Introduction to Goal Development

- Definition of a “Goal” for a river
- How a Goal fits into an Instream Flow Study
- Examples: Goal, Objectives, Indicators
- Questions?

Definitions:

- Goal: a vision of a healthy environment for the Lower Sabine that reflects local values
- Objectives: specific means to accomplish goal
- Indicators: measures that show progress in meeting objectives

How a Goal Fits in the Process

Goal Development Consistent with Sound Ecological Environment

- Collect Baseline Information and Evaluate
- Collaborate with Public and Stakeholders through Meetings and Workgroups
- Study Design
- Multidisciplinary Data Collection and Evaluation
- Data Integration to Generate Flow Recommendations
- Study Report

Example of Goal, Objectives, and Indicators:

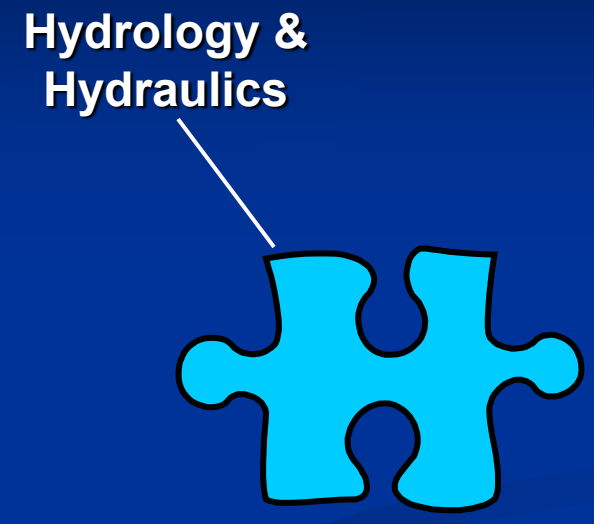
- Goal: maintaining the current health and productivity of the river, including ….. maintaining riparian areas, ….
- Objectives: provide adequate overbank flows to maintain bottomland hardwood areas
- Indicators: measures collected in bottomland hardwood areas
  - Soil moisture throughout the year
  - How often they receive flow from the river
  - Amount of sediment and nutrients from river

Example: Murray-Darling Basin

- Goal: "a healthy, working river – one that assures us of continued prosperity, clean water and a flourishing environment."

Goal: a healthy, working river

- **Objectives:**

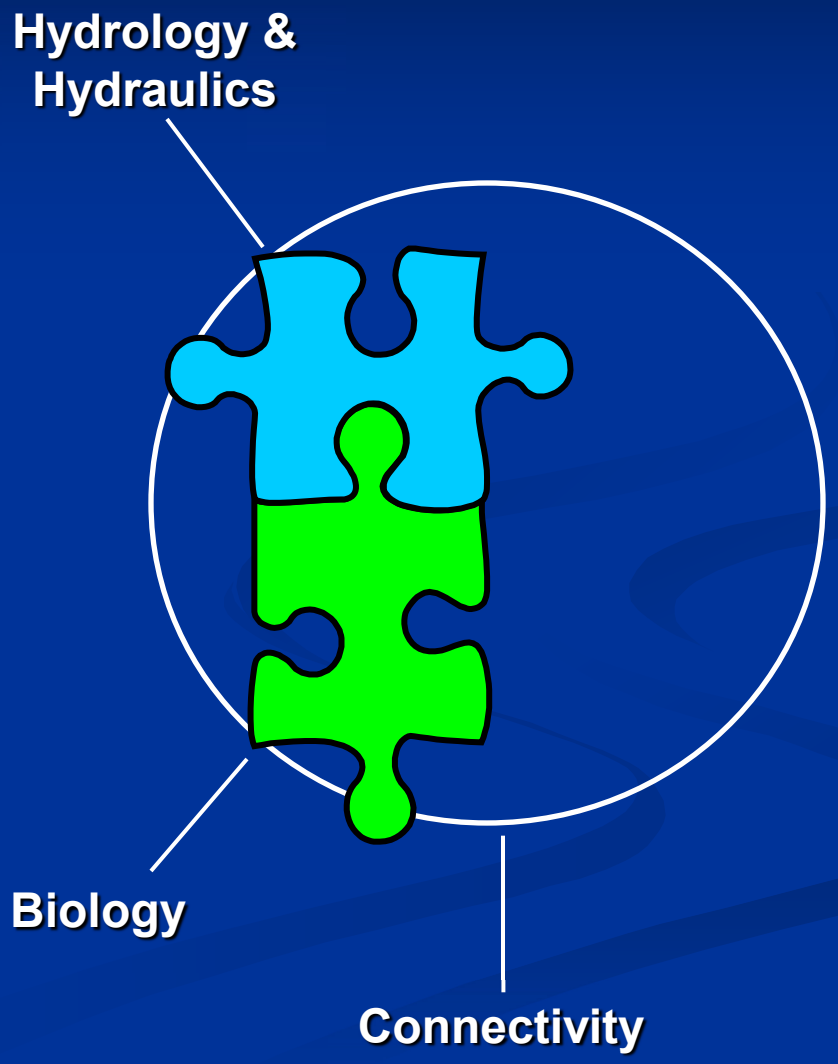


1. Reinstate ecologically significant elements of the flow regime

Goal: a healthy, working river

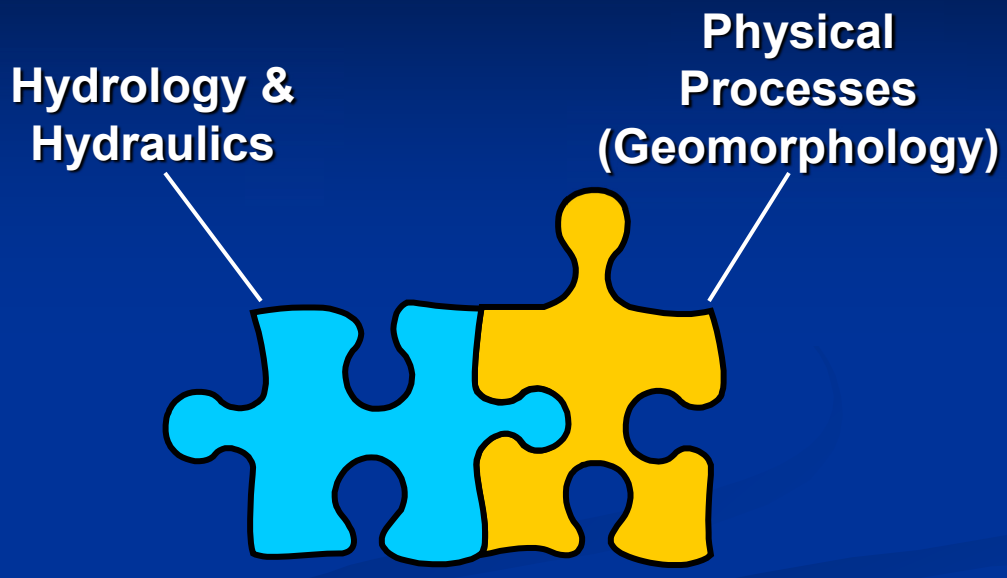
- **Objectives:**

2. Overcome barriers to migration of native fish species



Goal: a healthy, working river

- **Objectives:**

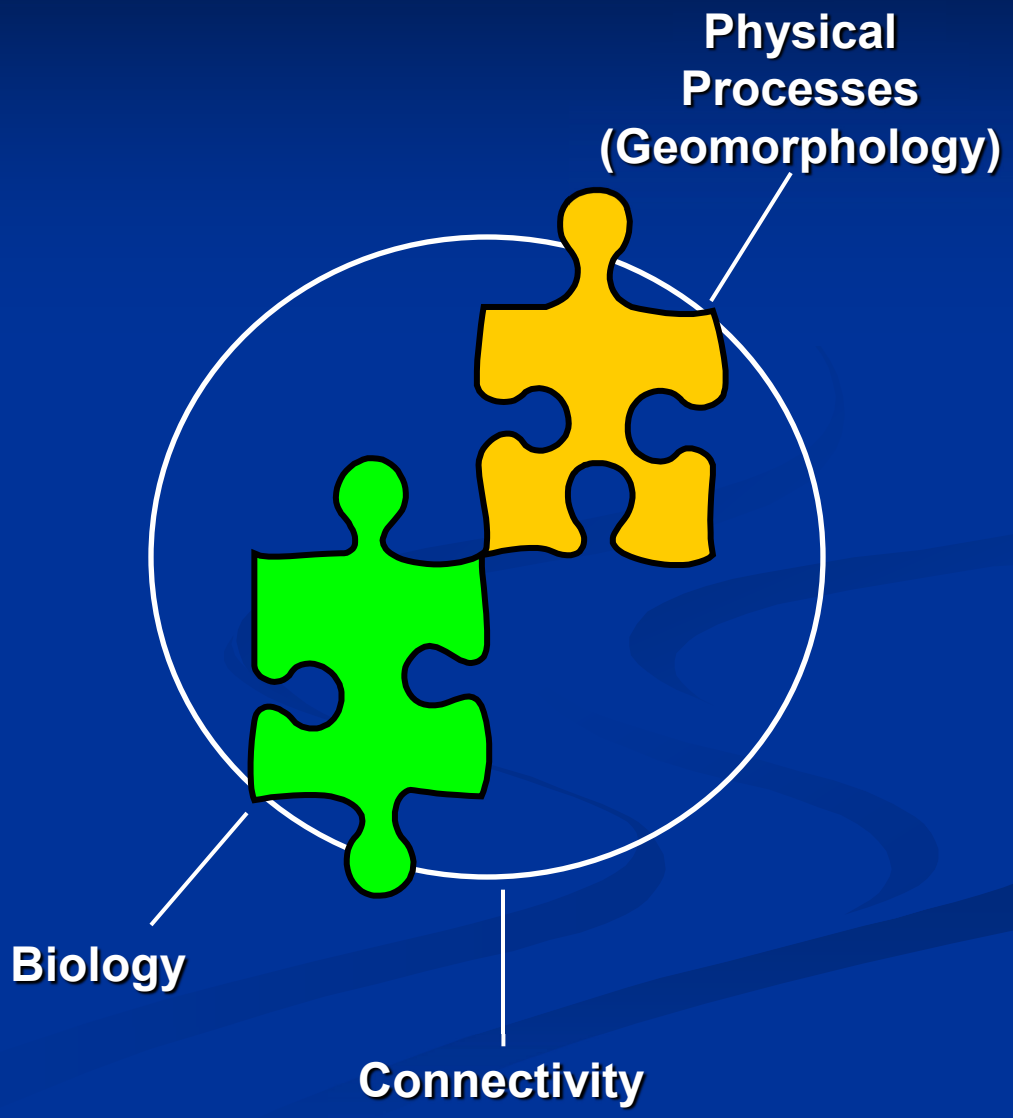


3. Maintain current levels of channel stability

Goal: a healthy, working river

- **Objectives:**

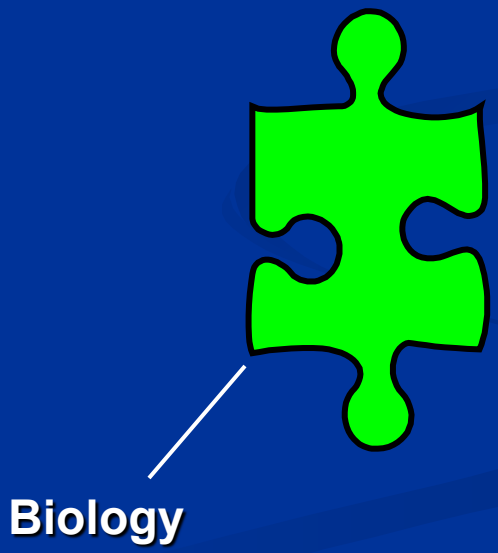
4. Protect and restore key habitat features in the river and riparian zone



Goal: a healthy, working river

- **Objectives:**

5. Prevent the extinction of native species from the riverine system



Goal: a healthy, working river

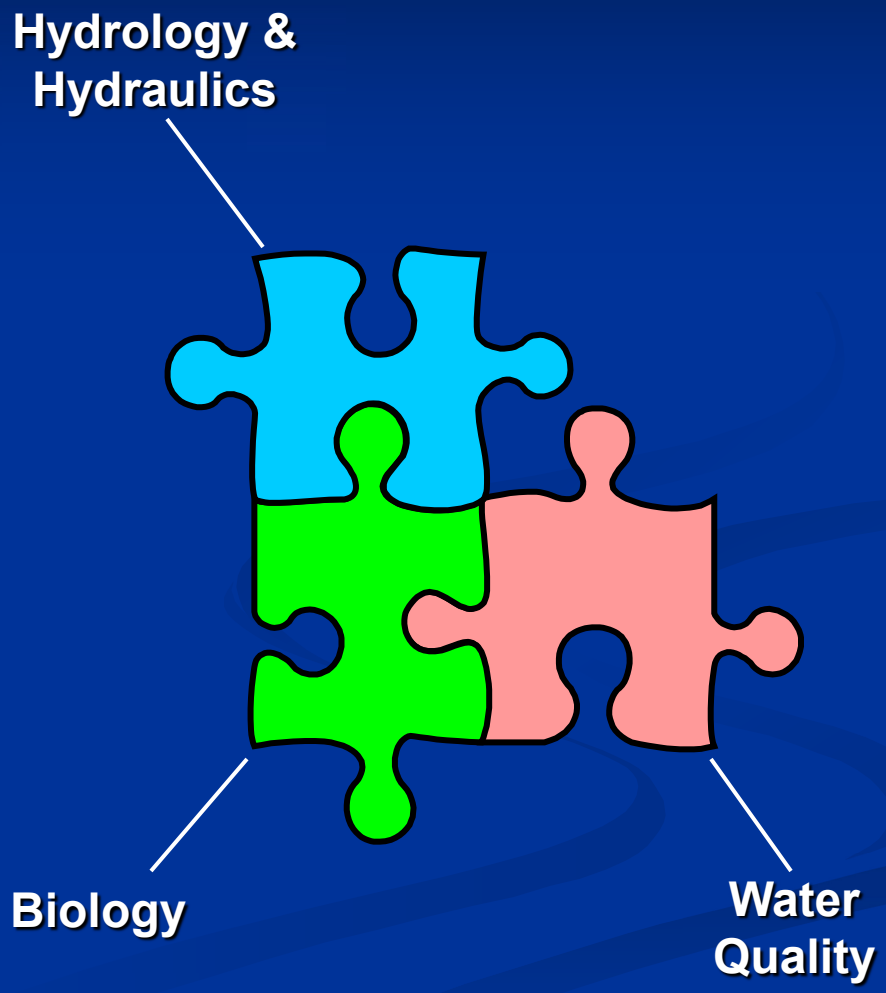
- **Objectives:**

6. Improve connectivity between the river and riparian zone

Goal: a healthy, working river

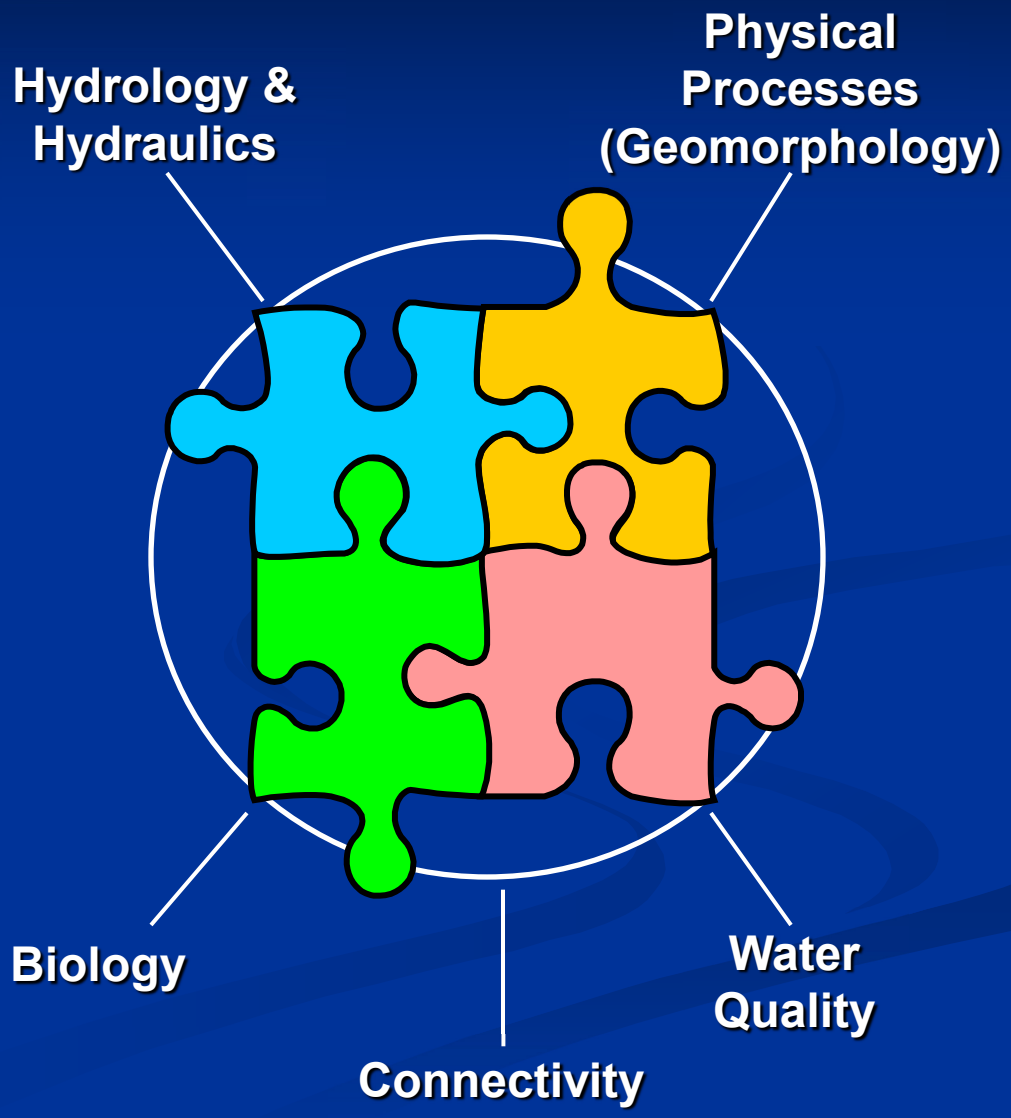
- **Objectives:**

7. Manage flow-related water quality to sustain ecological processes and productive capacity

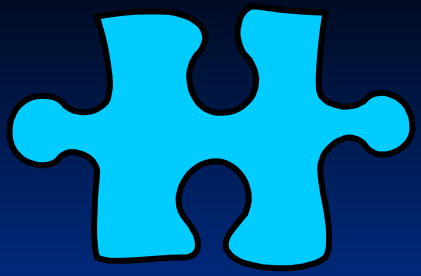


Example: Murray-Darling Basin

- Indicators:
  - Hydrology
  - Biology
  - Geomorphology
  - Water Quality

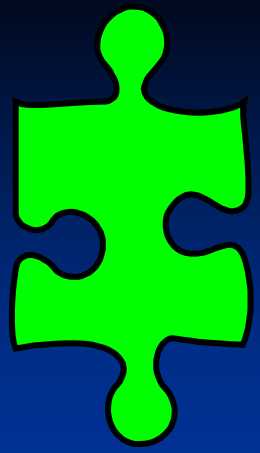


Indicators: Hydrology



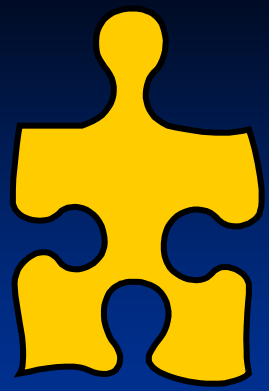
High Flow:	Number of 1 in 10 year floods
Low/zero flow:	Number of low flow events
Variability:	Seasonal amplitude
Seasonality:	Seasonal period index
Flow volume:	Median annual flow volume
	Mean annual flow volume

Indicators: Biology



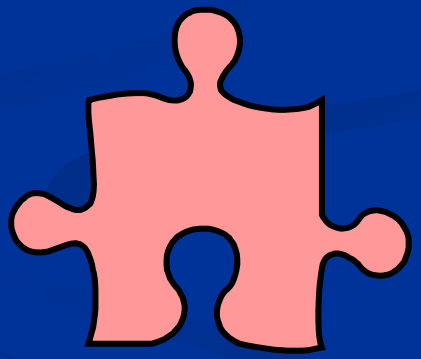
Macroinvertebrate:	Richness
	Pollution sensitivity score
Fish:	Total species richness
	Proportion native species
	Proportion megacarnivores
Riparian:	Waterbird breeding
	Healthy vegetation area

Indicators: Physical Processes



Channel Stability: Maintain current level of channel erosion

Indicators: Water Quality



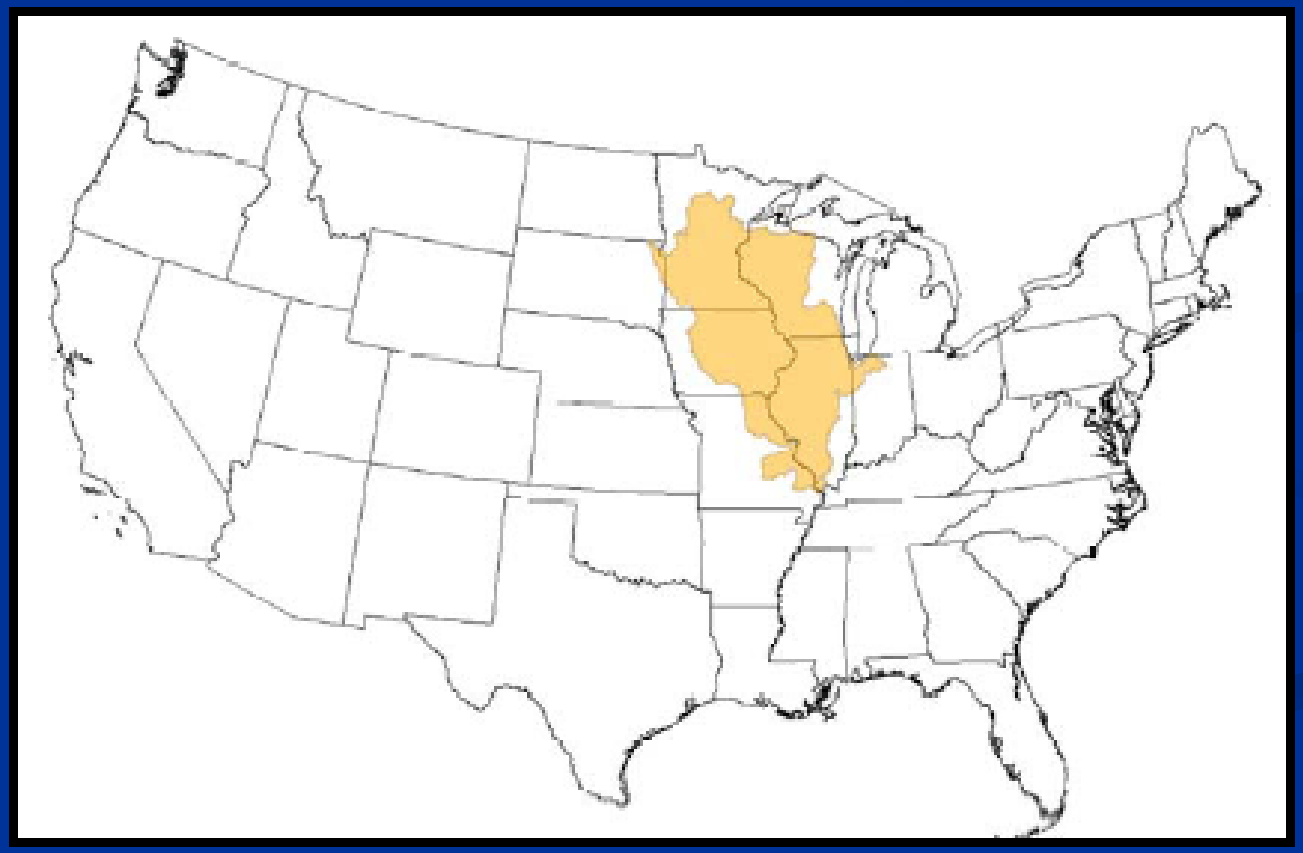
Total phosphorous:

Upland rivers: < 20 µg/L

Lowland rivers: < 50 µg/L

Example: Upper Mississippi River

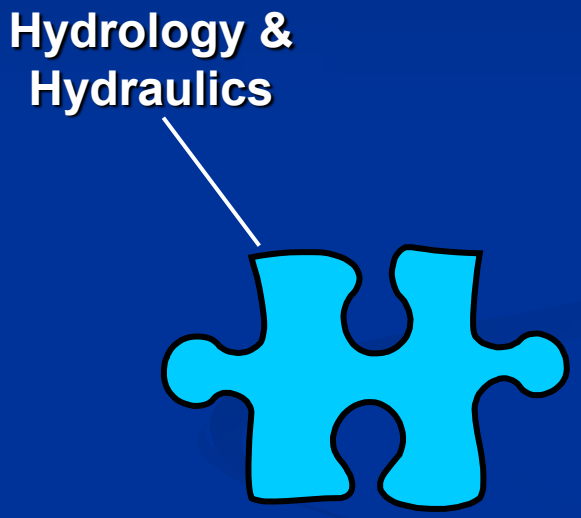
- **Goal: "…** ***to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System …"***



Goal: "… *to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System …*"

- **Objectives:**

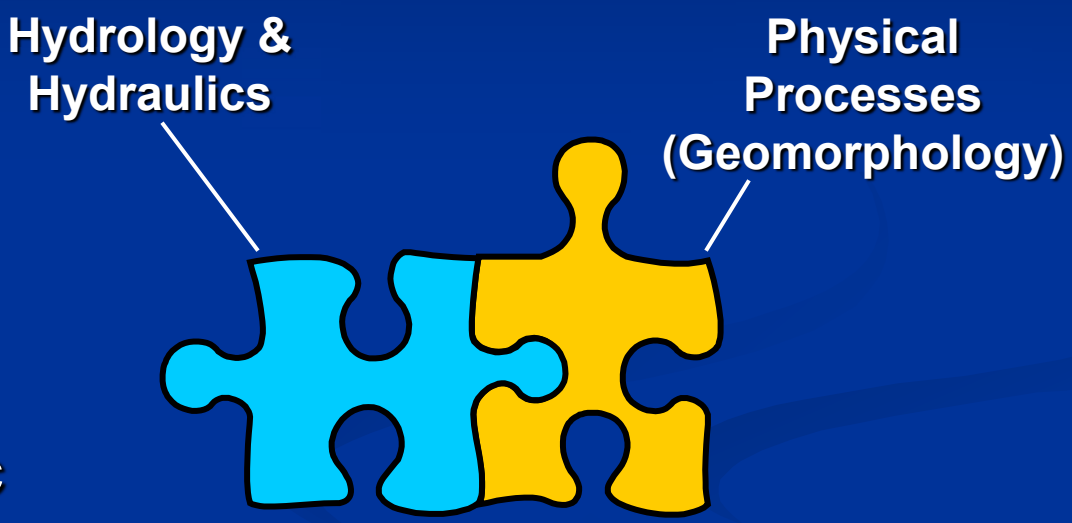
1. a more natural hydrologic regime;



Goal: "… *to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System …*"

- **Objectives:**

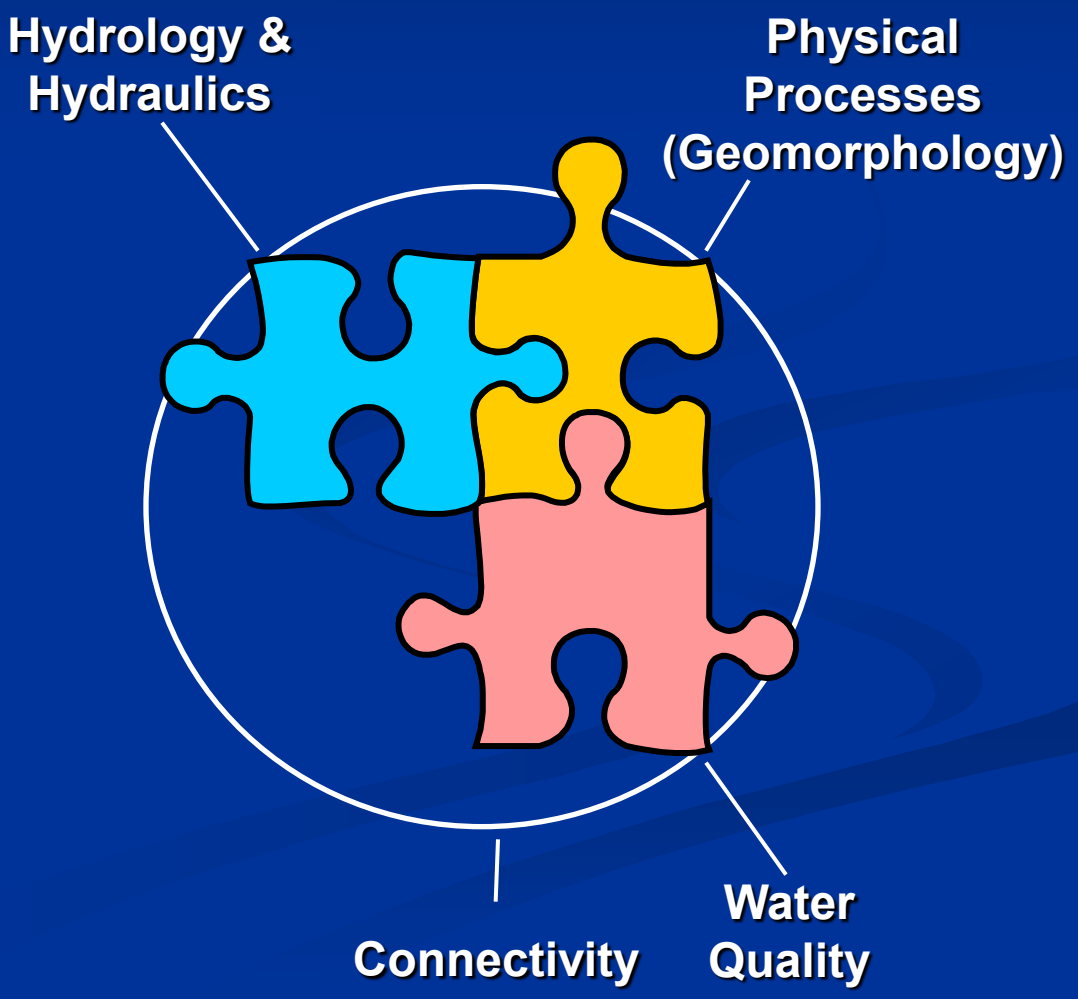
1. a more natural hydrologic regime;
2. processes that shape a diverse and dynamic river channel;



Goal: "… *to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System …*"

- **Objectives:**

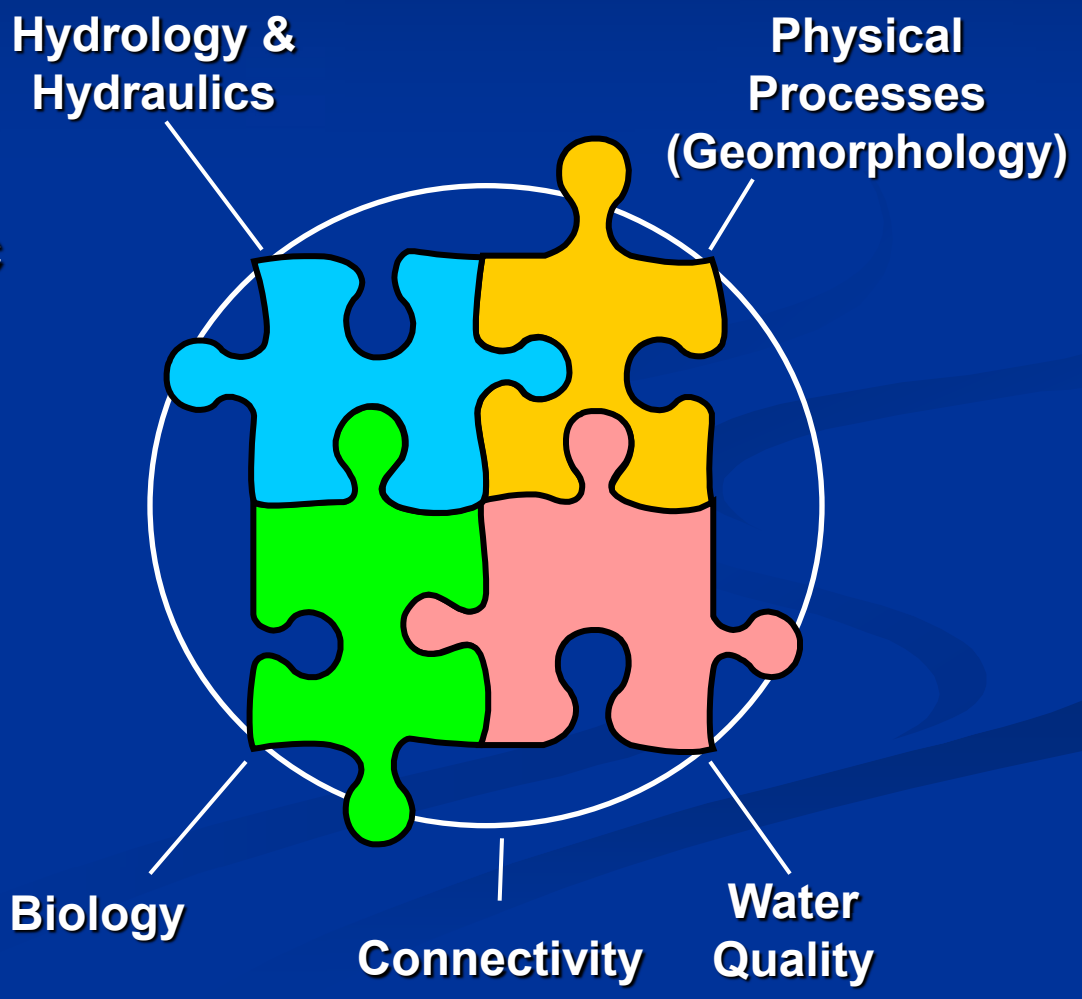
3. processes that input, transport, assimilate, and output materials within UMR basin river-floodplains: water quality, sediments, and nutrients;



Goal: "… *to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System …*"

- **Objectives:**

4. a diverse and dynamic pattern of habitats to support native biota, and;
5. viable populations of native species and diverse plant and animal communities.



Objective 1: A more natural hydrologic regime

Indicators:

- Short term fluctuations (hourly to daily) in water levels
- Summer low flows (frequency, magnitude, and duration)
- Winter flows (frequency, magnitude, and duration)

Objective 2: Processes that shape a diverse and dynamic river channel

Indicators:

- Flows in secondary channels and backwaters
- Seasonally flooded landscape area
- Formation of natural channel features

Objective 3: Processes that input, transport, assimilate, and output materials within river-floodplains: water quality, sediments, and nutrients

Indicators:

- Mean annual export of nitrogen at Cairo, Illinois
- Denitrification rates within the river corridor
- Sediment and nutrient delivery from tributaries

Objective 4: A diverse and dynamic pattern of habitats to support native biota

Indicators:

- Diversity, patch size, connectivity, [other measures?] of major floodplain habitat types
- Diversity of depths and current velocities in aquatic areas
- Area connected to river channel during a 10 year flood

Objective 5: Viable populations of native species and diverse plant and animal communities

Indicators:

- Number of years that skipjack herring and other migratory species reach Minneapolis, Minnesota, and Joliet, Illinois
- Number of locations that support viable populations of ebony shell mussel
- Diversity of the floodplain forest tree community

Questions?