

Managing Freshwater Inflows to Estuaries

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Flow Regime
(quantity, timing, quality)

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graph TD; A["Flow Regime<br/>(quantity, timing, quality)"] --> B["Physical Habitat"]; A --> C["Water Quality"]; A --> D["Connectivity"]; A --> E["Energy Supply"]; A --> F["Species Interactions"]; B --> G["Ecological Integrity"]; C --> G; D --> G; E --> G; F --> G;
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The diagram is a flowchart on a blue background. At the top is a light blue box containing the text 'Flow Regime (quantity, timing, quality)'. Five arrows point downwards from this box to five separate light blue boxes arranged in a horizontal row. These boxes are labeled 'Physical Habitat', 'Water Quality', 'Connectivity', 'Energy Supply', and 'Species Interactions'. From each of these five boxes, an arrow points downwards to a single, larger light blue box at the bottom labeled 'Ecological Integrity'.

Physical
Habitat

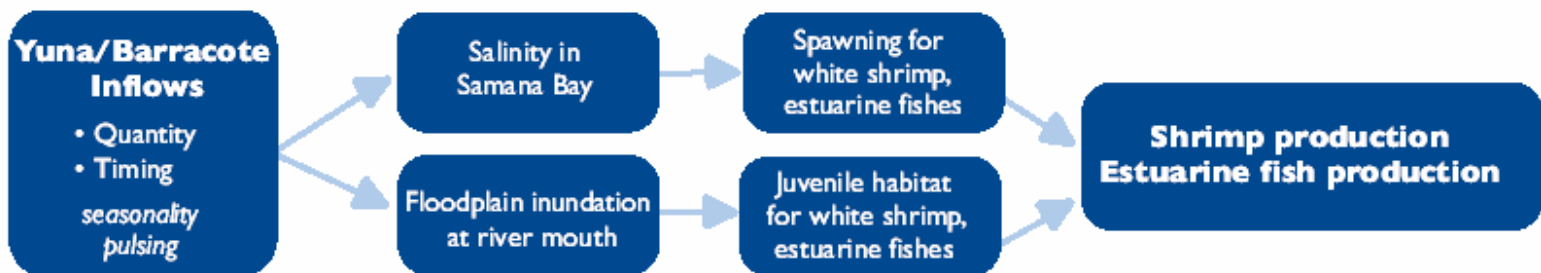
Water
Quality

Connectivity

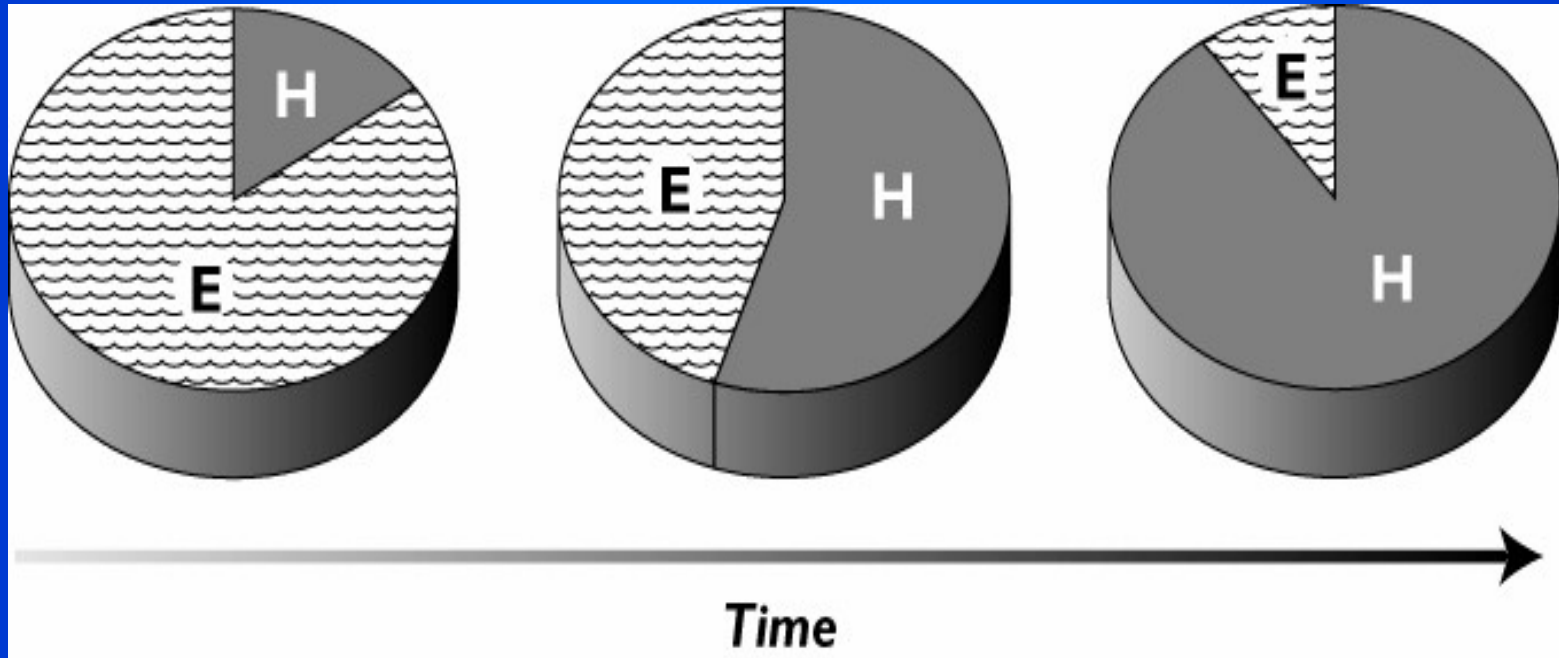
Energy
Supply

Species
Interactions

Ecological
Integrity



Traditional Approach to Water Management

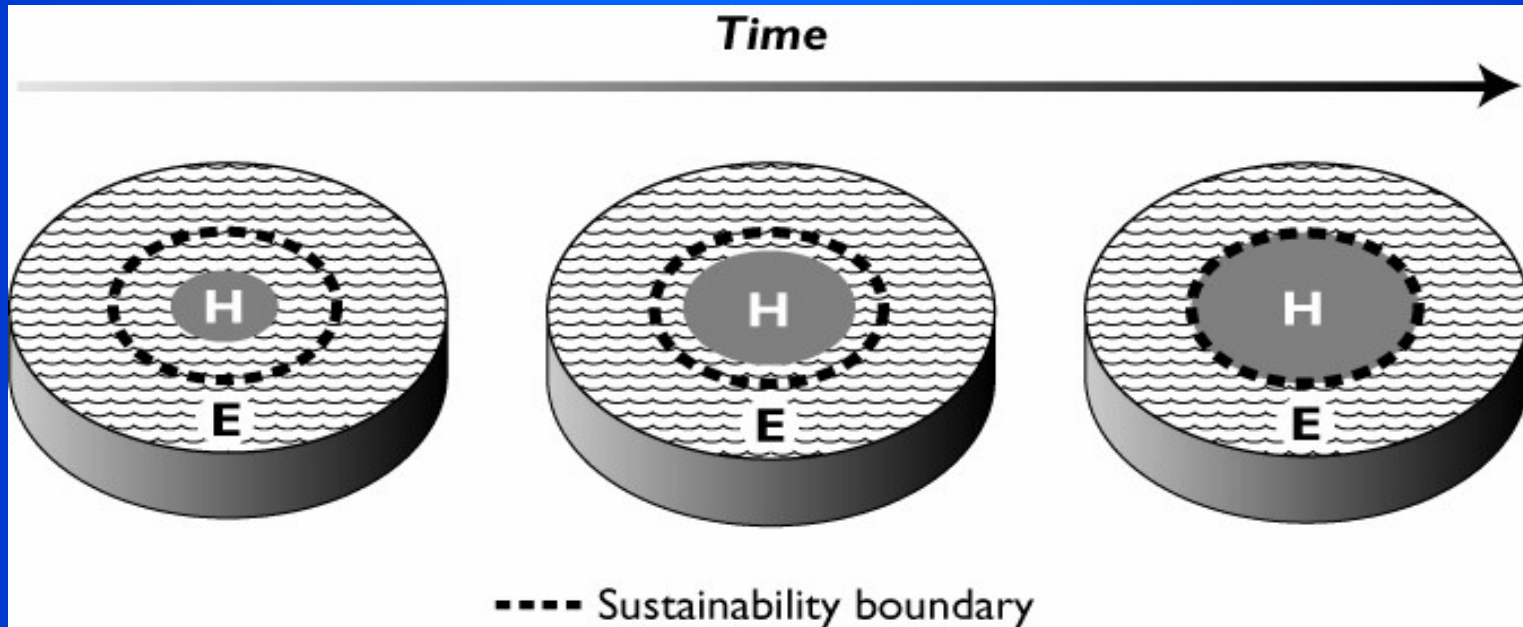


E = ecosystem support

H = human use

From “Rivers for Life: Managing Water for People and Nature” by Sandra Postel and Brian Richter (Island Press 2003)

Sustainable Approach to Water Management

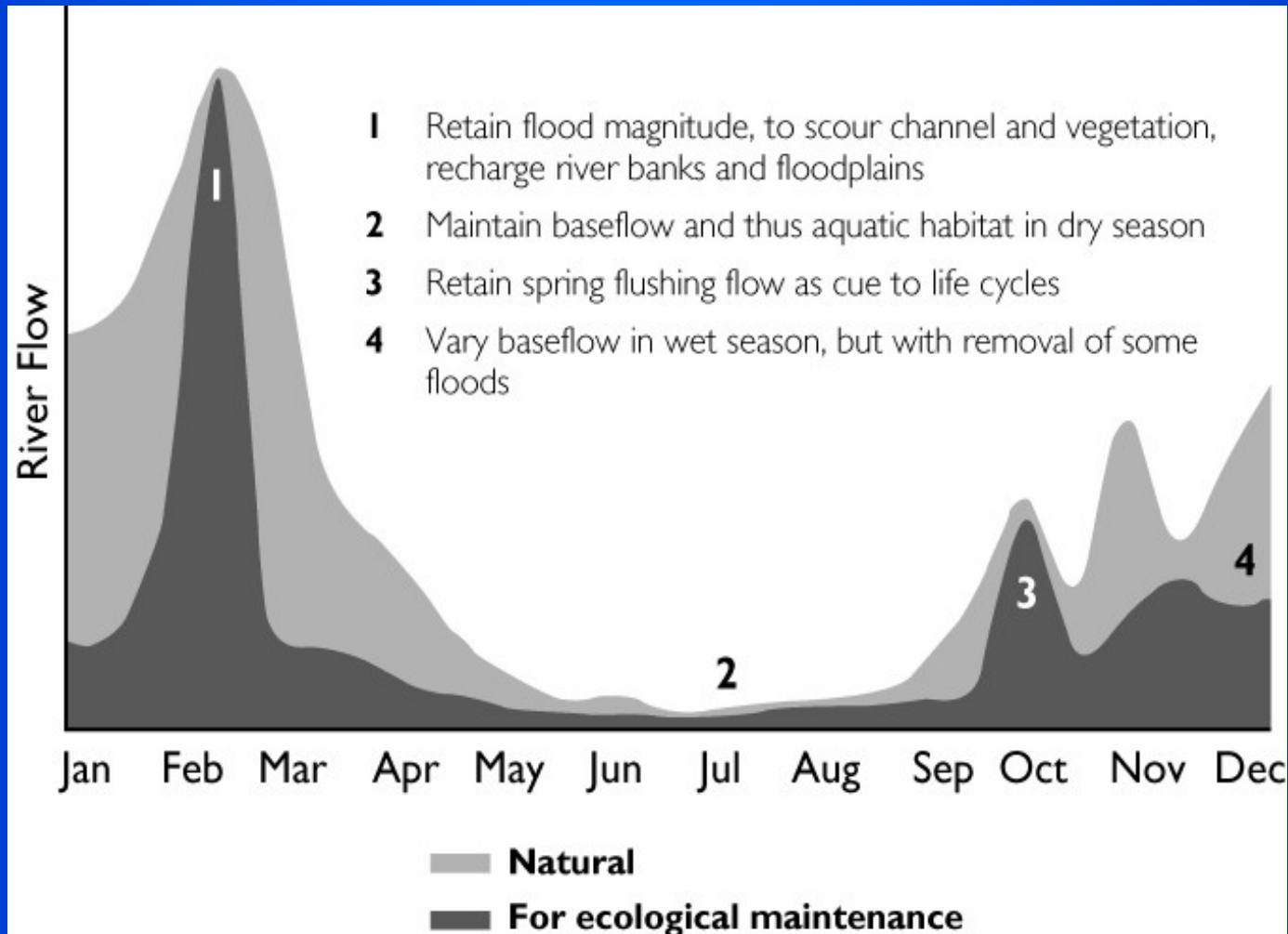


E = ecosystem support

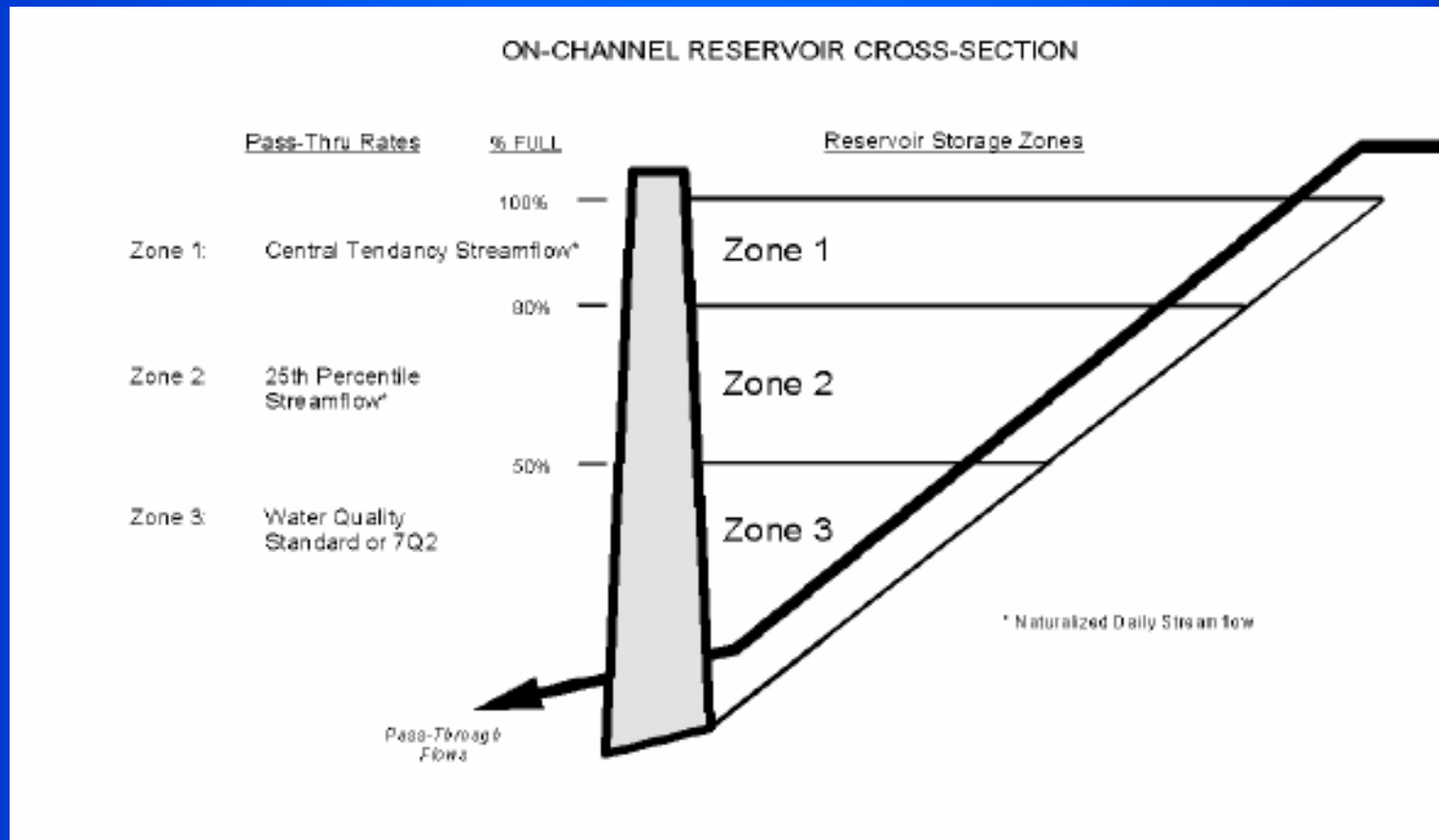
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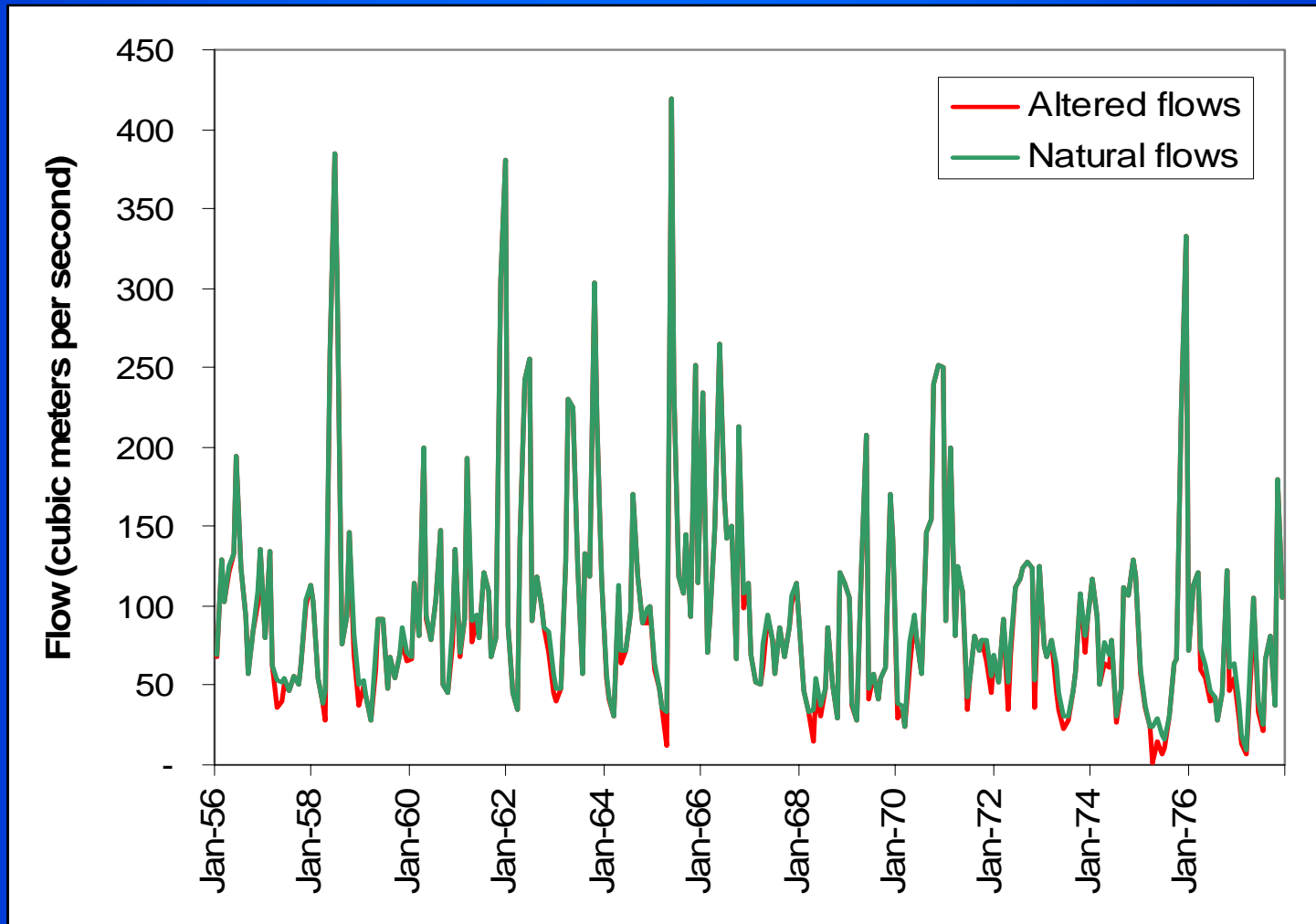
Managing for Natural Variability



Texas 3-Zone Water Pass-Through System

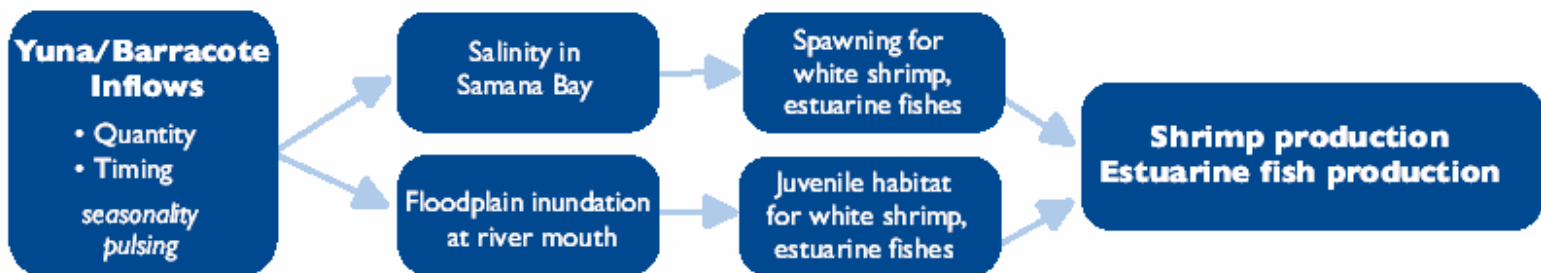


Simulated Impact of Irrigation Withdrawals On Freshwater Inflows to Samana Bay



Valued Ecosystem Components (VECs) for Samana Bay, DR

- White shrimp
- Oysters
- Estuarine fish (jacks, herrings, silversides, ballyhoos, drums, snooks, anchovies)
- Birds (herons, frigates, ibis, flamingos, ducks, doves)
- Seagrasses, coral reefs, mangroves



Savannah River, Georgia



Environmental Flow Building Blocks

Savannah River, below Thurmond Dam (*River-Floodplain*)

Floods

50,000-70,000 cfs; 2 weeks, avg every 2 yrs

- Maintain channel habitats
- Create floodplain topographic relief
- Provide fish access to the floodplain
 - control invasive species
- Maintain wetlands and fill oxbows and sloughs
- Enhance nutrient cycling & improve water clarity
 - Disperse tree seeds

High Flow Pulses

>30,000 cfs; 5 pulses, >2 days with 2 events of 2 week duration (March and early April)

20,000-40,000 cfs; 2-3 days, 1/month

- Provide predator-free habitat for birds
 - Disperse tree seeds
 - Transport fish larvae
- Flush woody debris from floodplain to channel
 - Floodplain access for fish
 - Fish passage past NSBLD

<13,000 cfs; 3 successive years, every 10-20 years

- Floodplain tree recruitment

8,000-12,000 cfs;

- Exchange water with oxbows

Low Flows

>8,000 cfs

- Larval drift for pelagic spawners

<5,000 cfs

- Adequate floodplain drainage
- Create shallow water habitat for small-bodied fish

3,000 cfs; 3 successive years every 10-20 years

- Floodplain tree recruitment

Key

- Wet Year
- Avg Year
- Dry Year

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Demonstration Project: Savannah River, Georgia



Yangtze River, China





For more information:
www.nature.org/freshwater

