Collaborative Water Governance and Social-Hydrological Justice:

The Case of the Upper Colorado River Endangered Fish Recovery Program

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Lecture Slides

The Big Picture

The Upper Colorado River Endangered Fish Recovery Program: an example of regional collaborative governance

Outline

- Introduction to collaborative environmental governance

- Overview of Upper Colorado River Endangered Fish Recovery Program

  - Threats to fish

  - Recovery goals

  - Committee structure

  - UCREFRP elements

What's the difference between government and governance?

Government

Governance

What is collaboration?

An academic definition:

A <u>sustained process</u> where:

- A dynamic network of people and affiliated institutions

- Representing different stakeholder perspectives or interests

- Comes together to pool resources and share power in order to achieve outcomes that could not be achieved independently

Write 10 words that come to mind in response to the question:

*"**What** is collaborative governance?"*

Collaborative Environmental Governance

The processes and structures of public policy decision making *and* management that engage people *constructively* across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished. (Emerson & Nabatchi, 2015)

The Upper Colorado River Endangered Fish Recovery Program: A Continuing Collaborative Success Story

Adapted from presentation by Angela Kantola, Assistant Program Director
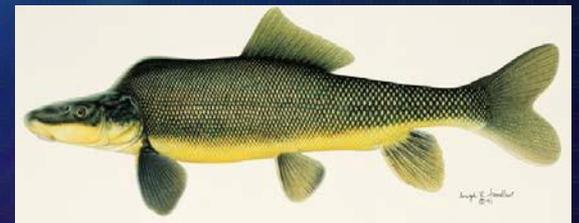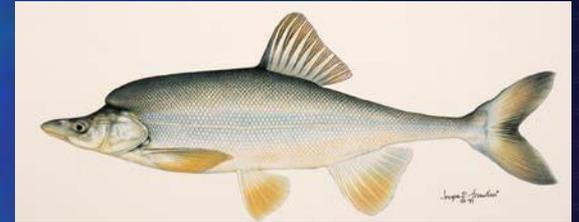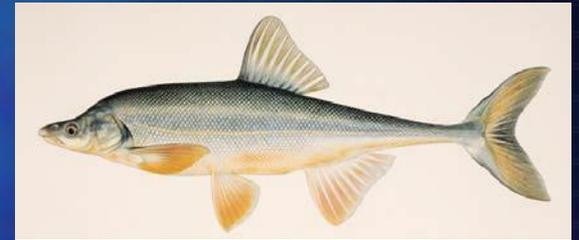
Full Program Scope
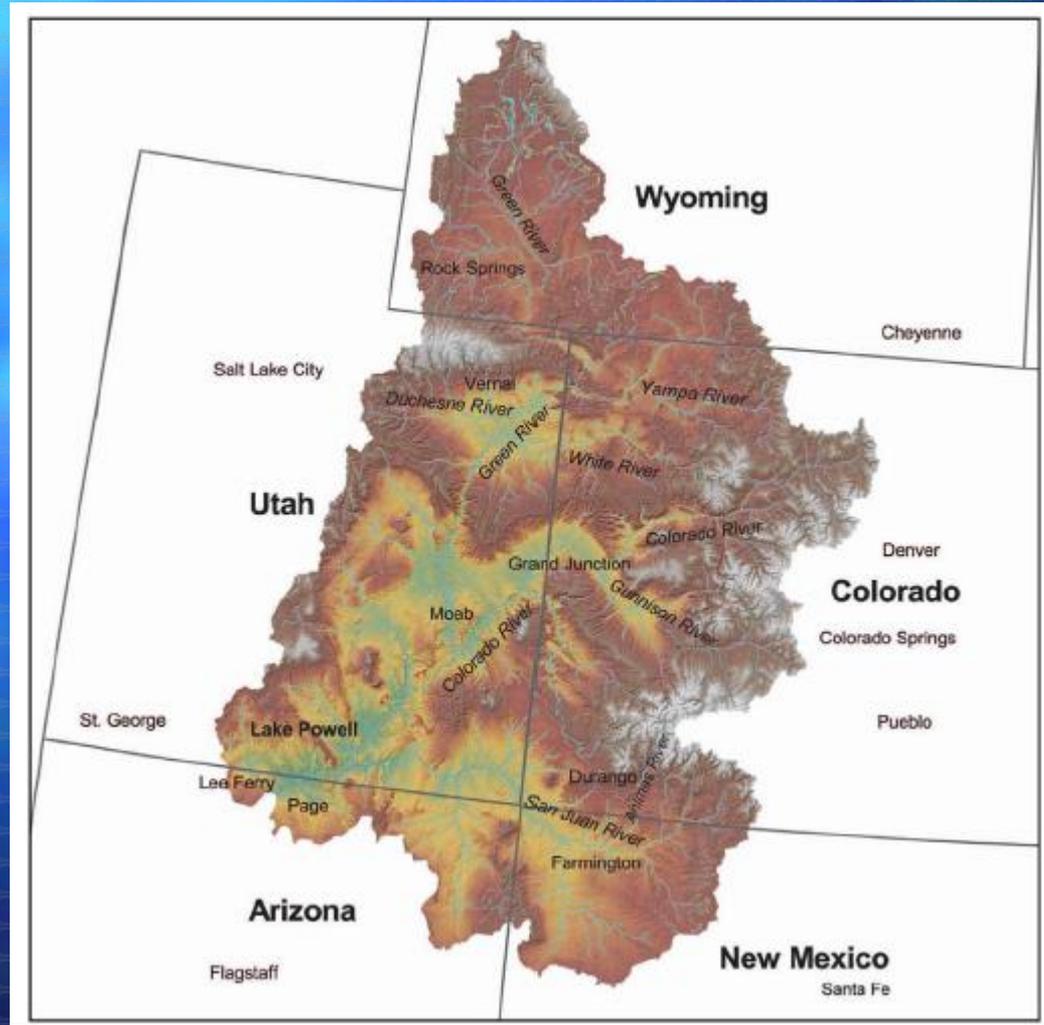
Colorado pikeminnow
Ptychocheilus lucius

Razorback sucker
Xyrauchen texanus
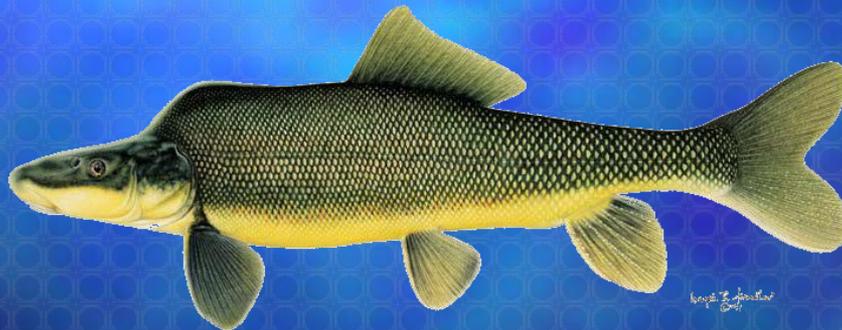
Humpback chub
Gila cypha

Bonytail
Gila elegans

Threats to Native Fish

- Streamflow regulation
  - Water depletion
- Habitat modification
  - Large reservoirs
  - Fish barriers
- Competition with and predation by nonnative fish (e.g. Catfish, Smallmouth bass, Northern pike, and Walleye)
- Pesticides and pollutants
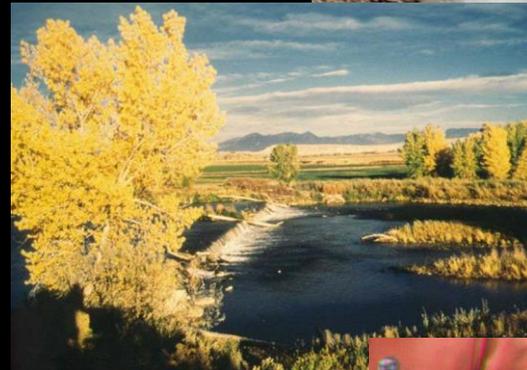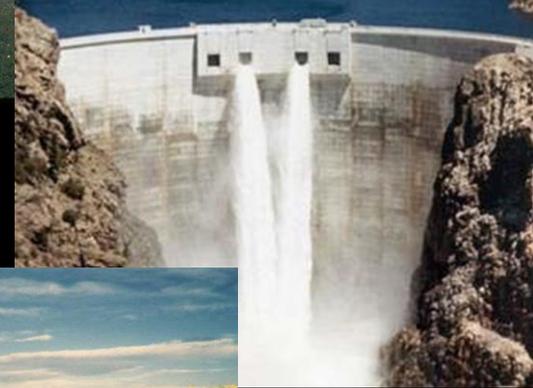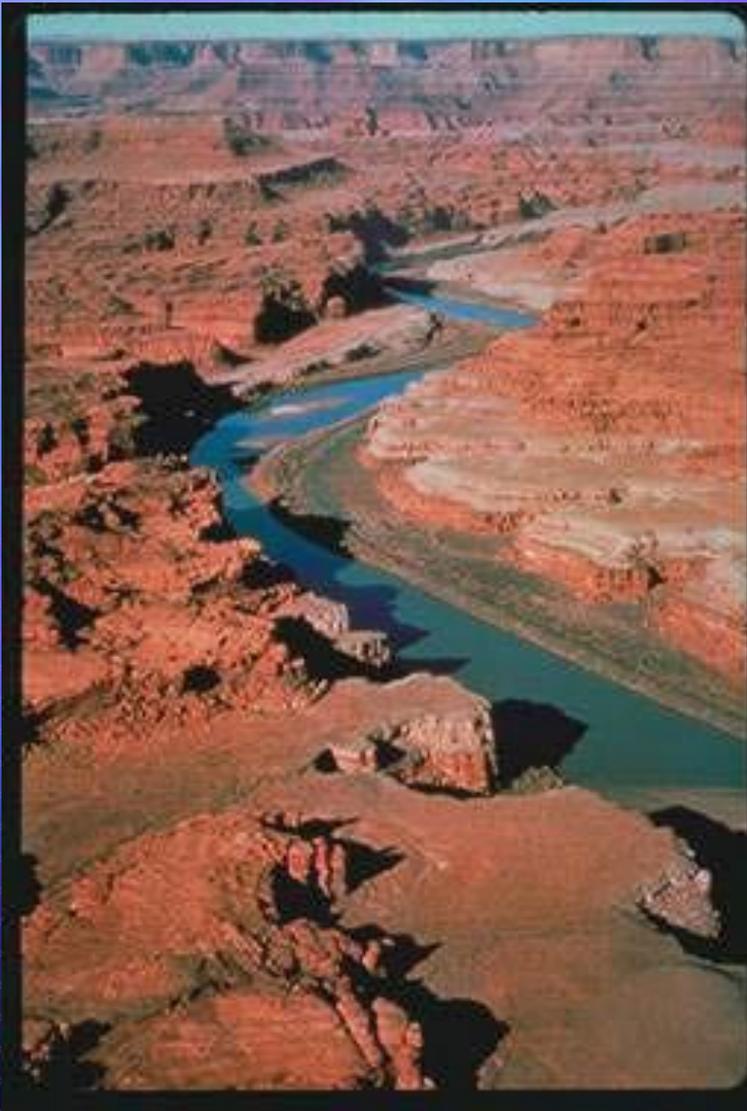
The Recovery Program was established in 1988 to address conflicts between the Endangered Species Act and water development

Potential train wreck:

In the mid to late 1970s, U.S. Fish and Wildlife Service determined that <u>any</u> further depletion of water from the upper basin would result in jeopardy to endangered fish.

1984: Federal agencies, states, environmental groups, and water users began negotiations.

They recognized the conflicts were a symptom of the problem that the fish were endangered.

SOLUTION: Recover the fish.

1985: Recovery Program proposed.

1987: Framework document completed.

1988: Cooperative Agreement signed by the Secretary of the Interior, governors of Colorado, Wyoming, and Utah, and the Administrator of the Western Area Power Administration

Multi-Agency Partnership

STATES

- **Utah**
- **Colorado**
- **Wyoming**

FEDERAL AGENCIES

- **U.S. Fish and Wildlife Service**
- **U.S. Bureau of Reclamation**
- **National Park Service**
- **Western Area Power Administration**

INTEREST GROUPS

- **Water users (Colorado, Utah, Wyoming)**
- **Environmental organizations**
- **Colorado River Energy Distributors Association**

Program Structure: Committees
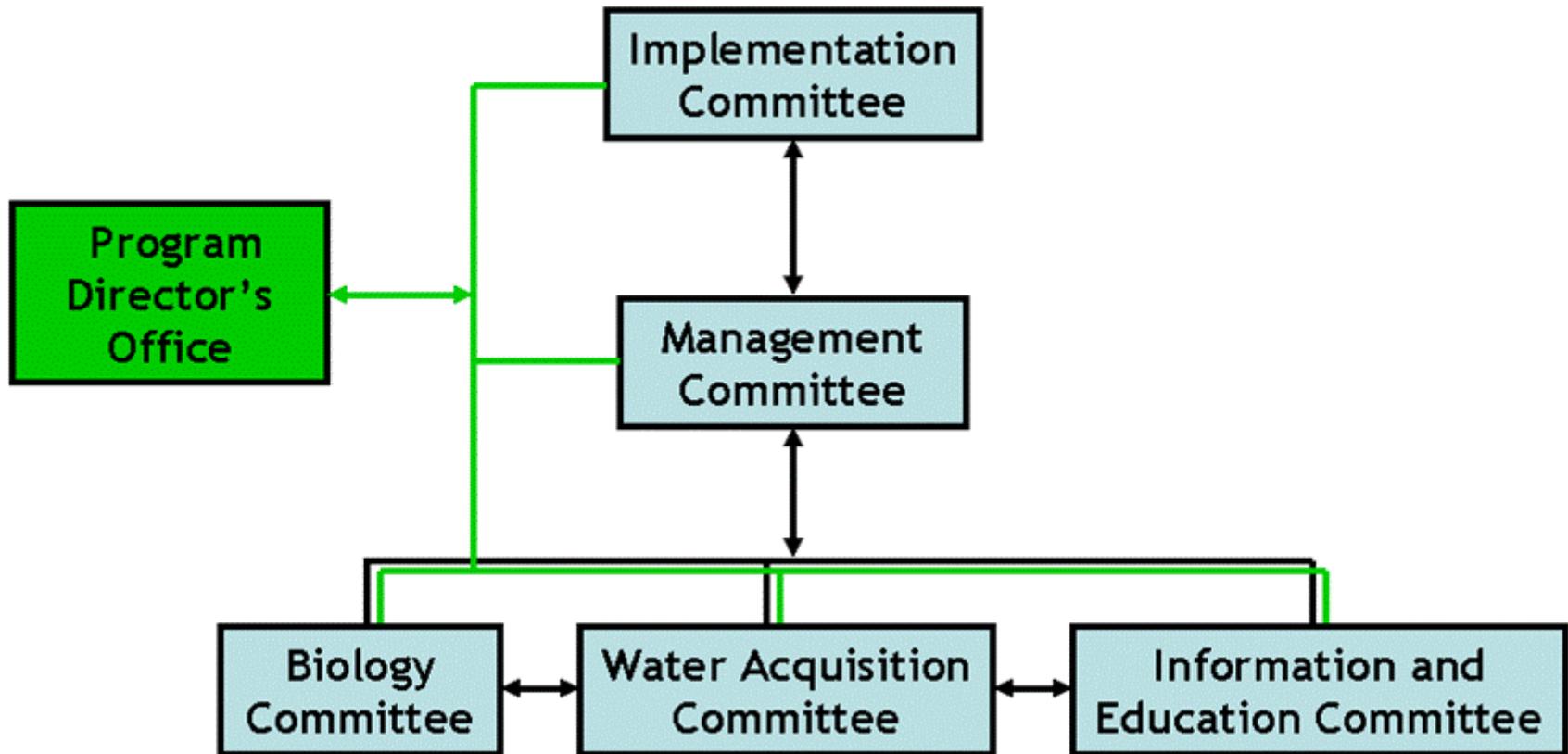
Goal: Recover and delist the endangered fishes by restoring and establishing self-sustaining populations and protecting sufficient habitat to support them as water development proceeds in compliance with the Endangered Species Act and state water law.
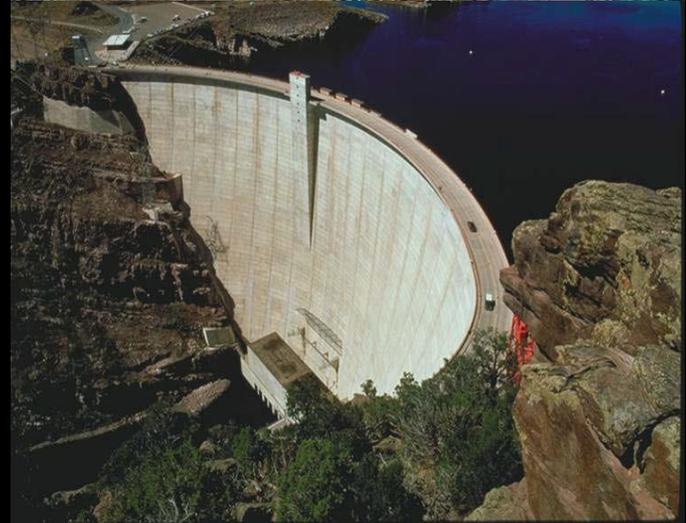
The ESA's Recovery Goals

- The Recovery Program relies on recovery goals to develop and implement management actions and measure success.
- The recovery goals provide objective, measurable criteria for **downlisting to "threatened" and delisting** (removal from Endangered Species Act [ESA] protection)
- Recovery is based on reduction of threats and improvement of a species' status during the time it is listed under the ESA.
- Recovery goals identify the number and age of fish that comprise a specified number of self-sustaining wild populations. They also identify site-specific management actions that reduce threats to the species.
- The U.S. Fish and Wildlife Service will consider downlisting or delisting the endangered fishes once the required **demographic and genetic standards for self-sustaining** populations are reached and the **necessary management actions are achieved to reduce the threats** that caused the fish to be listed.

Recovery elements

Habitat Development

Habitat-Flow Management

Research and Monitoring

Managing Nonnative Fish

Stocking Endangered Fish
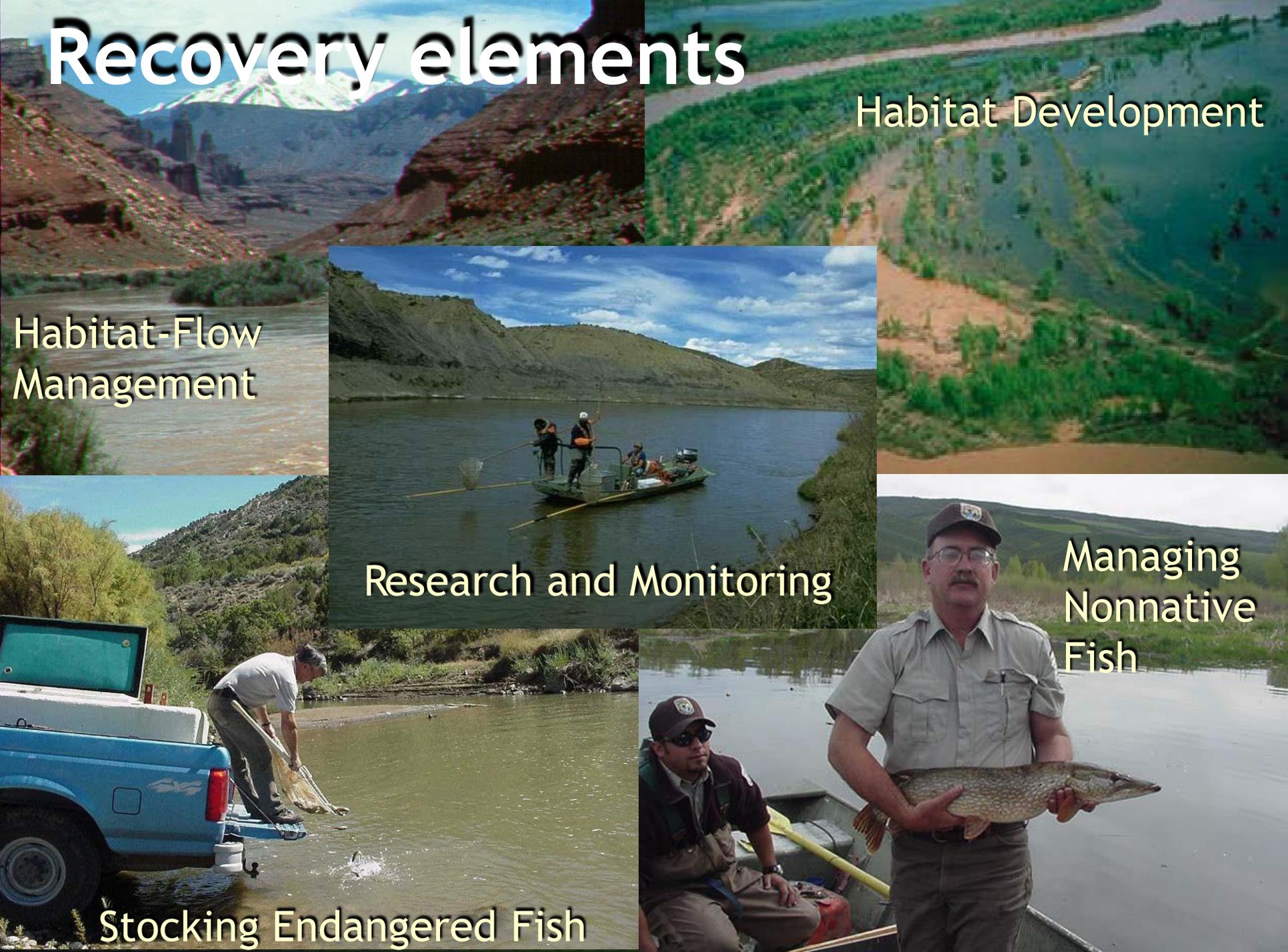
5 Main Strategies of UCREFRP

- Habitat/Flow management
  - Identify and provide adequate instream flows
- Habitat development/maintenance
  - Restore and maintain habitat
- Native fish propagation and stocking
  - Produce genetically diverse fish in hatcheries and stock them in the river systems
- Non-native species sportfishing
  - Reduce the threat of certain nonnative fish species while maintaining sportfishing opportunities
- Research, monitoring, and data management
  - Provide data on life-history requirements of the endangered fishes, and monitor progress toward recovery

Flow protection

- Operation of Federal dams/ reservoirs
- Improved efficiency of irrigation systems
- Cooperative reservoir operations
- Partnered in a new water storage project

06 27 2002

Elkhead Reservoir

Habitat restoration

Restore floodplains

Provide fish passage

Screen diversions

PARACHUTE

DEBEQUE

Colorado River

to UTAH

Government Highline Canal

GRAND JUNCTION

Colorado River

Redlands Canal

Redlands Water and Power Company Diversion

Grand Valley Project Diversion

Price-Stubb Diversion

Grand Valley Irrigation Company (GVIC) Diversion

GVIC Canal

Gunnison River

to DELTA, COLO.

Nonnative fish management

- Regulate nonnative fish stocking
- Prevent escapement from impoundments
- Change state fishing regulations to increase harvest
- In-river management of most problematic species
- Research/monitoring

Propagation, genetics, and stocking

Research, monitoring, and data management

Finito
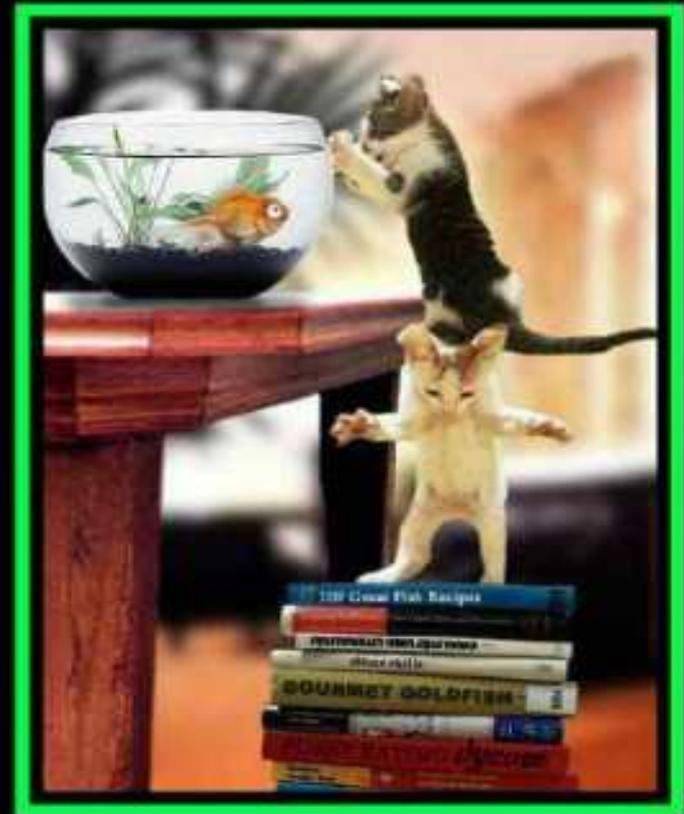
TEAMWORK

In union there is FISH.

motifake.com

A conceptual model for understanding the intended outcomes of UCREFRP

& a brief introduction to the endangered Colorado pikeminnow

Lecture 1.2

Outline for Teaching Notes

- Applying the Open Standards conceptual model to the UCREFRP case

- The Colorado pikeminnow
  - Ecology and life history
  - Status and threats

- Team homework assignment

Let's experiment with a conceptual model...

- How can we visually depict:
  - The context within which UCREFRP is operating
  - The major forces that are influencing the biodiversity of concern to the Program
  - The chain of logic showing how (in theory) the strategies of UCREFRP lead to desired outcomes for biodiversity?

A systems model would be great…
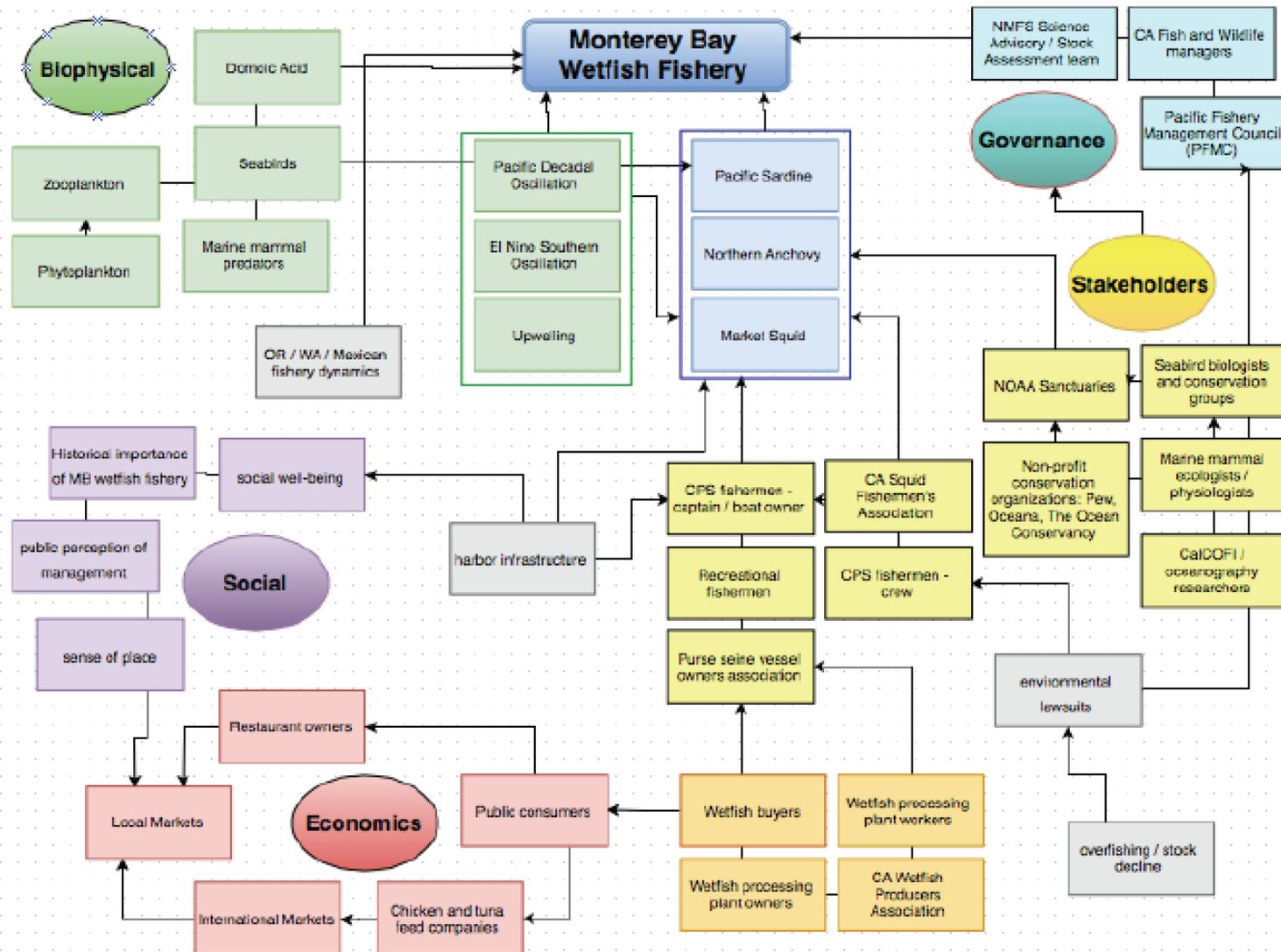
…But do we have enough information?

Biophysical

Today

Governance

Social?

Next Class

Stakeholders?

Economic?
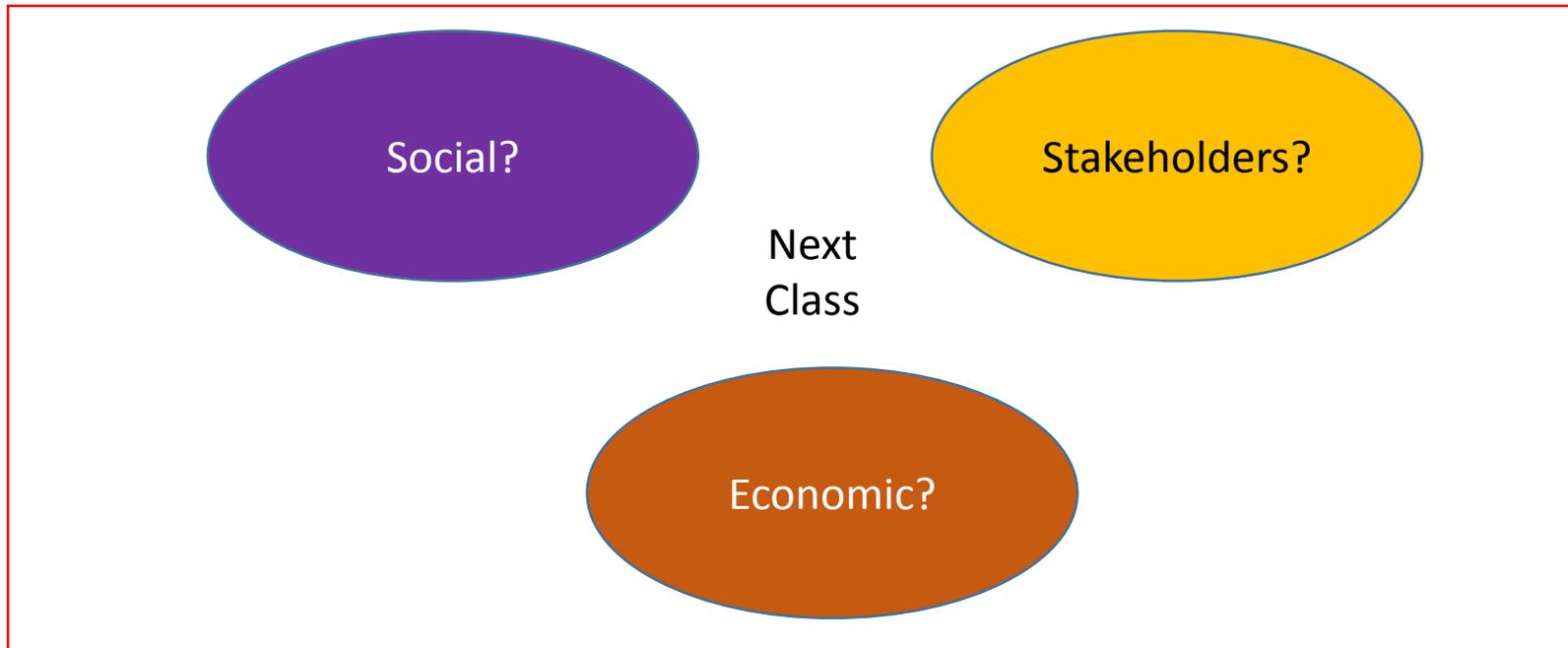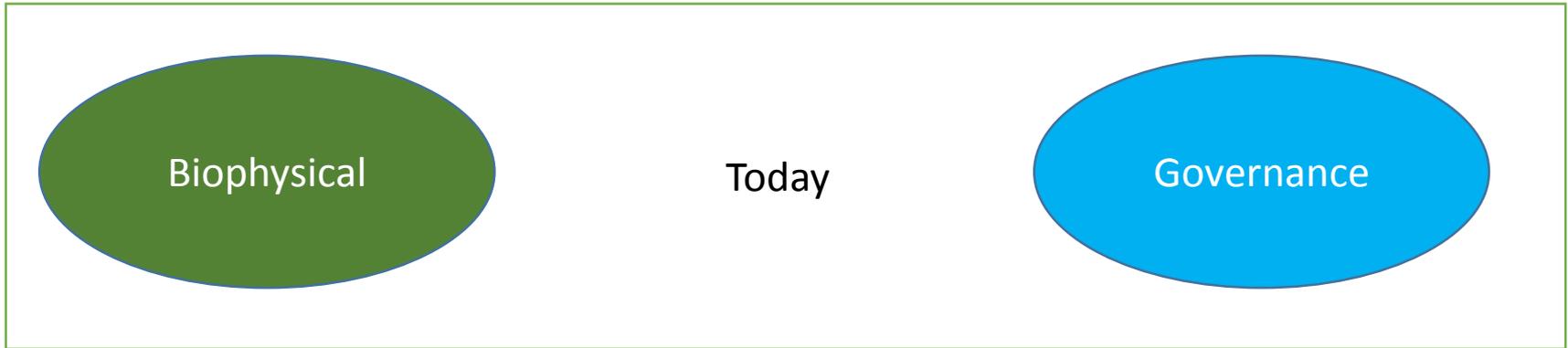
Borrowing from the Open Standards for the Practice of Conservation

- Standardized set of tools developed by a consortium of large conservation NGOs and foundations

- Provides conservation practitioners a model for conceptualize and design effective projects using principles of adaptive management

- We can adapt it as a simple logic model until we have more information

http://conservationmeasures.org/CMP/Site_Docs/CMP_Open_Standards_Version_2.0.pdf
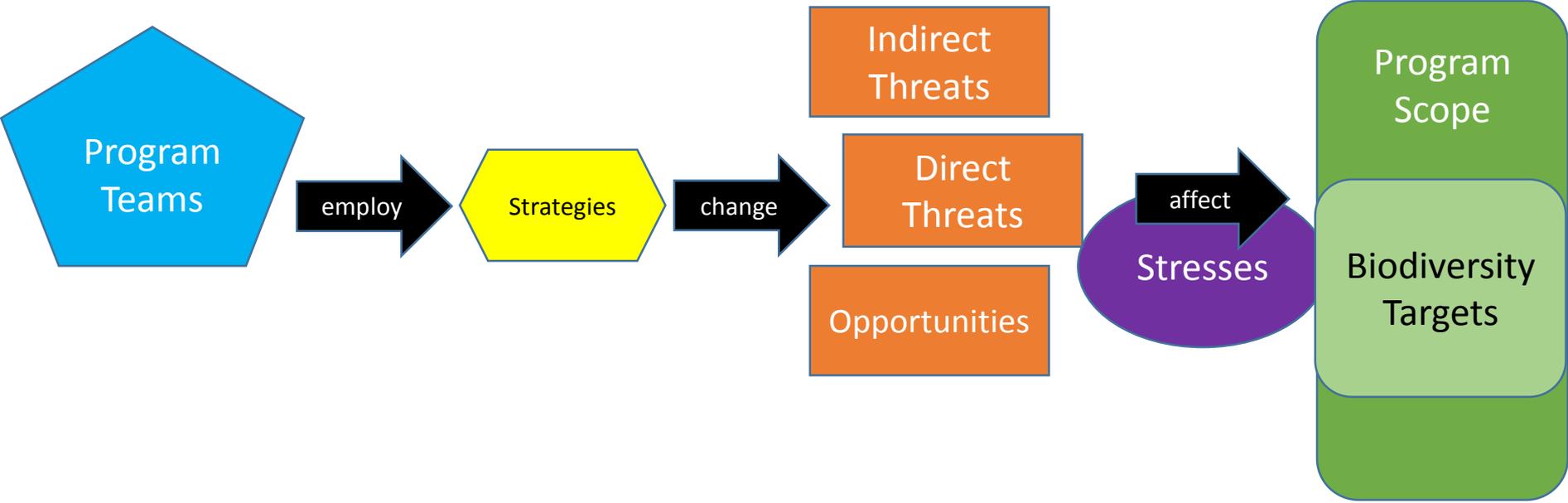
What are the implicit assumptions of how the strategies applied by the Program will lead to the desired results?
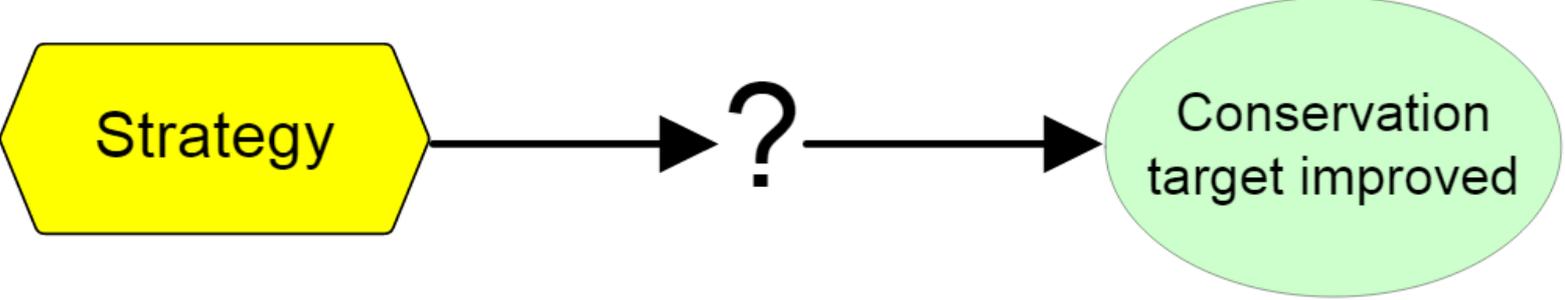
See handout for terminology definitions

Team Activity: 20 minutes

- Break into teams of 5
- Open https://www.draw.io/
- Let's build a simplified logic model of the UCREFRP program using the information presented earlier
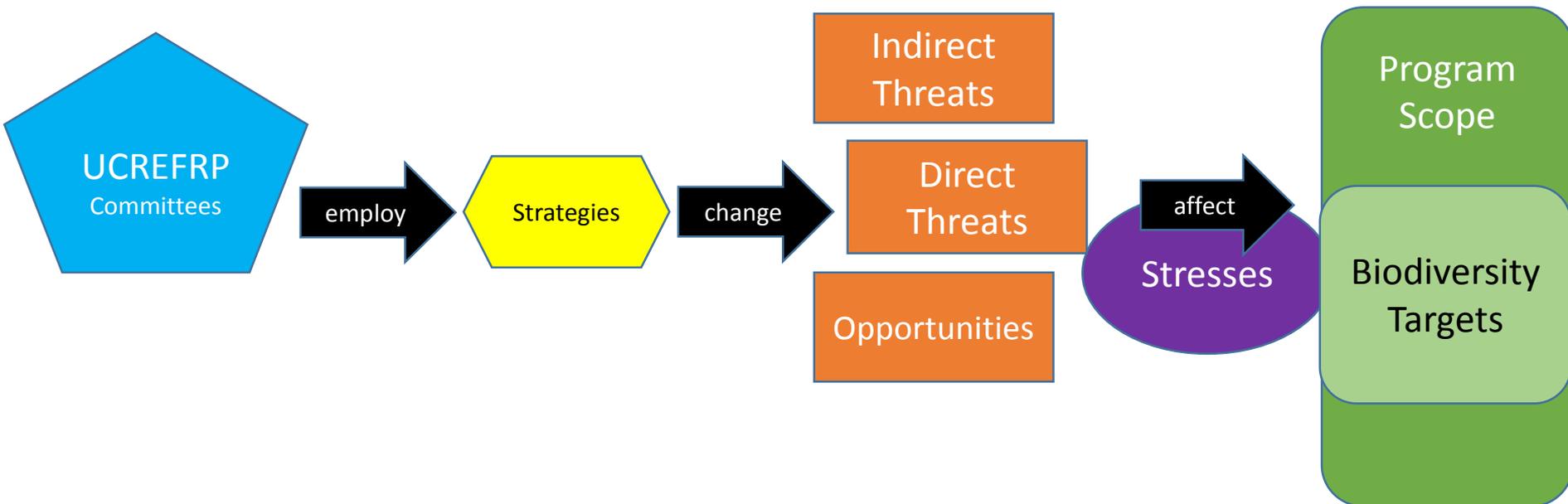
Units of the model
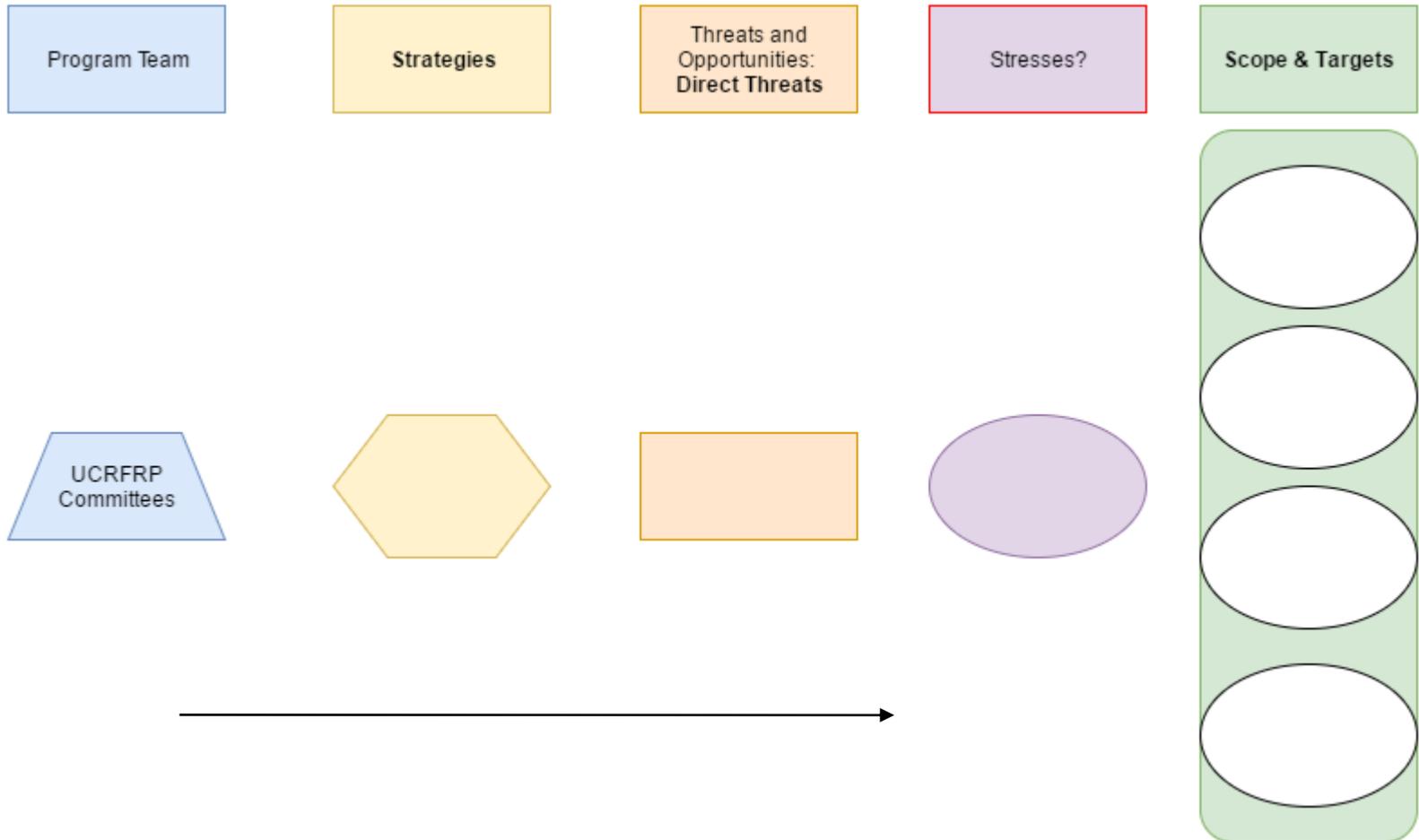
Questions to guide your model

- What is the scope of UCREFRP?

- What are its primary conservation targets?

- What are the direct threats to those targets?

- What are its main strategies or program elements?

- What are the relationships between the elements of your model? (arrows!)

Model Discussion

- What does this model tell you?

- What parts of the model are missing?

- What information would we need to know about the conservation targets to make a better model?
  - What about the threats? The strategies?

- What other information would improve this model?

- Would modeling this at a smaller scale make more sense? Why or why not?

Example Logic Model of Overall UCREFRP Program
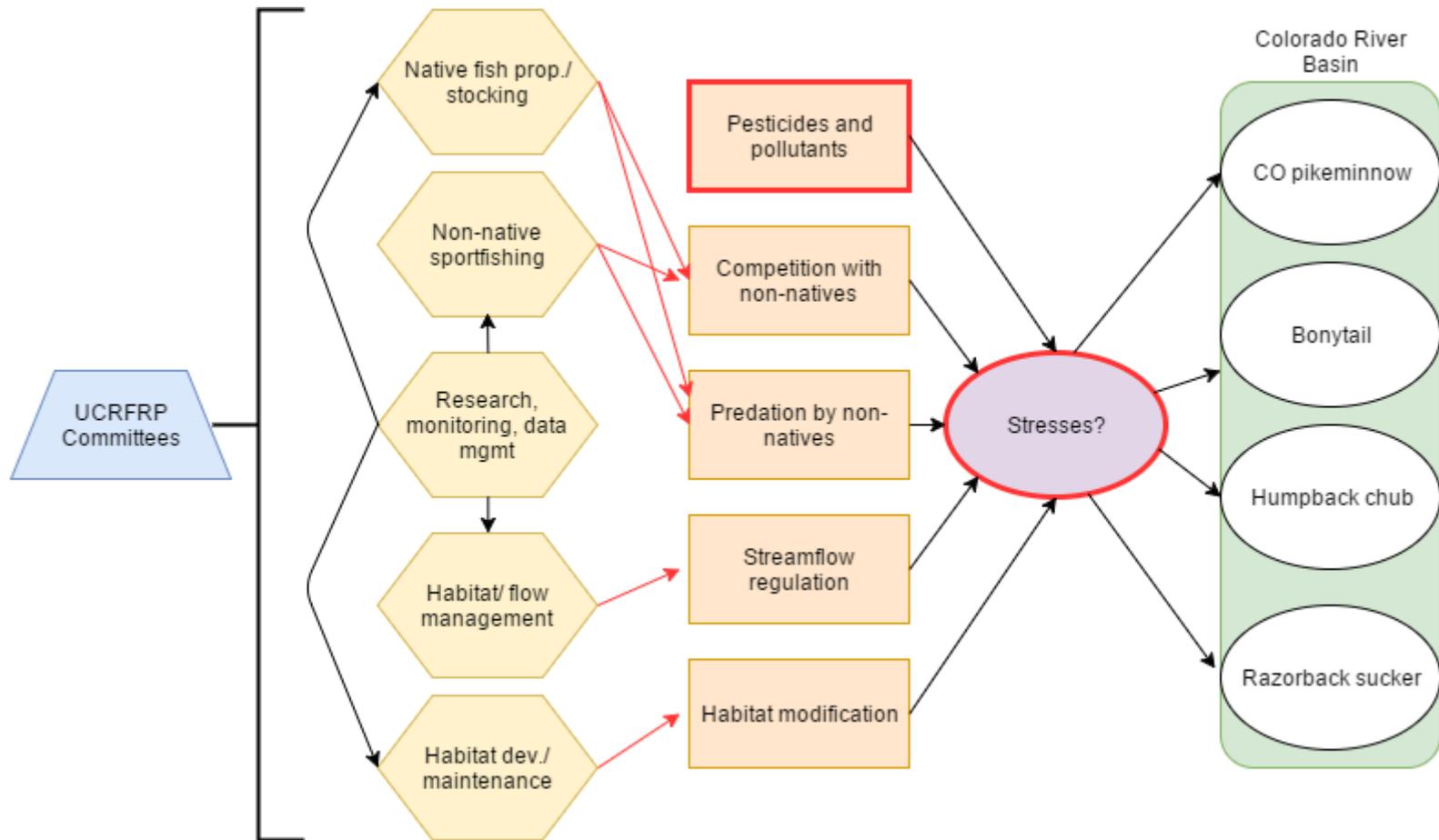
Let's scale down…
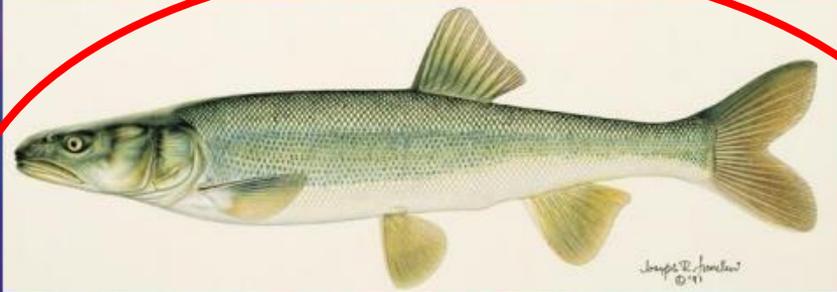
Colorado pikeminnow
Ptychocheilus lucius

Razorback sucker
Xyrauchen texanus
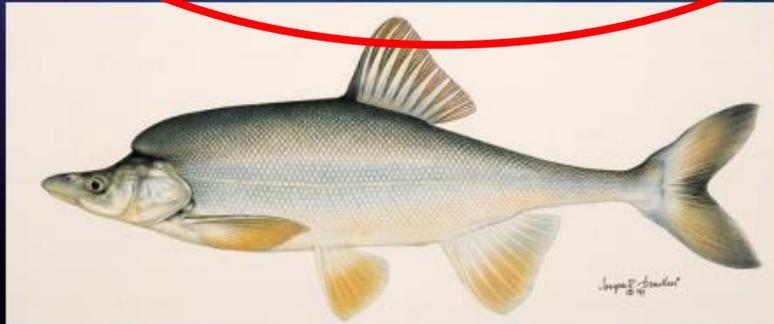
Humpback chub
Gila cypha

Bonytail
Gila elegans

The Colorado Pikeminnow *(Ptychocheilus lucius)*
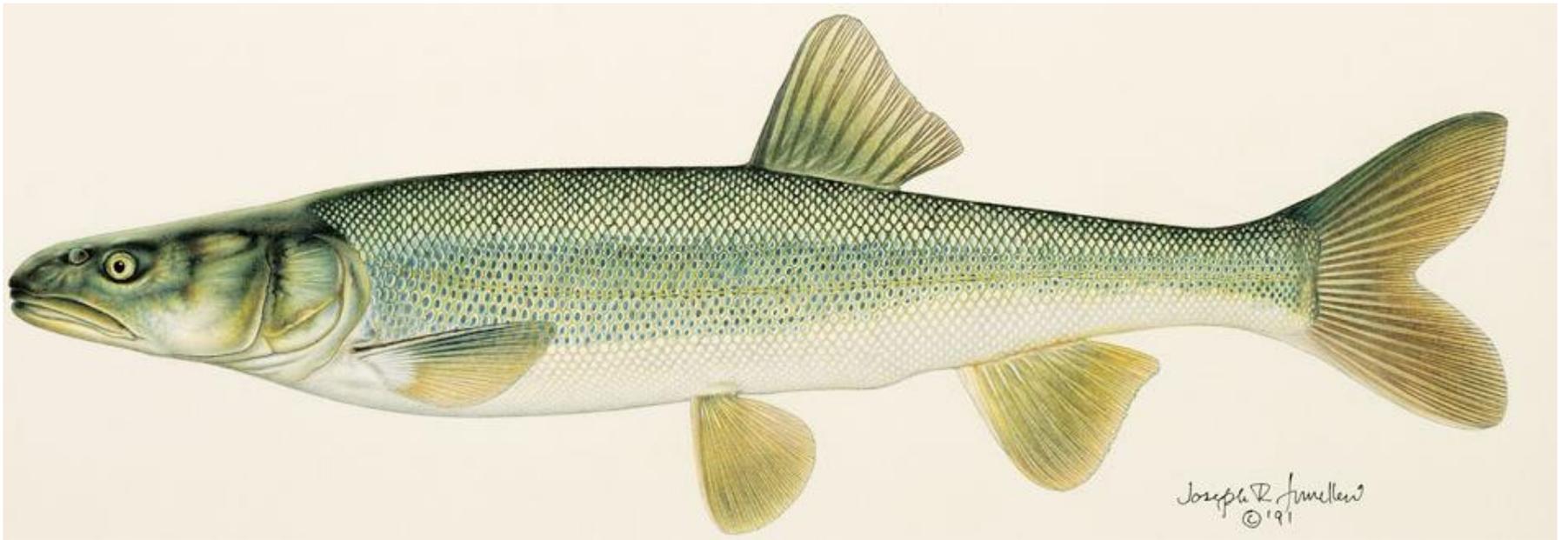
Distribution of Wild Colorado Pikeminnow in the Colorado River Basin
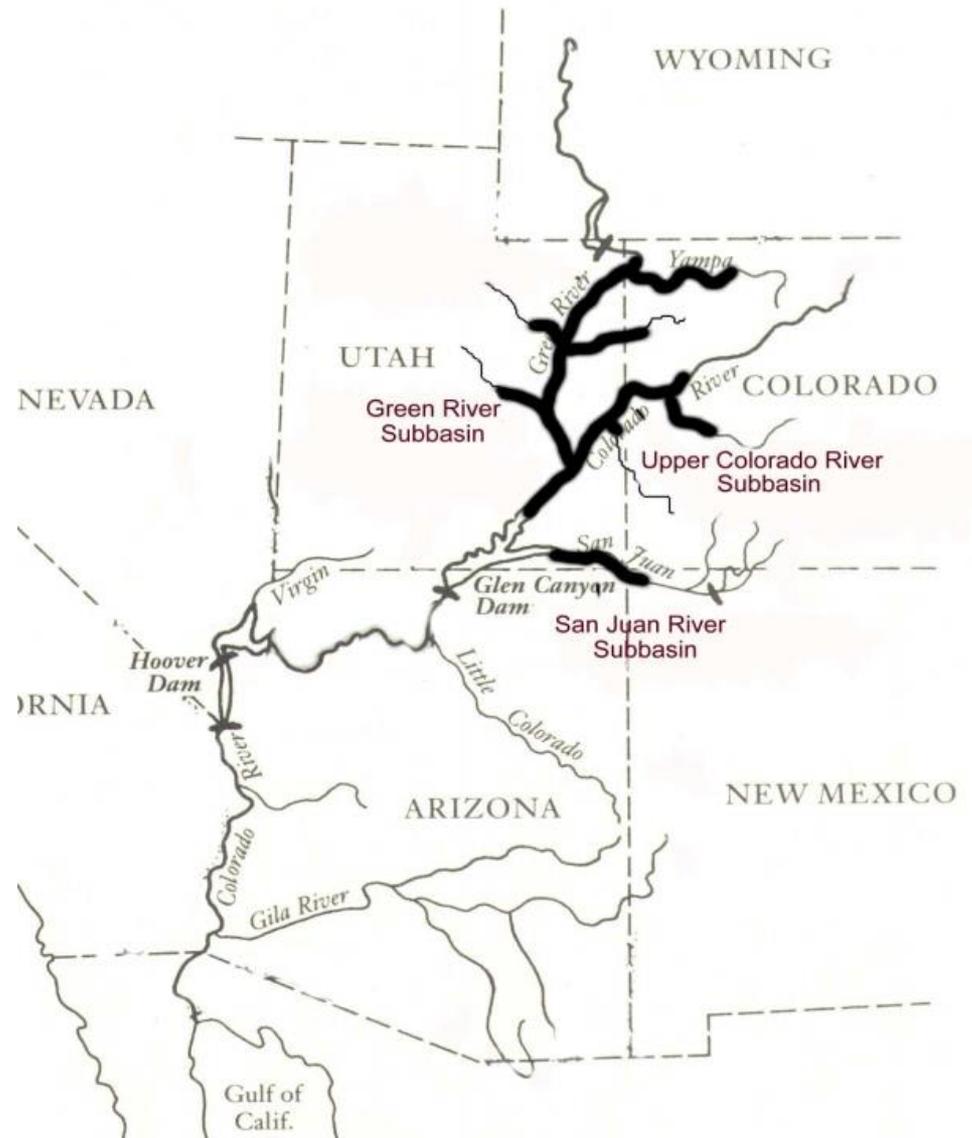
Spatial Ecology of the Colorado Pikeminnow:

- *Potamodromous:* freshwater spawning migration

- Life cycle requirements

- Current population averages
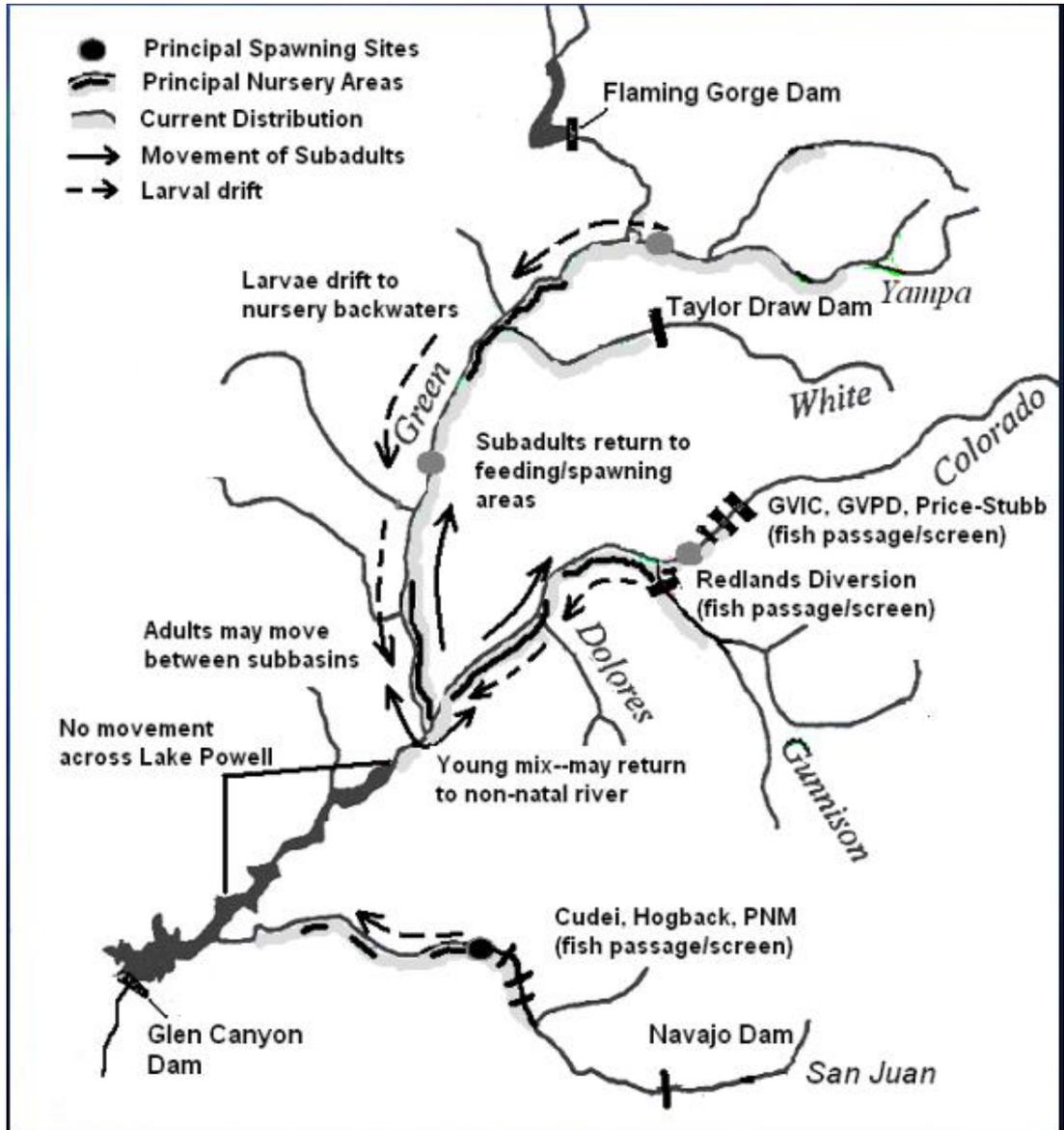
The Colorado Pikeminnow, Then and Now
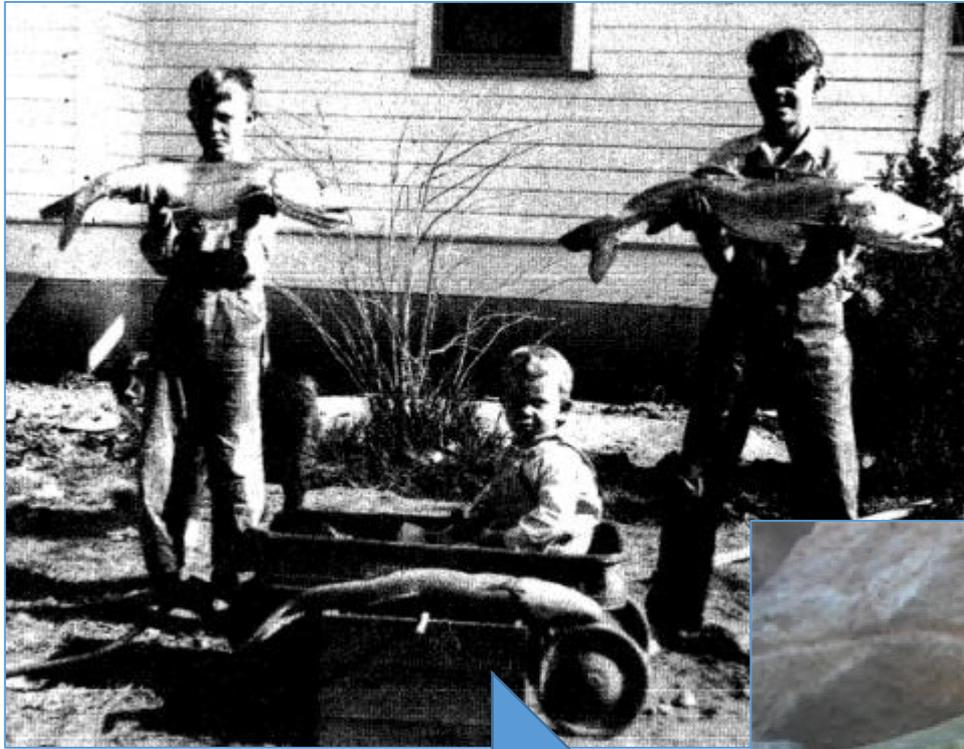
Once abundant southwestern population of North America's largest minnow

Listed as endangered by USFWS in 1967, 1973

Threats to the Colorado pikeminnow

- Streamflow regulation
  - Water depletion
- Habitat modification
  - Large reservoirs
  - Fish barriers
- Competition with and predation by nonnative fish (e.g. Catfish, Smallmouth bass, Northern pike, and Walleye)
- Pesticides and pollutants

Downlisting Criteria for Pikeminnow

Over a 5-year monitoring period:

- Maintain the Upper Basin metapopulation
- Maintain populations in the Green River and Upper Colorado River sub-basins ("no net loss")
- Green River sub-basin population >2,600 adults
- Upper Colorado River sub-basin population >700 adults
- Establish 1,000 age-5+ subadults in the San Juan River sub-basin

Delisting Criteria for Pikeminnow

For <u>7 years beyond downlisting</u>:

- Maintain the Upper Basin metapopulation

- Maintain populations in the Green River and Upper Colorado River sub-basins ("no net loss")

- Green River sub-basin population >2,600 adults

- Upper Colorado River sub-basin population **>1,000** adults **OR Upper Colorado River sub-basin population >700 adults and San Juan River sub-basin population >800 adults**

Next class: building a more comprehensive model

- First we need to redefine the program scope and targets

Scope

- What are the broad parameters or rough boundaries of our 'system'?

Upper Colorado River subbasin
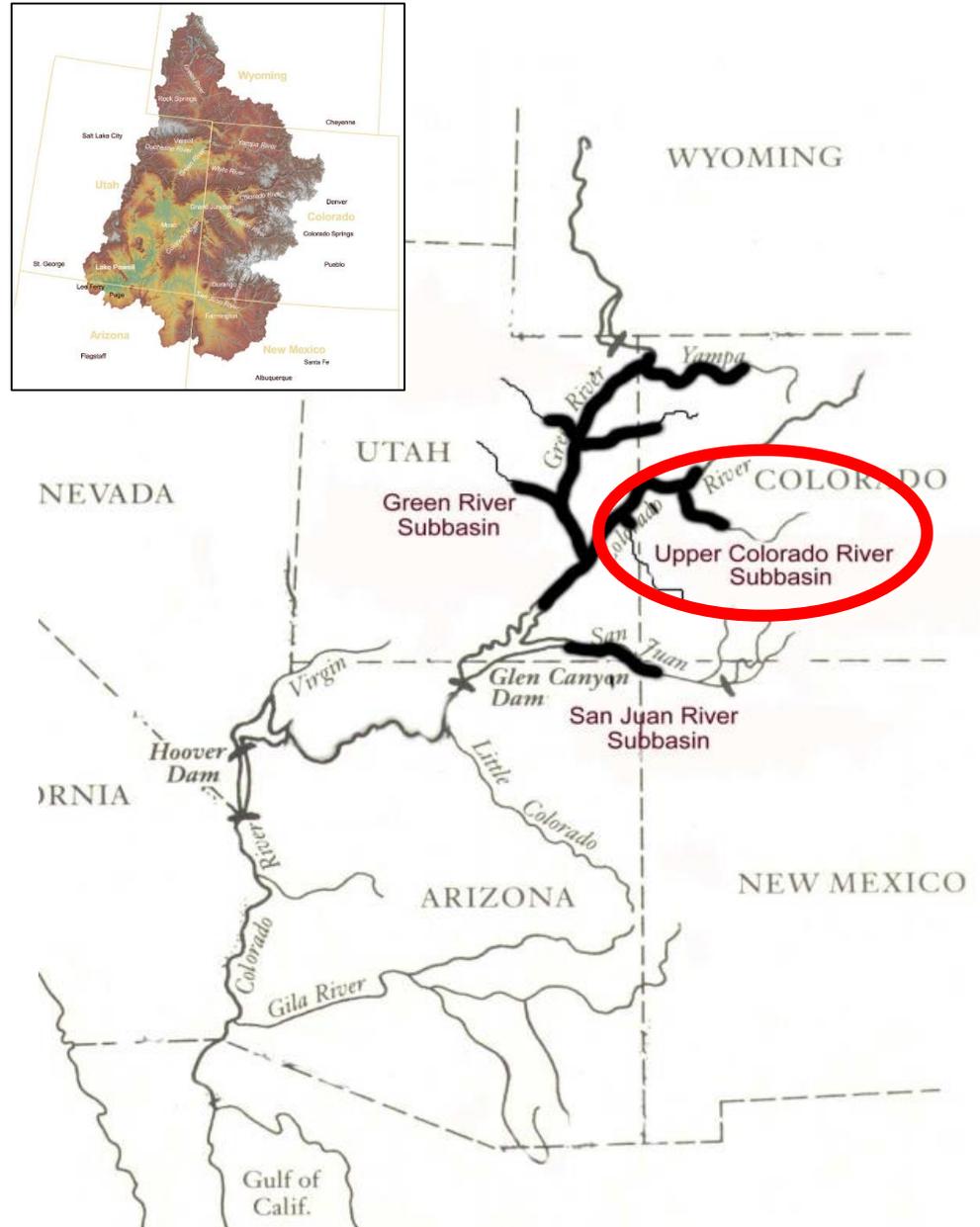
Distribution of pikeminnow populations

Nested Scales of UCREFRP
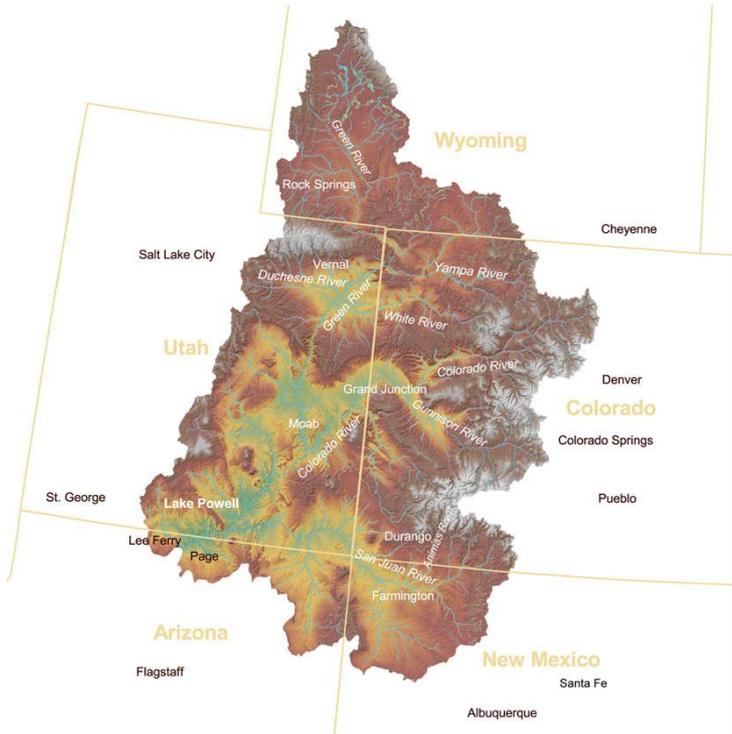
Upper Colorado River subbasin within state of Colorado
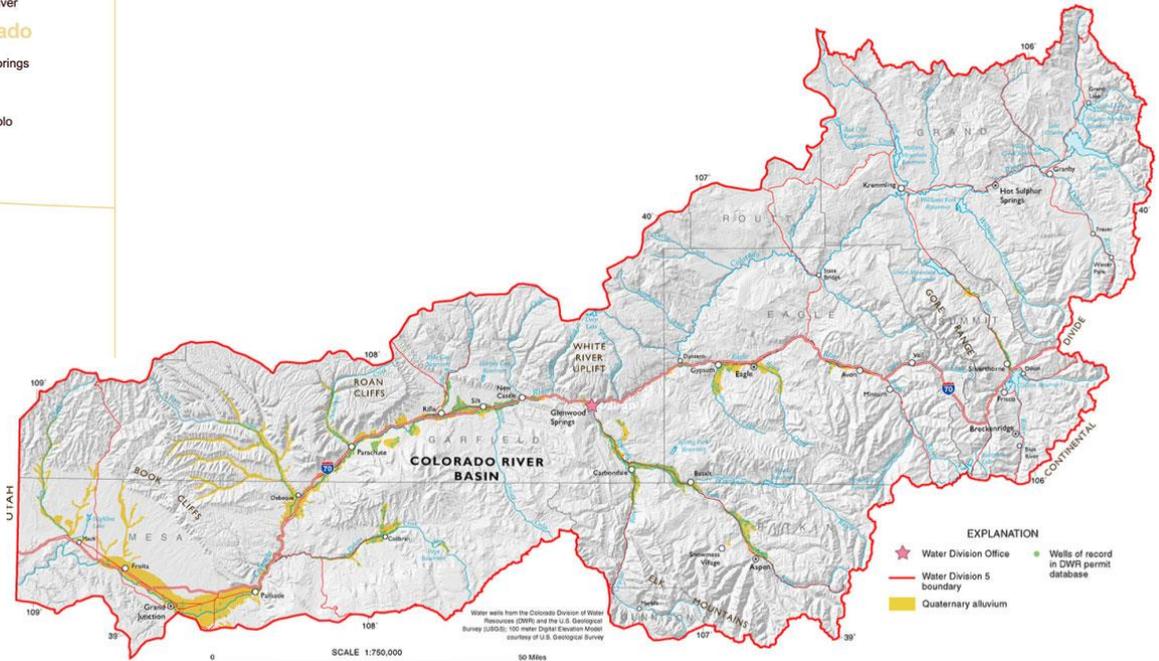
Full Program Scope

Conservation Target: Pikeminnow

- An element of biodiversity at a project site, which can be a species, ecological community, or habitat/ecological system on which a project has chosen to focus.

Upper Colorado River Subbasin

?

Working backwards: let the goal define the targets

Goal: Recover and delist the endangered fishes in the Upper Basin by restoring and establishing self-sustaining **populations** and protecting sufficient **habitat** to support them
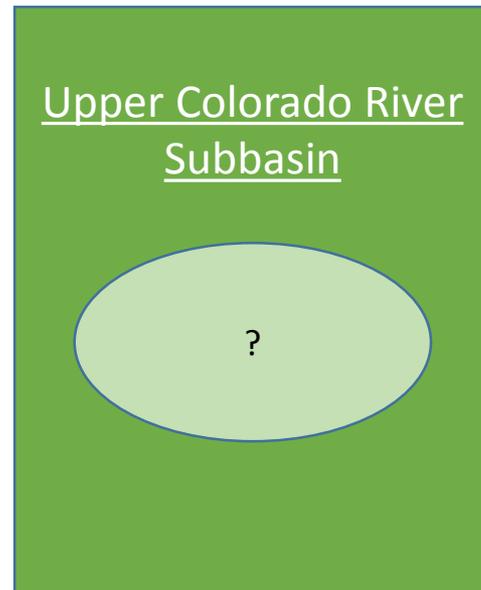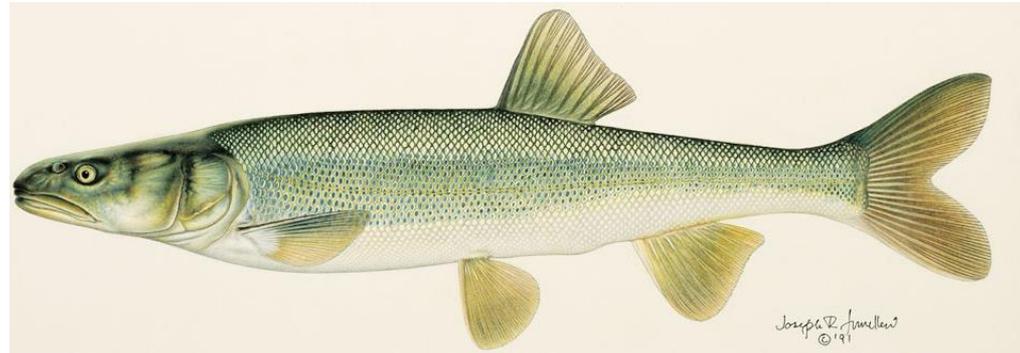
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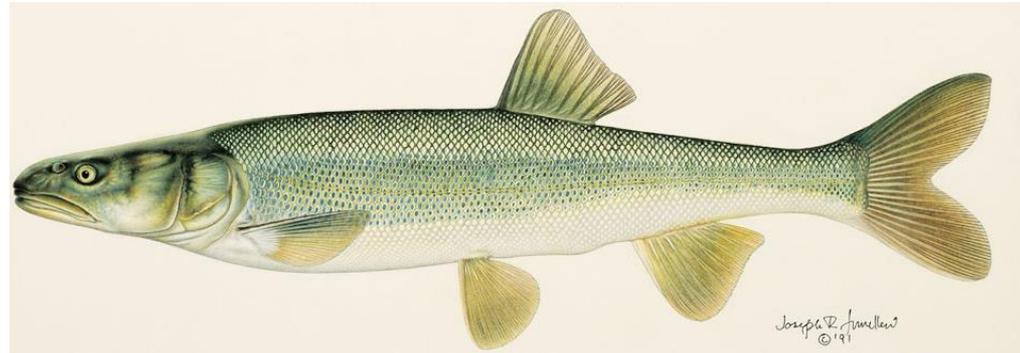
Upper Colorado River Subbasin

Colorado pikeminnow populations

Colorado pikeminnow habitat

Strategy: The Historic User Pool Phone Call

- Consensus-based arrangement

- Managing over 10,000 acre feet of water during irrigation season through an information sharing phone call

- Coordinating releases for augmented spring peak flows

Team Homework
See assignment handout

1. Link threats to conservation targets via stresses

2. Elaborate contributing factors to threats

3. Elaborate strategies and actions linked to streamflow regulation

4. Turn in answers to guiding questions by ___

5. Questions?

Refining the Concept Model

UCREFRP in the Upper Colorado River Subbasin

Lecture 1.3

Outline for Teaching Notes

- Overview of the Upper Colorado River Subbasin

- Review of concept models
  - Adding human ecosystem services and possible human wellbeing targets

- Team Activity

- Report-outs

- Prep for next Module

Brief overview of the Colorado portion of the Upper Colorado River Subbasin
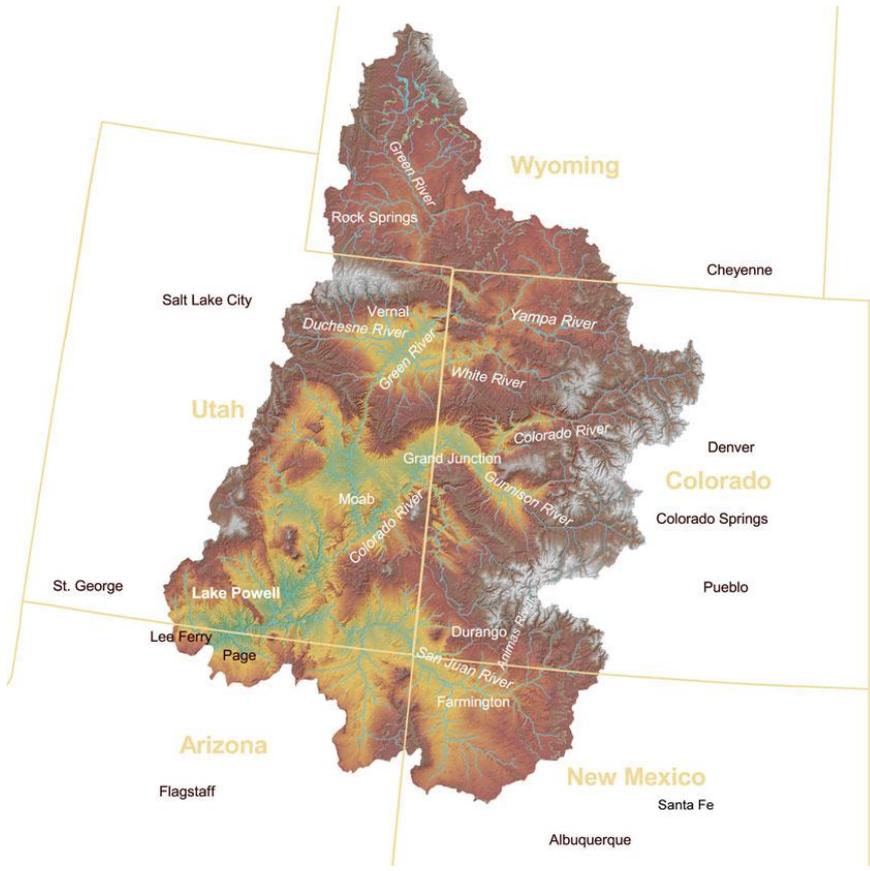
Colorado Subbasin

Full Basin
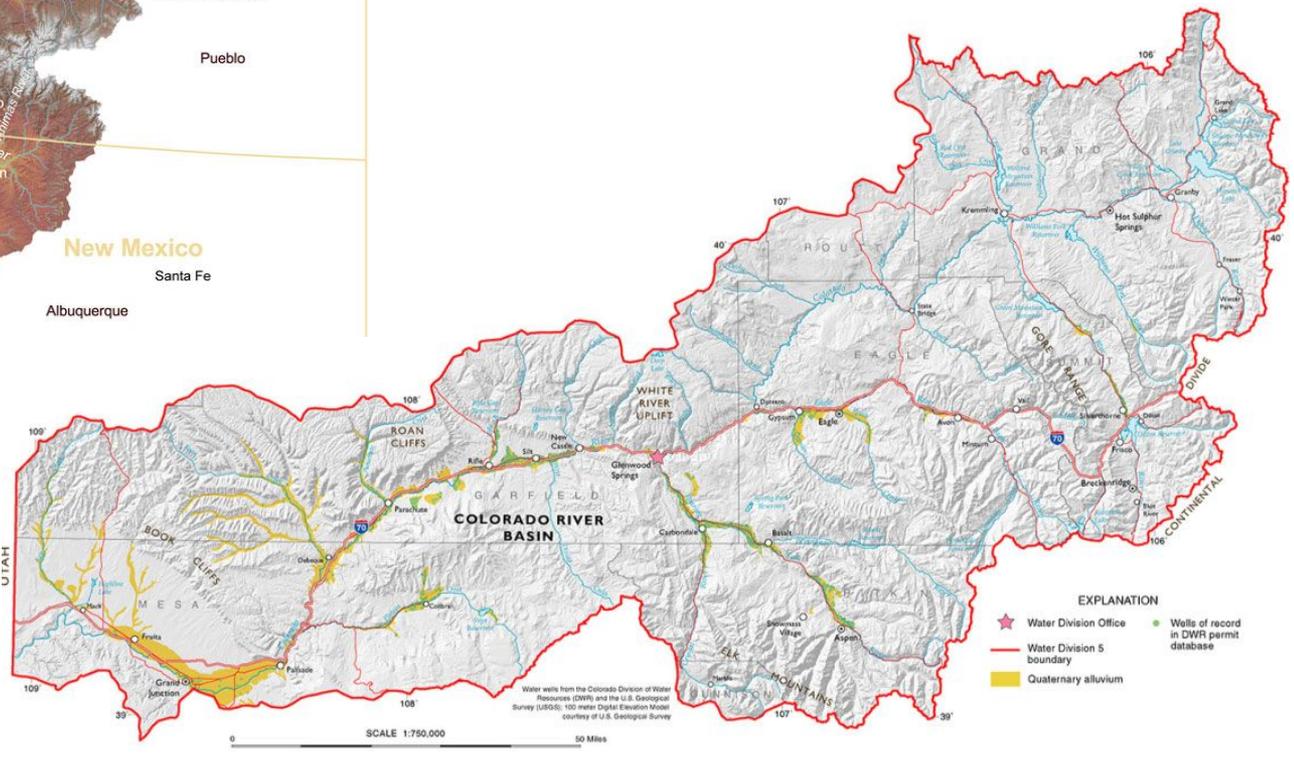
Headwaters of the Upper Colorado Basin
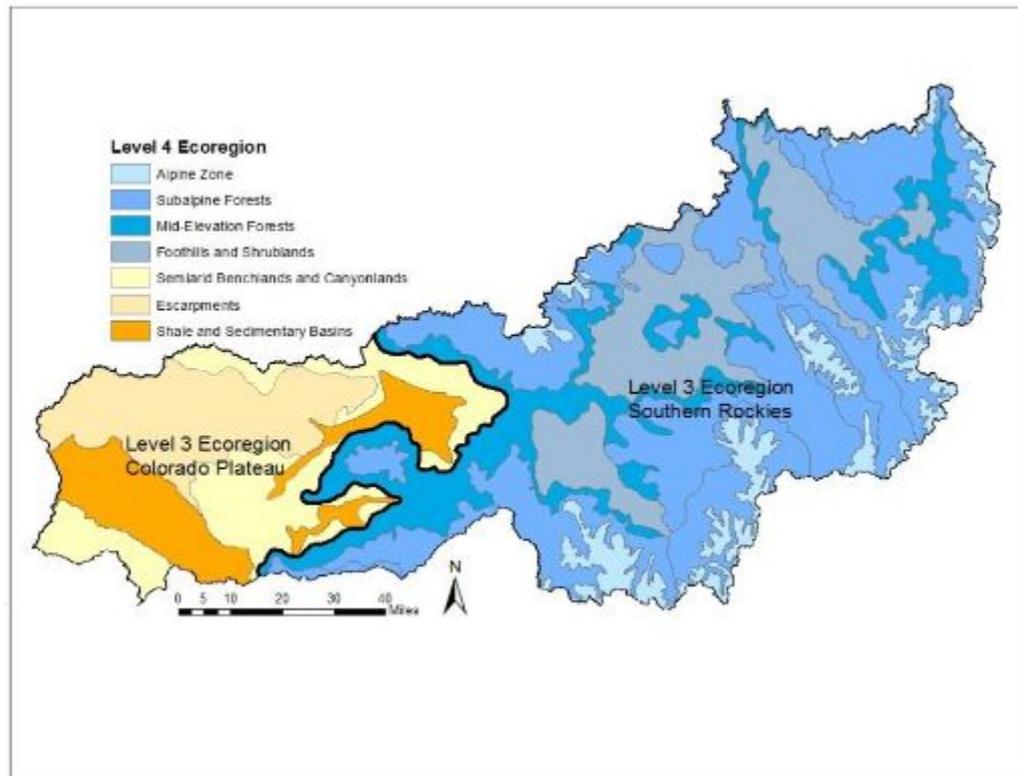
- Differences between 2 Physiographic Provinces
- Topography
- Climate
- Precipitation

Colorado's Southern Rockies

Colorado's Southern Rockies

Colorado Plateau

Colorado Plateau

Aquatic Communities of UCRB

Controlling Factors:

- Thermal profiles

- Velocity profiles

- Substrate composition

- Physiochemical conditions

- Physical habitat

- Land use effects
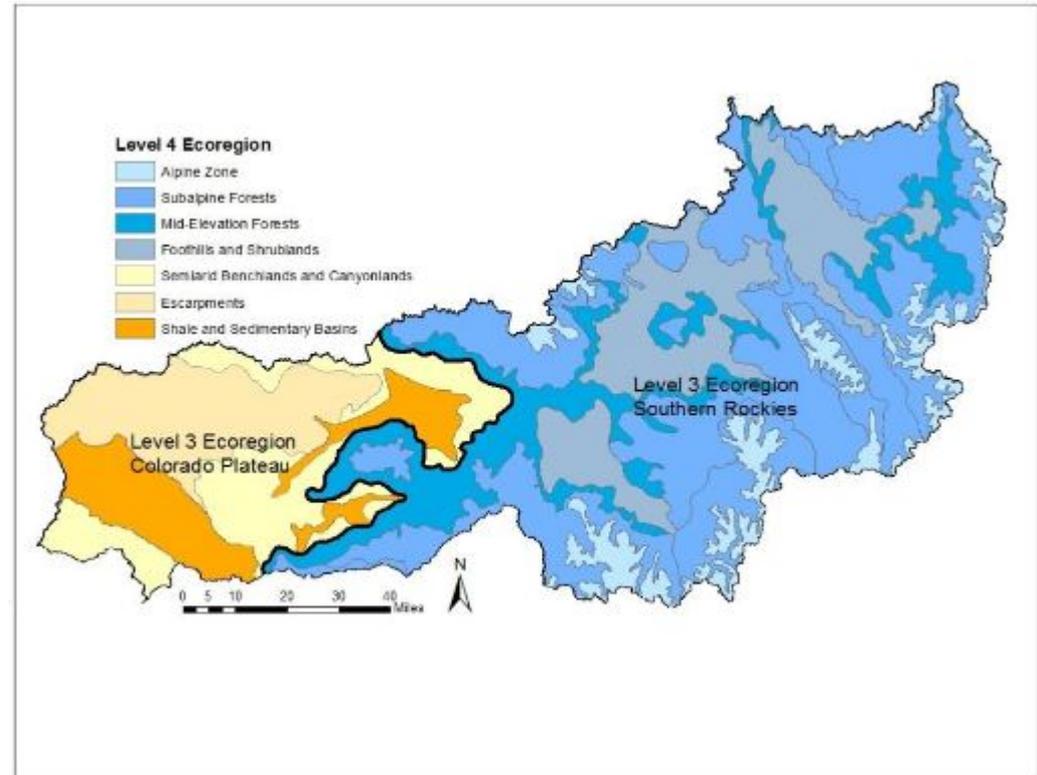
Native Fishes of the Colorado River Basin

- Unique group of native fish species (many found only in Colorado River Basin)

- Highly specialized and unusual

- 36 native fish species basin-wide (14 species in Upper Basin)

- Majority of native fish are species of minnows and suckers

Nonnative Fishes

- About 67 nonnative fish species introduced into the Colorado River Basin since turn of the century (about 40 species in the upper basin)

- Many of the nonnative species were introduced to create and maintain sport fisheries

- Nonnative fishes are now widespread, often predominant in fish communities, and compete with or prey on native fish

- Some represent a distinct threat to native/ endangered species

Aquatic Assemblages

Cold Water (Southern Rocky Mountain ecogreion)

- Nonnative Trout
- Native Cutthroat Trout
- Dace
- Mottled Sculpin
- Longnose and Mountain Sucker
- Mountain Whitefish
- Macroinvertebrates:
  - Stoneflies, caddisflies, mayflies

Warm Water (Colorado Plateau ecoregion)

- Bass
- Carp
- Funnelmouth and Bluehead Sucker
- Speckled and Kendall Warm Springs Dace
- Macroinvertebrates:
  - Aquatic worms, leeches, dragonflies

Land Cover, Use, and Ownership

- Wetlands

- Forest, shrub, and grassland

- Crops and pasture land

- Fed, state, and private ownership

National Land Cover
- Open Water
- Perennial Ice/Snow
- Developed Land
- Barren Land
- Forested
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Wetlands

Land Ownership
- Federal
- State
- Private
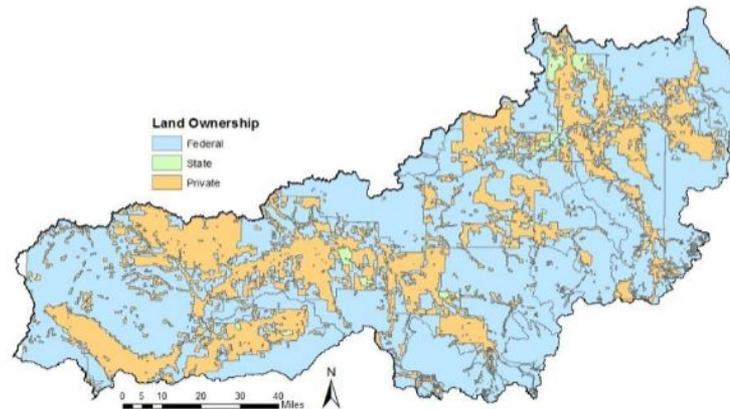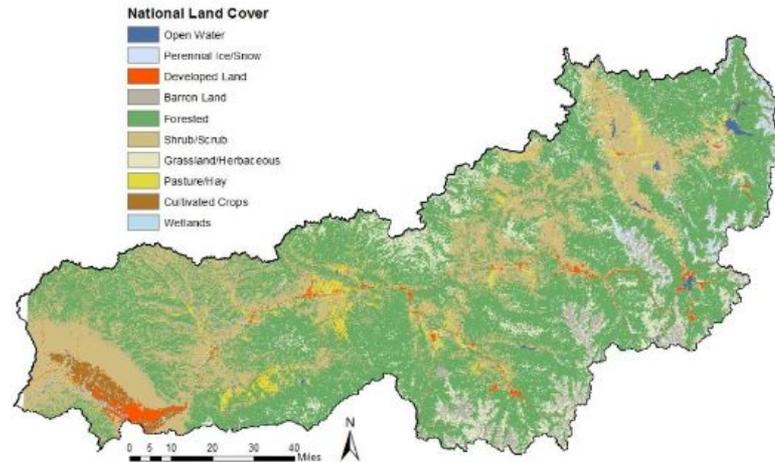
Extractive Water Uses

- Supply largely dependent on spring snowmelt
- Irrigation accounts for >75% extractive use
- Other uses: water storage, fisheries, municipal uses
- Trans-basin diversions
- Colorado River Compact
- Future stressors

Surface Water Diversions in Acre-feet by Use

Legend:
- Irrigation
- Storage
- Municipal
- Commercial
- Domestic
- Stock
- Industrial
- Recreation
- Fishery
- Augmentation
- Recharge
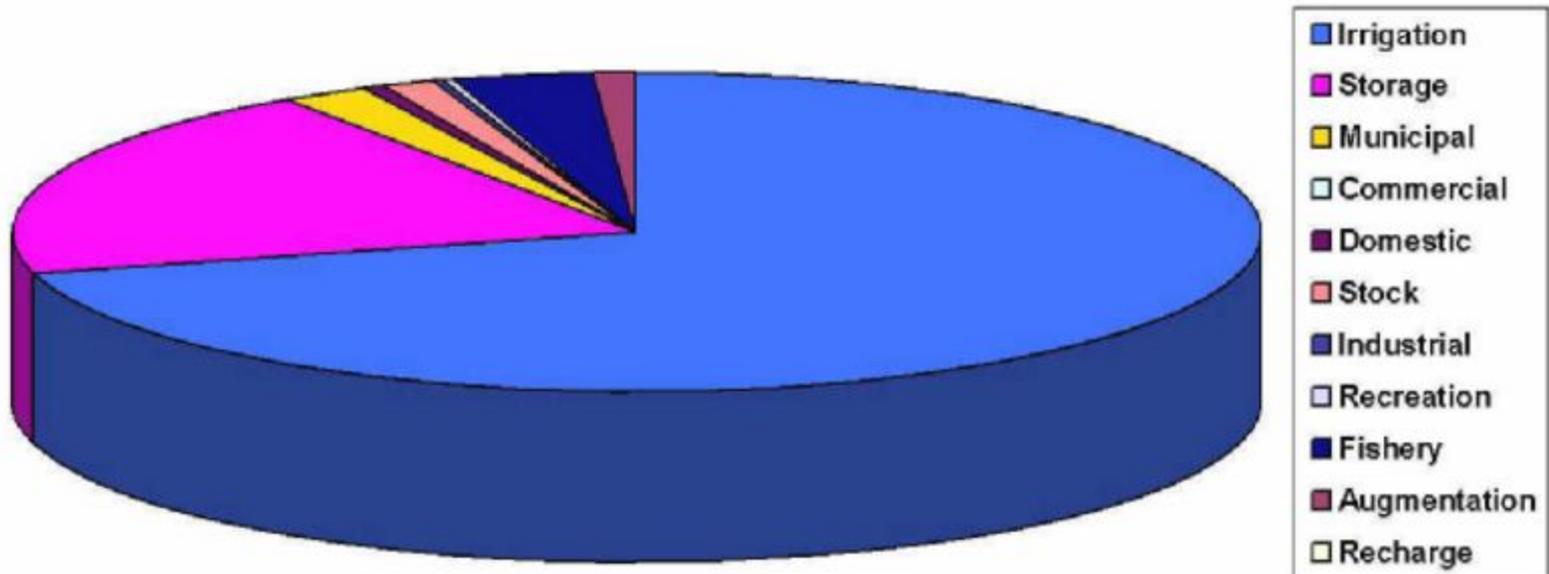
Water Quality

- Effects of dams, mining, and water extraction
  - Heavy metals
  - Temperature changes
  - Sediment loads
  - Threats to aquatic life
- EPA and the Clean Water Act
- Impacts of climate change on water quality

Governance of the Upper Colorado River subbasin

- Upper Colorado River Compact
- **Prior Appropriation**
  - First in time, first in right
  - Beneficial use/ Doctrine of waste
  - Adjudication through water court
- Colorado Basin Roundtable
- Special Districts
- Federal regulatory water rights (CWA, **ESA**)
- The Upper Colorado River Endangered Fish Recovery Program

Team Activity

Homework Recap and Expanding our Models

How threats affect targets via stresses to key ecological attributes…
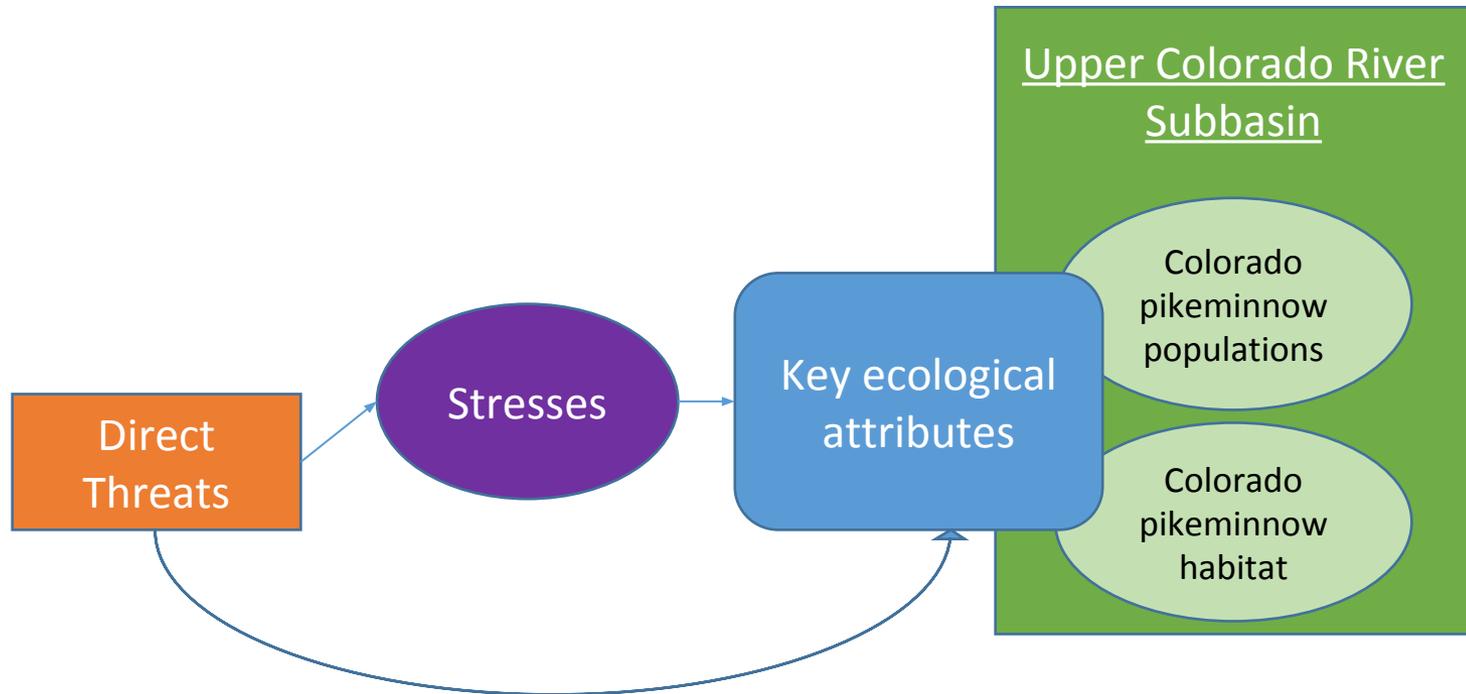
More specific direct threats and the factors contributing to them…

Contributing Factors

- Indirect threats?
- Root causes?
- Opportunities?

- Streamflow regulation
- Habitat modification
- Competition w/ non-natives
- Predation by non-natives
- Pesticides and pollutants

Upper Colorado River subbasin

- CO pimeminnow population
- CO pimeminnow habitat
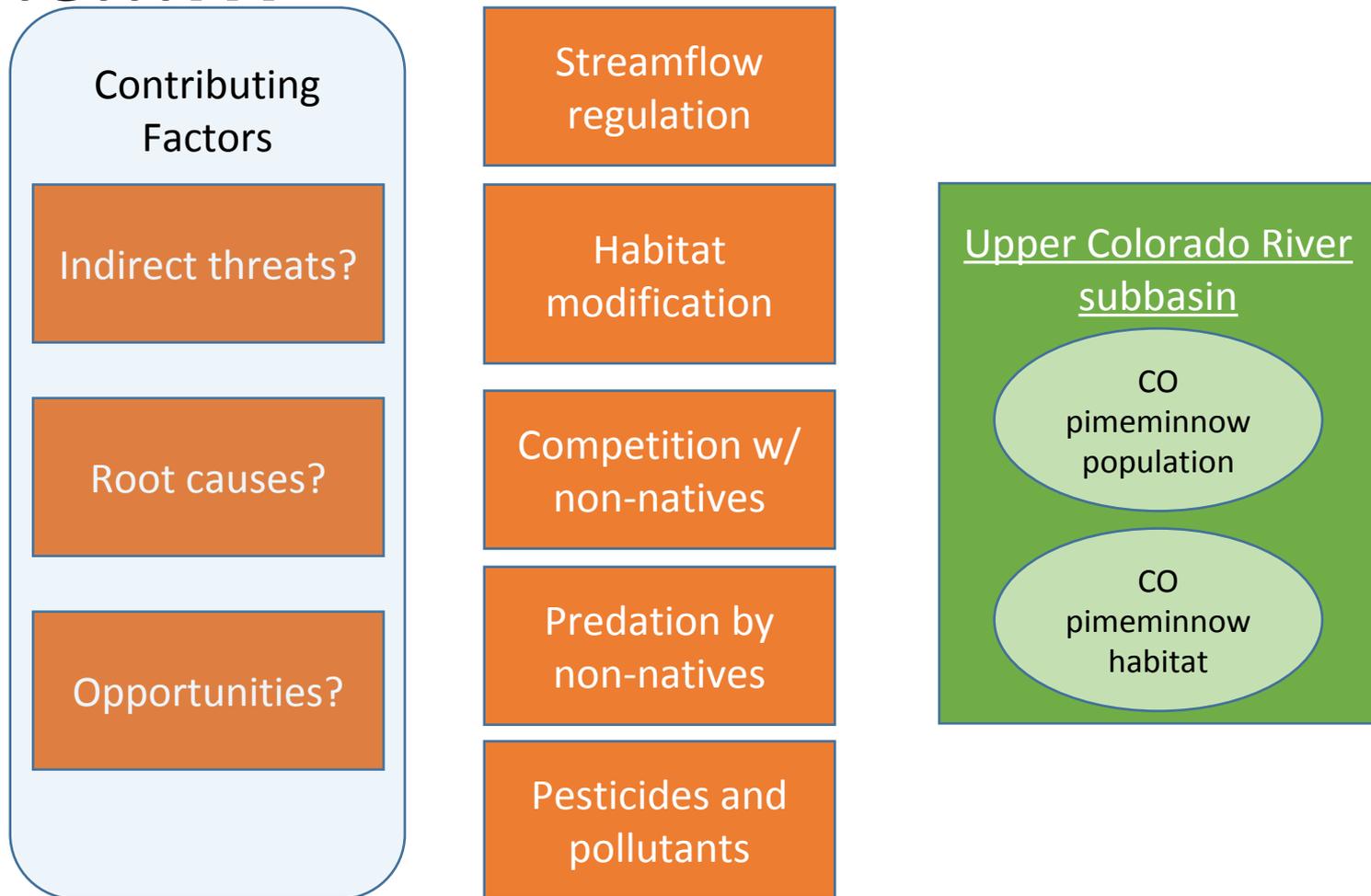
The water management strategy and activities within the 15-Mile Reach

Goal for today: More than just connecting the dots…
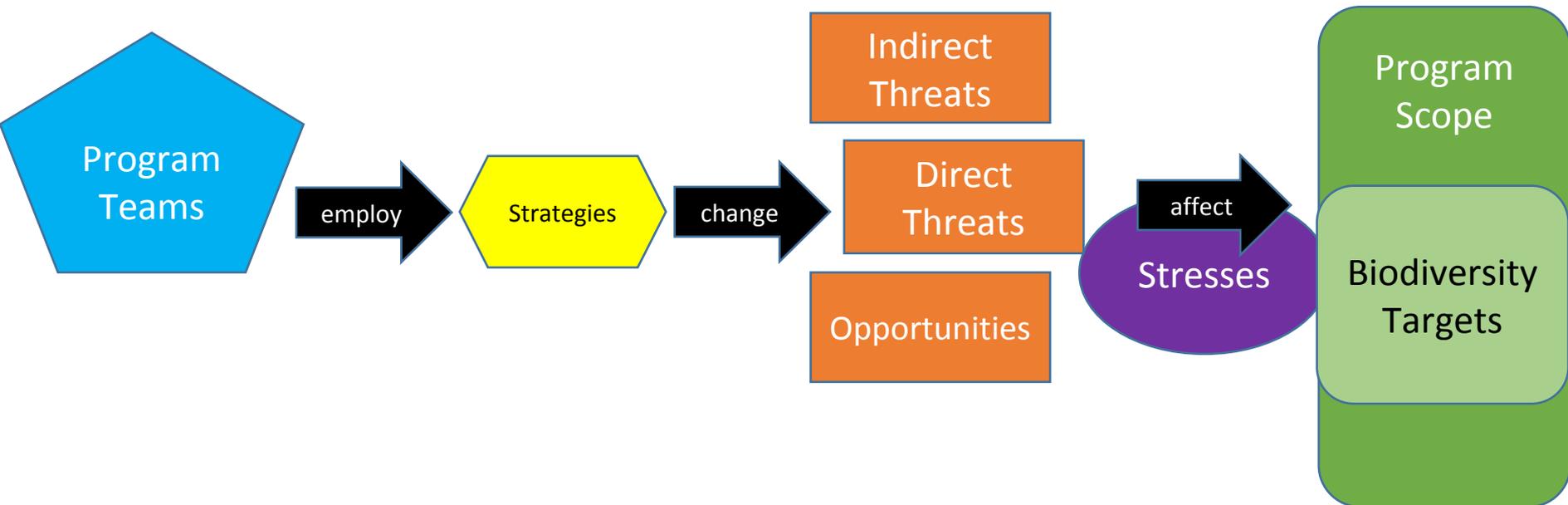
How can we expand this to be more descriptive of the social-hydrological system?

Accounting for social and economic factors: Ecosystem Services

Conservation Targets

Upper Colorado River subbasin

CO pimeminnow population

CO pimeminnow habitat

Ecosystem Services

Upper Colorado River subbasin

?

Human Welfare Targets

Upper Colorado River subbasin

?
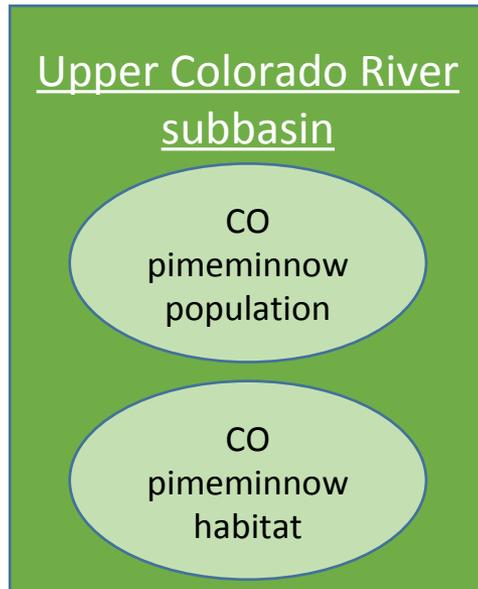
Conservation Targets	Ecosystem Services	Human Wellbeing Targets
Upper Colorado River subbasin	Upper Colorado River subbasin	Upper Colorado River subbasin
CO pimeminnow population	?	?
CO pimeminnow habitat		
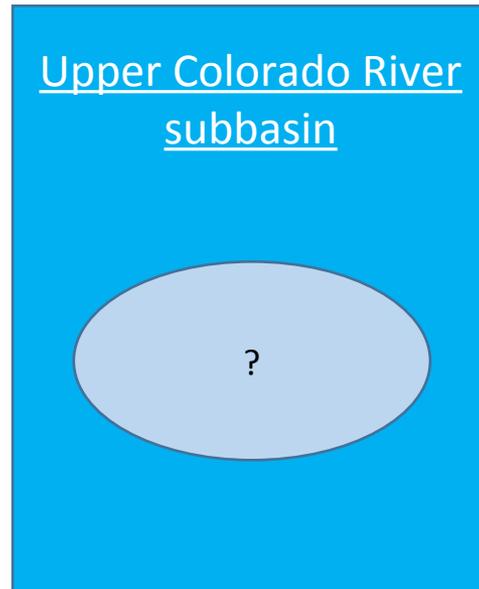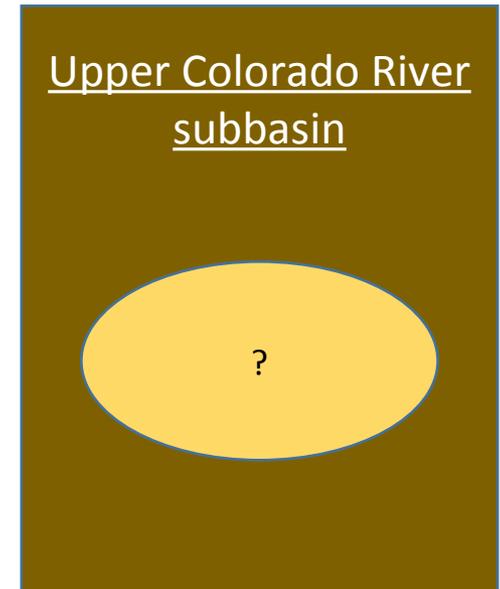
- What are ecosystem services?
- What ecosystem services might be generated as a byproduct of addressing conservation targets?
- How might these ecosystem services be incorporated into your models as human wellbeing targets?

Possible categories of human wellbeing targets

- **Necessary material for a "good life"**: including secure and adequate livelihoods, income and assets, enough food at all times, shelter, furniture, clothing, and access to goods;

- **Health**: including being strong, feeling well, and having a healthy physical environment;

- **Good social relations**: including social cohesion, mutual respect, good gender and family relations, and the ability to help others and provide for children;

- **Security**: including secure access to natural and other resources, safety of person and possessions, and living in a predictable and controllable environment with security from natural and human-made disasters; and

- **Freedom and choice**: including having control over what happens and being able to achieve what a person values doing or being

Source: Millennium Ecosystem Assessment

Team Activity (1 hour)

- Share and discuss answers to homework questions, starting with section 1.

- Are you able to identify ecosystem services provided by healthy/functioning conservation targets that might translate to human wellbeing targets?

- Save at least 30 minutes to work on connecting the different parts of your model. Focus on getting all the important elements into the model first, then worry about arranging and adding arrows.

- Select a team reporter to share your progress and challenges at the end of class

Team Report-Outs

- Share links to models with instructor so all can view

- Highlights:
  - What are some of the dominant physical, biological, and human elements and processes affecting the Colorado pikeminnow's population and habitat within the Upper Colorado River subbasin?
  - Were you able to identify any wellbeing targets?
  - How is the HUP call ultimately intended to influence the targets?

Final Team Products
See Session 1.2 Handouts

- Final product should include full concept model in Draw IO and a narrative explaining the model by answering 10 questions provided on the handout.

- Extra credit
  - 10 points if you include a brief discussion of how you might use a model like this to evaluate elements of UCREFRP

Can we get closer to this using our model?

Introduction to Collaboration and its Evaluation

Collaboration: the art of herding cats

Particular ways of working together
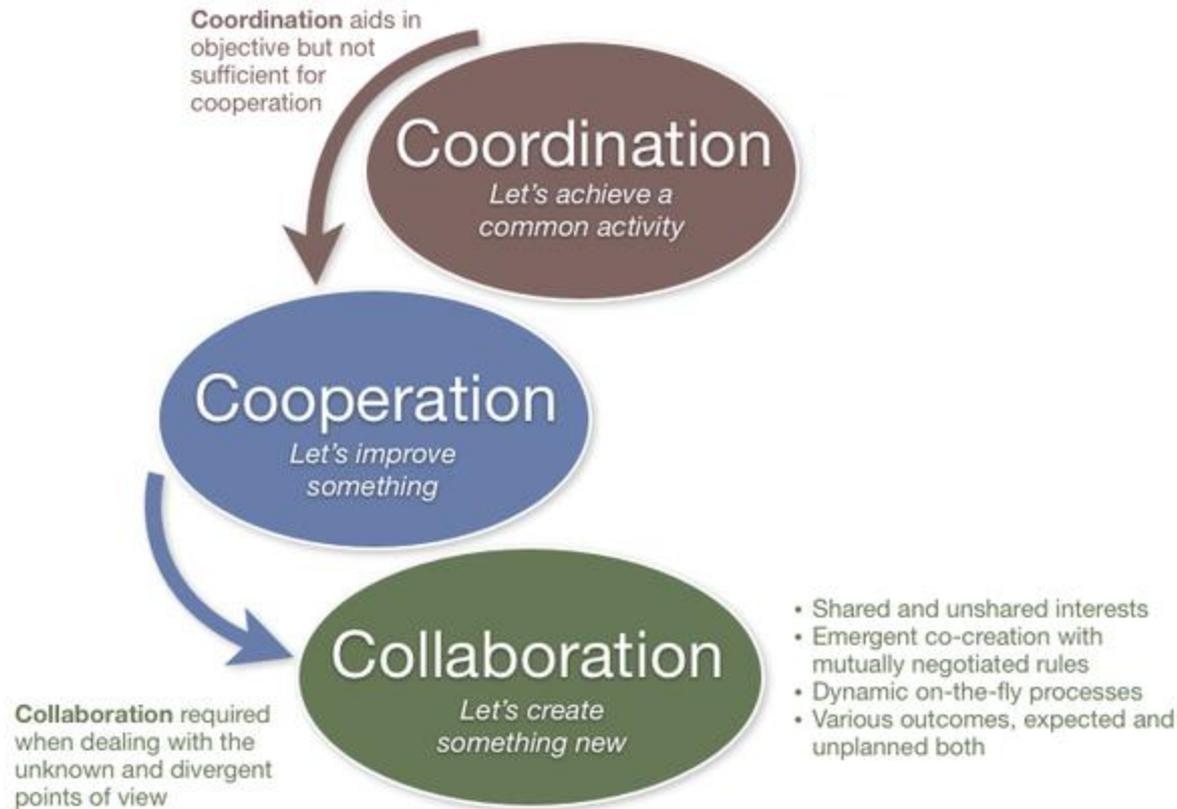
Coordination aids in objective but not sufficient for cooperation

Coordination
Let's achieve a common activity

Cooperation
Let's improve something

Collaboration
Let's create something new

Collaboration required when dealing with the unknown and divergent points of view

- Shared and unshared interests
- Emergent co-creation with mutually negotiated rules
- Dynamic on-the-fly processes
- Various outcomes, expected and unplanned both

What is collaboration?

An academic definition:

A <u>sustained process</u> where:

- A dynamic network of people and affiliated institutions

- Representing different stakeholder perspectives or interests

- Comes together to pool resources and share power in order to achieve outcomes that could not be achieved independently

What is collaboration?

A practitioner's definition:

Collaboration is 'a kind of awkward dance that none of us knows the steps to'

Particular ways of working together

- Co-learning, trust-building

- Consensus building

Discovering   **Defining**

Determining   **Deliberating**

- Making decisions

- Reflecting, chewing on it

Emerson & Nabatchi, 2015
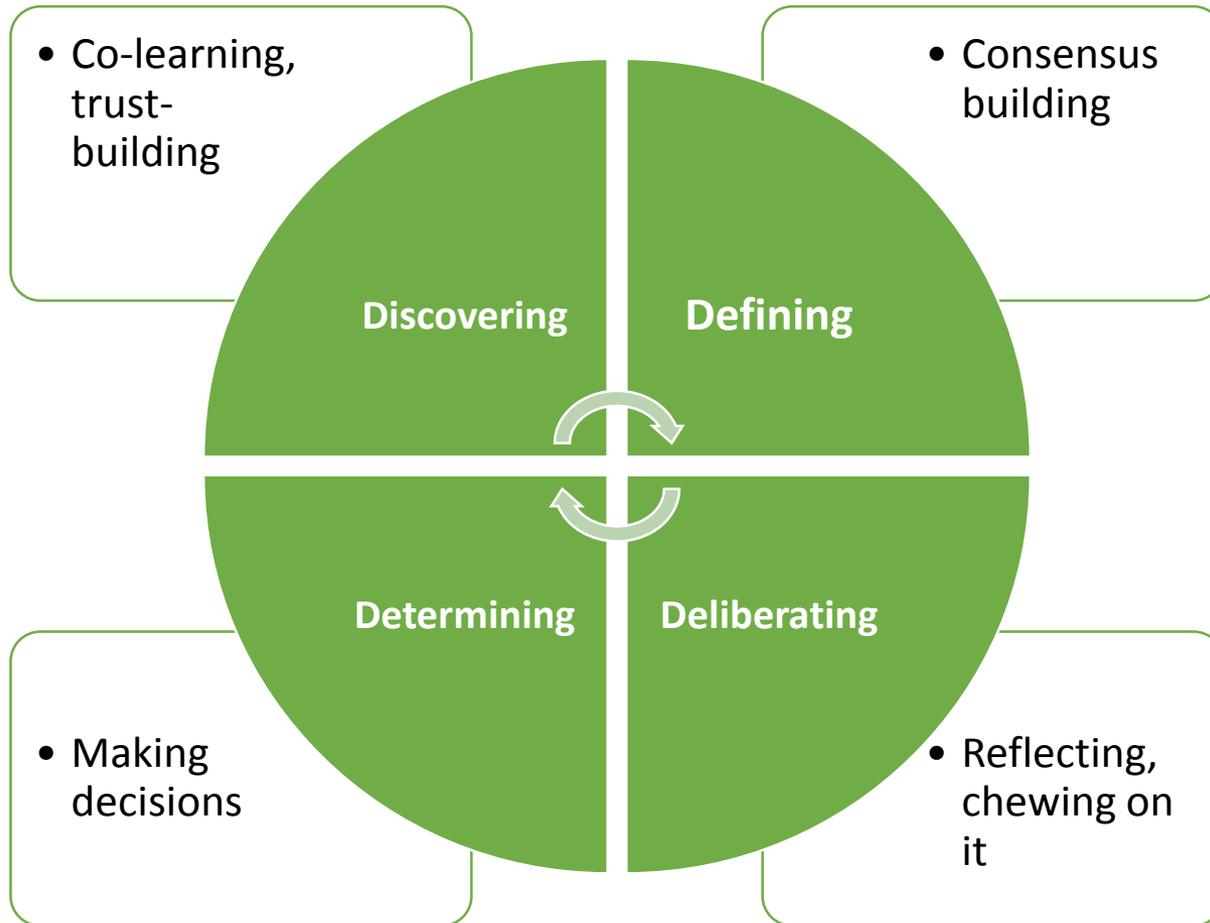
Some elements of Collaborative Conservation

- **Driven by:** Often initiated by a combination of external drivers (e.g. a fire or regulatory requirement) and proximate factors (e.g. or a funding opportunity)

- **Issues:** Often involves resource flows that cross jurisdictional boundaries, common pool resource appropriation problems, public goods provisioning problems, or 'wicked' problems

- **Participation:** Often includes some combination of individual citizens, *bridging* organizations, advocacy coalitions, community groups, land-owners, extractive and non-extractive resource users, local/regional/ federal government agencies, special districts, private sector, universities, other relevant stakeholders

Power Sharing
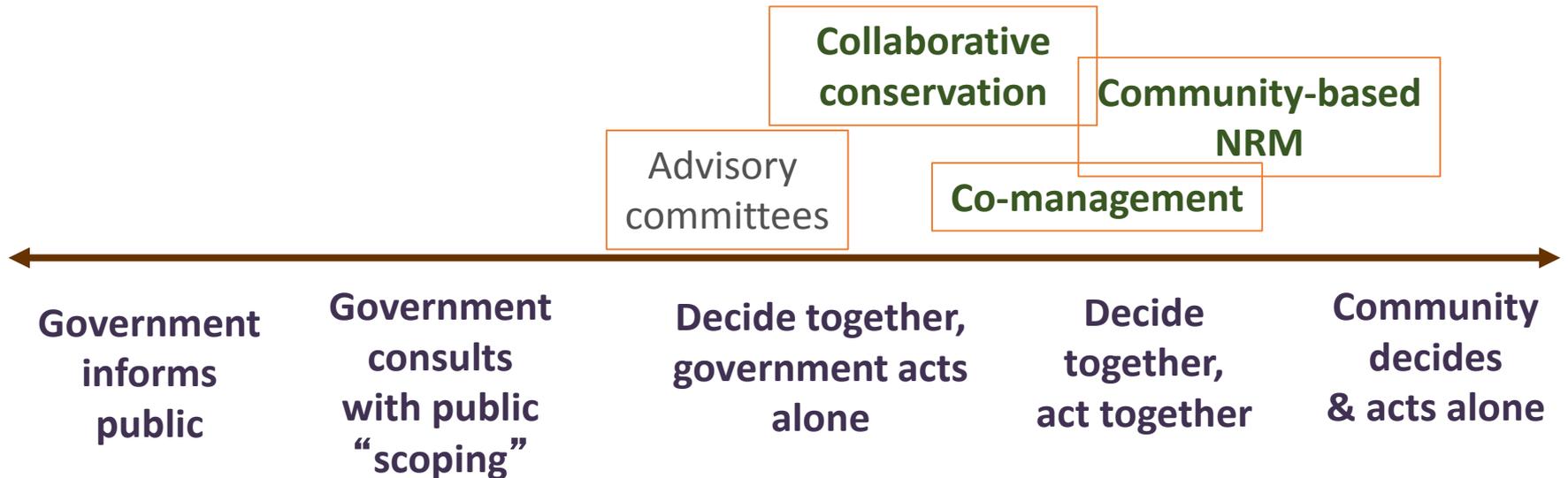
What do collaboratives do?

Learn together

Manage conflict

Build norms of trust and reciprocity

Identify and prioritize issues

Set goals

Forge agreements

Develop and select strategies

Implement strategies

Evaluate outcomes

Depending on issues and available resources...

Cheng & Sturtevant (2012)

When should you NOT collaborate?

Not necessary:

- Conservation problem does not cross boundaries

- Conservation problem not important enough to need collaboration time and energy

Not appropriate

- Collaboration would weaken local stakeholders

- Stakeholders not ready to work together

- Other policy tools might work better to achieve objectives (e.g. citizen-driven litigation to spur agency enforcement of existing environmental regulations)

Critiques of collaboration

- Transaction costs:
  - expensive in terms of time, social capital
  - conflict prone
- Power imbalances:
  - May leave important perspectives out
  - May reinforce status quo or entrench power asymmetries
- Involves trade-offs that may go unacknowledged
- Outcomes are uncertain

Why evaluate collaboration?

- Effective evaluation can help determine whether collaboration is effective at all, and if so, whether its effectiveness can be attributed to the normative reasons its proponents often cite, or for some other latent reasons

- BUT: it's challenging!

Simple logic model of collaboration

Formative Evaluation

Inputs
- Resources (funding, leadership, knowledge and expertise, technology, etc.)
- Procedural/ institutional arrangements that promote effective collaboration

Process Evaluation

Process
- Process design
- Dynamics of collaboration

Summative or Performance Evaluation

Actions/ Outputs
- Activities undertaken to achieve goals (e.g. training, restoration projects)
- Tangible and intangible products or results

Outcomes
- Short or medium-term process outcomes
- Short or medium-term socio-economic outcomes
- Short or medium-term ecological outcomes

Impacts
- Ultimate change in conditions attributable to collaborative intervention
- Adaptation

Evaluating performance

Unit of Analysis →	Participant Organization	Collaborative Initiative	Target Goals
Performance Level ↓			
Actions & Outputs	Efficiency	Efficacy	**Equity**
Outcomes	Effectiveness	External Legitimacy	**Effectiveness**
Adaptation	Equilibrium	Viability	**Sustainability**

Emerson & Nabatchi, 2015

What kinds of outcomes to evaluate?

Ecological

Process/Participation

Livelihood/Economic

Collaborative evaluation process

1. Stakeholders decide together what to evaluate
2. Identify criteria and indicators together that can be used to measure progress toward goals & possible outcomes
3. Develop an evaluation plan-what, how, who
4. Gather & interpret data
5. Learn from results

A social science perspective on socio-ecological complexity

Lecture 3.1

Presentation Goals

- Examine social critique of SES

- Start to think about *how* to address social complexity in socio-ecological systems

Presentation Overview

- Socio-ecological Systems (SES)

- Social Critique of SES
  - How we think about institutions

- Finito

Why Social-ecological Systems?

- Inadequacy of conventional resource management models and output objectives

- Systems are complex and management based on the idea of single equilibria and balance of nature have failed

- Complex systems attributes:
- Nonlinearity, uncertainty, emergence, scale and self-organization
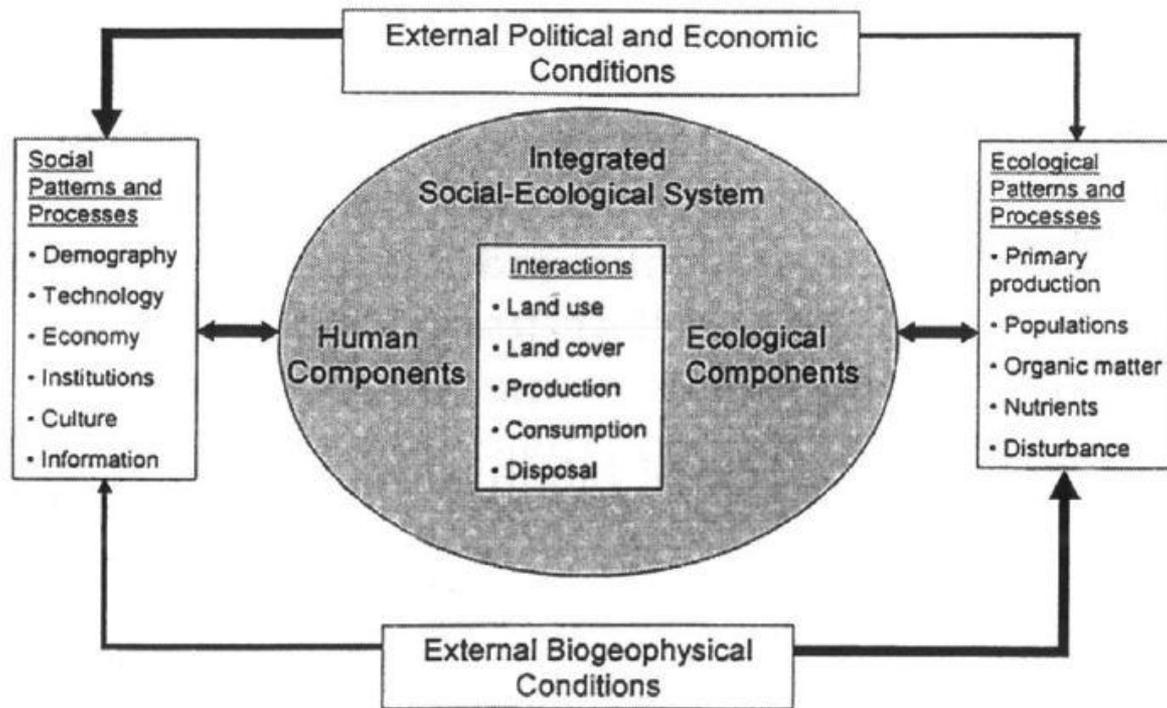
Figure 2. Conceptual framework for long-term investigations of social-ecological systems (SES).

System of biophysical and social factors interacting in a resilient and sustained manner, defined at multiple spatial, temporal, and organizational scales

(REDMAN, GROVE & KUBY 2004)

S1 Economic development. S2 Demographic trends. S3 Political stability.
S4 Government resource policies. S5 Market incentives. S6 Media organization.

Resource systems (RS)	Governance systems (GS)
RS1 Sector (e.g., water, forests, pasture, fish)	GS1 Government organizations
RS2 Clarity of system boundaries	GS2 Nongovernment organizations
RS3 Size of resource system*	GS3 Network structure
RS4 Human-constructed facilities	GS4 Property-rights systems
RS5 Productivity of system*	GS5 Operational rules
RS6 Equilibrium properties	GS6 Collective-choice rules*
RS7 Predictability of system dynamics*	GS7 Constitutional rules
RS8 Storage characteristics	GS8 Monitoring and sanctioning processes
RS9 Location	

Resource units (RU)	Users (U)
RU1 Resource unit mobility*	U1 Number of users*
RU2 Growth or replacement rate	U2 Socioeconomic attributes of users
RU3 Interaction among resource units	U3 History of use
RU4 Economic value	U4 Location
RU5 Number of units	U5 Leadership/entrepreneurship*
RU6 Distinctive markings	U6 Norms/social capital*
RU7 Spatial and temporal distribution	U7 Knowledge of SES/mental models*
	U8 Importance of resource*
	U9 Technology used

Interactions (I) → outcomes (O)

I1 Harvesting levels of diverse users	O1 Social performance measures
I2 Information sharing among users	(e.g., efficiency, equity,
I3 Deliberation processes	accountability, sustainability)
I4 Conflicts among users	O2 Ecological performance measures
I5 Investment activities	(e.g., overharvested, resilience,
I6 Lobbying activities	bio-diversity, sustainability)
I7 Self-organizing activities	O3 Externalities to other SESs
I8 Networking activities	

Related ecosystems (ECO)

ECO1 Climate patterns. ECO2 Pollution patterns. ECO3 Flows into and out of focal SES.

*Subset of variables found to be associated with self-organization.

Social Critique of SES

- Over simplifying conceptualizations of the social world
  - Institutions as coordinating mechanisms sustaining equilibrium – miss subtle changes

- Overly generalizing onto diverse cultural contexts
- Heterogeneous social networks of relations that shape management practices

Social Critique of SES

- Avoidance of politics and power relations
  - International development NGOs

- Over emphasis on formal legal institutions and mechanisms
  - Inhibits move toward sustainable management of resources

Re-conceptualize How Institutions are Maintained

- Recursive interaction of social groups with social/institutional structure, historical circumstance, individual agency

- Institutions are intermittent often invisible, social norm informed, being located in the daily interactions of ordinary lives

(Cleaver 2000:366)

Examples of Informal Institutions

- Recognition of religion's role in attributing legitimacy to resource governance institutions

- Historically contentious relationships
  - Environmental and farming communities

Methodological Inquiry

- How do we identify, measure, describe and propose solutions for informal institutions if their so abstract and hidden?

- Different ways of doing science

- Different research paradigms

Addressing social complexity in SES:

Qualitative methods and research paradigms

Lecture 3.2

Turn to a partner and discuss:

- What underlying assumptions about science and research did the respondents have?

- Where do these assumptions come from?

- What assumptions do you transfer when turning your science into policy?

Presentation Goals

- Start to think about how to capture social complexity into research designs

- Understand relevant methodologies for measuring this complexity

Presentation Overview

- Qualitative Research Methodologies

- Research Paradigms and Worldviews
  - Positivist and Naturalist

- Group Activity

Qualitative Methods

Qualitative Methods

- Participant observation

- Field notes

- Interviews

- Participate by immersing ourselves into the everyday events and lives of another group

Emerson et al. 2011

Purpose of Qualitative Methodology

- Learning what people make of the world around them, how they interpret their surroundings, and how they assign meanings and values to events and objects

- Insights to their distinct lenses and importantly how people deduce their understanding of their lived experiences
  Emerson et al. 2011

Philosophical Drivers of Methodological Inquiry

Epistemology – What Constitutes Valid Knowledge and How Can We Obtain It? (A theory of knowledge)

Ontology – What Constitutes Reality and How Can We Understand Existence?

(A view of reality)

Research Paradigms

Positivist
  Naturalist

Research Paradigms: Positivist

- There is a single, objective reality that can be observed and measured without bias using standardized measurements
- Goal is universal truth, a rule or explanation
  - Repeatability in experiments
  - Scientific method
- Researcher as neutral recorder

Rubin and Rubin 2013; Becker 1996

Research Paradigms: Naturalist

- There is a reality but it cannot be measured directly, only perceived through how others experience it

- What we know is not objective

- What is discovered is embedded in a complex changing reality
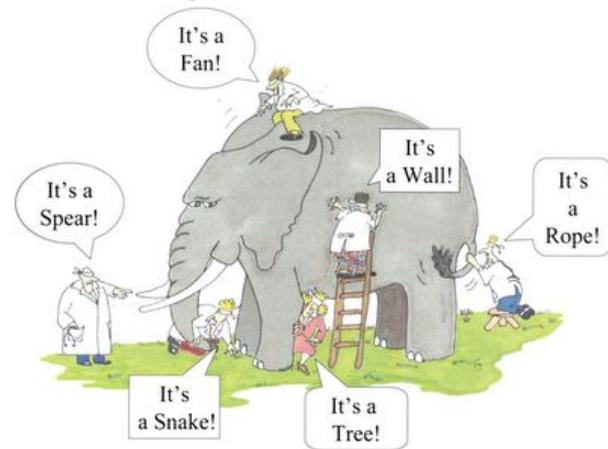
Research Paradigm: Naturalist

- The possibility that there are multiple versions of reality

- Focuses on what is happening in a particular context instead of predicting what will happen next

- Interested in interpreting as opposed to predicting

Philosophical Drivers of Inquiry

Epistemology

(A theory of knowledge)

- How do we know what we know?

- What constitutes valid knowledge and how can we obtain it?

Philosophical Drivers of Inquiry

Ontology

(A view of reality)

- What constitutes reality?

- Are there multiple realities or one measurable, objective reality?

Our epistemology, ontology, & research paradigm shape our research question

Once a research question is established, we determine the best methods for answering that question

Common Characteristics

Quantitative Methods	Qualitative Methods

Quantitative Methods

- Involves experiments, surveys, testing, and structured content analysis, interviews, and observation
- Objective
- Deductive
- High degree of structure
- Some manipulation of subjects
- May take little time to conduct
- Much social distance between researcher and subject

Qualitative Methods

- Involves unstructured interviews, observation, and content analysis
- Subjective
- Inductive
- Little structure
- Little manipulation of subjects
- Takes a great deal of time to conduct
- Little social distance between researcher and subject

What does this mean for how we think about science and capturing social complexity in research design?

Validity in Qualitative Research: Naturalist Paradigm

- Replacing ideas of
  - Validity
  - Reliability
  - Objectivity
  - Generalizability

Validity in Qualitative Research: Naturalist Paradigm
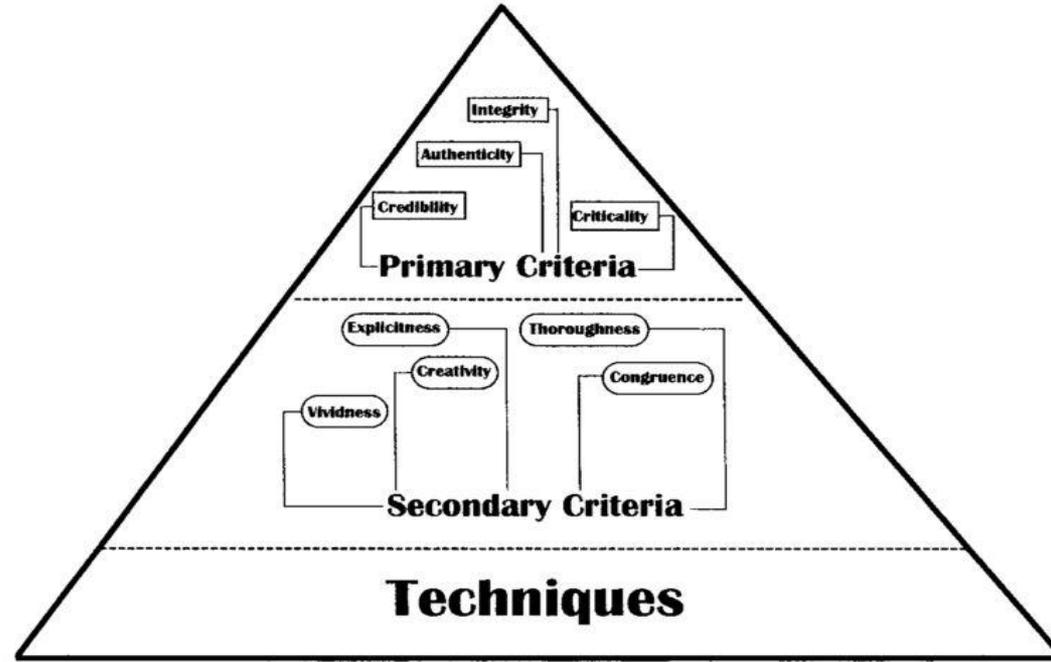
FIGURE 1: Contemporary Synthesis of Validity Criteria in Qualitative Research

Whittemore et al 2001

Triangulation

Interviews

Object

Document Analysis

Participant Observation
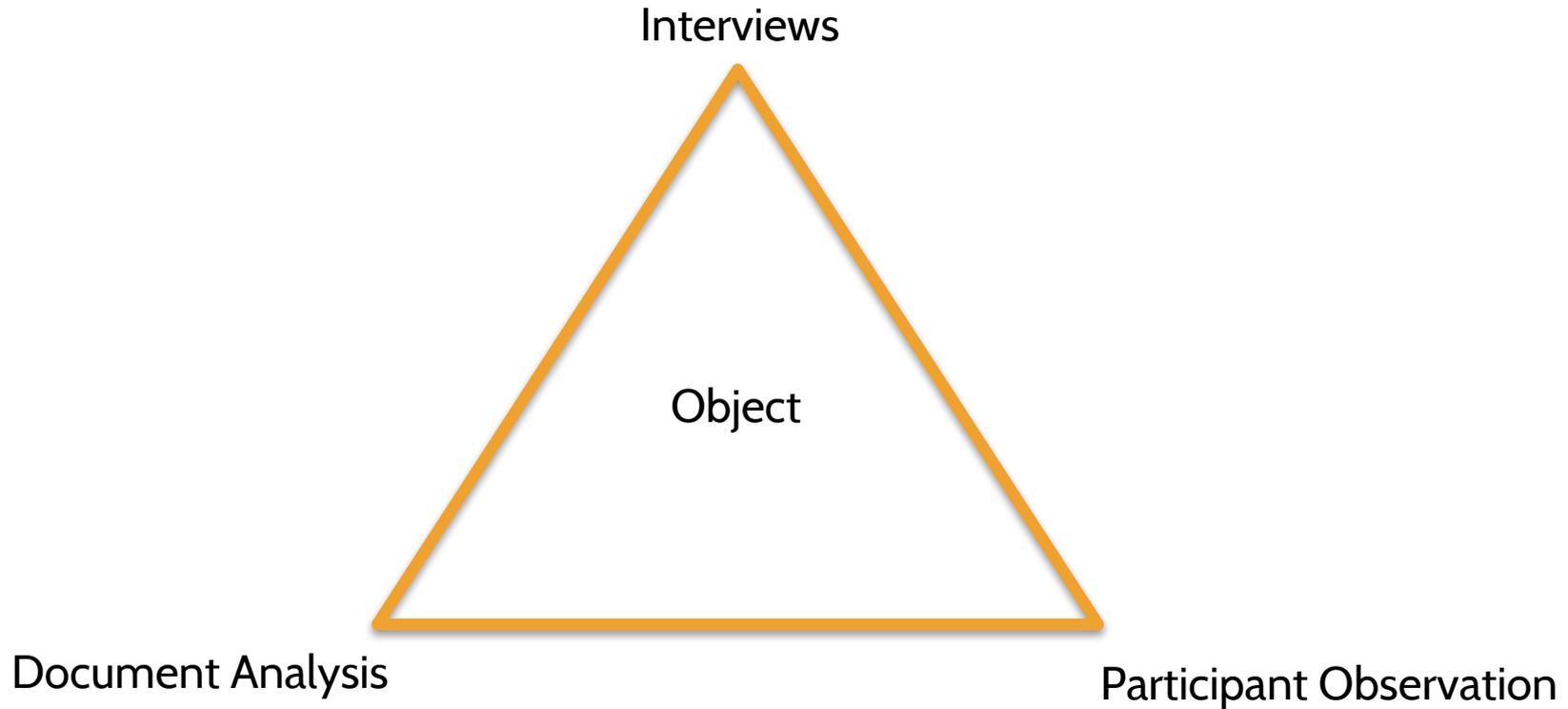
Validity in Qualitative Research: Naturalist Paradigm

- Check list of validity tests:
  - Searching for alternative explanations
  - Searching for discrepant evidence and negative cases
  - Triangulation
  - Soliciting feedback from those familiar with the setting and from strangers
  - Member checks
  - Rich data
  - Comparison

Conclusion: Integration of Social into SES Frameworks

- Allows too much focus on the structures and 'functionality' of an institutional system, devoid of political, historical and cultural meaning

- Greater efforts at situating definitions and question formulation within political and cultural heterogenesis contexts

Cote and Nightingale 2012

Student Small Group Activity

Research Question: What are the UCREFRP stakeholders perceptions' of the collaborative's strategies and goals for reducing threats and stresses to the Colorado Pikeminnow? Do participants believe the collaborative outcomes have been or are successful?

1. Epistemology & Ontology: What kind of knowledge is valid and how can we make sense of stakeholder's realities and practices? What research paradigm would be useful for answering this research question (positivist, naturalist, or a combination)? (10 Minutes)

2. Methods: Draw up a short research brief containing: (a) the methods you could use (e.g. closed-ended questionnaires, depth-interviews); (b) the scale of your research (e.g. sample size) and (c) the mode of data collection (e.g. face-to-face, by post, by e-mail, by telephone). (10 Minutes)

3. Choose a spokesperson to report back on: (i) how your research brief grew out of your epistemological starting point(s); (ii) any difficulties you faced in agreeing on epistemological and ontological positions in relation to your proposed research; (iii) potential limitations to the research: e.g. in terms of validity, representativeness, etc. (5 Minutes)

End

How move to workable, portable solutions

Assessing Resilience in Social-Ecological Systems: Workbook for Practitioners

Revised Version 2.0

ResilienceAlliance
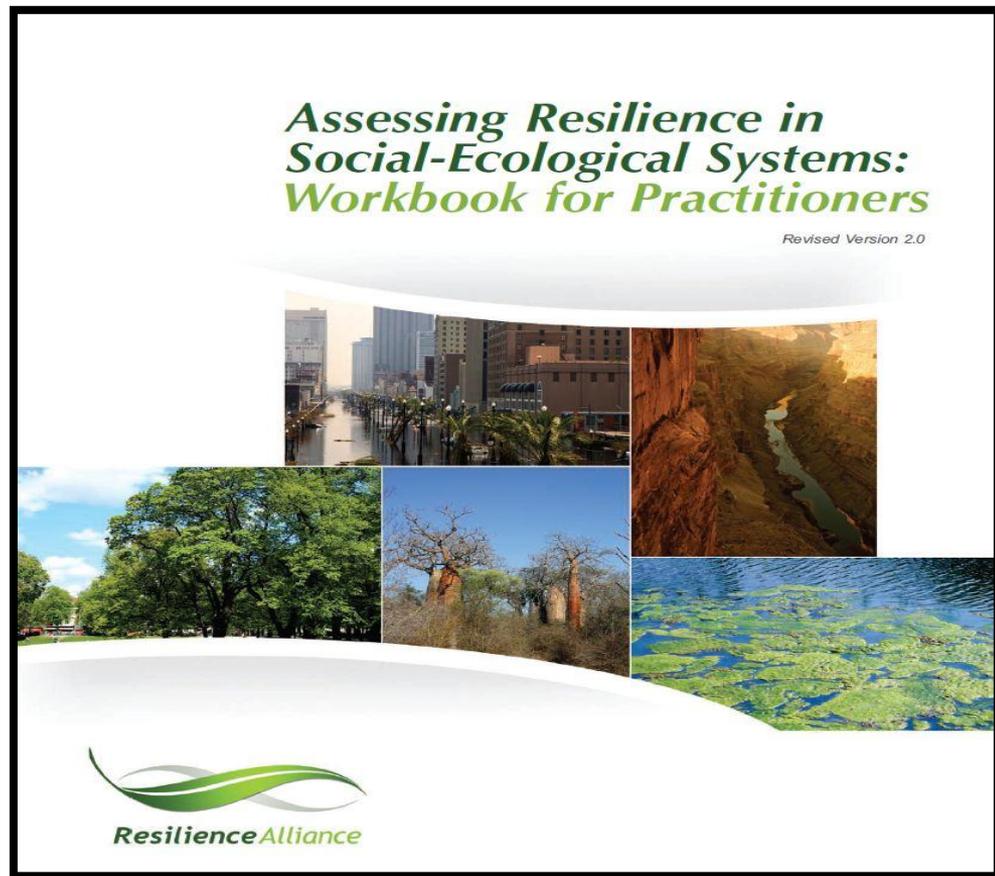
Qualitative Coding Methods for Identifying UCREFRP Collaborative Participant Perceptions

Lecture 3.3

What is Qualitative Coding?

- The process of defining what the data is about

- It is segmenting and labeling data in a way that categorizes, summarizes & accounts for each piece of data

- It is the first step in the data analysis process that allows a researcher to make analytic interpretations

- Link between collecting data and developing an emergent theory to explain the data

What does the coding process look like? An Example from Disaster Research

Youth Creating Disaster Recovery Codebook

Central Project Goal: The goal of YCDR is to learn from and creatively engage disaster-affected youth about what has helped them to physically, emotionally, educationally, and socially recover in the aftermath of disaster.

People – This set of codes should capture any instances where youth speak about people in their lives that were meaningful in some way before or after the disaster.
- **people family** –This code should include any time the person is speaking about a family member including parents, siblings, or extended family.
- **people family adult P** – adult describes a family member including parents, siblings, or extended family OR describes what families are like or their conditions in the community
- **people friends** – This code should include any time the person is speaking about a friend who was meaningful to them in some way.
- **people employers**
- **people employers adult P** – adult describes employers in the community before OR after the disaster
- **people spiritual** – participant describes leaders or lay members of spiritual communities (including church group members) before or after the disaster
- **people teacher** – youth describes a teacher that was meaningful to her/him before or after the disaster
- **people teacher adult P** – adult describes a teacher that was meaningful to her/him before or after the disaster
- **people volunteers** – participant describes people that provided help to their family or community in the aftermath or disaster
- **people volunteers adult P** – an adult participant describes people that provided help to their family or community in the aftermath or disaster
- **people media** – participant describes members of media in the community before OR after the disaster
- **people media adult P** – adult describes members of media in the community before OR after the disaster
- **people coaches/program leaders** – youth describe how leaders of organized programs

Applying Codes to YCDR Interview Transcript

Choir's just been a big part. Last year we got to go see, in the capital, the governor and other people that were there. And because of the choir last year I got to go to graduation and meet the president because my cousin was graduating. The people in choir are just some of the bestest friends I have ever had in my life. I know that I can trust them for anything. One of the guys that was in show choir with us, he shipped off to go to Kentucky to start training for the army. So that was a really big deal for us because he is like a brother, we are seriously like one big family. After the tornado, as soon as we got to where we could get Internet and the computer, everyone was getting on the choir page to see where everybody was. It is just one big family that I am really happy to call mine.

This is my best friend ████. I don't have a title for this one yet, but I am sure I could call it "Double Trouble" or something. This is my best friend. We have been through so much. We both lost our homes in the tornado because she lived just a couple streets over from me because we both lived on the 20th block. She lived like right behind the high school. So, she was living in a FEMA trailer and I was living in a house that my uncle had cause he hadn't rented it out yet to people. And we were kind of like just "yeah we're friends" when the tornado hit, but over the last two years we have become best friends. And we helped each other through a lot. Like, whenever we were moving into our houses we helped each other move and pack up everything. And I know I can talk to her about anything and she can talk to me about anything. And you know, just like the storms and stuff, I am okay with storms that come in now, but she is just still

- **people friends** – This code should include any time the person is speaking about a friend who was meaningful to them in some way.

P-Docs | Quotes | 2:15 The people in ▾ | Codes | activities art {12-0}· ▾ | Memos

.docx

[00:24:07]

That's me in a choir robe. It's the first choir robe that actually fit me properly. It only took until the musical this year and the one time that a choir robe actually fit. But choir has been a big part of my life because I have been singing since I could talk and I talked really early. Choir's just been a big part. Last year we got to go see, in the capital, the governor and other people that were there. And because of the choir last year I got to go to graduation and meet the president because my cousin was graduating. The people in choir are just some of the bestest friends I have ever had in my life. I know that I can trust them for anything. One of the guys that was in show choir with us, he shipped off to go to Kentucky to start training for the army. So that was a really big deal for us because he is like a brother, we are seriously like one big family. After the tornado, as soon as we got to where we could get Internet and the computer, everyone was getting on the choir page to see where everybody was. It is just one big family that I am really happy to call mine.

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Next month she and I are taking a road trip to St. Louis and she is auditioning for the Voice. [crowd says ohh...that's awesome, etc] She is really, really good. Like it is kind of upsetting how good she is. In our show choir performances, on our ballad, she had the [unclear], it was a mash up that our teacher knew and she had this solo thing all throughout it and she won best female soloist against these schools that put like thousands of dollars a student into a show, when we only put $200 per student into it. So, it's really exciting because there is no reason why she should not be getting on, like she could go to the very end. She could kick everybody's butt. It is just exciting that I have somebody, even when I leave, I know that she will still be there for me and I will be there for her.

[00:28:21]

This was at the Walmart in ████████, which is a small town, but compared to the town the camp is in, that's the city. It was really

activities choir/orchestra~

people friends~

people friends~   disaster impact~

responsibilities emotional care~   responsibilities home

Size: 100%   Rich Text   Default

P-Docs   [redacted]   Quotes   Codes   activities art {12-0}   Memos

[redacted].docx

113   ride with him to practice and sort of get that one on one time when we were mentoring freshman and things. I hope he does really well this year.

114   I had to put this picture in here because I just looked really odd. These are just some people we hung out with in project graduation. What I was really doing was waiting for the dodge ball tournament to be over with so we could play the basketball tournament. They were sitting there and took that picture. I didn't think anything of it, but then they posted it on Facebook. Project graduation was very fun for me. That was actually the last time I got to hang out with all the friends that were in that other picture at the party-- [redacted] actually just took off for the Military about a week and a half ago. He went down to Kentucky. Yeah, I had to put that funny picture of me in there.

115

116   [00:32:03]

117

118   [clapping]

119

120   [redacted] Overall, there are so many more things that I could have put into it, but just as a brief representation for just right now, those are some of the main things that have helped me get through life. I just try to find things in a more positive light than when I used to. And it can only get better from here because I enroll for college on Monday.

121

122   ([redacted] are you okay if we have questions or comments?)

123

124   [redacted] I think I knew some of those people in your prom picture.

125

126   ([redacted] am struck by how many of your pictures are people pictures. That seems like a really important part of who you are and also your recovery process.)

127

128   Tyler: Yeah, ever since the tornado, it has been a little bit of a struggle, but it has been one that I would not want tot change. Because after the tornado, and sort of like watching scrubs, I found out I want to go be a doctor and things. It has just pushed me to have the motivation to want to help the people that have helped me. During my car wreck I had some really nice paramedics that were joking around with me and talking about sports during the time that I was conscious. It was just really awesome and I want to do that for people when I get older. I have got a little vision for when I am like 40 or something.

129

activities youth programs~
activities sports~

challenges general~
disaster impact~
hopes career~
hopes help others~

P-Docs   Quotes   Codes   activities art {12-0}   Memos

.docx

017

018 Ok, well, obviously, I know you've heard tons about the tornados, million statistics that I could give you and I'm sure others gave you about what happened, but in terms of mental health, we had 14 facilities here in the city, and lost eight of those. They were totally destroyed. We were very fortunate that we did not lose any of our clientele because many of our facilities are 24-hour facilities, and we are also very fortunate we did not lose any staff members, but we did have, I think 44 staff members who lost their homes and/or loved ones in the storm. So we were, you know, kind of at a loss as to what to do that first night. I always start out by telling my story, and then move into it.

019

020 (Interviewer 1: Please)

021

022 So you'll have to tolerate that

023

024 (Interviewer 1: No, we welcome it.)

025

026 I live north of Joplin, so I live on the north side, and the tornado went right down the center. So you have a north side and south side and nothing in-between, which is significant for transportation because you couldn't get from one side to the other very, very easily. So I was at home and I as I often do on a Sunday afternoon, had no makeup on, I have no idea what my hair looked like, and I was probably in pajama—men's pajama pants—and a t-shirt, literally watching Lifetime movie on TV. And my husband decided he needed to go into work to do something and he said, "you need to watch regular TV," that's what we call it, "you need to watch the local station because I think there's something coming, there's something with the weather, I think there's tornado watches, and you should get off that cable and watch regular TV so you'll know." So I'm like mmhmm, OK, sure, , see ya. So then, when you've lived here as long as I've lived here, which is 48 years, you understand and you know when a tornado's coming and you know when the bad ones are coming, of course we've never lived through one like this, so now we have a little more information, but… It gets very still outside, and it sort of changes colors. It's sort of a hazy green outside, and you instantly know that there's a bad thing coming. So that started to happen and I looked out the window and I was like, OK so I got up and I turned on the TV in the kitchen, because it wasn't… this is how we live here, I wasn't really sure that it was going to turn into anything and I always tell people when, they say how do people over here react to tornados, and I'm like, well before the tornado of 2011, the women would sort of kind of hang by the tv and/or get their kids closer to the area they go to for a storm. The men would go out on the front porch and look for it

027

028 (Interviewer: To watch it.)

029

disaster impact adult P~
programs mental health~

disaster story adult P~

Qualitative Coding

- Emphasis on emergence of themes
  - codes arise from the reading of the data rather than emanating from an earlier frame applied to them
- Fosters studying action and processes
- Two phases:
  - Initial Coding
  - Focused Coding

Best Practices for Initial Coding

- Remain open

- Stay close to the data

- Keep your codes simple and precise

- Construct short codes

- Preserve actions

- Compare data with data

- Move quickly through the data

Grappling with Preconceptions

- Every researcher holds preconceptions that influence what we attend to and how we make sense of it

- Preconceptions that emanate from such standpoints as class, race, gender, age, and historical era may permeate an analysis without the researcher's awareness

- Our preconceptions may only become apparent when our taken-for-granted standpoints are challenged
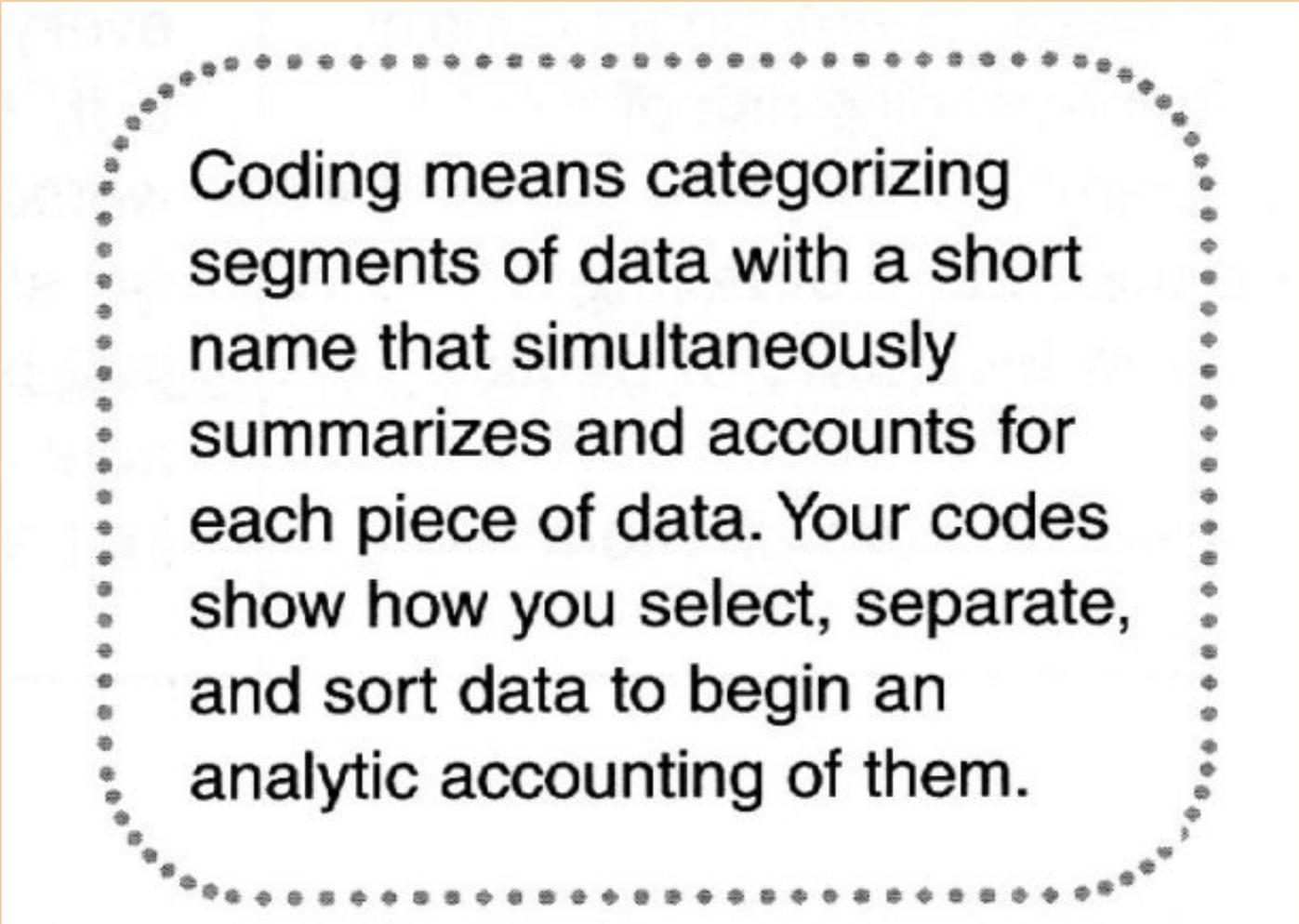
Coding means categorizing segments of data with a short name that simultaneously summarizes and accounts for each piece of data. Your codes show how you select, separate, and sort data to begin an analytic accounting of them.

Questions to keep in mind while coding

- What process(es) is at issue here? How can I define it?
- How does this process develop?
- What does the research participant(s) profess to think and feel while involved in this process? What might his or her observed behavior indicate?
- When, why, and how does the process change?
- What are the consequences of the process?

Ready, set, code!

Synthesizing Social Science and Conservation Conceptualizations of Justice in Collaborative Processes and Evaluation

Lecture 4.1

Presentation Goals

- Understand the value of different knowledge sources and ways of knowing in relation to collaboration, conservation, & environmental governance

- Identify relevant disciplines and approaches for moving the UCRERP forward

- Communicate notions of justice across disciplinary boundaries and apply them to improving UCREFRP

Presentation Overview

- Ways of knowing & Ethical Tensions

- Social Science Approaches
  - To culture & Conservation
  - Environmental Justice

- Conservationist Approaches
  - To culture & Conservation
  - Ecological Justice
- Toward a convergence of approaches

- EJ Case Study – 'Leave the Oil in the Soil'

- Student Activity: Revising Evaluations

Review & Discussion

- Module 2: Stakeholder perceptions
  - Similarities, differences?

- Module 3: Research Paradigms
  - Ways of knowing
  - Ways of collecting and analyzing data
  - Tensions?

Invitation: Class discussion on positionality
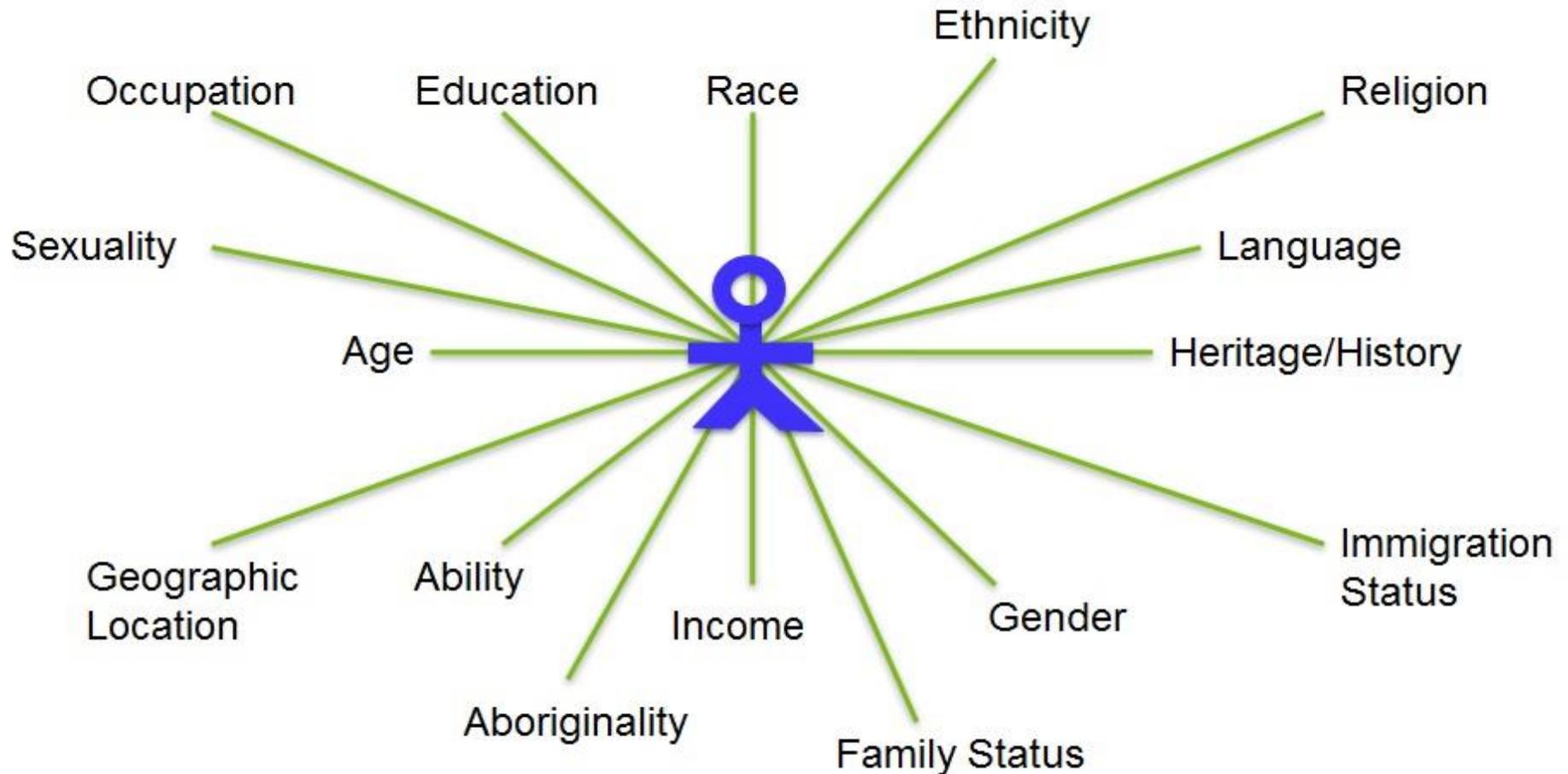
How does your positionality influence your approach to knowledge, research, & what you focus on in your work?

Ways of knowing

- Social Sciences
  - Justice, Power, Market, Sustainability, Climate Change

- Natural Sciences
  - Biodiversity, Conservation, Sustainability, Climate Change

- Together, how might these different ways of knowing work within an environmental ethic framework?

Underlying Ethical Tensions

- *Environmental ethics*
  - Extension of moral considerability beyond humans or persons (e.g. Goodpaster, 1979)

- *Liberal theories of justice*
  - Fairness to persons within human societies

Environmental and Ecological Justice

- The struggle for justice as it is shaped by the politics of the environment . . .has two relational aspects: the justice of the distribution of environments among peoples, and the justice of the relations between humans and the rest of the natural world. We term these aspects of justice: *environmental* justice and *ecological* justice. They are really two aspects of the same relationship.

  (Low and Gleeson 1998: 2)

Social Science Philosophy on Culture & Conservation

- Efforts to protect the environment through conservation can threaten community livelihoods and endangers traditional practices
  - Focus on human rights and indigenous entitlements against Western neocolonial environmentalists
  - Concerned with the burden of environmental damage should be equally distributed so that underprivileged communities are not unfairly saddled by exposure to environmental risks or the necessity for environmental repair

(Low and Gleeson, 1998; Schlosberg, 2007)

Social Science Philosophy on Culture & Conservation

- ''Justice for people must come before justice for the environment"

- Anthropocentrism
  - Hierarchical view of human life, needs, and rights as more important than nonhumans
  - Valuing nature primarily for its utilitarian value

- Environmental Justice
  - Concerned with the fair distribution of environmental ills & benefits among human communities
  - All are entitled to a clean and healthy environment where they live, work & play

Environmental Justice Concerns

- *Distributive notion of justice*
  - Distribution of environmental qualities, be they 'bads' in form of risks and costs or 'goods' in form of access and opportunities

- *Justice as recognition*
  - Equal rights and ownership to environments and the recognition of connections between community and place
  - Injustice based on a lack of recognition of identity, or a lack of recognition of difference in views, values and interests

- *Justice as participation*
  - Communities and persons 'have a say' in environmental matters that concern them
  - Democratic procedures for participation and representation in environmental decisions

Conservationist critique

- Social scientists must widen their empathy circles to include other species using the same ethical framework that guides their interactions with other humans.

(Ouimet and Kopnina 2015)

Conservationist Philosophy on Culture & Conservation

- Conservation:
  - Is essential to protect nonhuman species from the impact of human development and population growth
  - Should be based not only on the instrumental value of nature and nonhuman species to humans, but on intrinsic value
  - Purely instrumental motivation for conservation threatens species that do not offer any explicit benefit to humans.

Conservationist Philosophy on Culture & Conservation

- Ecocentrism
  - Nature-focused set of values that denies the idea that there is a hierarchical division between human-nature realms that grants humans greater intrinsic value than nonhuman species

- Ecological Justice
  - Attaches standard theories of justice to ecology, and claims that all organisms have the right to a fair share of the planet's environmental resources

(Baxter 2005)

Ecological Justice

- Extends moral considerability to animals and other living organisms and to ecological communities and systems, that they should have the opportunity to exist, flourish and develop in accordance with their natures

- Distinguishes between moral agents, who are capable of acting morally and taking on moral responsibility, and moral objects, which are taken into moral consideration by others.

- Understands moral responsibility as a correlate of power in questions of ecological injustice where large differences in power and action abilities are common

- The participatory processes of justice are only open to moral agents, while distribution and recognition concerns all moral objects

- Ecological justice as recognition must involve reflexive attitudes towards the limitations of knowledge and rationality

Rights of non-human organisms?

- Is self-awareness morally relevant?
- Is sentience morally relevant?

  - Treating plants and pigs alike is unjust if sentience is morally relevant, and treating pigs and persons alike is unjust if self-awareness is morally relevant (Alrøe and Kristensen, 2003: 75).

Social Scientist Critique

- Tactics are exclusionary. Conservationists work with political elites who enact various forms of violence, withhold compensation, force community migration, and expose disadvantaged communities to unequal shares of environmental risk. Conservation is linked to the deployment of environmental protection in the name of neo-colonial state building.

A Thesis of Convergence?

- Protecting disadvantaged people and protecting the natural environment are not at odds; they tie in with each other (e.g. Shrader-Frechette, 2002).

- Still:
  - Justice in the Aristotelian sense means proportional treatment where like instances are treated alike and relevant differences are taken into account.
  - All life forms deserve certain rights to the fullness of their natural existence but a biospherical egalitarianism cannot be sustained logically or practically (Low and Gleeson, 1998: 157).

Beyond eco vs. anthropocentric

- Relationships between humans and nonhuman species are too complicated to be generalized and in practice will likely need to be addressed on case-by-case bases

- Each case must be approached with an emphasis on justice for both humans and nonhumans; and the recognition that every species has inherent value regardless of their utility and/or risk to human development

- Need for increased data on cultural needs and beliefs in the context of conservation

- Both type of academics can utilize their ethics and knowledge of cultural beliefs and behaviors to inform and improve conservation efforts

Beyond eco vs. anthropocentric

- We need to expand the traditional notion of holism in order to unpack and study contexts in which humans are important but not the only players

- Can achieve through interdisciplinary collaboration that combines theories and research from the social and natural sciences

- Also achievable through 'multispecies ethnographies,'
  - Stress the philosophical, cultural, and biological aspects of animal–human encounters

Multicriteria Problems: An EJ Case Study on Oil

- A multicriteria problem is characterized by the presence of:
  - a finite set of alternatives
  - the existence of different – and often conflicting – valuation criteria under which we evaluate each alternative (e.g. impacts on land use, travel costs, people affected).

- In order to structure a multicriteria problem, must define:
  - the alternatives/scenarios/options considered
  - The stakeholders involved
  - the dimensions, criteria and indicators for evaluation.

  - These three categories also deeply political and also subjective questions, but this doesn't mean they cannot be defined on a reasonable and common basis, understandable to all actors through participation.

Multicriteria Analysis & Evaluation

- Multicriteria analysis:
    - is used to evaluate problems with different alternatives, expectations and wants, in order to find the most 'suitable' solutions
    - deals with complex and unstructured problems in decision making, mainly in the sphere of socio-environmental management
    - involve a number of conflicting ecological, social, political and economic objectives, multiple interests groups, and different languages of valuation
    - typically deal with the incommensurable, uncertain and irreversible effects of the decisions to be taken.
    - are subjective

- Multicriteria evaluations can allow stakeholders to develop a common understanding of the issues at hand and the decision that must be made

Leave the oil in the soil?: Case of oil in Ecuador and the Niger Delta

- This issue has the need to take into account multiple issues and multiple actors from different sectors and spatial scales

- Costs and benefits are unequally distributed among different stakeholders

Potential Scenarios

- Leaving fossil fuels in the ground without any prior financial condition

- Leaving fossil fuels in the ground, with international contribution

- Leaving fossil fuels in the ground, within a 'market environmentalist' framework (strategy to obtain financial advantages in the form of any financial support, carbon credits, etc.) while fundamentally continuing business-as-usual

- Exploitation of fossil fuels

Potential Stakeholders

- Government
- Capitalist Sector
- Local populations
- Civil Society Organizations
- International Organizations
- Academic Sector
- Nature

Decision-making criteria

- Environmental
- Social
- Political
- Economic

Indicators for Scenario Evaluation

- Local economy
- Health of national economy
- Environmental dimension
- Social dimension
- Cultural dimension
- Governance & social cohesion
- International relations

Understanding Outcomes

- "Acción Ecológica believes that tools such as multi-criteria analyses and assessments can be useful, but when there is a disconnection with local processes, they can be confusing and even dangerous" (Oilwatch, 2012).

- What is the legitimacy of a multicriteria evaluation if important stakeholders do not acknowledge any of the scenarios evaluated?

- What is the legitimacy of a multicriteria evaluation if stakeholders feel betrayed by the indicators used?

- The key to avoid this is: *participation/deliberation*. From the beginning, an evaluation *must* include the participation of stakeholders in order to have as many reality-checks as possible

- Must be able to acknowledge *all* positions, including the most radically opposed ones.

Small Group Activity – Peer Reviewing Module 2 Assessments

- You are expected to provide your peer feedback by developing your review comments into a 1-page single spaced organized narrative for them to review.

- The central focus of this exercise is to identify areas of improvement based on what we have learned in Modules 3 and 4, building on Modules 1 and 2.

- The purpose of this exercise is to develop the ability to provide constructive criticism to your peers, and in turn, be able to incorporate their constructive feedback into your own work to improve your approach to assessing the UCREFRP collaborative.