

# In-Depth Assessments

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## Chapter 2. More than a Percent of Flow Approach: In-Depth Methods to Request Additional Water

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*Instream flow studies must evaluate flow needs and opportunities in terms of hydrology, biology, geomorphology, water quality, and connectivity. (Instream Flow Council 2008)*

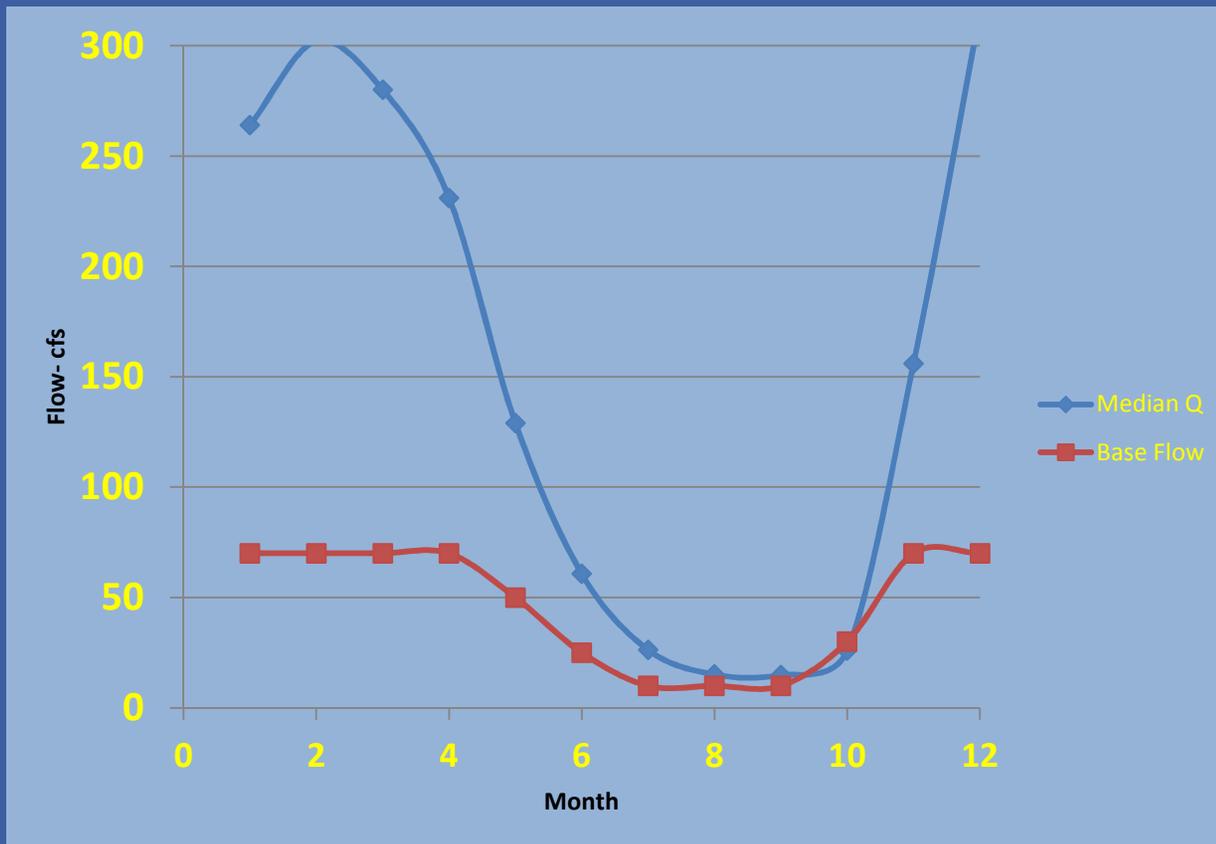
θεωρητικό μπορεί να γίνει με τη βοήθεια της μεθόδου (instream flow council 2008)  
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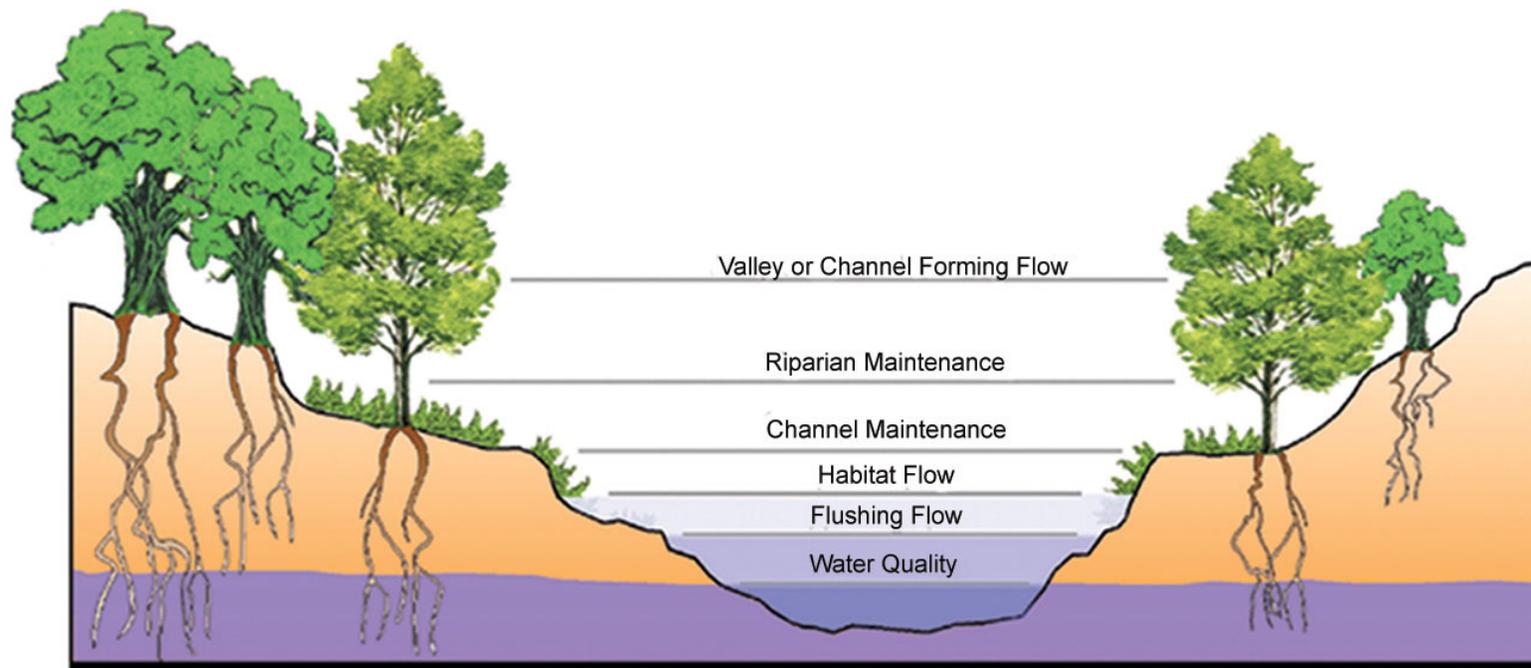
# Instream protections

- 1859-1955: no protection
- Minimum Perennial Streamflow Act 1955
- Basin Investigations 1960's-70's
- Instream Water Rights Act 1987

# Base Flow Protection



# Flows and functions



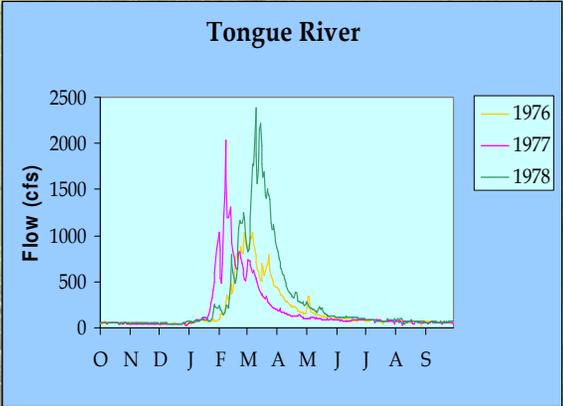
# Geomorphology



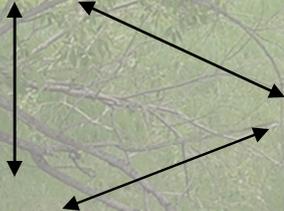
# Biology



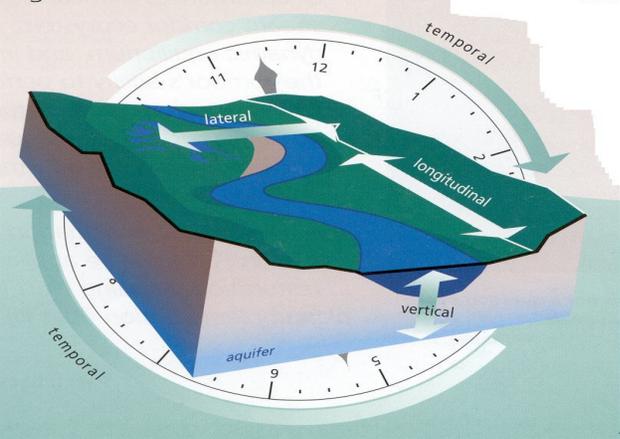
# Hydrology



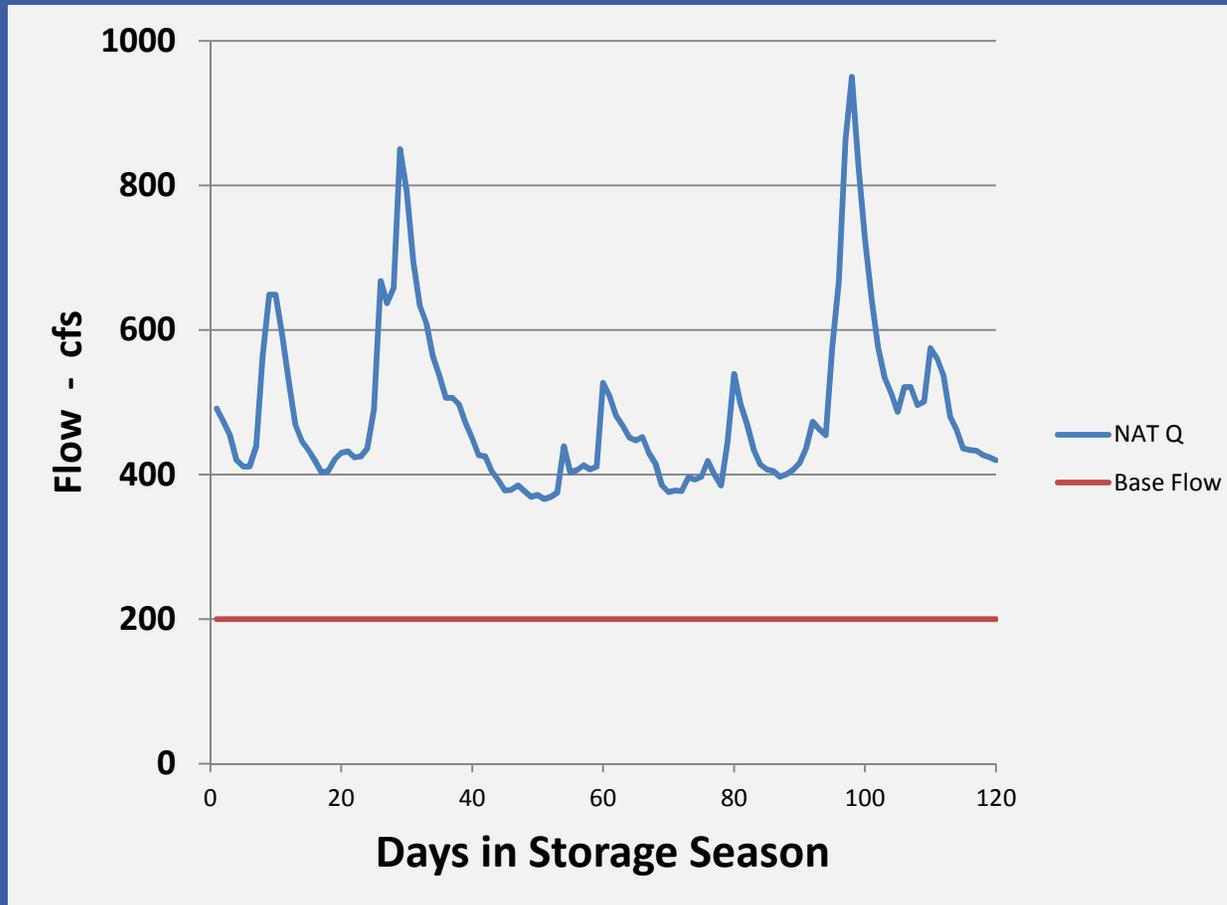
# Connectivity



# Water Quality



# Base flow protection only



# Many jurisdictions are addressing ecological flows in law and policy

**Colorado's Water Supply Future**

Colorado Water Conservation Board

Watershed Flow Evaluation Tool Pilot Study for Roaring Fork and Fountain Creek Watersheds and Site-Specific Quantification Pilot Study for Roaring Fork Watershed

June 2009

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*Draft Report*

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES

SR55 May 2011

Michigan's Water Withdrawal Assessment Process and Internet Screening Tool

David A. Hamilton and Paul W. Seelbach

November 2010

**Water Framework Directive**

The EU Water Framework Directive

In 2000, the European Union took a groundbreaking step when it adopted the Water Framework Directive. This 193-page instrument provides a comprehensive approach to managing and protecting inland hydrological resources by focusing on river basins. It also requires coordination of different EU policies and sets out a clear framework for action with 2015 as the target date for getting all European waters into good condition.

Water supports life. It is a crucial resource for humanity, generating and sustaining economic growth and prosperity. It is also at the core of natural ecosystems and climate regulation.

Europe's water is under pressure. Recent figures show that 20% of surface water is at serious risk from pollution, 60% of European cities over-exploit their groundwater resources, 50% of wetlands are endangered. Demand for water is growing all the time.

Three-quarters of Europeans get their supply from groundwater. Nearly half the EU population lives in water-stressed countries, where the abstraction of water from freshwater sources is too high.

River basin management plans are the key tools for implementing the WFD. They are drawn up after extensive public consultation, and are valid for a six-year period.

water environment

FISHERIES DIVISION  
SPECIAL REPORT 55



PROPOSED  
National Environmental Standard  
>> on Ecological Flows and Water Levels

DISCUSSION DOCUMENT



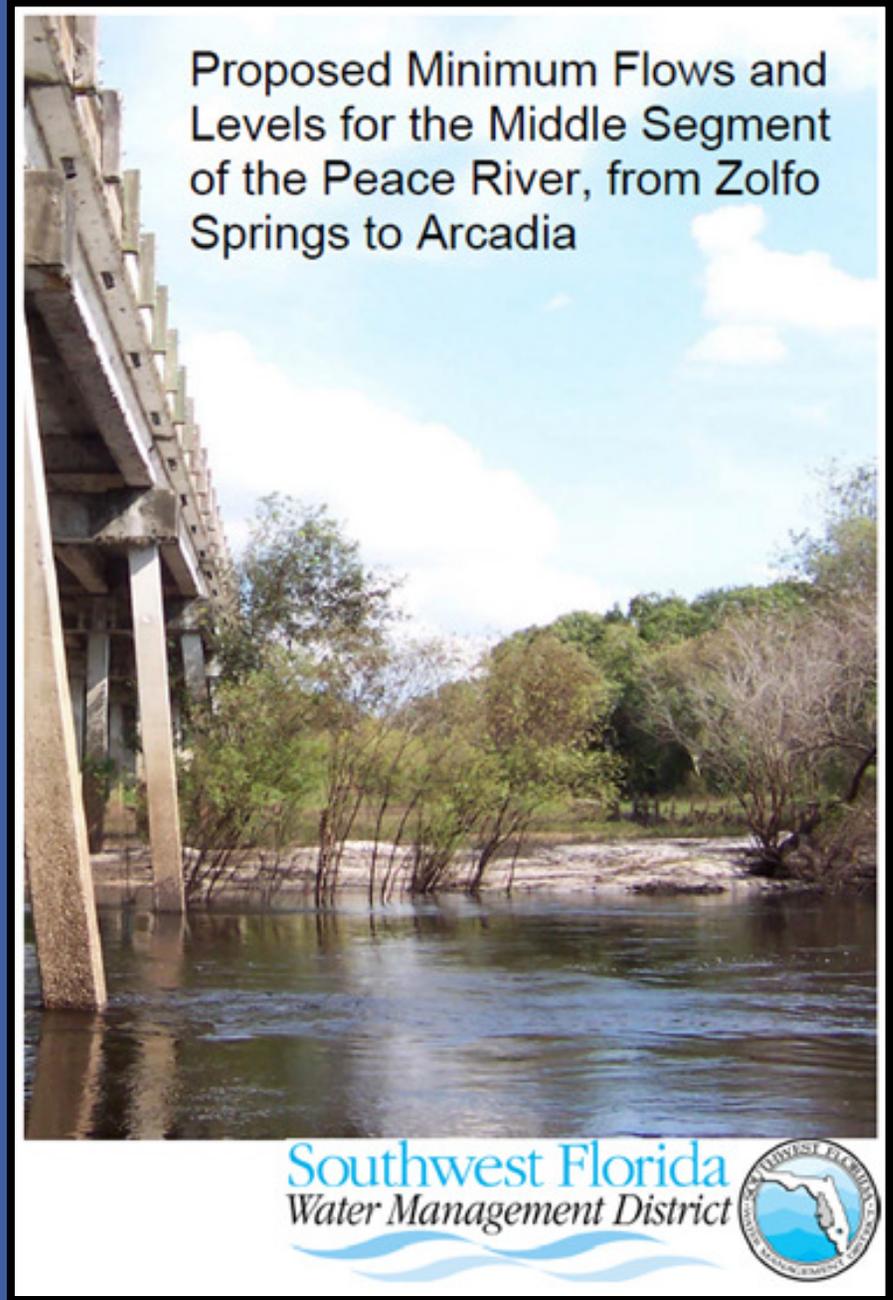
**POLICY FOR MAINTAINING INSTREAM FLOWS IN NORTHERN CALIFORNIA COASTAL STREAMS**

EFFECTIVE SEPTEMBER 28, 2010

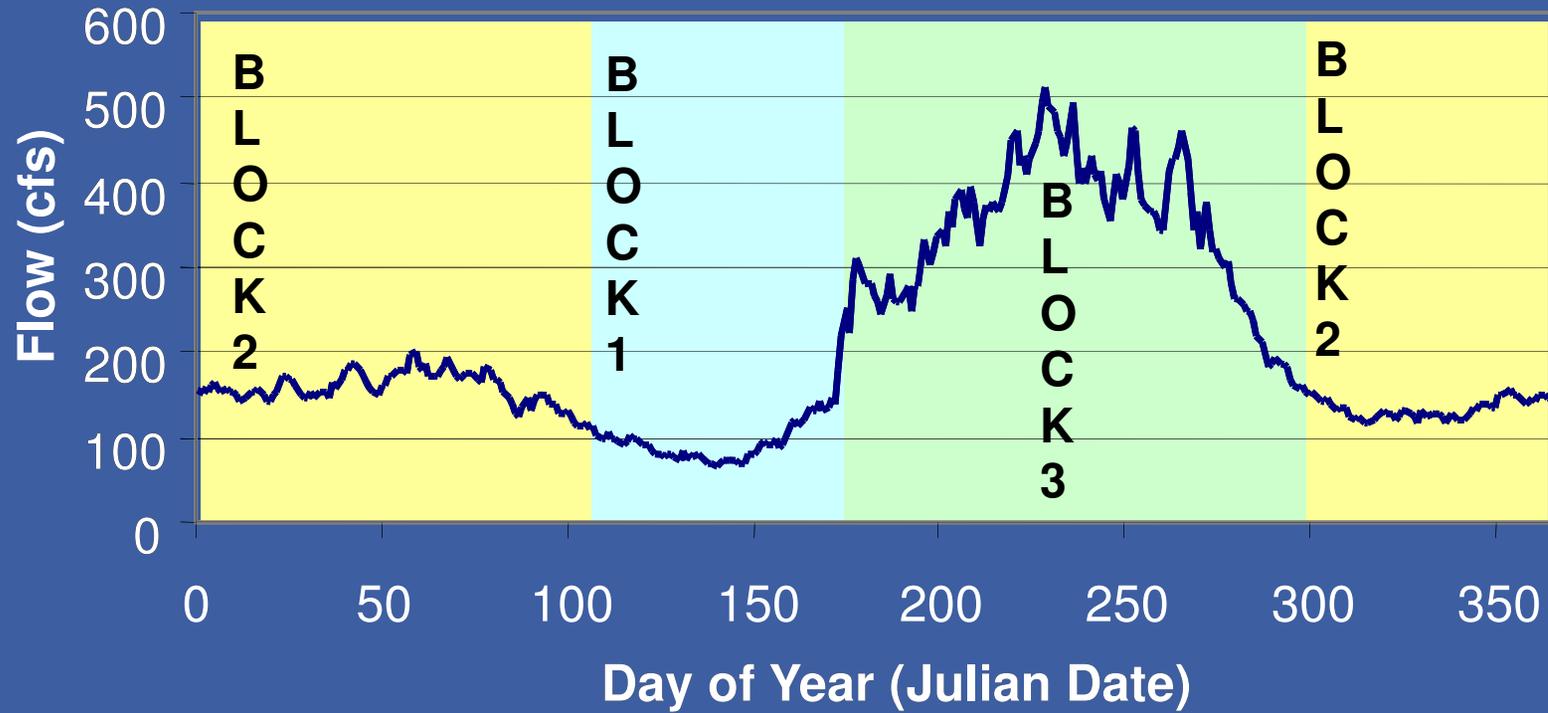
DIVISION OF WATER RIGHTS  
STATE WATER RESOURCES CONTROL BOARD  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

# Florida Example

- Metrics and Process:
  - Habitat, water quality, connectivity
  - Peer-reviewed
  - 15% reduction in habitat
- Methods
  - Building Block
  - PHABSIM
  - Floodplain Inundation/Vegetation
- Time
  - 2-3 years
- Cost
  - \$500k for entire process



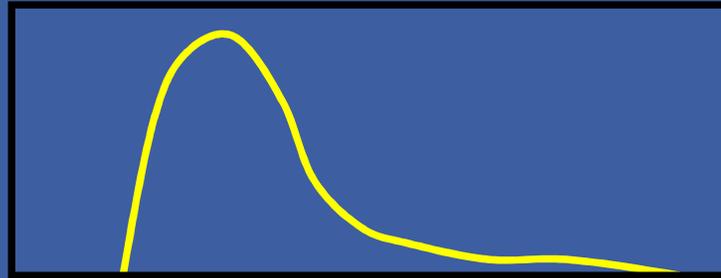
## Period of Record Median Daily Flows for Alafia River at Lithia, FL



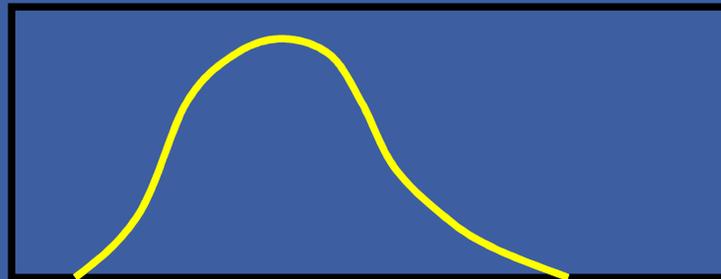
# PHABSIM – Physical Habitat Simulation System

Block 1

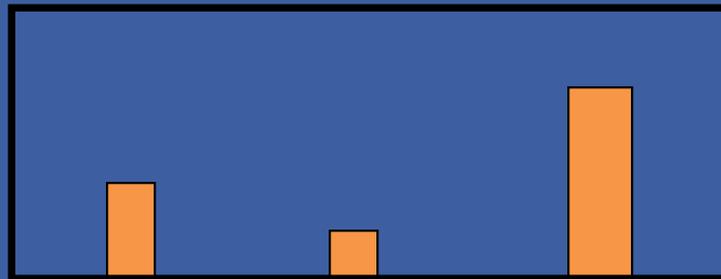
PREFERENCE



FLOW RATE →



WATER DEPTH →



SAND MUD ROCK

## HABITAT SUITABILITY



## Block 3

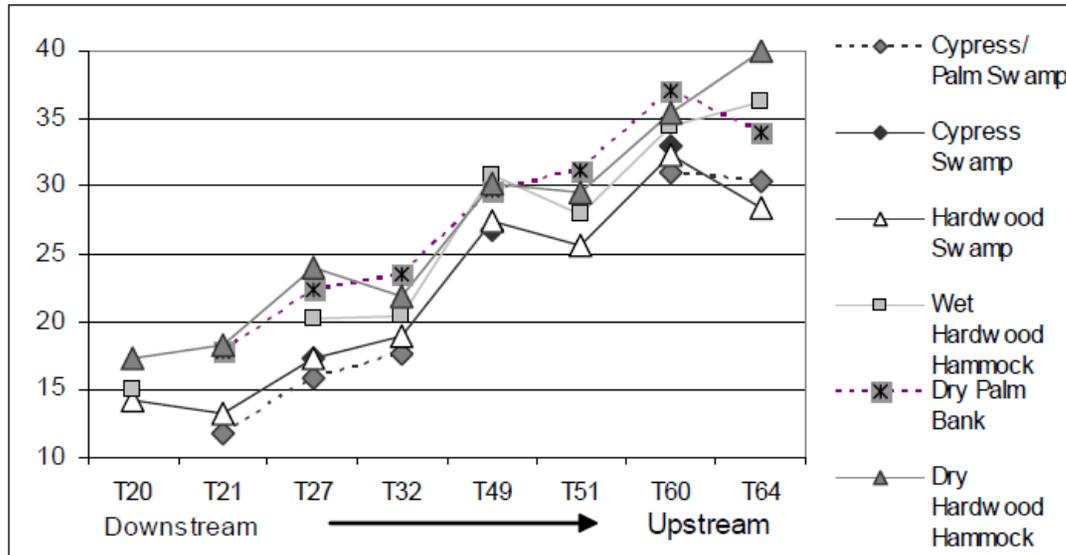


Figure 5-5. Mean elevations of six vegetation classes at eight Alafia River floodplain cross-sections (transects).

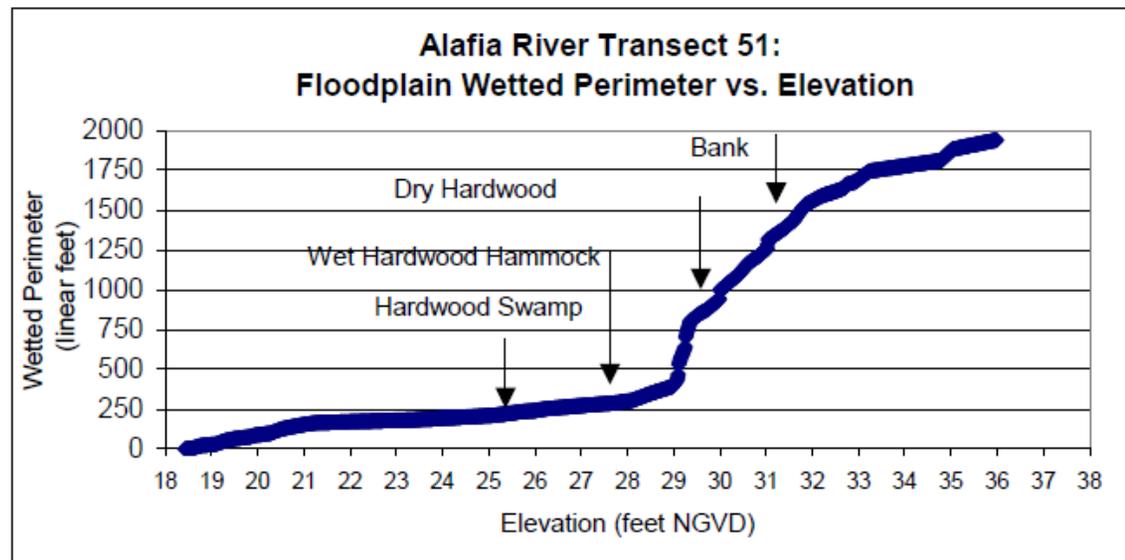
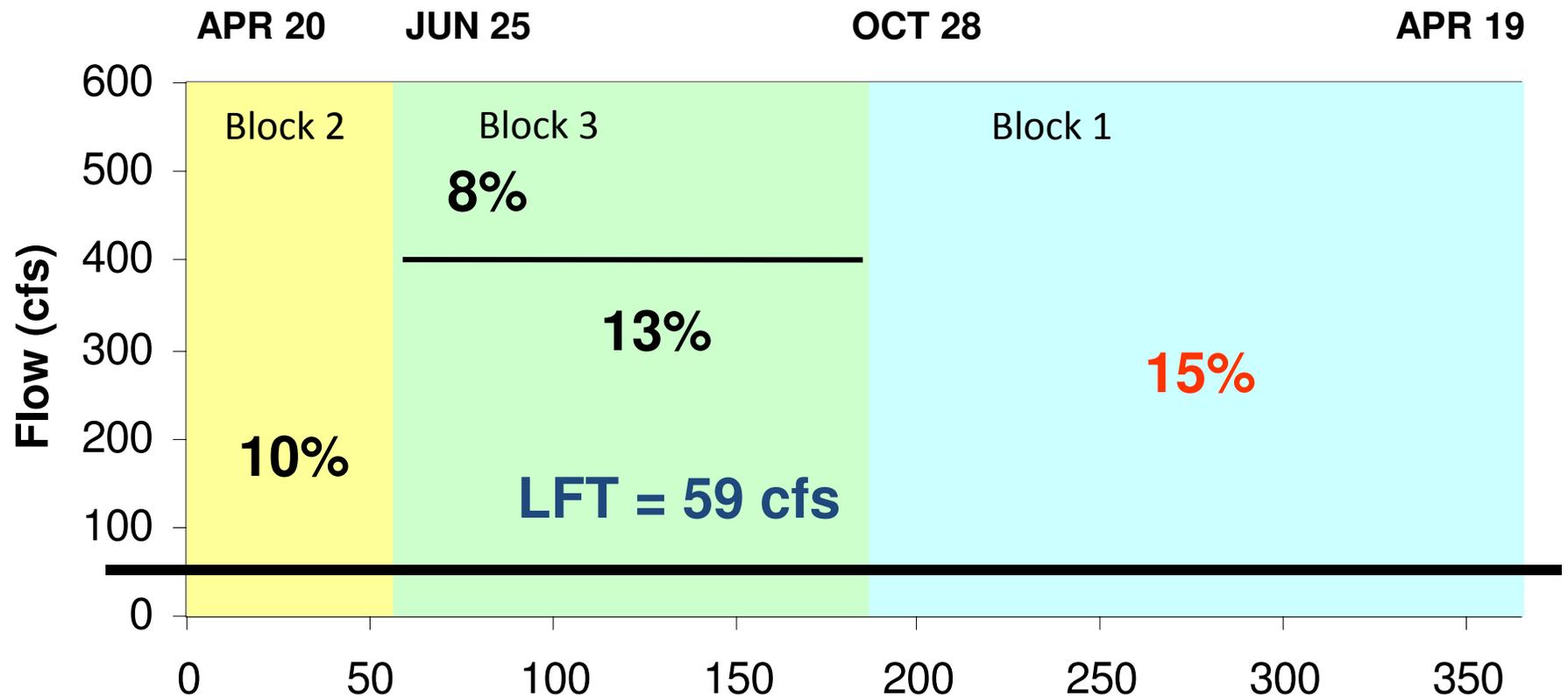


Figure 5-6. Floodplain wetted perimeter versus elevation at floodplain vegetation cross-section 51 (transect 51). Arrows indicate mean elevations for floodplain vegetation classes at the site.

# Flow Prescription – Percent of Reduction (POR) Daily Flows

## Alafia River at Lithia - POR Median Daily Flow



LFT = Low Flow Threshold

# Categories of SVF in SB839

- Channel maintenance
- Connectivity to floodplain
- Sediment transport / deposition
- Upstream / downstream migration
- Spawning/incubation/rearing
- Fish passage
- Including, but not limited to

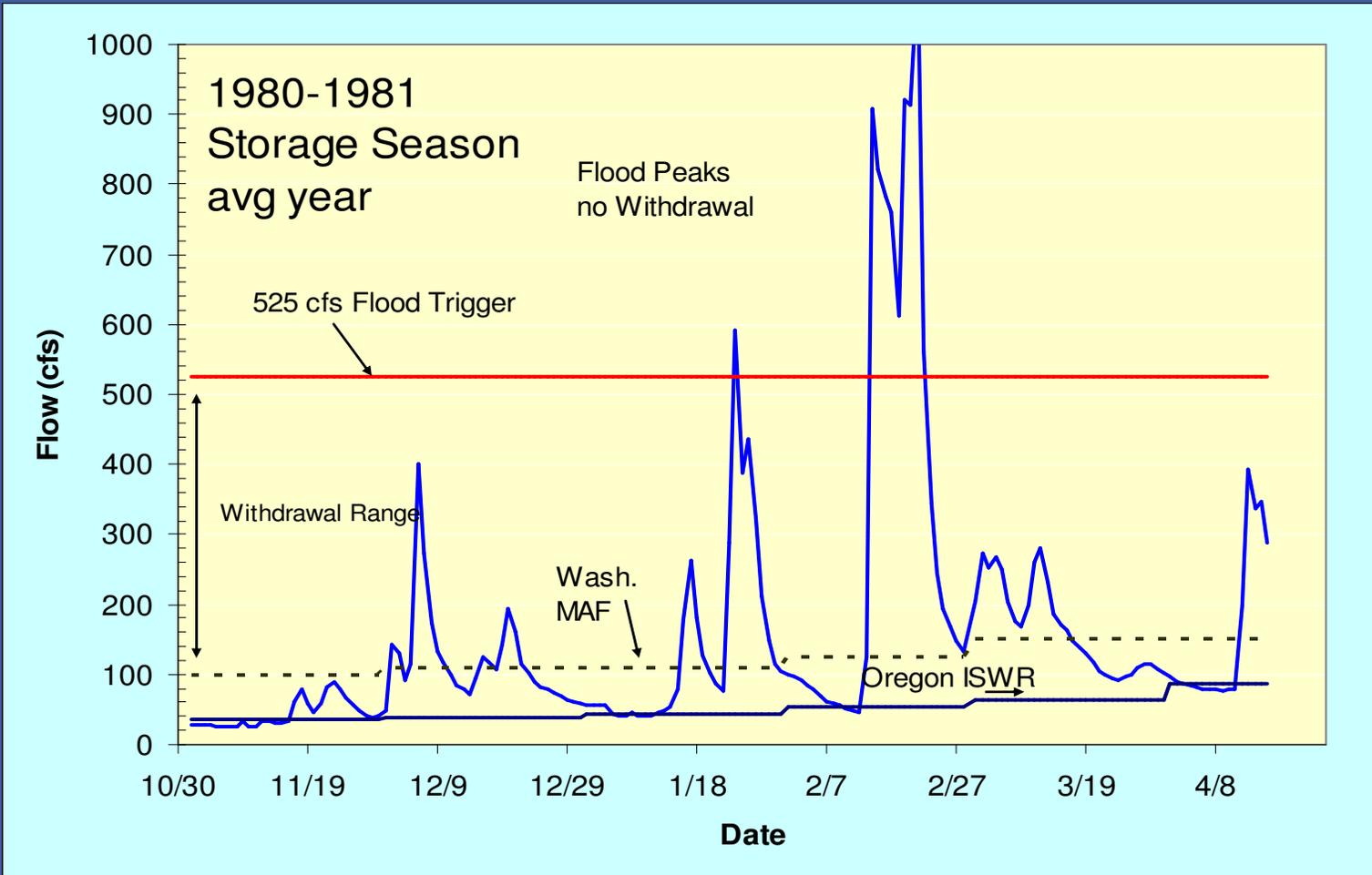
# Channel Maintenance Flows



# Channel maintenance flows: methods

- Hydrological: flow recurrence
- Hydraulic models
- Empirical

# Example: gravel bed stream



# Connectivity methods

- Site-specific
- Incorporates
  - Biology
  - Hydrology
  - Direct observations

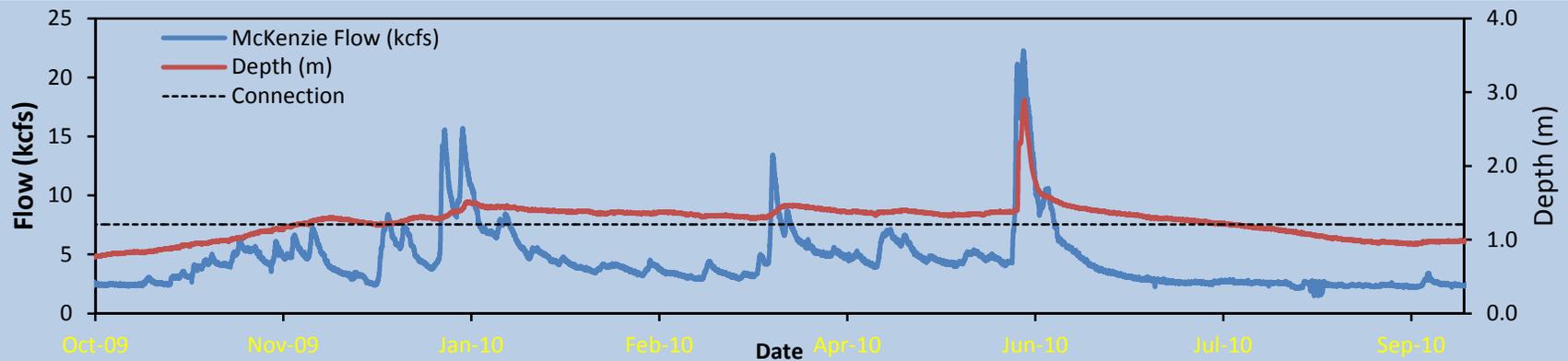


# Floodplain Connectivity Study



Field studies relating Oregon chub to off-channel habitat

# Connectivity to off-channel pond

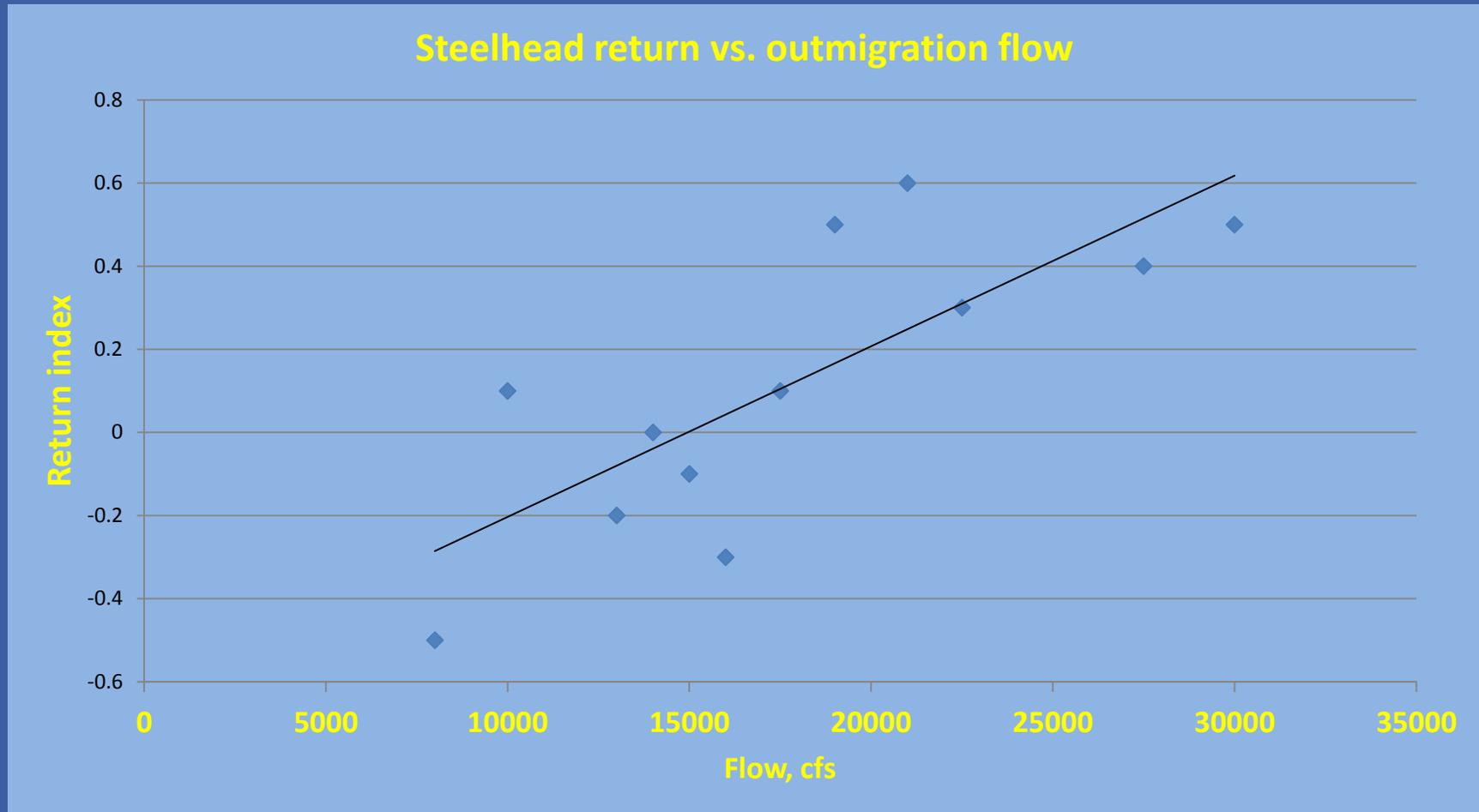


# Migration Flows



- Seasonality
- Magnitude
- Basin-specific data

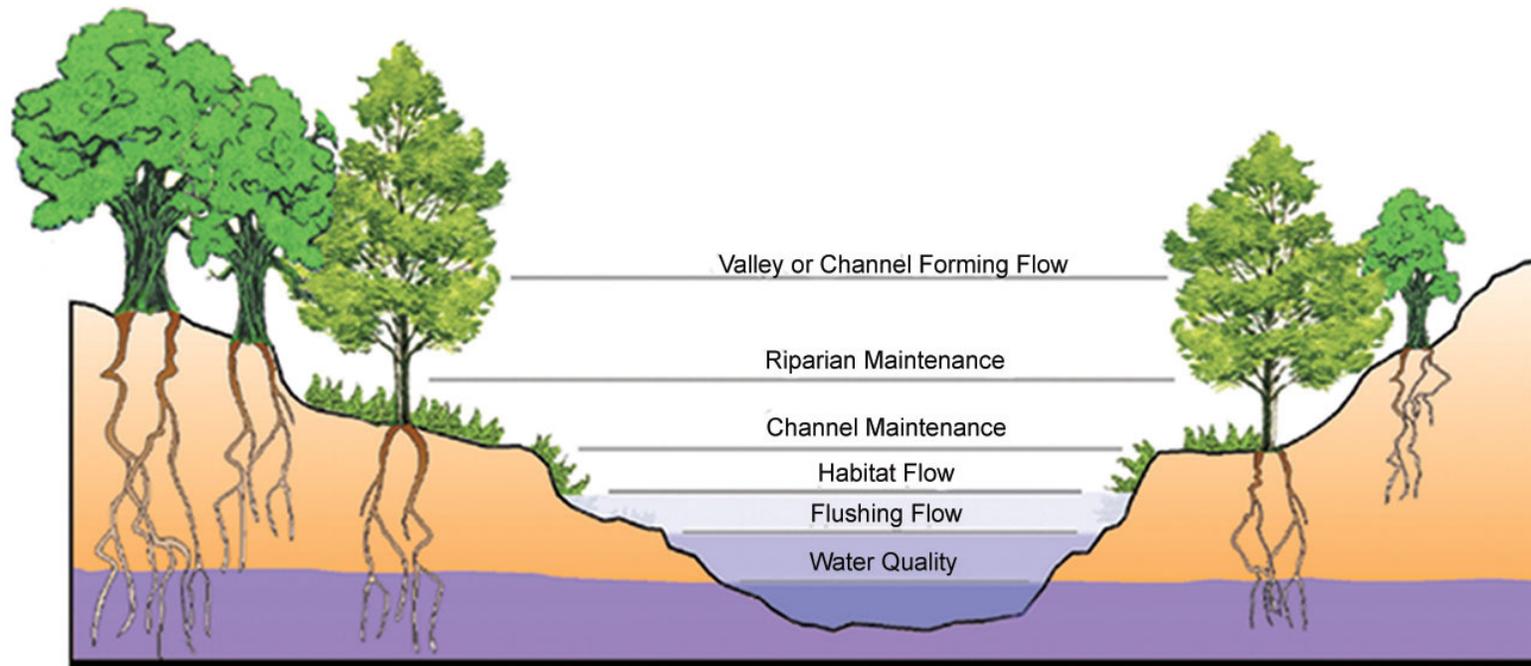
# Analysis of steelhead returns



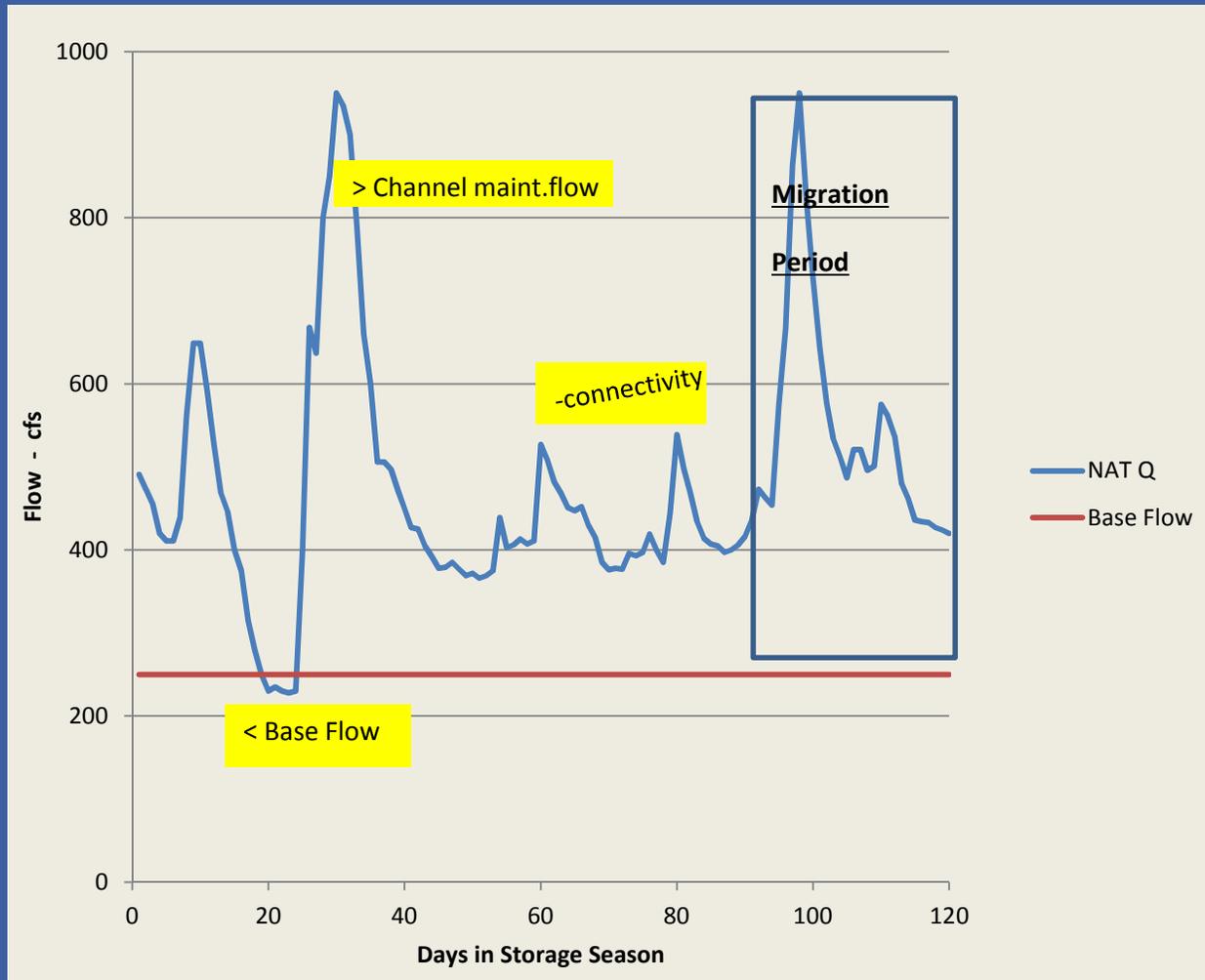
# Example: SVF flow levels

<u>Category</u>	<u>recurrence</u>	<u>Flow-cfs</u>	<u>Times per year</u>	<u>duration</u>
Channel maintenance	1.5- 2 yr	5000	~ 1	~ 1 day
Sediment transp/deposition	< 1 yr	1200	2-3	days
Migration	< 1yr	400+	1	weeks
Floodplain connectivity	<1 yr	500	several	days
(Approx. median Q)		(400)		

# Flows and functions



# Putting it together (*example*)



# Scoping

- Crucial
- Approximate level of effort needed
- Species, channel condition, existing impacts
- Hydrology

# Oregon Water Resources Department

Scope of Work  
↓  
Study Plan, Schedule,  
Budget  
↓  
Specific SVF Components  
↓  
Analysis  
↓  
SVF Description  
↓  
Water Withdrawal  
Regime

Technical  
Review Team

