Draft Study Design

Instream Flow Study of the Lower San Antonio River and Lower Cibolo Creek

Draft Study Design

Prepared for

Lower San Antonio River Sub-Basin Study Design Workgroup

Prepared by

TEXAS INSTREAM FLOW PROGRAM
AND SAN ANTONIO RIVER AUTHORITY

JUNE 2009

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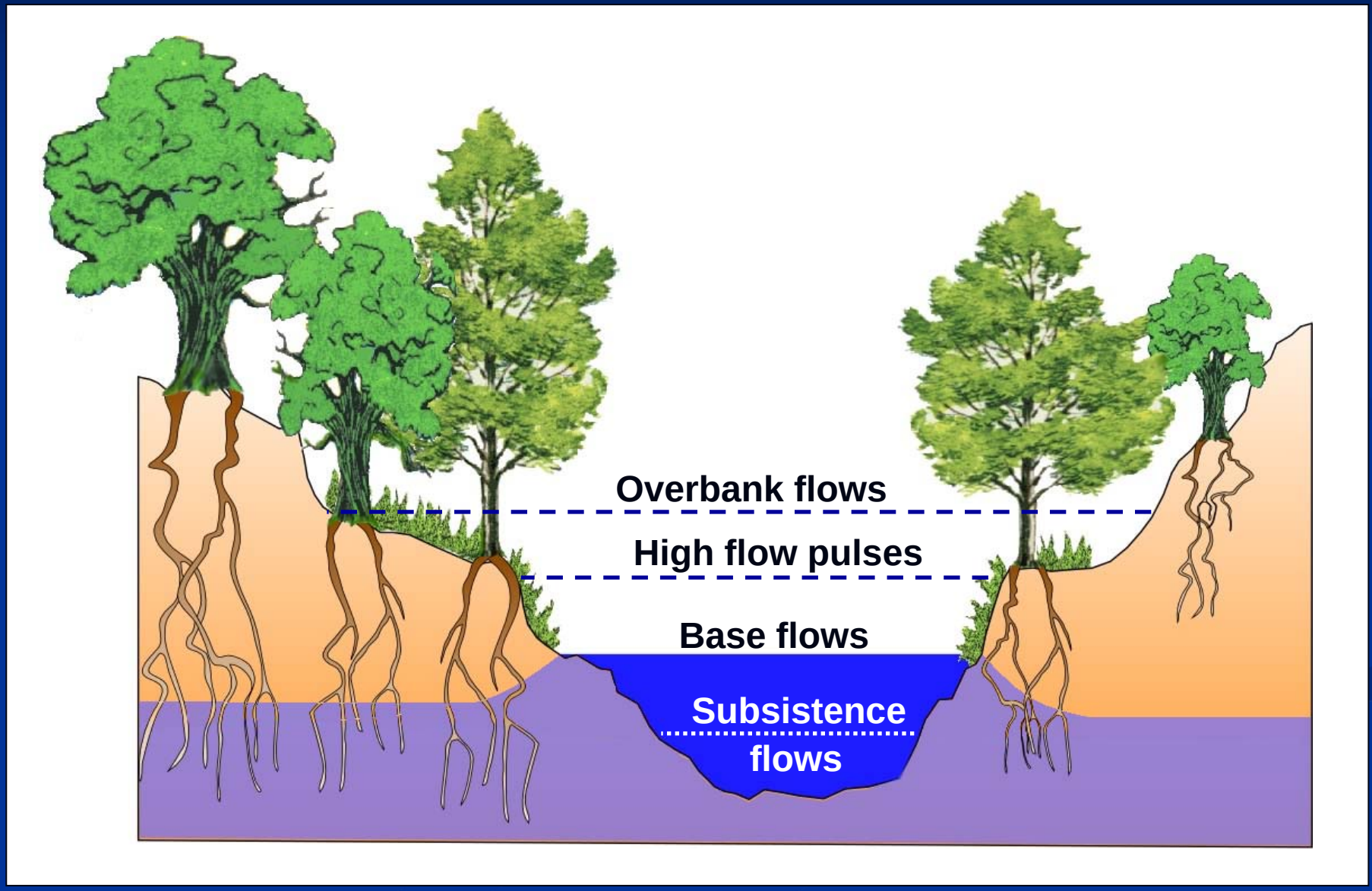
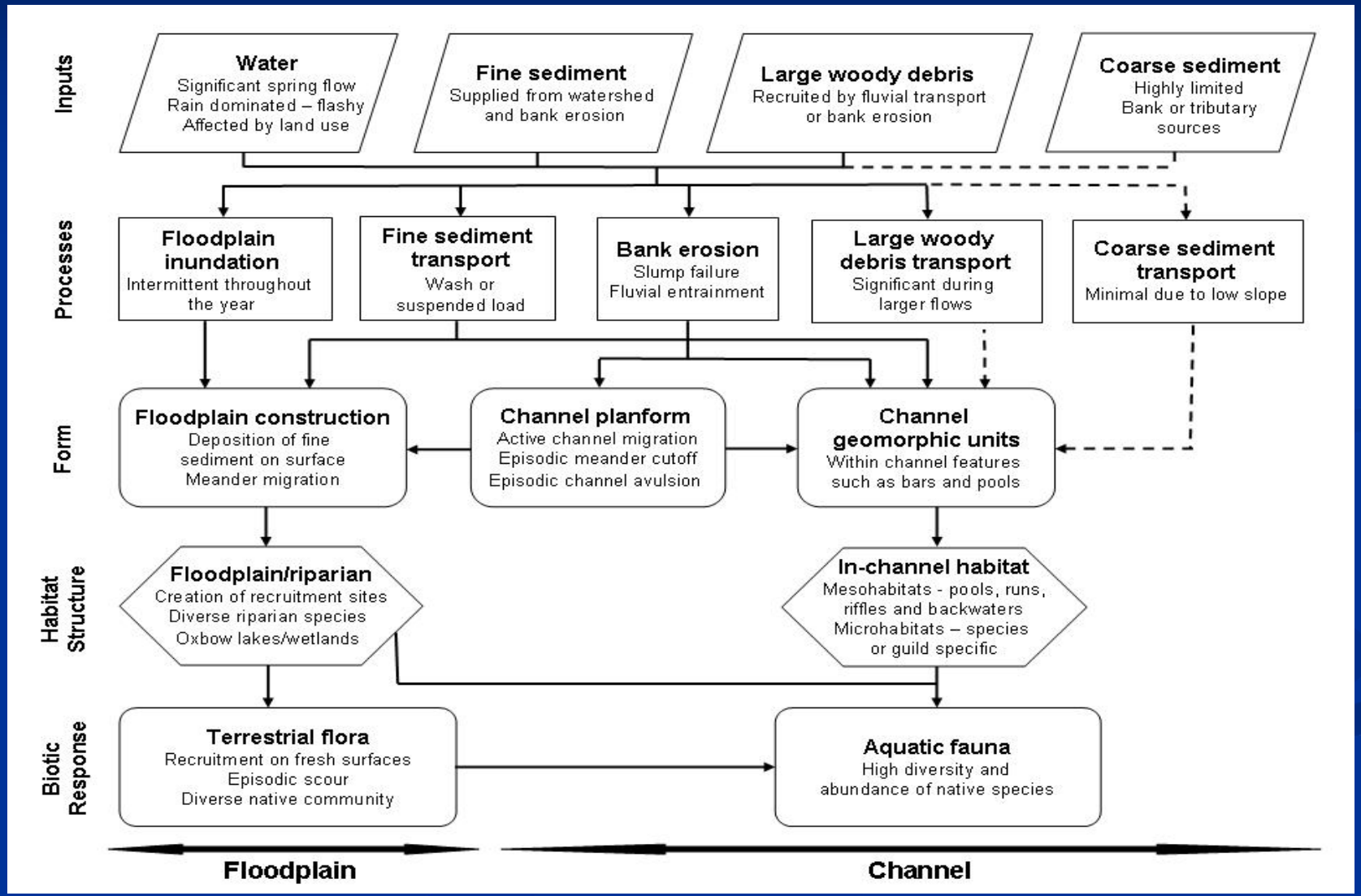


Conceptual Model of lower San Antonio sub-basin

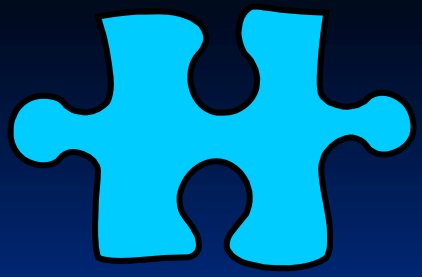


Ecological Processes/Flow Regime of lower San Antonio sub-basin

Component	Hydrology	Geomorphology	Biology	Water Quality	Connectivity
Subsistence flows Infrequent, low flows (typically during summer)	Spring flow (especially from the Edwards Aquifer) and return flows (such as wastewater discharge) make up a large portion of flow	Increase deposition of fine and organic particles	Provide limited aquatic habitat Maintain populations of organisms capable of repopulating system when favorable conditions return	Maintain adequate levels of dissolved oxygen, temperature, and constituent concentrations (particularly nutrients)	Provide limited lateral connectivity along the length of the river Affected by groundwater/ surface water interactions Maintain longitudinal connectivity
Base flows Average flow conditions, including variability.	Elevated in recent years partially due to increased groundwater use (with return flow) in the basin May vary by season and year	Maintain soil moisture and groundwater table in riparian areas Maintain a diversity of habitats	Provide suitable aquatic habitat for all life stages of native species	Provide suitable in-channel water quality Edwards Aquifer spring flow contributes to nitrate levels	Provide connectivity along channel corridor Groundwater / surface water connectivity plays an important role.

Eco. Proc./Flow Regime (continued)

Component	Hydrology	Geomorphology	Biology	Water Quality	Connectivity
High flow pulses In-channel, short duration, high flows	Increased development in the basin (increasing impervious cover) may have increased the magnitude and frequency of these events	Maintain channel and substrate characteristics Flush sediment Prevent encroachment of riparian vegetation Play an important role in recovery of channel after extreme flood events	Provide spawning cues for organisms	Restore in-channel water quality after prolonged low flow periods	Provide connectivity to near-channel water bodies
Overbank flows Infrequent, high flows that exceed the channel	Occur more frequently due to natural climate, geography, and geology of the Hill Country	Provide lateral channel movement and floodplain maintenance Form new habitats Flush organic material into channel Recruit and transport large woody debris Deposit nutrients in floodplain	Provide spawning cues for organisms Maintain diversity of riparian vegetation	Restore water quality in floodplain water bodies	Provide connectivity to floodplain Provide large volumes of freshwater to San Antonio Bay

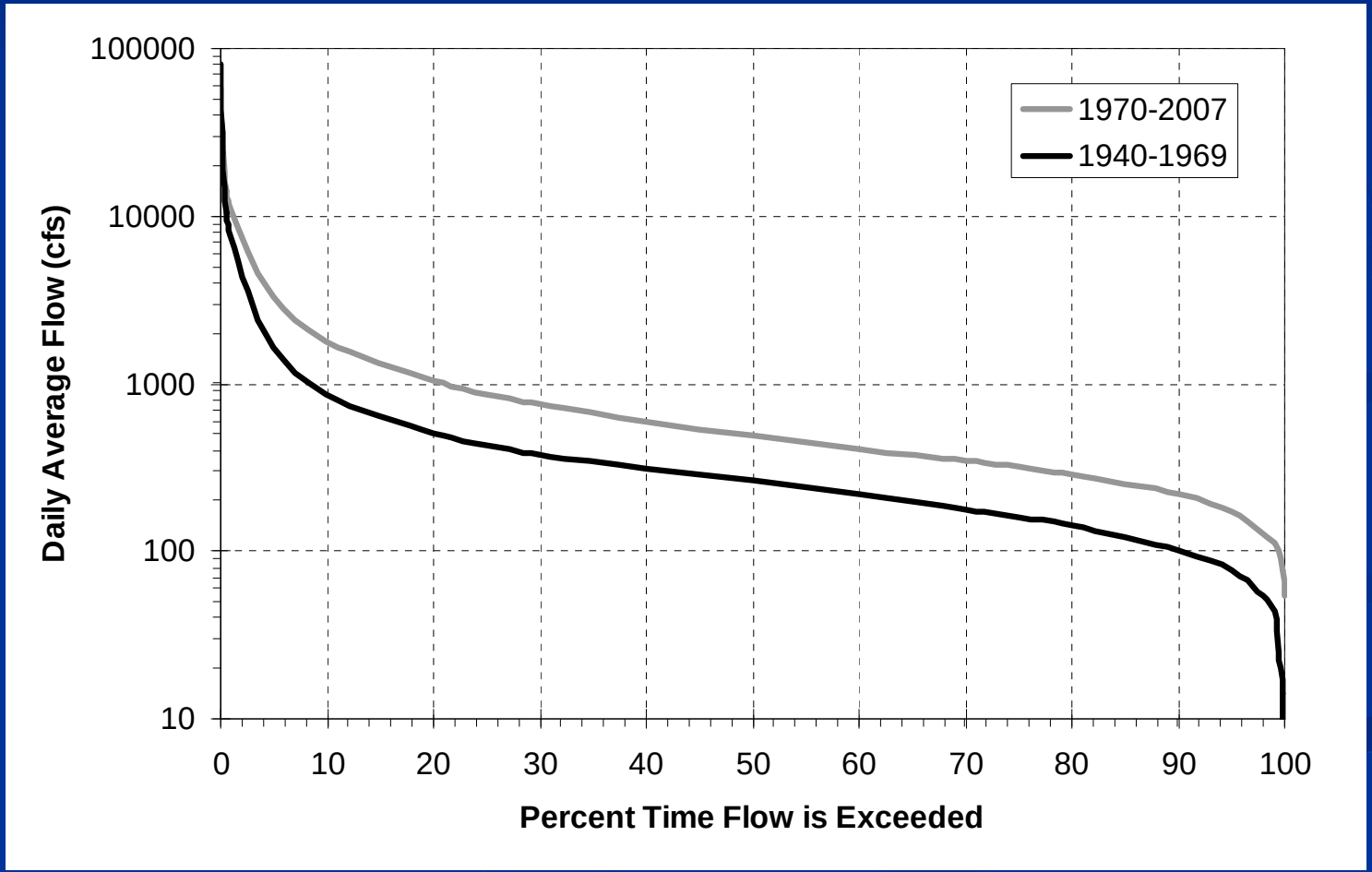


Hydrology and Hydraulics

Indicators	and	Activities
Flow regime components (frequency, timing, duration, rate of change, magnitude)		**Hydrologic evaluation**
Natural variability		**Hydrologic evaluation**
Losses/gains		**USGS studies**

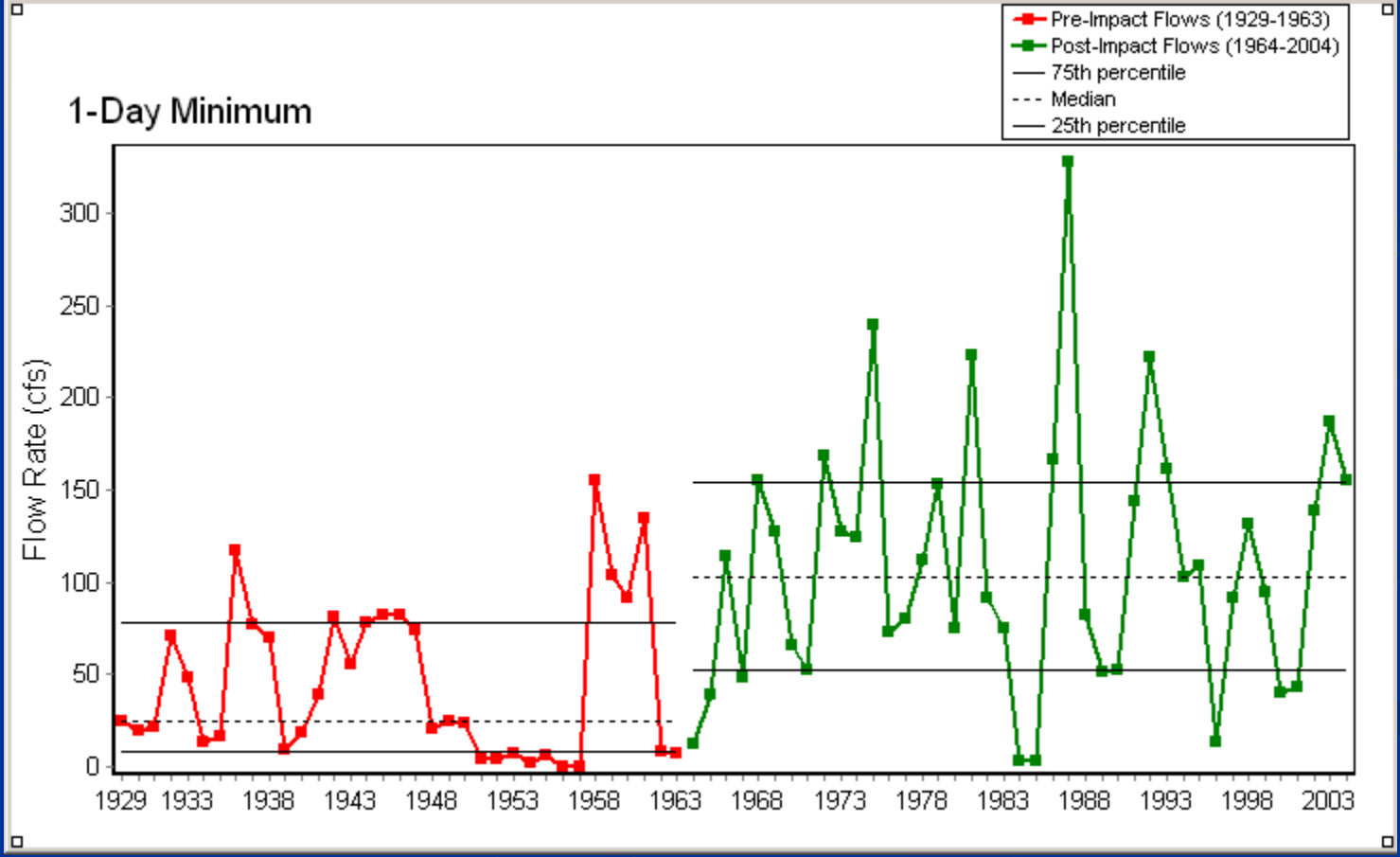
Hydrology and Hydraulics

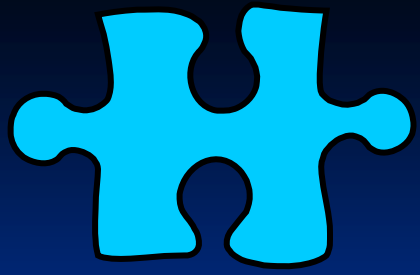
Hydrologic Evaluation



Hydrology and Hydraulics

Hydrologic Evaluation





Hydrology and Hydraulics

Activities to support Other disciplines

2-d hydraulic modeling

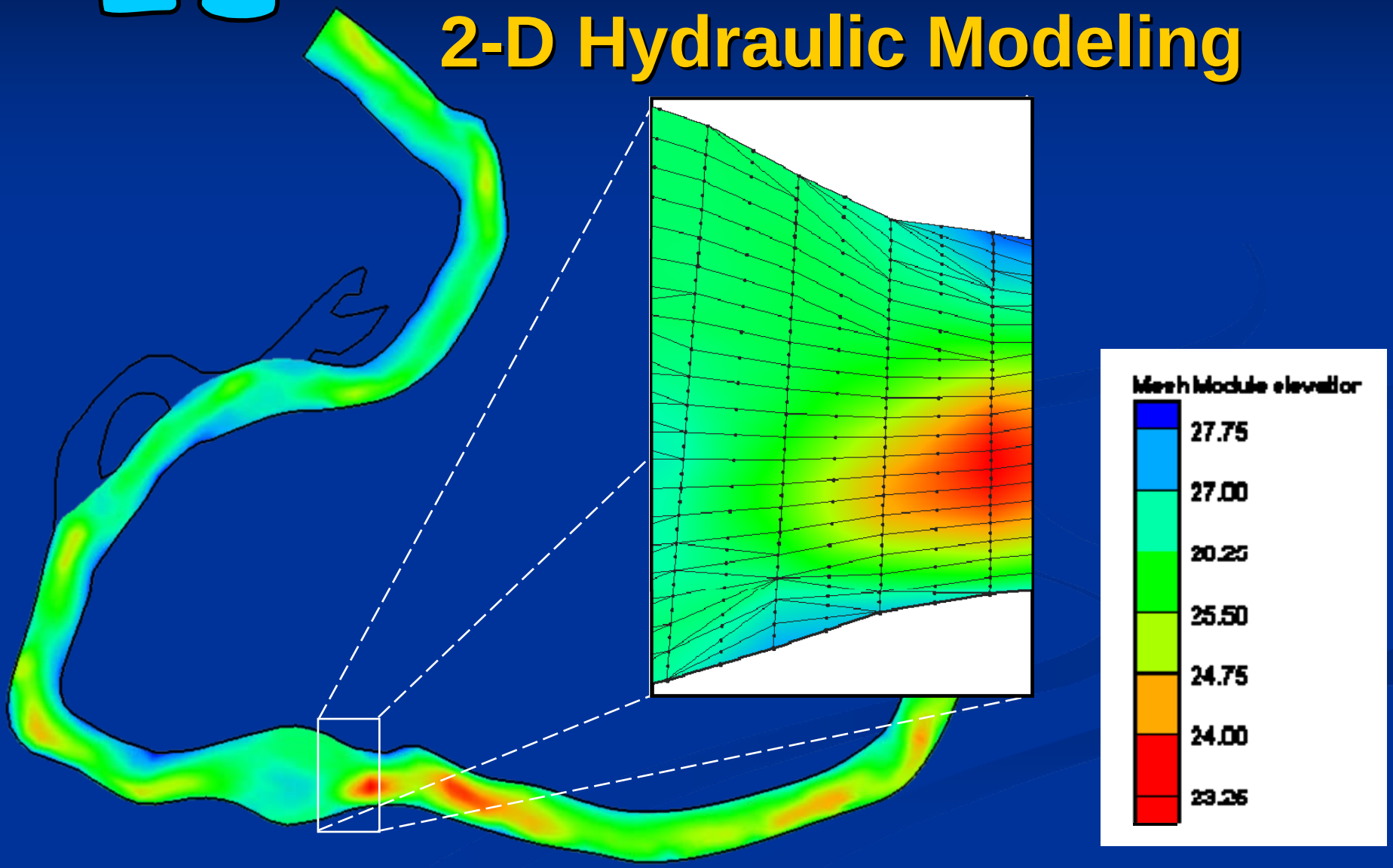
- **Biology** (habitat modeling)
- **Physical Processes** (sediment transport)
- **Other** (recreation modeling)

1-d hydraulic modeling

- **Biology** (riparian studies)

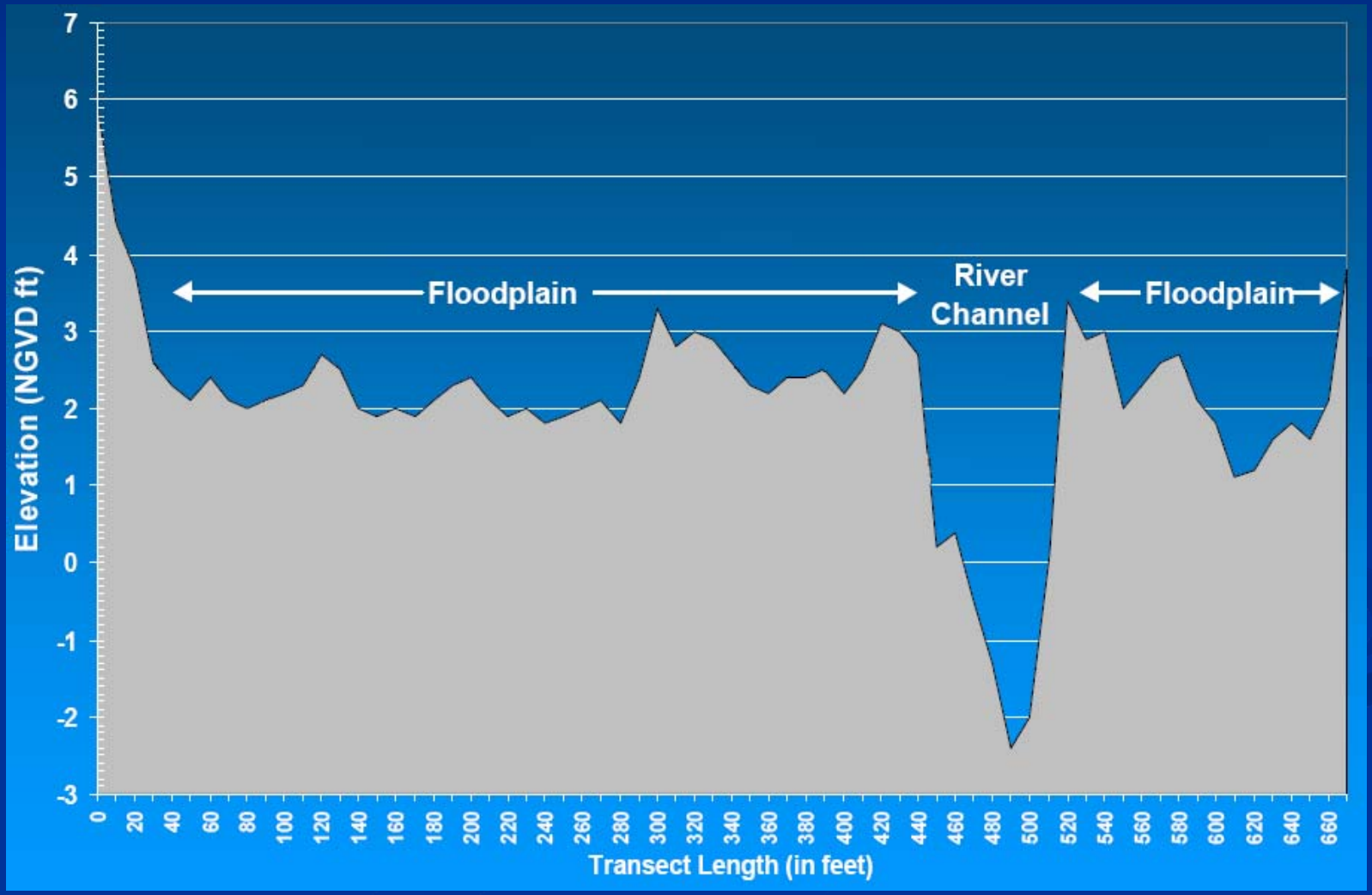
Hydrology and Hydraulics

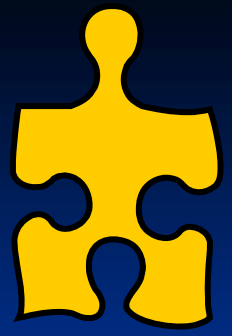
2-D Hydraulic Modeling



Hydrology and Hydraulics

1-D Hydraulic Modeling



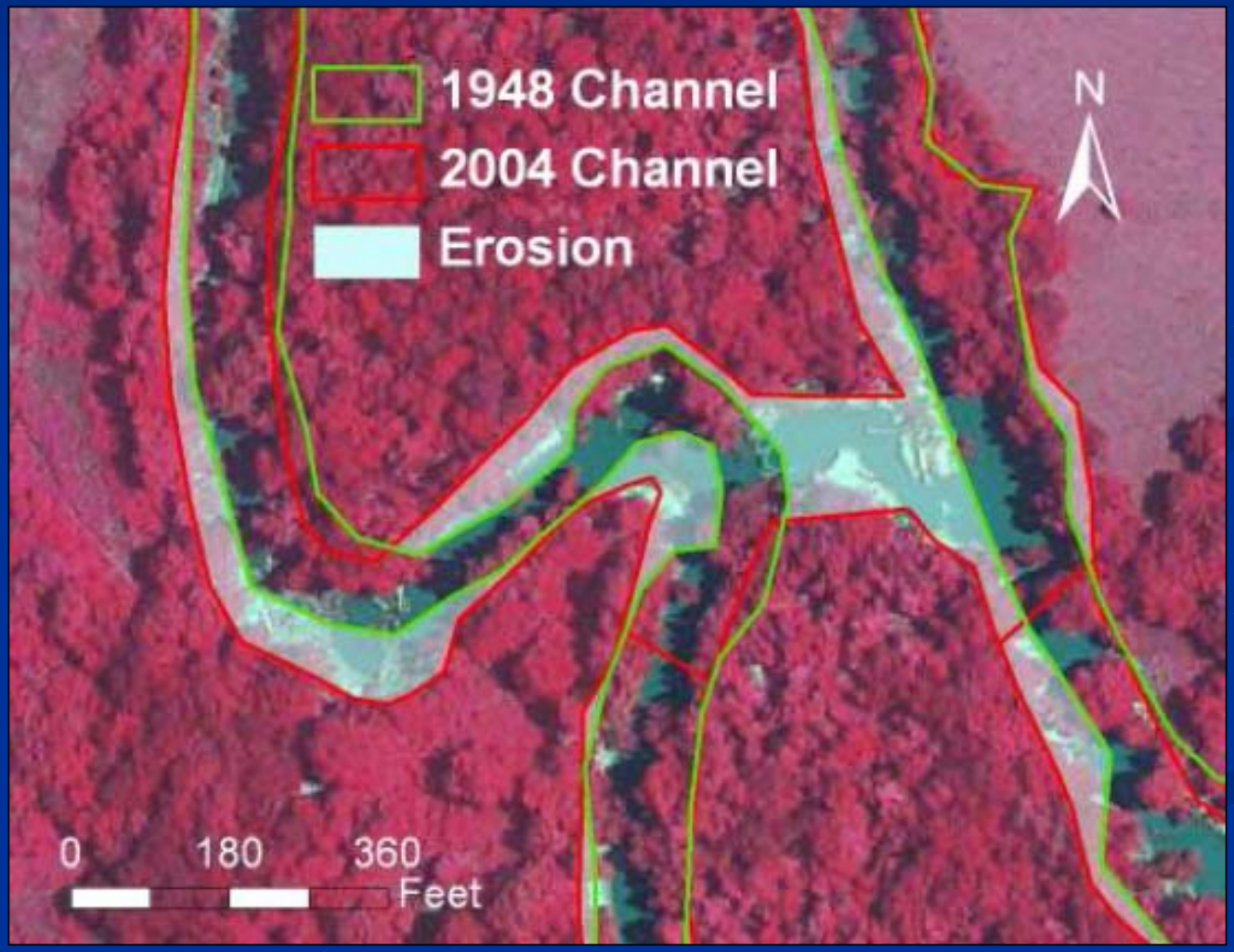


Physical Processes (Geomorphology)

Indicators	Activities
Channel migration (lateral migration, channel avulsion, bank erosion rates)	**Analysis of aerial photos**
Overbank flows	**Hydraulic modeling**
Woody-debris	**LWD budgeting**
Channel shape (in-channel bars, meander pools)	**Sediment budgeting, transport modeling**

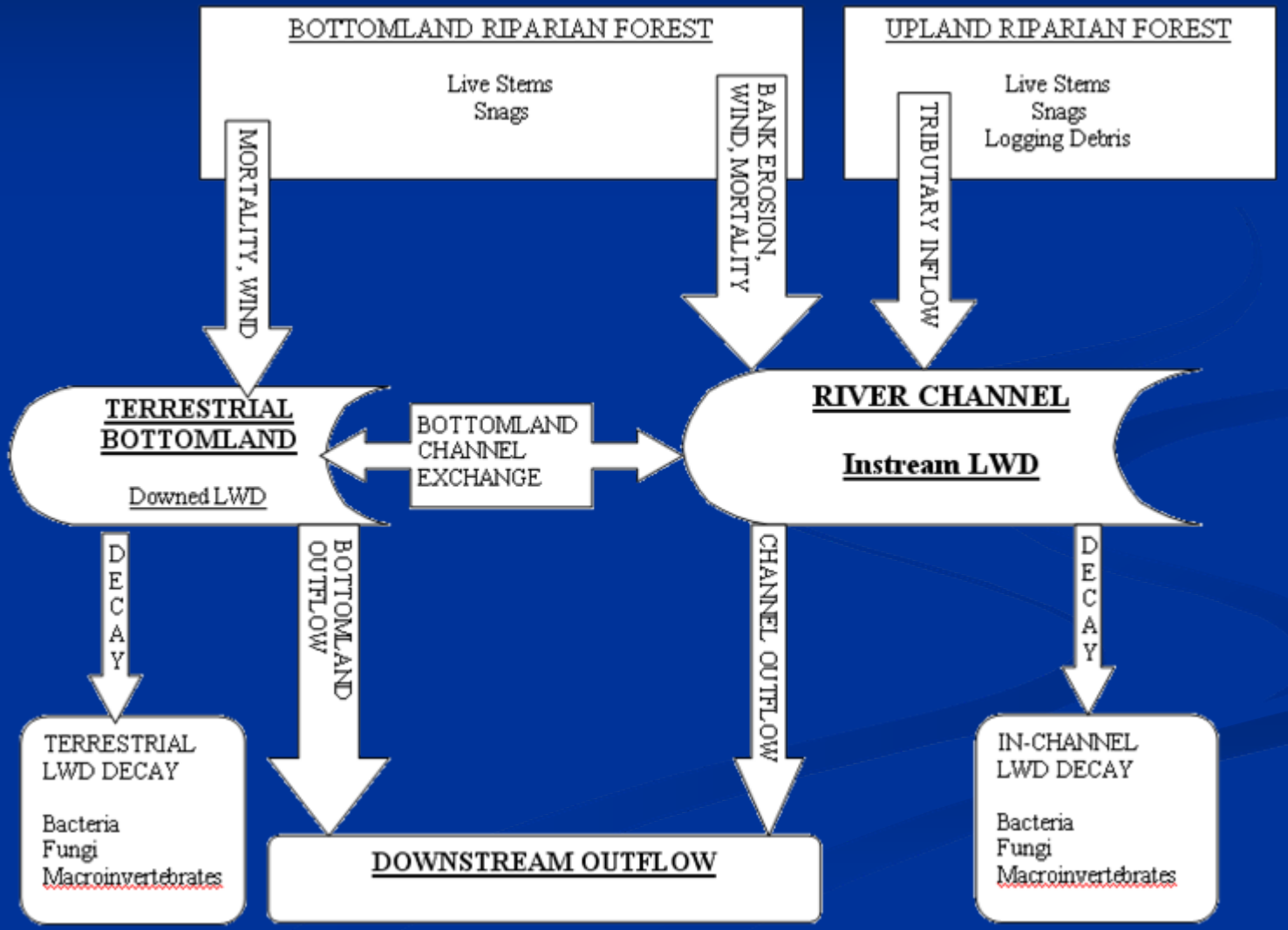
Physical Processes

Analysis of Aerial Photos



Physical Processes

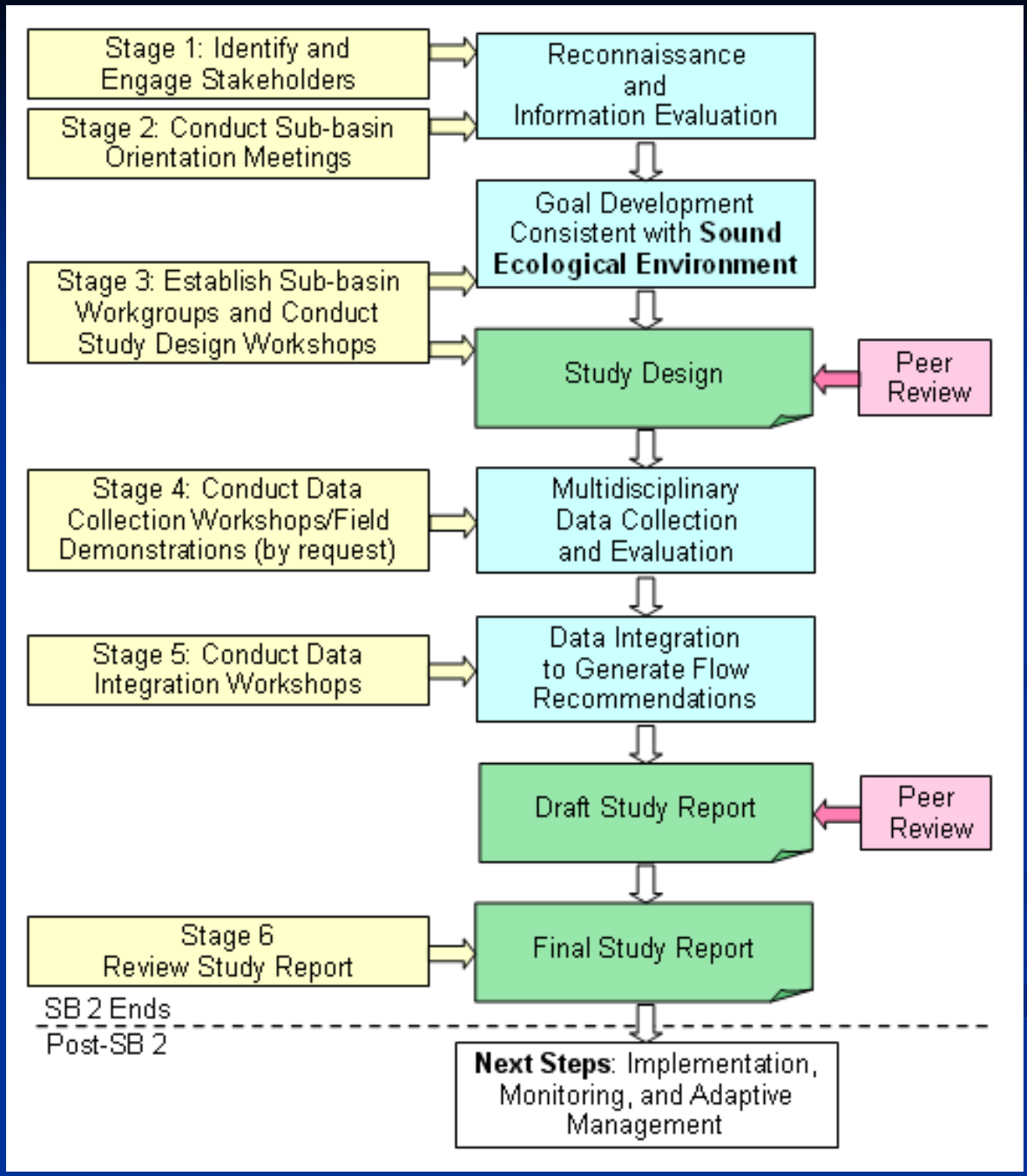
Large Woody Debris Budgeting



Connectivity

Indicators	and	Activities
Losses/gains		USGS studies
Connection to river (frequency, duration, timing)		Monitoring
Freshwater inflow (monthly/yearly volumes)		Calculate volumes

Next Steps


2005
2008
2008-09
est. 2010 -2012
est. 2012
est. 2013
Stage 1: Identify and Engage Stakeholders
Stage 2: Conduct Sub-basin Orientation Meetings
Reconnaissance and Information Evaluation
Goal Development Consistent with Sound Ecological Environment
Stage 3: Establish Sub-basin Workgroups and Conduct Study Design Workshops
Study Design
Peer Review
Stage 4: Conduct Data Collection Workshops/Field Demonstrations (by request)
Multidisciplinary Data Collection and Evaluation
Stage 5: Conduct Data Integration Workshops
Data Integration to Generate Flow Recommendations
Draft Study Report
Peer Review
Stage 6 Review Study Report
Final Study Report
SB 2 Ends
Post-SB 2
Next Steps: Implementation, Monitoring, and Adaptive Management
2005
2008
2010
est. 2010 -2012
est. 2013
est. 2013

Comments on Draft Study Design

- Today's meeting
- Send comments by July 17, 2009
  - E-mail: tifp@twdb.state.tx.us
  - Mail: Texas Instream Flow Program
    P.O. Box 13231
    Austin, TX 78711-3231

How to stay involved

- Check website for updates
  - www.twdb.state.tx.us/instreamflows/
- Electronic/postal newsletter
- Contact TIFP if interested in seeing study activities in field
- Participate in Data Integration Workshops
- Review Study Report