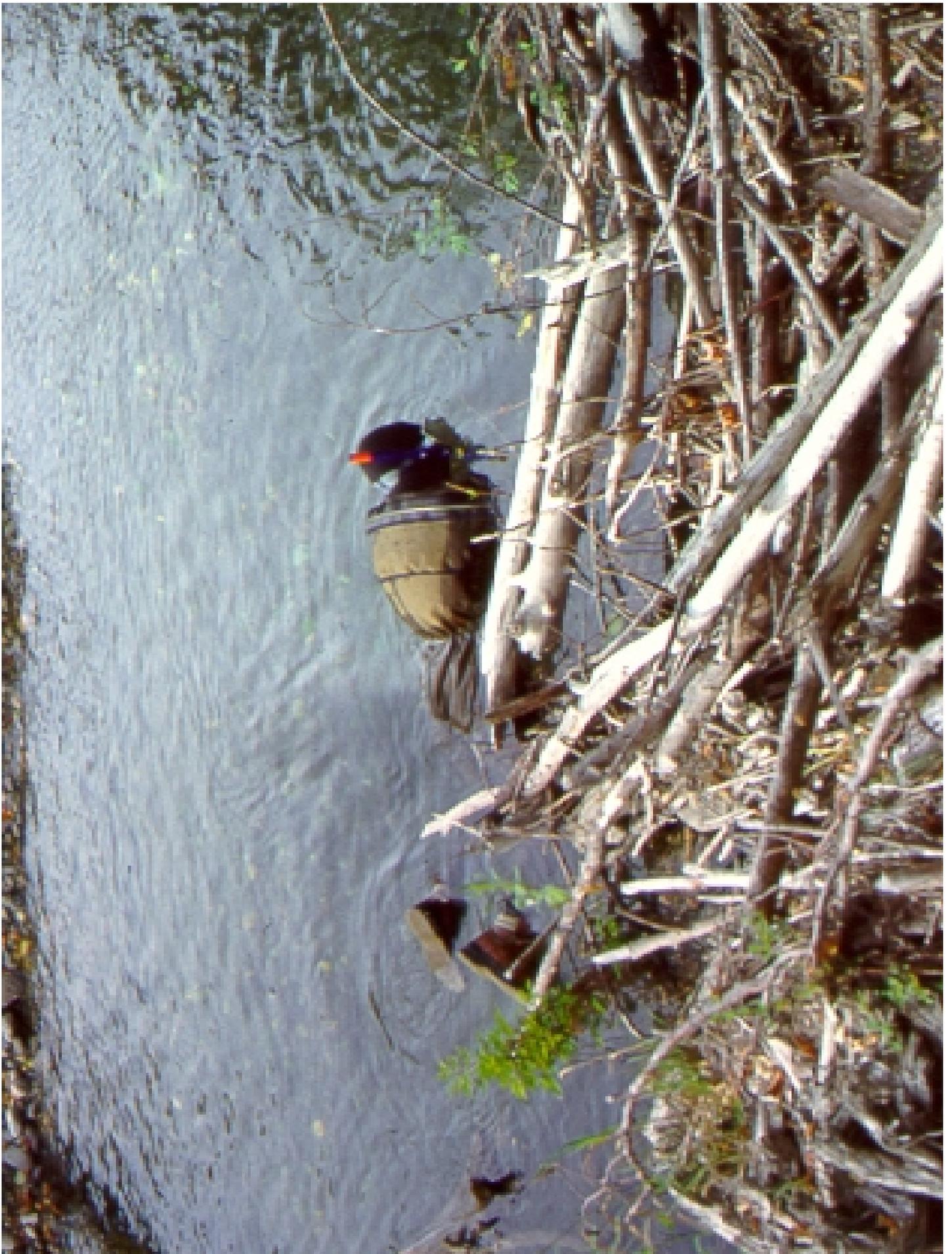


**Diel Habitat Selection by Juvenile
Chinook Salmon in the Cedar
River, Washington**

R. Peters, R. Tabor, D. Low, B. Missildine
U.S. Fish and Wildlife Service

Objectives

- **Determine diel habitat selectivity by juvenile chinook salmon**
- **Identify important main channel and lateral habitat rearing areas**
- **Determine temporal changes in habitat use**

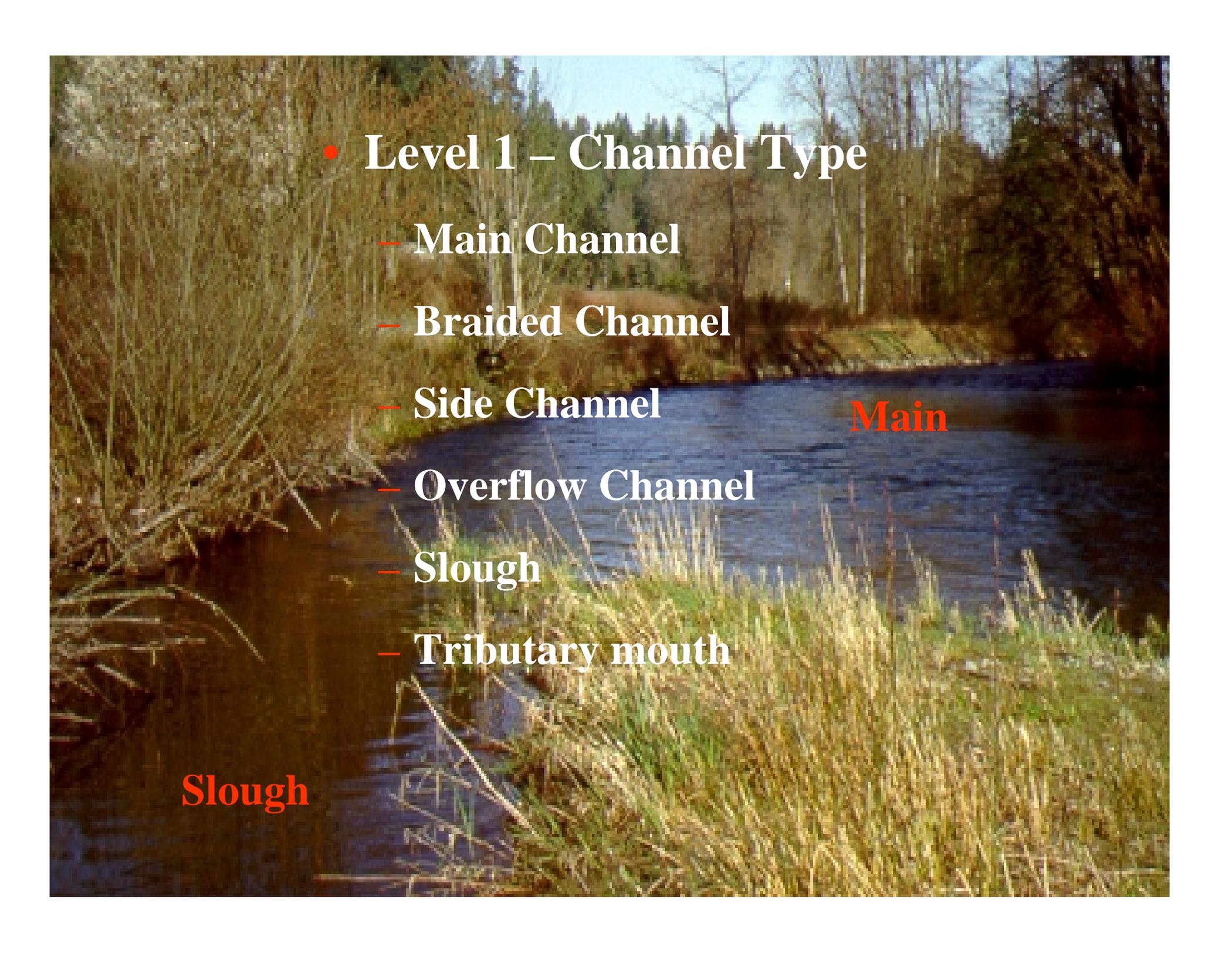


Methods

- **Snorkel estimates made using bounded count**
 - **Abundance = $2 * (\text{high count}) - \text{low count}$**
- **Two reaches surveyed once a month**
- **Ten additional reaches surveyed once**
- **Habitat classified using a 5 level modified hierarchical habitat classification system (Hawkins et al. 1993)**

Habitat

- **Level 1 – Channel Type**
 - **Main, Braided, Side, Overflow, Slough, Tributary mouth**
- **Levels 2-4 – Classify the entire channel width**
- **Level 5 – Classifies secondary channel units >20% of channel width long or wide**



- **Level 1 – Channel Type**

- **Main Channel**

- **Braided Channel**

- **Side Channel**

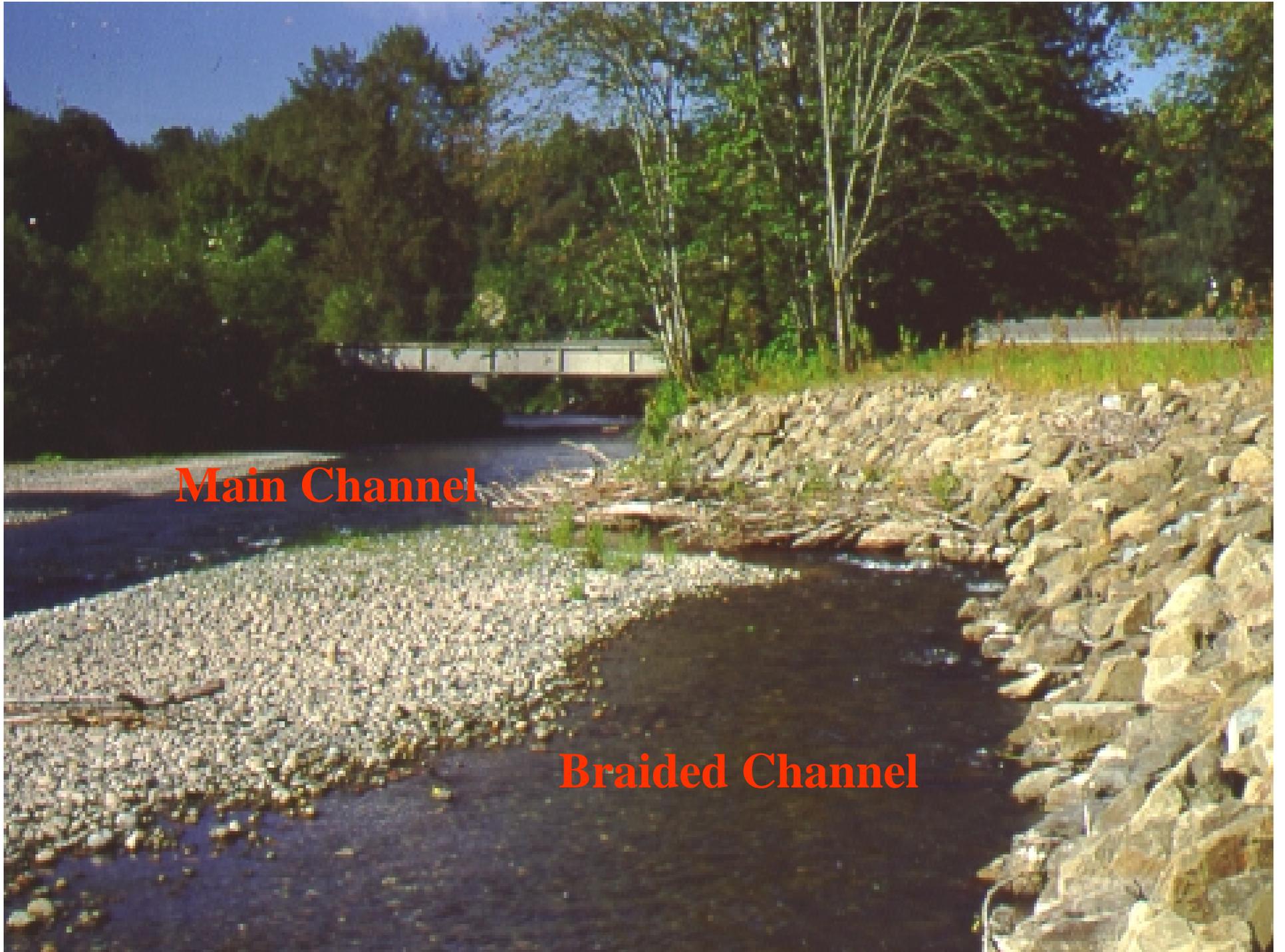
Main

- **Overflow Channel**

- **Slough**

- **Tributary mouth**

Slough



Main Channel

Braided Channel

Levels 2 & 3

- **Deep Water**
 - **Scour Pool**
 - **Dammed Pool**
- **Shallow Water**
 - **Turbulent**
 - **Non-Turbulent**

Levels 4 & 5

- **Scour Pool**

- **Eddy**
- **Trench**
- **Mid Channel**
- **Convergence**
- **Lateral**
- **Plunge**
- **Deposition**

- **Dammed Pool**

- **Debris**
- **Beaver**
- **Landslide**
- **Backwater**
- **Abandoned**
- Channel**

Levels 4 & 5

- **Turbulent**

- **Riffle**

- **Rapid**

- **Chute**

- **Fall**

- **Cascade**

- **Non-turbulent**

- **Sheet**

- **Run**

- **Tail out**

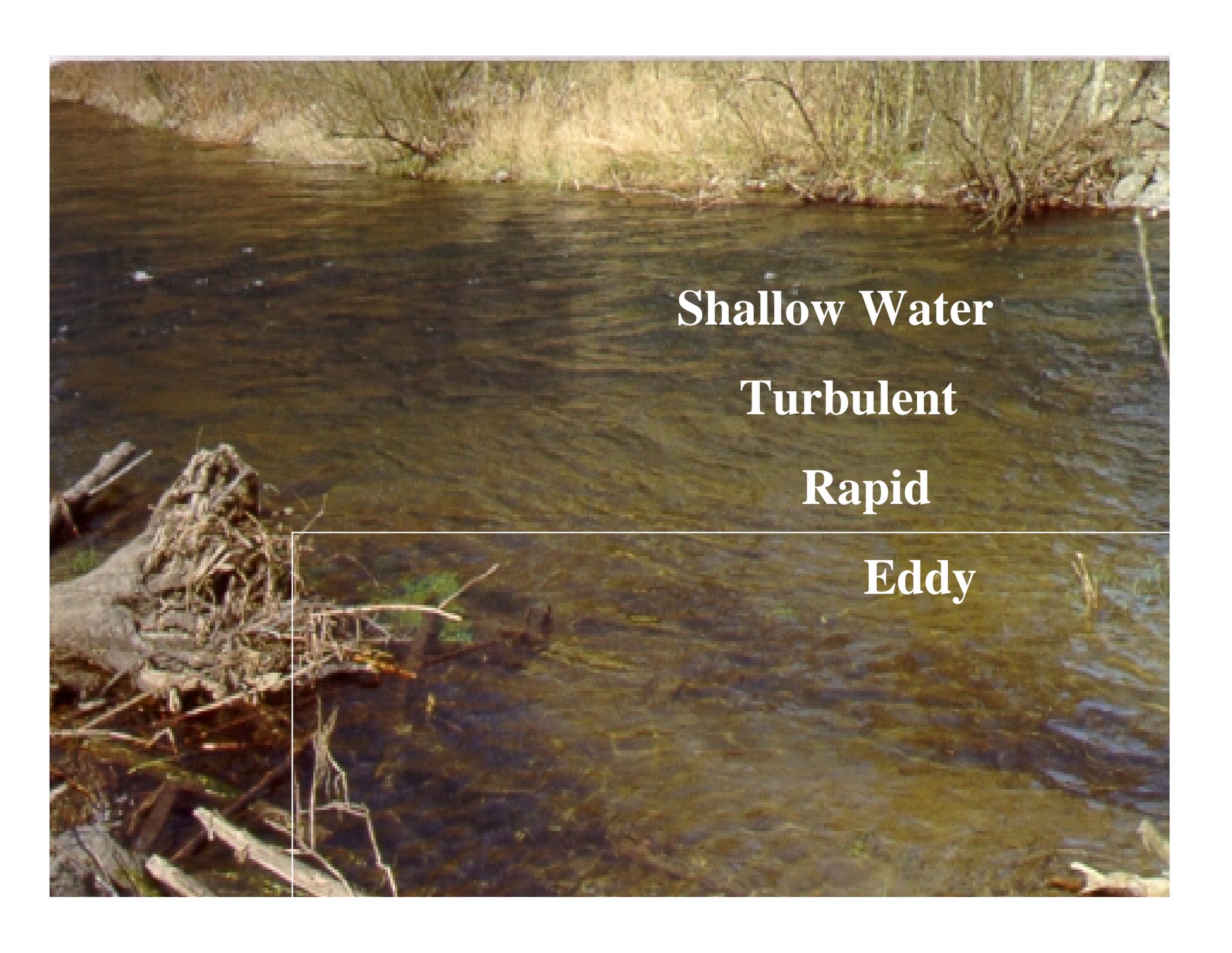


Deep Water

Scour Pool

Lateral Scour

Lateral Scour



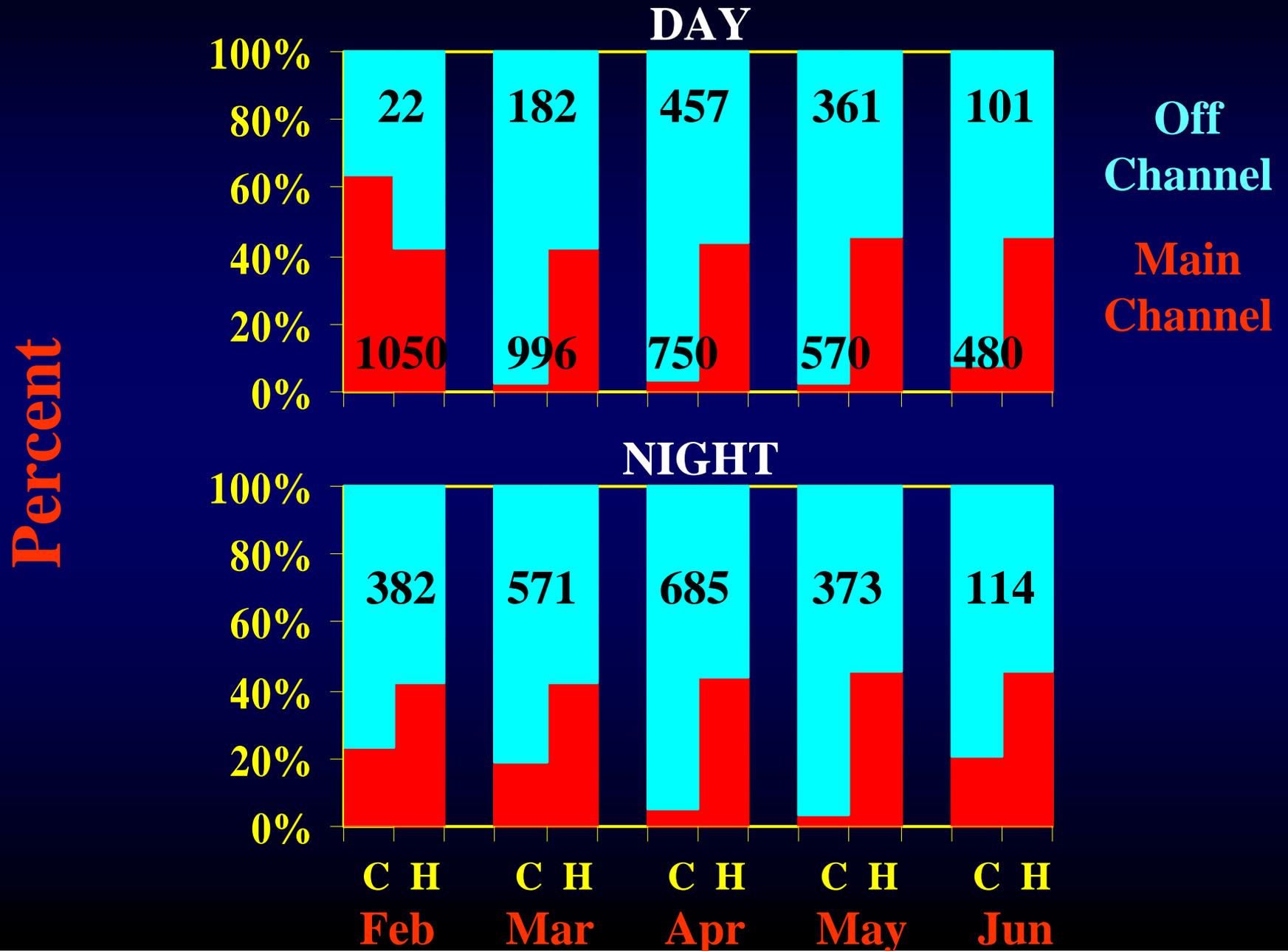
Shallow Water

Turbulent

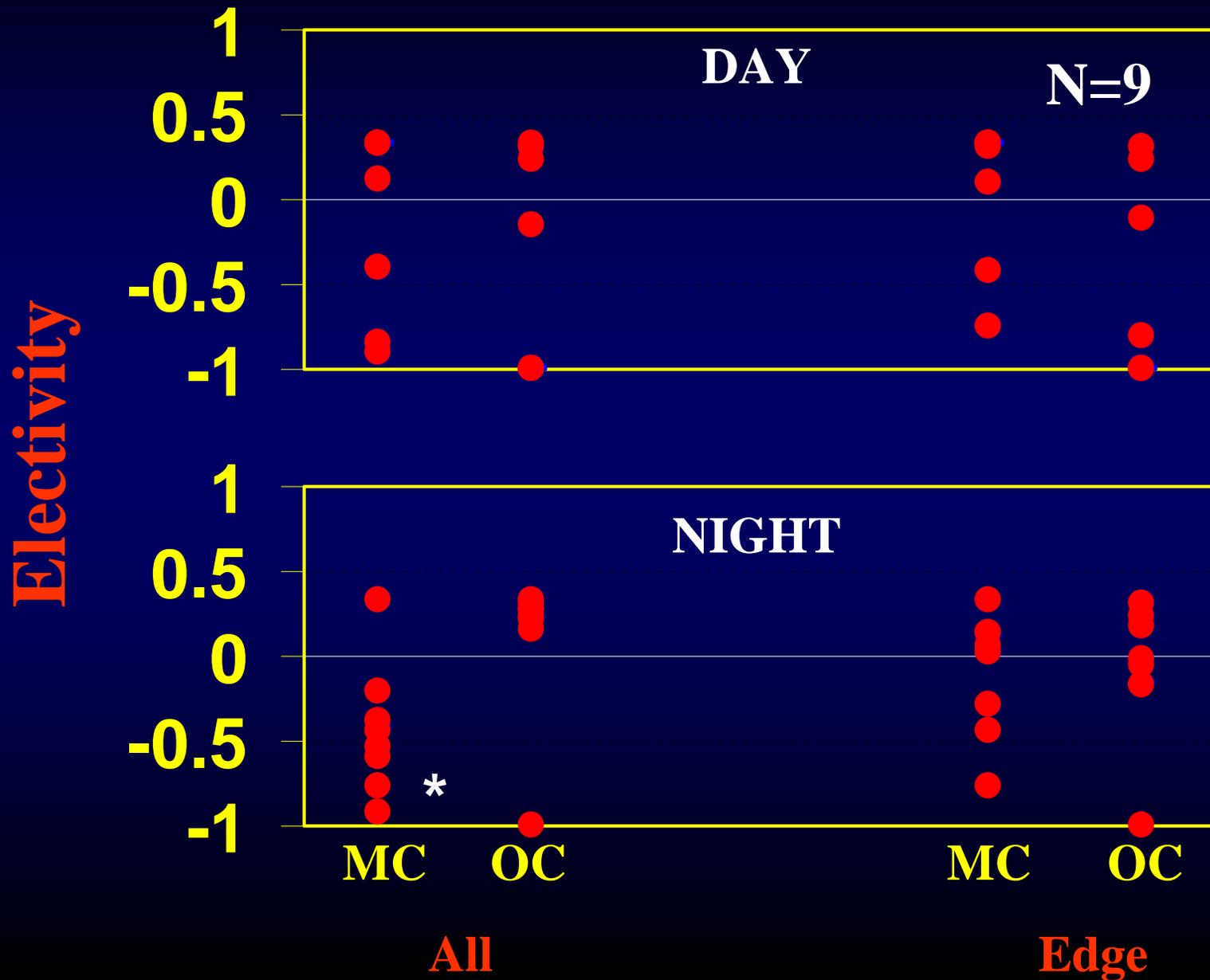
Rapid

Eddy

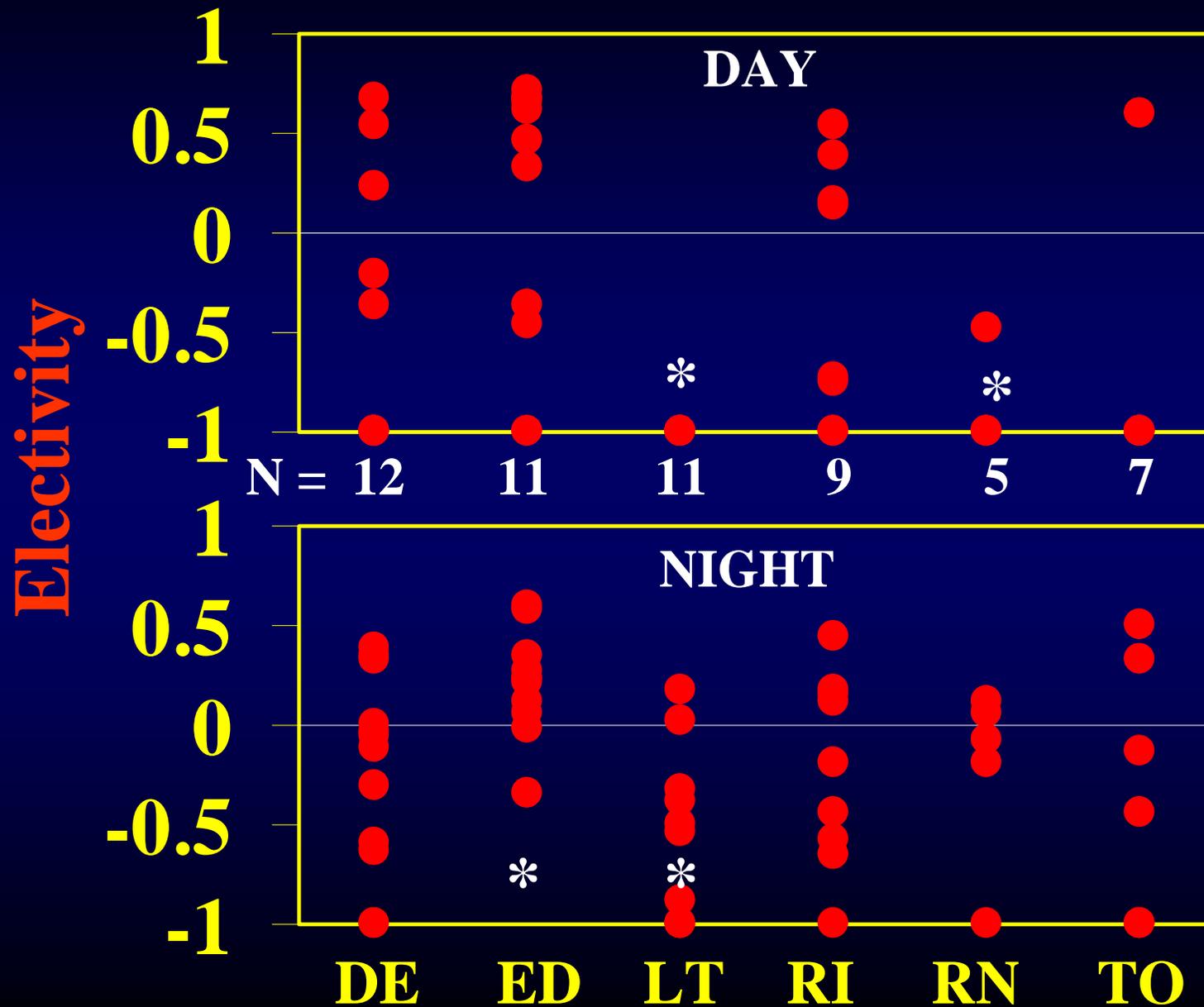
Percent Use/Availability -Elliott



Main Channel/Off-Channel Electivity



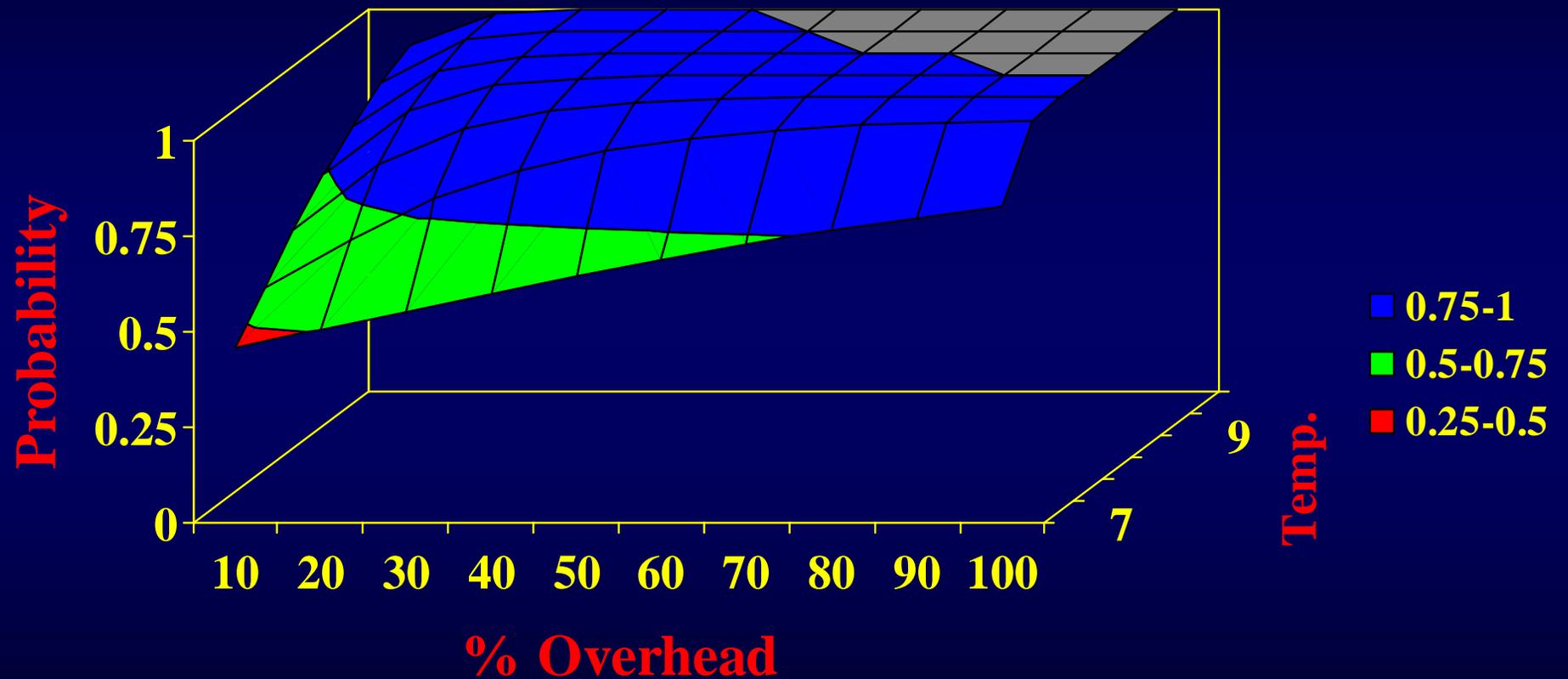
Secondary Habitat Electivity



Logistic Regression

- **Temperature (+)**
- **Habitat Area (+)**
- **Ave. Velocity (-)**
- **Max. Depth (-)**
- **Overhanging Cover (+)**
- **Sediment Score (-)**
- **Temperature*Overhanging Cover**
- **Habitat Area*Sediment Score**

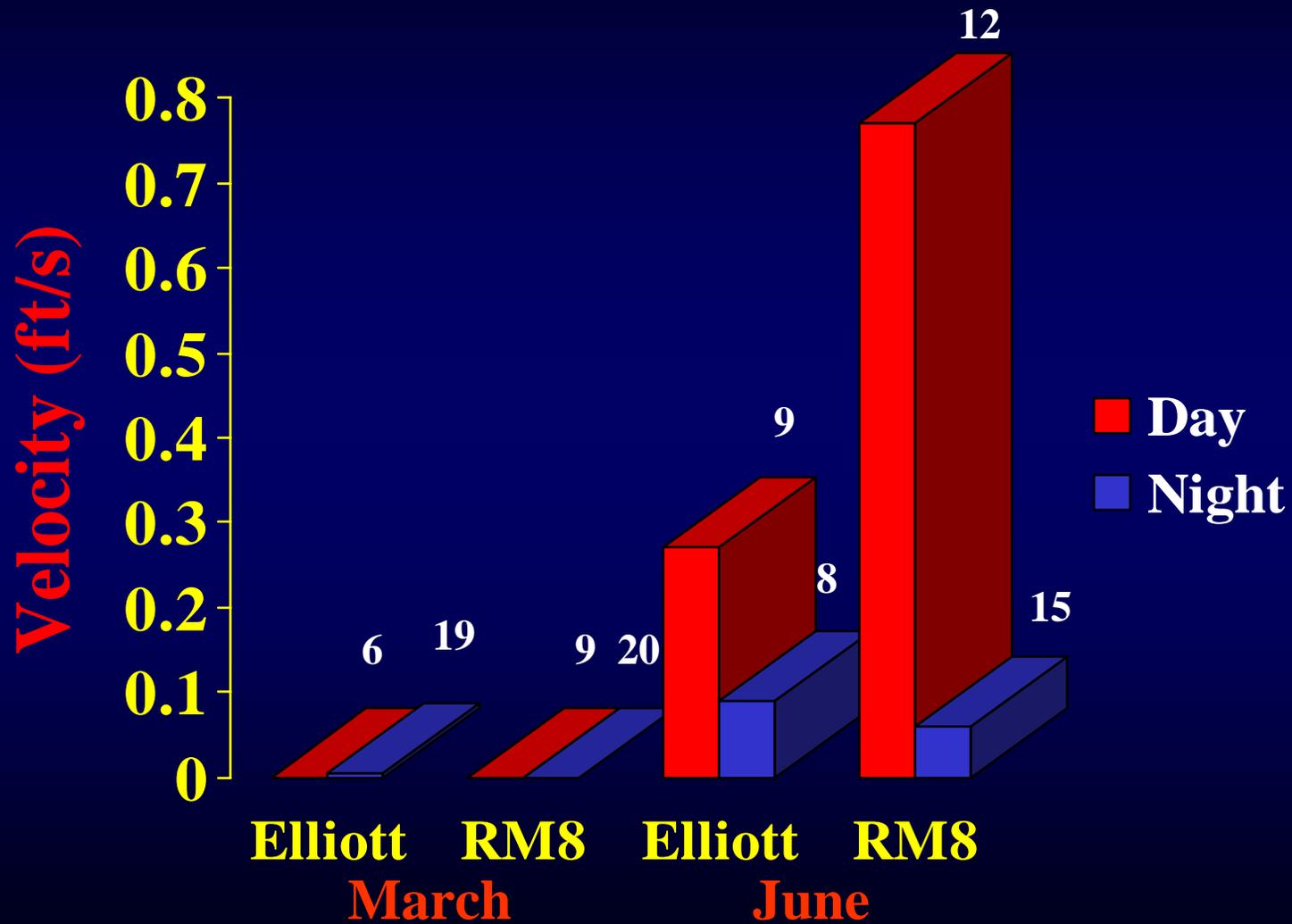
Logistic Regression

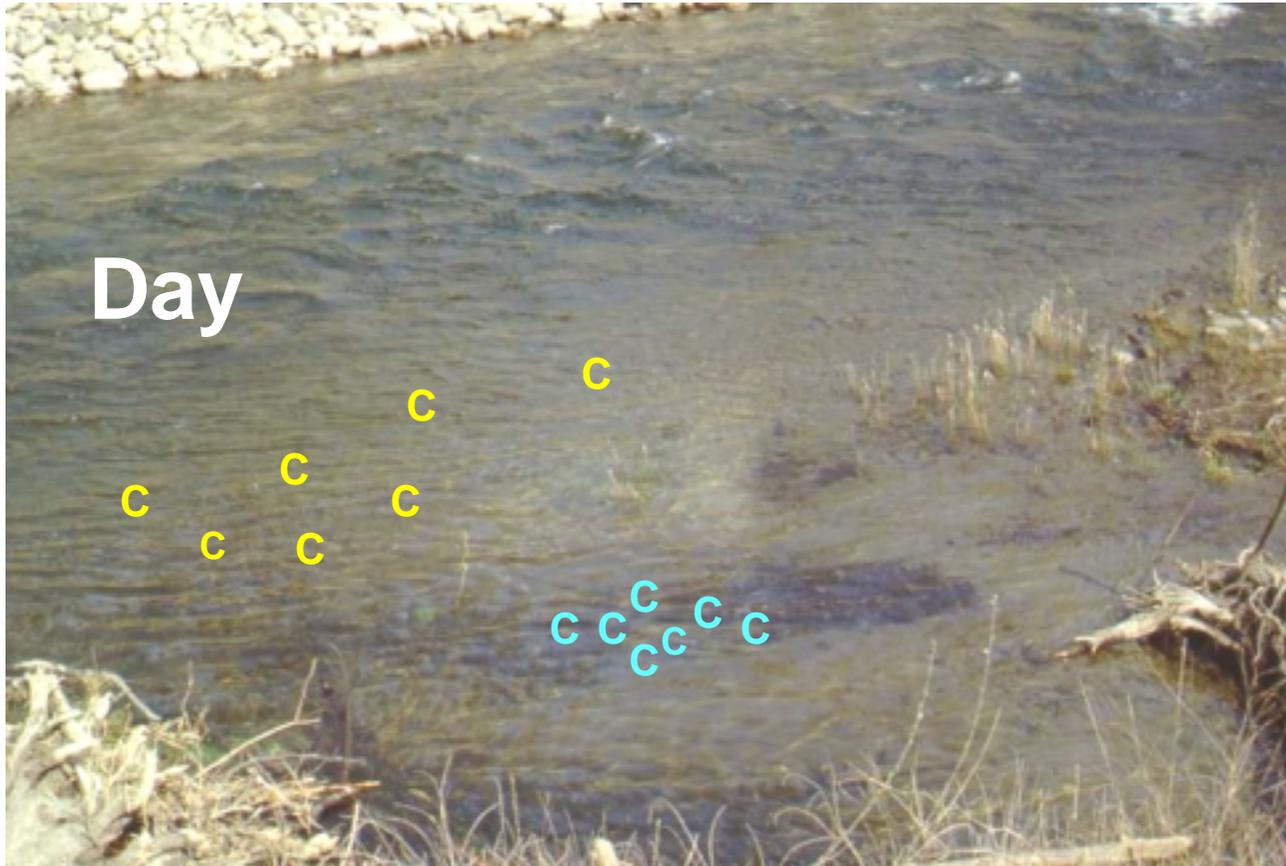


Logistic Regression

- **Model development data set (n = 91)**
 - Predicted presence in 59 of 65 cases (90.7%)
 - Predicted absence in 16 of 26 cases (61.5%)
- **Validation data set (n = 46)**
 - Predicted presence in 14 of 37 cases (37.8%)
 - Predicted absence in 6 of 9 cases (66.7%)

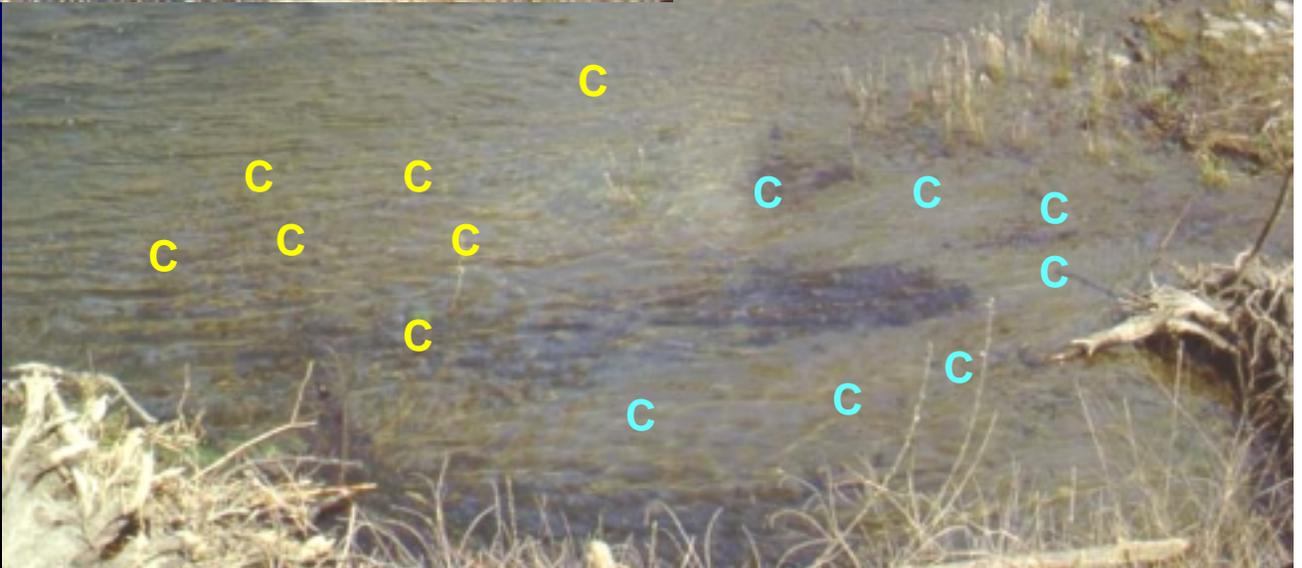
Microhabitat





Day

March 14
June 7



Night

Summary

- **Chinook used off channel habitats extensively**
- **Juvenile Chinook prefer off-channel areas?**
 - **When all main channel habitat considered**
 - **Not when only main channel edge habitat considered**
- **No consistent seasonal changes in habitat selection**

Summary

- **No preference for deep or shallow water**
- **Showed preferences for level 5 (secondary) habitats**
 - **Prefer eddies at night**
 - **Avoid lateral scour pools day and night**
 - **Microhabitat use varied by Month, diel period, and channel type**

What's Next?

- **Collect more habitat use data**
 - **Microhabitat**
 - **Mesohabitat**
 - **Macrohabitat**
 - **Channel Type**
- **Influence of flow on habitat use**

What's Next?

- **Microhabitat use**
 - **Develop preference curves for**
 - **Day/Night and different seasons**
 - **Evaluate the influence of flow**
- **Determine from microhabitat basis what period limits chinook rearing**

What's Next?

- **Mesohabitat use data**
 - **Determine influence of habitat variables**
 - **Day/Night and different seasons**
 - **Evaluate the influence of flow**
- **Evaluate influence of flow on habitat availability (2003?)**