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WORKSHOP PURPOSE & EXPECTATIONS

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Workshop Purpose

- To review and refine a set of proposed measures that will enable us to evaluate the effectiveness of the Conservancy's conservation strategies and actions in the Colorado River Basin
  - Provide feedback on measures framework and approach
  - Review & refine proposed indicators and the way we will report or map them
- Develop ideas for obtaining the data we need basinwide to inform our measures
- Identify the next steps in a measures development plan

COLORADO RIVER PROGRAM & MEASURES

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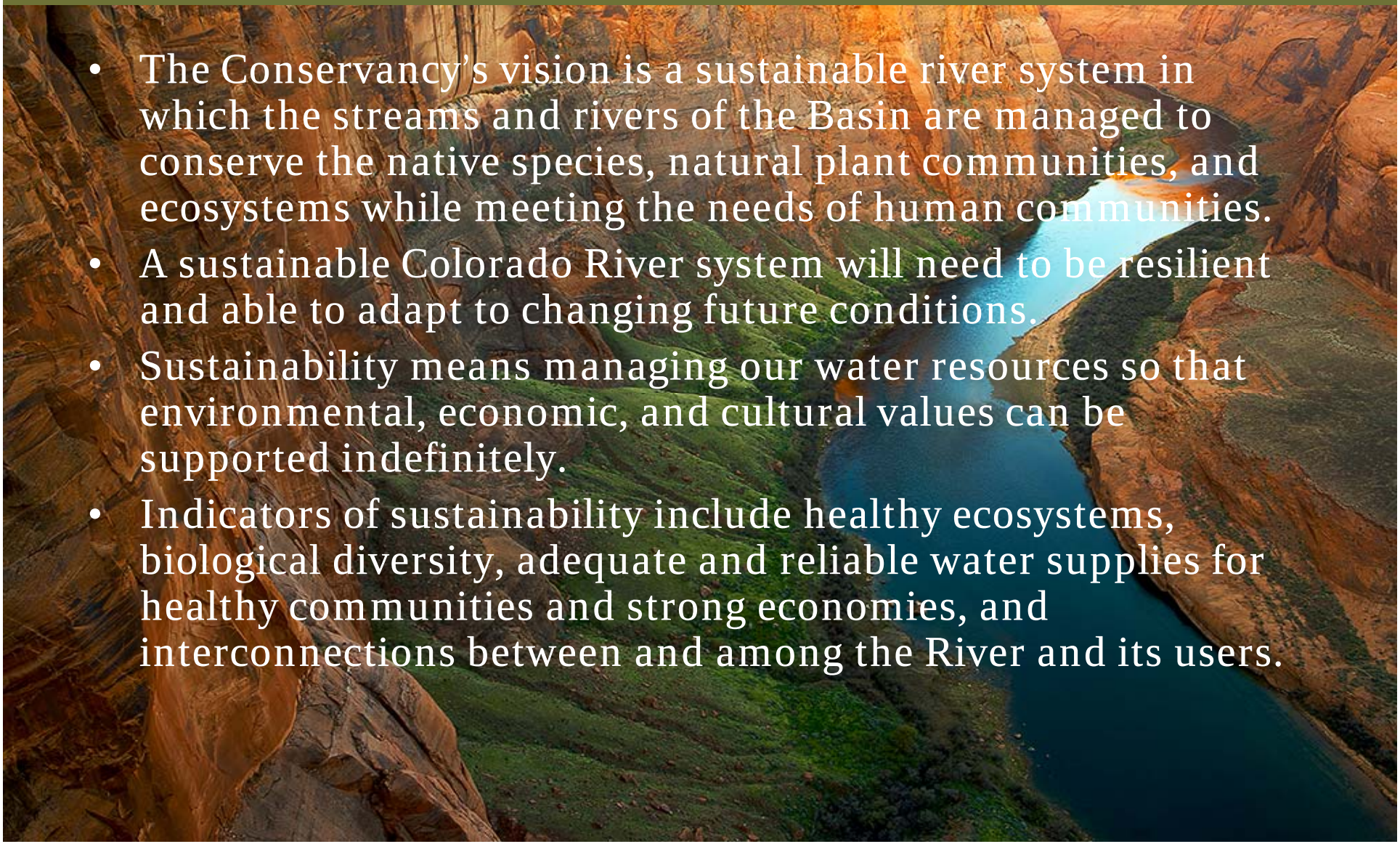
Colorado River Program Vision



- The Conservancy's vision is a sustainable river system in which the streams and rivers of the Basin are managed to conserve the native species, natural plant communities, and ecosystems while meeting the needs of human communities.
- A sustainable Colorado River system will need to be resilient and able to adapt to changing future conditions.
- Sustainability means managing our water resources so that environmental, economic, and cultural values can be supported indefinitely.
- Indicators of sustainability include healthy ecosystems, biological diversity, adequate and reliable water supplies for healthy communities and strong economies, and interconnections between and among the River and its users.

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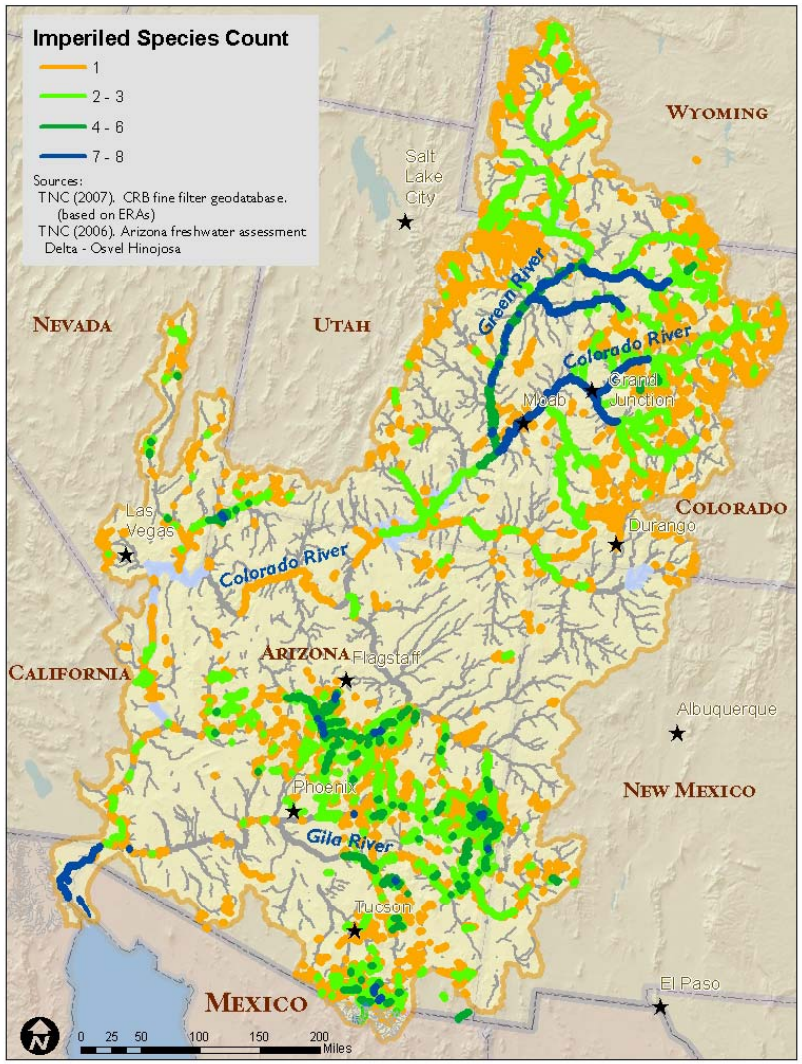

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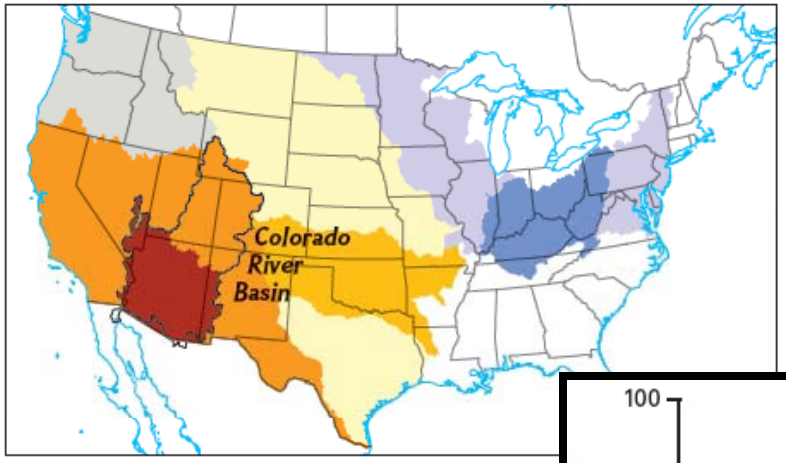
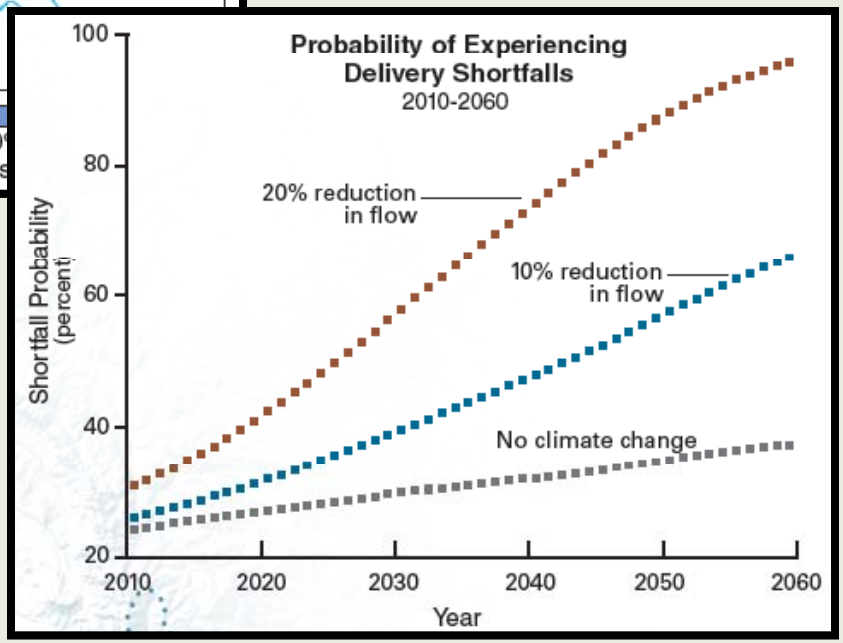
Recent studies of the Colorado River Basin estimate decreases in runoff ranging from 6 percent to 20 percent by 2050, compared to the 20th century, with further declines likely by 2100 as the climate continues to warm.

Average Projected Changes in Annual Runoff
2041-2060
(Selected river basins)





CREATE A DYNAMIC WATER MANAGEMENT FRAMEWORK THAT ENABLES PRESERVATION AND RESTORATION OF A SUFFICIENTLY REPRESENTATIVE, VITAL AND RESILIENT HEADWATERS, TRIBUTARY AND MAIN STEM HABITAT, AND ACCOMPANYING BIODIVERSITY, AND MEETS THE REASONABLE WATER NEEDS OF CITIES, AGRICULTURE AND INDUSTRY.

FLEXIBILITY

DEFINE FLEXIBILE SOLUTIONS AND DEMONSTRATE THAT THEY CAN WORK TO RESOLVE SUPPLY/DEMAN IMBALANCES AT SCALE (CO & AZ) IE. THAT INTERGRATED WATER MANAGEMENT PRACTICES CAN BENEFIT THE ECONOMY AND ECOLOGY OF THE BASIN

DEFENSE

STOP GAME CHANGING PROJECTS IN TERMS OF SCALE OR POLICY/LEGAL PRECEDENT AND ELIMINATE BAD SOLUTIONS FROM THE TABLE COMPLETELY

E FLOWS

DECISIONMAKERS RECOGNIZE AND AGREE ON ENVIRONMENTAL FLOWS FOR CRITICAL STRETCHES BY ALLOCATING THE RIGHT AMOUNT OF WATER, IN THE RIGHT STRETCHES, AT THE RIGHT TIME

SUSTAINABLE FUNDING

DEDICATED SOURCES OF FUNDING ARE ALLOCATED TO ADDRESS CRITICAL ENVIRONMENTAL ISSUES IN THE BASIN

POLITICAL WILL

DECISIONMAKERS CHANGE THEIR VALUES AND PERSPECTIVES AND BECOME WILLING TO TAKE ACTION

Water Bank
AG Transfers
Basin Study

Defense Against Bad Front Range Projects (DABFP)

Basin Study
Bi-National
Water Bank

Bi-National
Ag Transfers
DABFP

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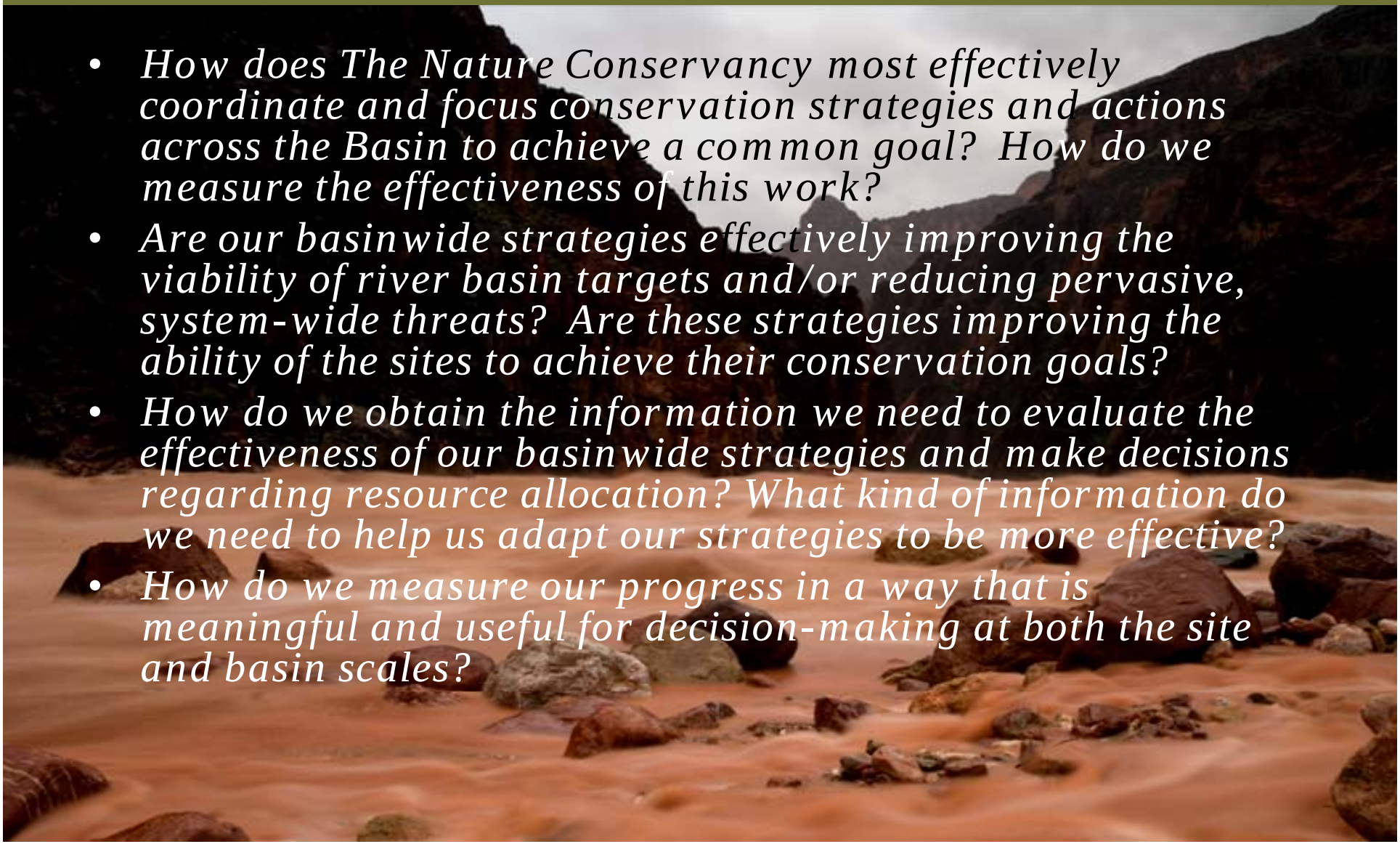
Management Questions Requiring Measures



- *How does The Nature Conservancy most effectively coordinate and focus conservation strategies and actions across the Basin to achieve a common goal? How do we measure the effectiveness of this work?*
- *Are our basinwide strategies effectively improving the viability of river basin targets and/or reducing pervasive, system-wide threats? Are these strategies improving the ability of the sites to achieve their conservation goals?*
- *How do we obtain the information we need to evaluate the effectiveness of our basinwide strategies and make decisions regarding resource allocation? What kind of information do we need to help us adapt our strategies to be more effective?*
- *How do we measure our progress in a way that is meaningful and useful for decision-making at both the site and basin scales?*

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Progress on measures

June 2010 workshop:

- Developed basinwide "focal" targets
- Refined results chain
- Drafted goals/objectives
- Provided guidance for selecting indicators

Progress since June:

- Further refined chain
- Refined & mapped targets
- Identified potential indicators

This workshop:

- Propose & review organizing framework for measures
- Propose, review & modify indicators
- Develop ideas and strategies for obtaining the data needed to inform the indicators

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Basinwide Conservation Targets ("Focal Targets")

- Aquatic systems
  - Small, medium, large rivers
  - Estuary
- Communities
  - Montane riparian
  - Semi-desert riparian woodland & shrubland
  - Desert riparian woodland & shrubland
  - Delta Cienega (wetlands)
- Species
  - "Big River" warmwater fish
  - "Small River" warmwater fish
  - Native trout

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  - Estuary
- Communities
  - Montane riparian
  - Semi-desert riparian woodland & shrubland
  - Desert riparian woodland & shrubland
  - Delta wetlands
- Species
  - "Big River" warmwater fish ← The "big four" ancient fish
  - "Medium River" warmwater fish ← The "three species"
  - Native salmonids
  - Neotropical migrants* , inc. willow flycatcher ← Nested target Under Riparian

} "Riparian Systems"

** target added after June workshop*

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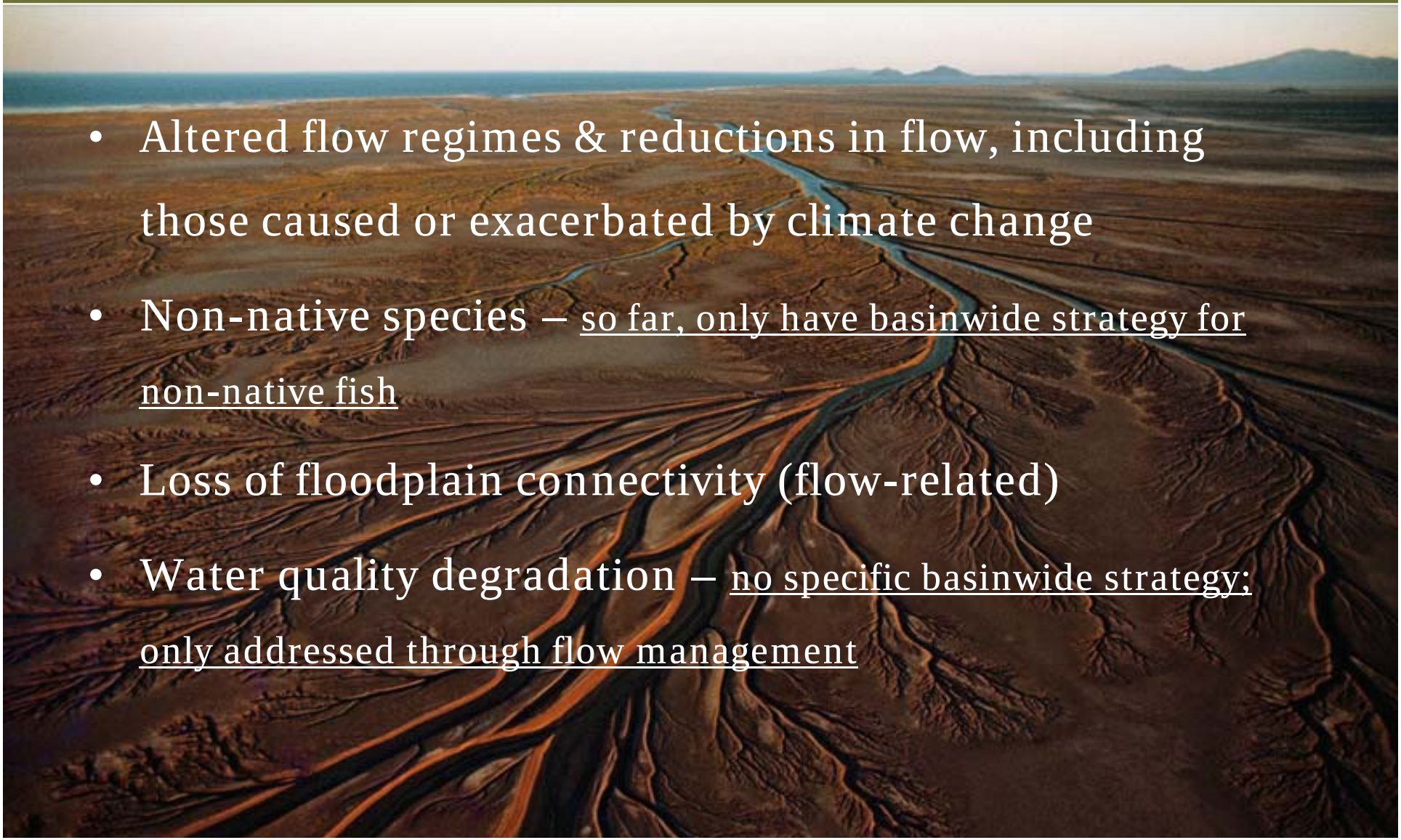
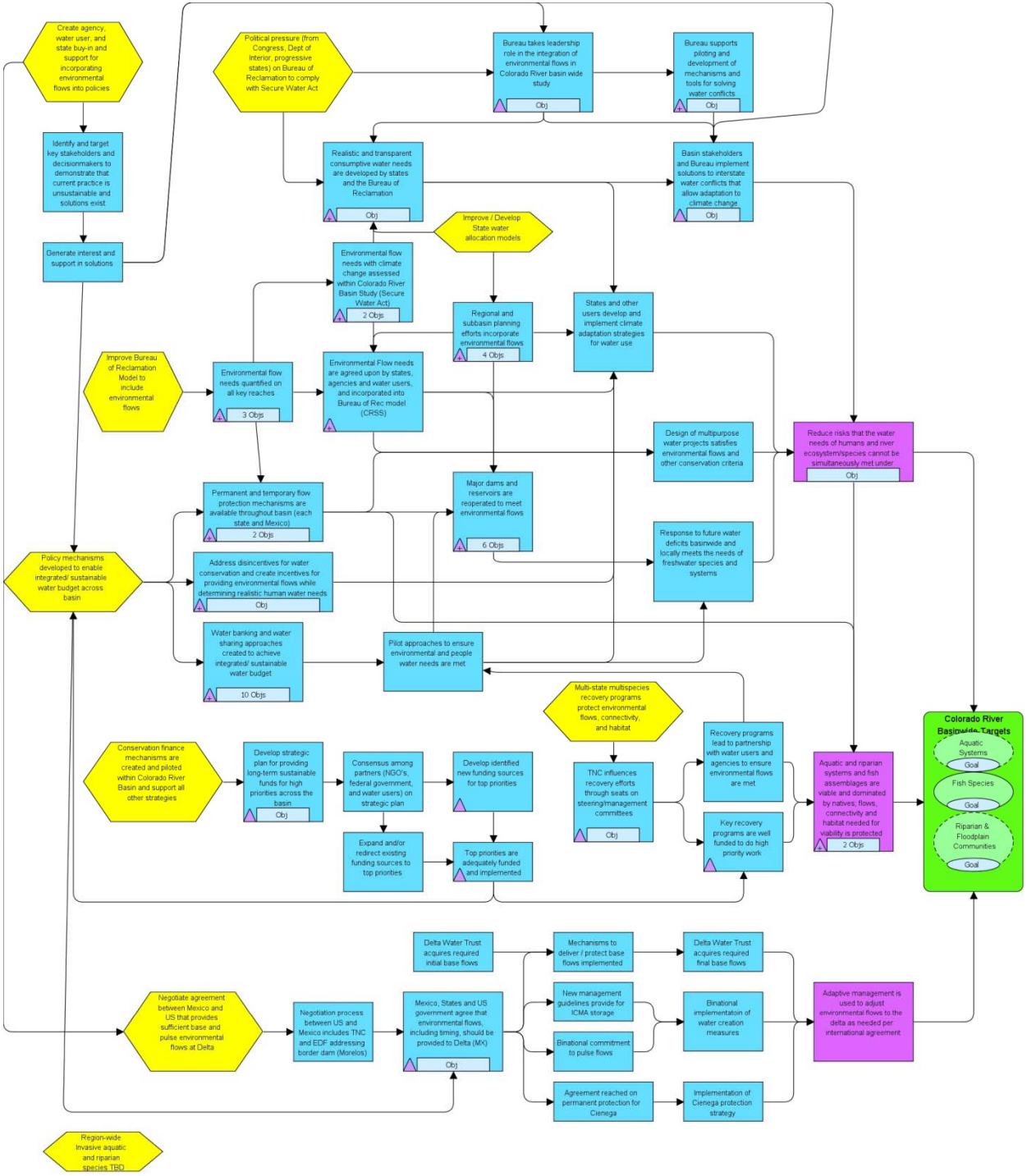
Basinwide Threats

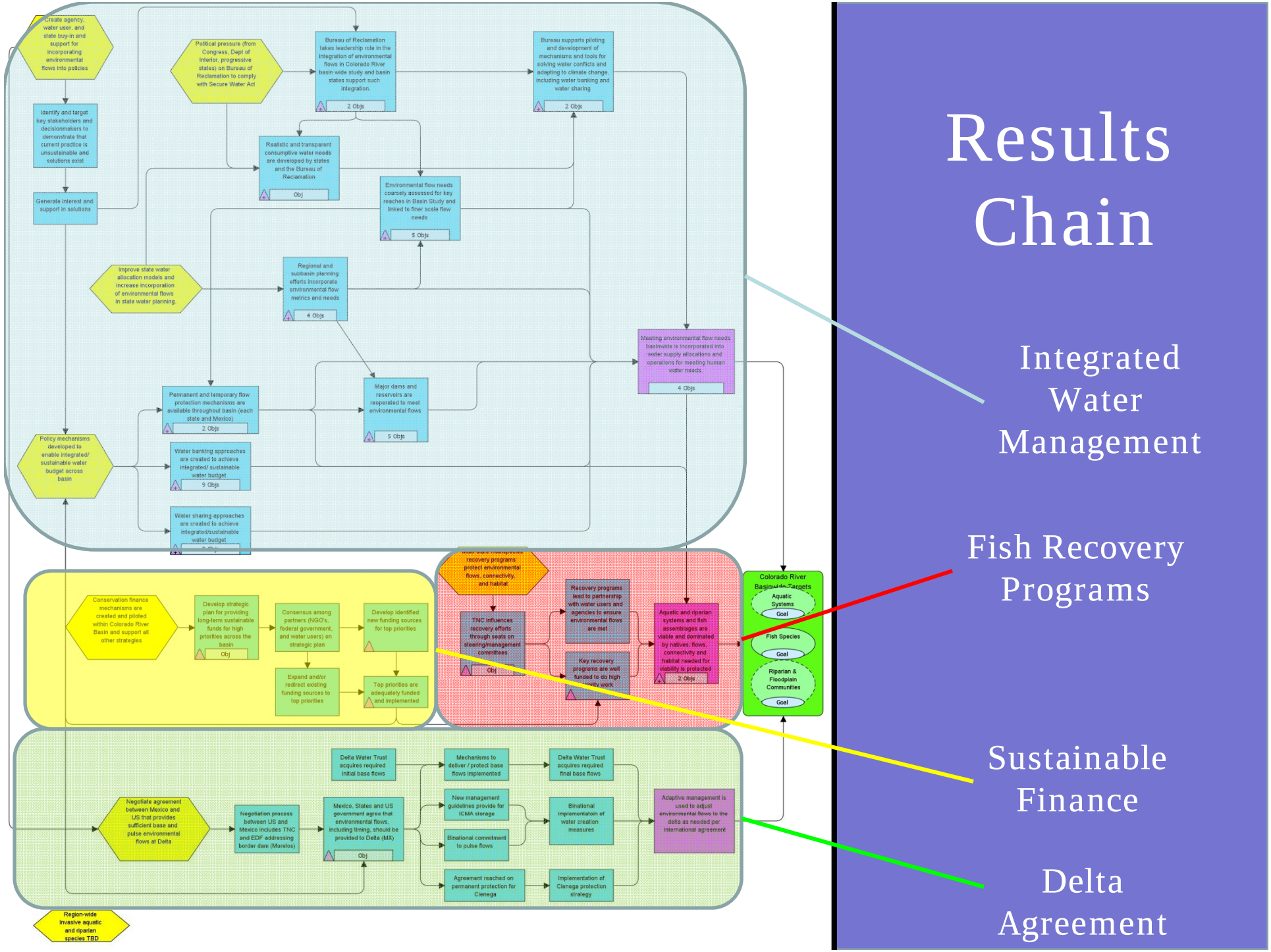
Adapted from CRB Strategic Plan



- Altered flow regimes & reductions in flow, including those caused or exacerbated by climate change
- Non-native species – so far, only have basinwide strategy for non-native fish
- Loss of floodplain connectivity (flow-related)
- Water quality degradation – no specific basinwide strategy; only addressed through flow management



Results Chain



Results Chain

Integrated Water Management

Fish Recovery Programs

Sustainable Finance

Delta Agreement

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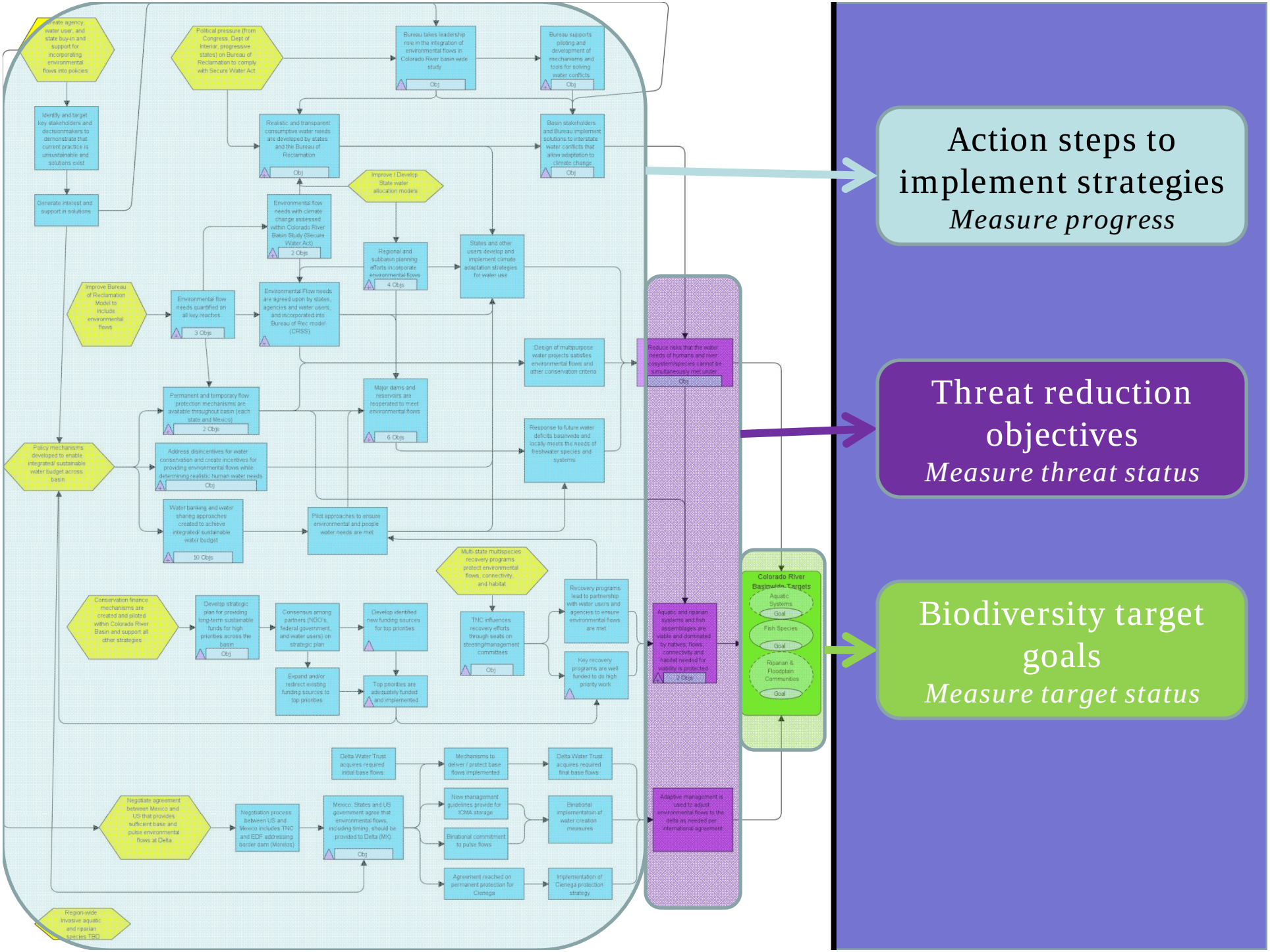
Basinwide Strategies

- Influencing the outcomes of the SECURE Water Act
- Developing environmental flow needs for key river reaches and incorporating into basinwide planning tools & processes
- Piloting/demonstrating new vehicles for increasing flexibility in CRB water resource management
  - Dam re-operation
  - Water banks
  - Smart water transfers
- Influencing the outcomes and rate of progress of the multi-state fish recovery programs
- Negotiating a bi-national agreement that provides for base and pulse flows for the Delta
- Developing sustainable conservation finance mechanisms
- Placeholder: Basinwide riparian invasives strategy


Action steps to implement strategies
Measure progress
Threat reduction objectives
Measure threat status
Biodiversity target goals
Measure target status
Colorado River Basin Aquatic Targets
Aquatic Systems
Goal
Fish Species
Goal
Riparian & Floodplain Communities
Goal

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C. Konrad's suggestions for basinwide indicators (6/2010)

- May-July streamflow (volume; acre-feet)
- Minimum streamflow for critical periods
- Area of native-dominated riparian vegetation
- Presence of native fishes

What we won't do in this workshop

- Spend much time on the results chain or on the measures of *progress* that apply to the blue boxes
- Revisit the objectives
- Get hung up on terminology
- Determine how we will incorporate measures implemented at the priority sites
- Get all our indicators and data sources perfect


MEASURES 101

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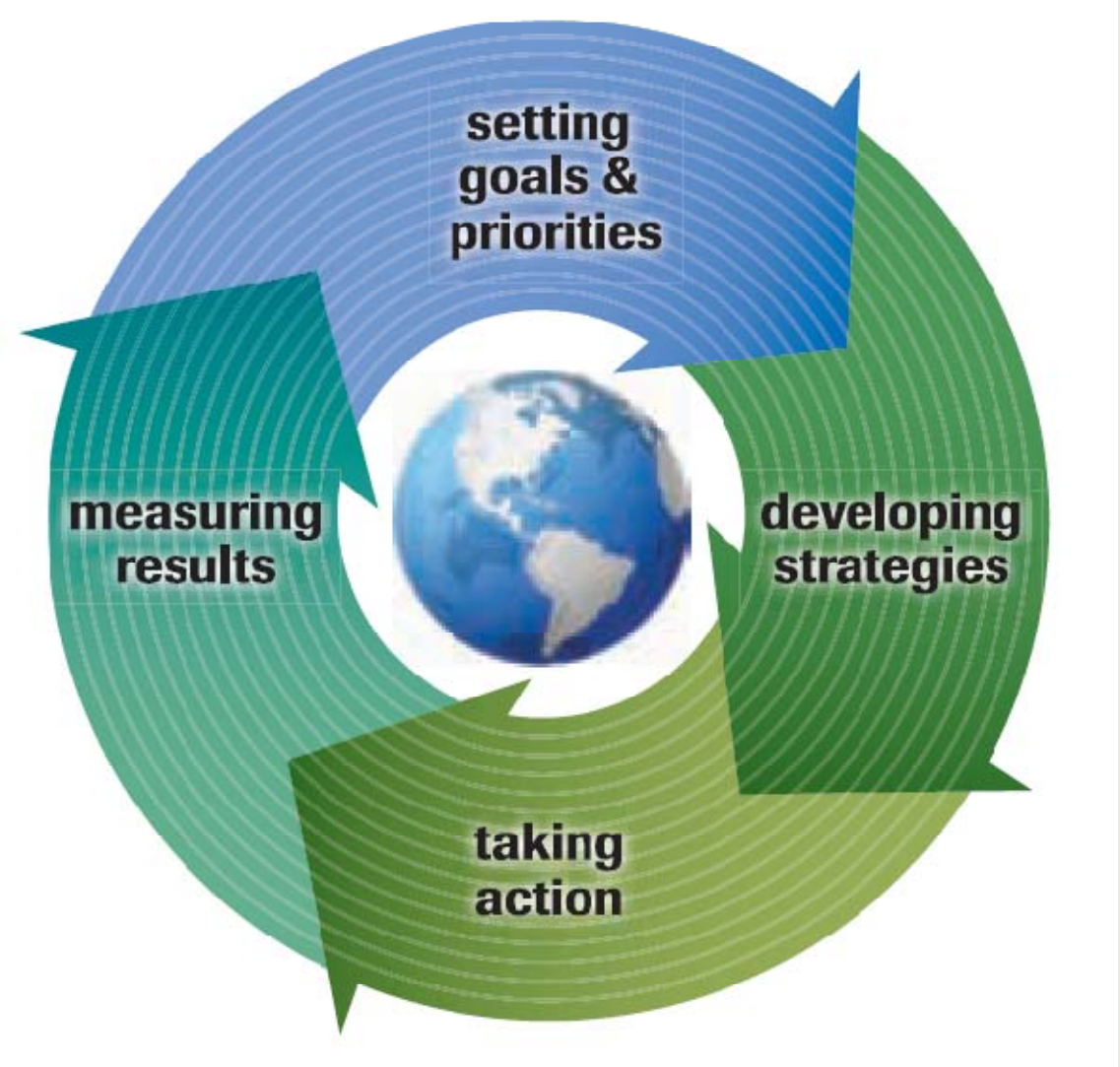
Conservation by Design



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Measures Vision

- Regular evaluation of the effectiveness of our conservation investments guides our work.
- Conservation measures inform priority setting and project design at all levels of the organization.

- TNC Measures Business Plan

  Approved by the Board of Directors
  December 2008

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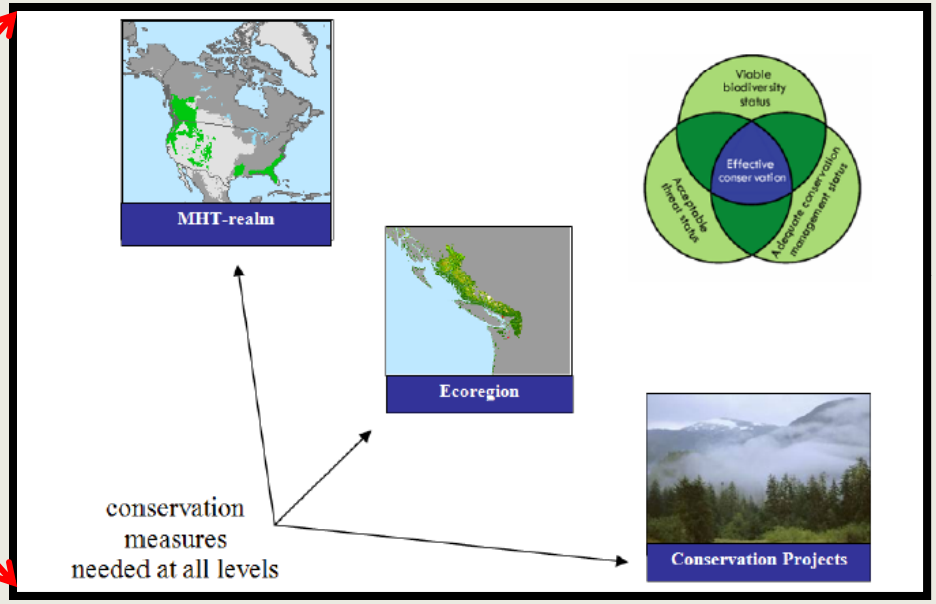
Simplified Measures Taxonomy

Status measures



Strategy effectiveness measures

Measure whether our <u>strategies and actions are having their intended effect</u> within a conservation project of any scale or across multiple conservation projects

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Strategy Effectiveness Includes

Are our actions are having the intended conservation effect?

- Measurable Objectives
- Identifying indicators
- Monitoring of Indicators
- Analysis and Feedback to Management

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Strategy Effectiveness Includes:

Strategy Implementation

Threat Reduction

Impacts on Targets

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Objectives

Specify:

- a desired outcome (“maintain”, “increase”, “decrease”) of indicator(s)
- how much of a change the design needs to detect (with specified precision)
- timeframe

Increase total fish biomass by 20% between 2010 and 2020

Maintain vegetated acreage of at least 4200 ha in the Cienega de Santa Clara for the next 10 years

Decrease municipal water use by 10% across the Upper Basin by 2020 through targeted conservation programs

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Possible criteria for indicators

- Measurable/reportable at basin-scale with spatial units (kilometers, hectares)
- Near-term response (careful with long-lived or rare species)
- Ability to document baseline conditions
- Known sensitivity or plausible link to conservation action
- Relative insensitivity to other factors
- Ability to define goals in terms of quantitative changes
- Relevance to conservation target

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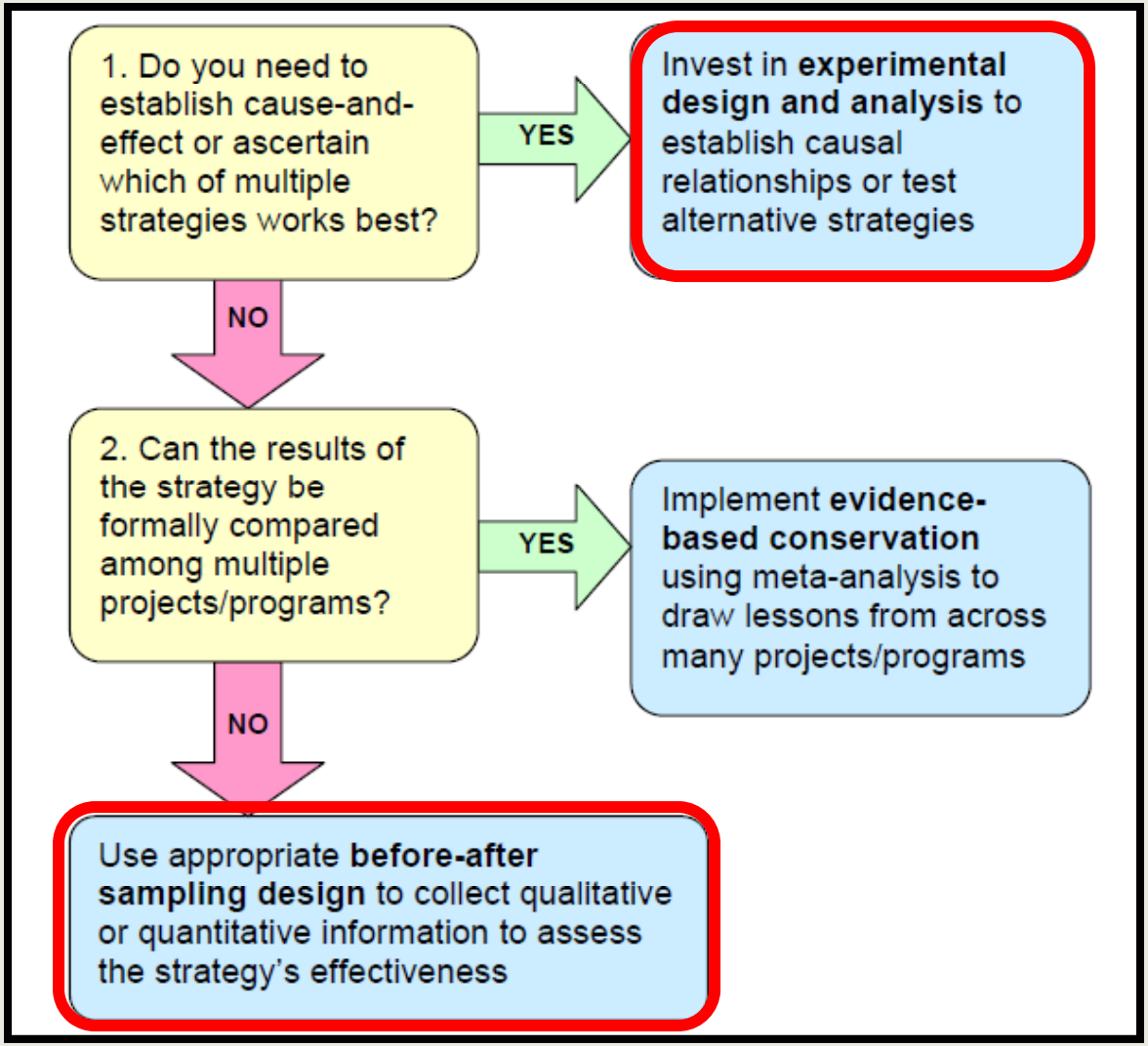
Design Considerations



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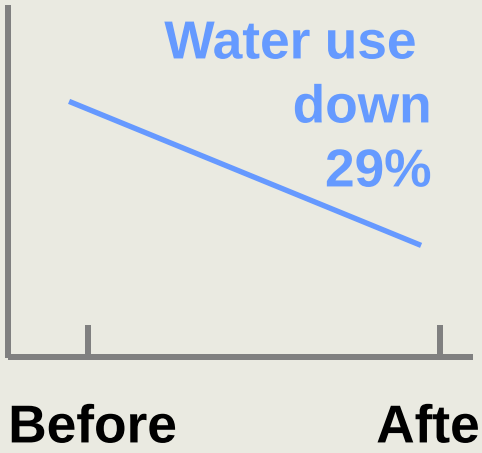
Counterfactual Design

- Measure indicators where action is implemented *and* where it is not
- Eliminates alternative explanations for what we observe
- Supports conclusions that effect of conservation action is likely not a coincidence
- Identifies what happens without the action

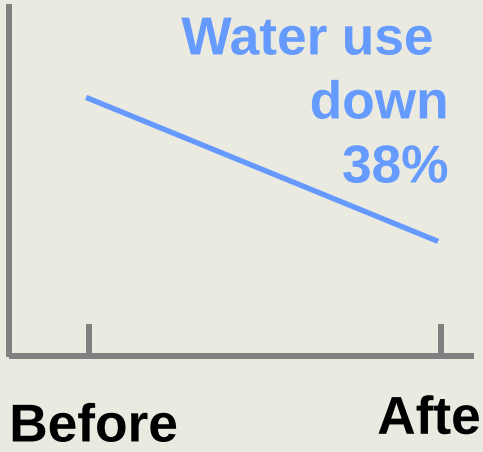
Water conservation education pilot

(Mulville-Friel & Anderson 1996)

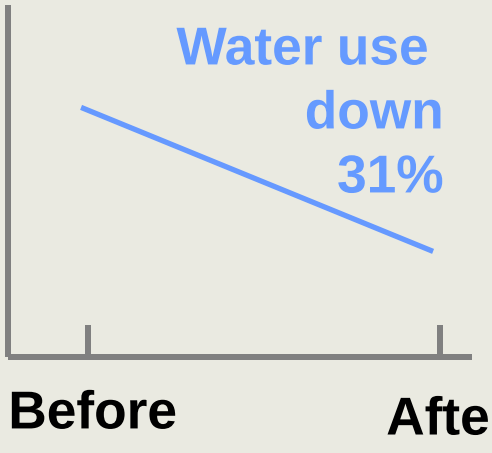
Pilot community 1



Pilot community 2



Control community (no education)



Alternative (true): Rainfall ⇧ household irrigation ⇩

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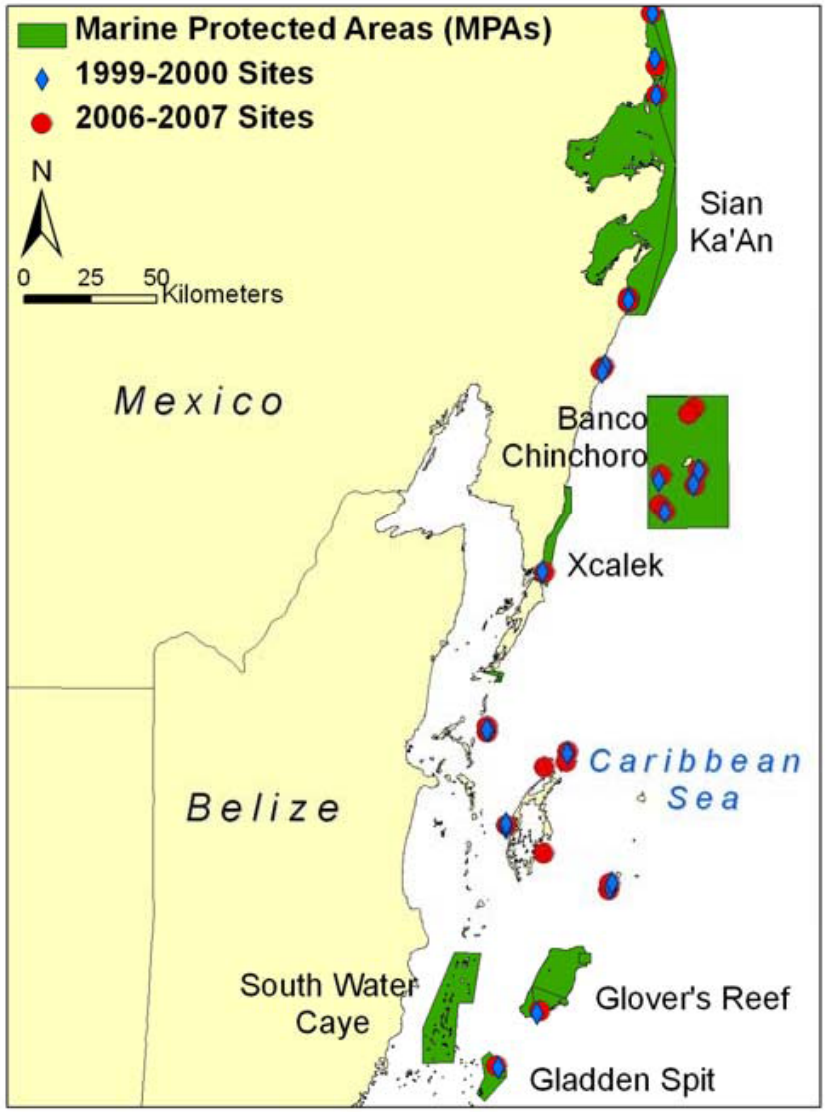
Mesoamerican Reef Example



SEM:
Assess whether the MPA strategy provides an overall benefit to biodiversity across the region.

Atlantic and Gulf Rapid Reef Assessment (AGRRA)

- 1999 – 2000
- 2006 – 2007

- 6 MPAs created 1996-2001

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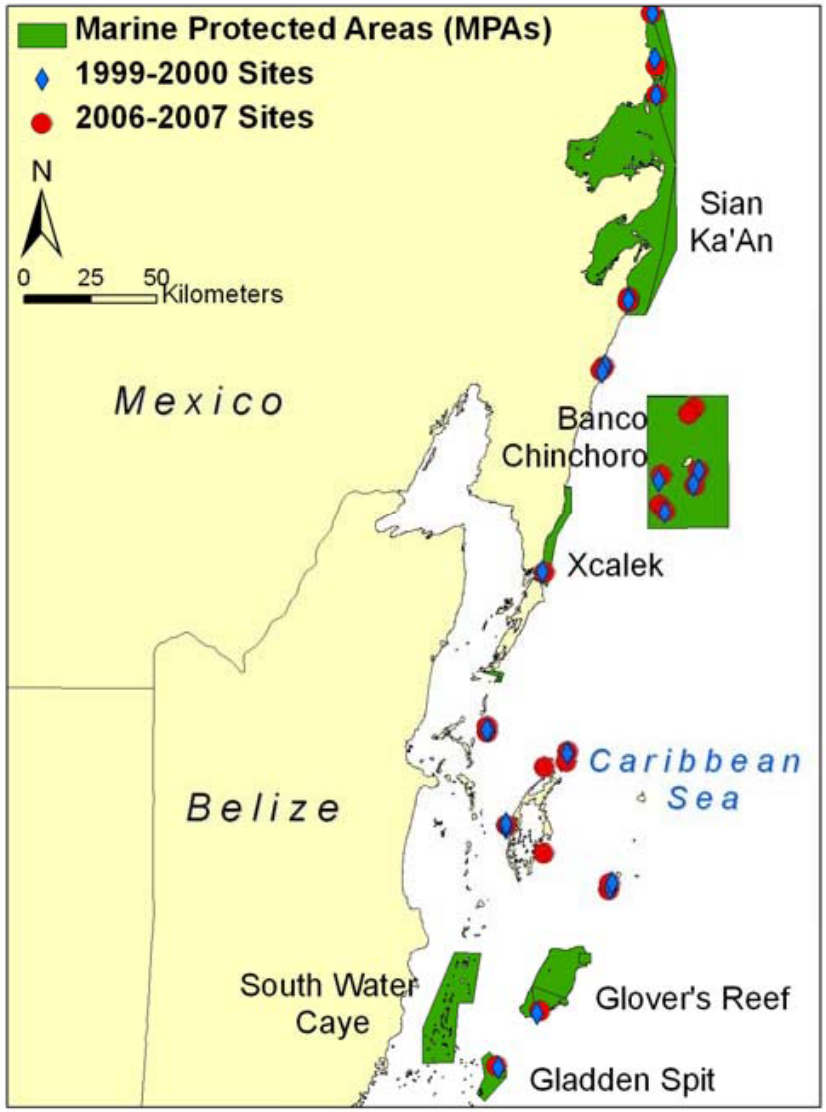
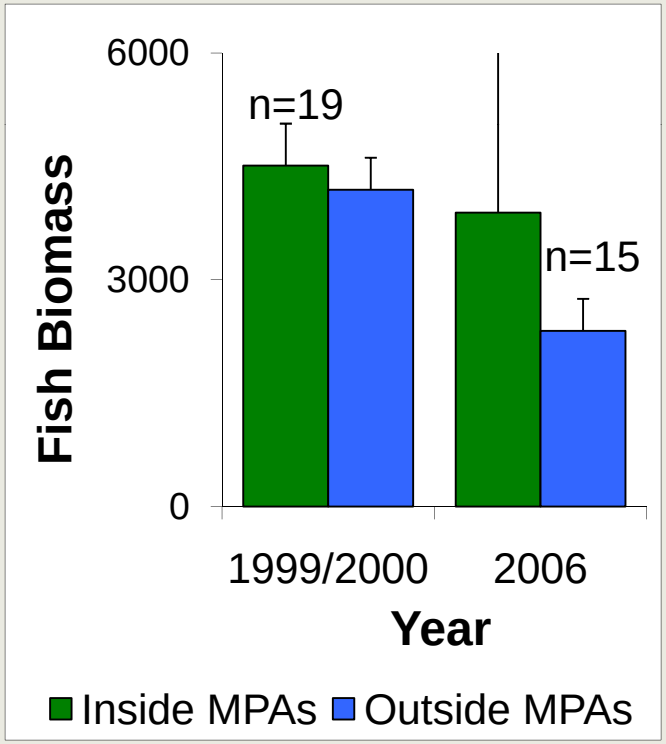
Mesoamerican Reef Example



Short-term Indicator: Total fish biomass (TFB)



- MPA *may be* an effective conservation strategy for TFB

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Limits of an experimental approach

- An experimental framework for evaluating environmental indicators across sites is limited because "treatments" and "responses" are not standardized:
  - implementation of environmental flows vary site to site, ranging from discrete events to operating policies; and
  - ecosystems vary across sites (biogeography) and different sites often monitor different outcomes

- A rigorous experimental framework is difficult to use for evaluating long-term outcomes at large spatial scales.

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Is system monitoring a better approach?

- The condition of targets may have low sensitivity to actions either because of spatial scale or other factors.
- It may not be feasible to monitor all of factors to account for temporal variability of monitoring targets, in which case long, high frequency time-series data are needed to deal with variability statistically.
- It may take years to acquire data that can inform management.

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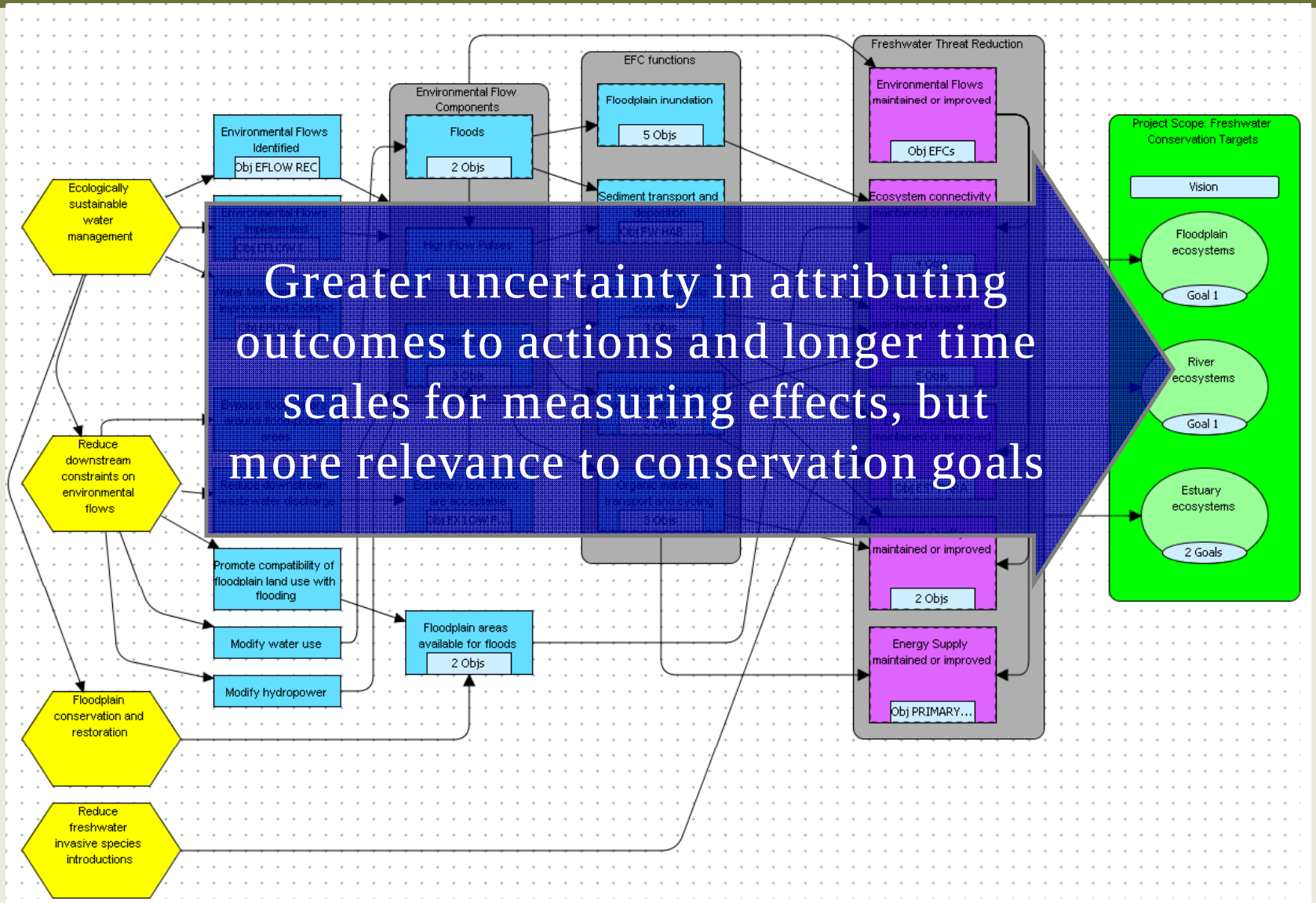
Is system monitoring a better approach?



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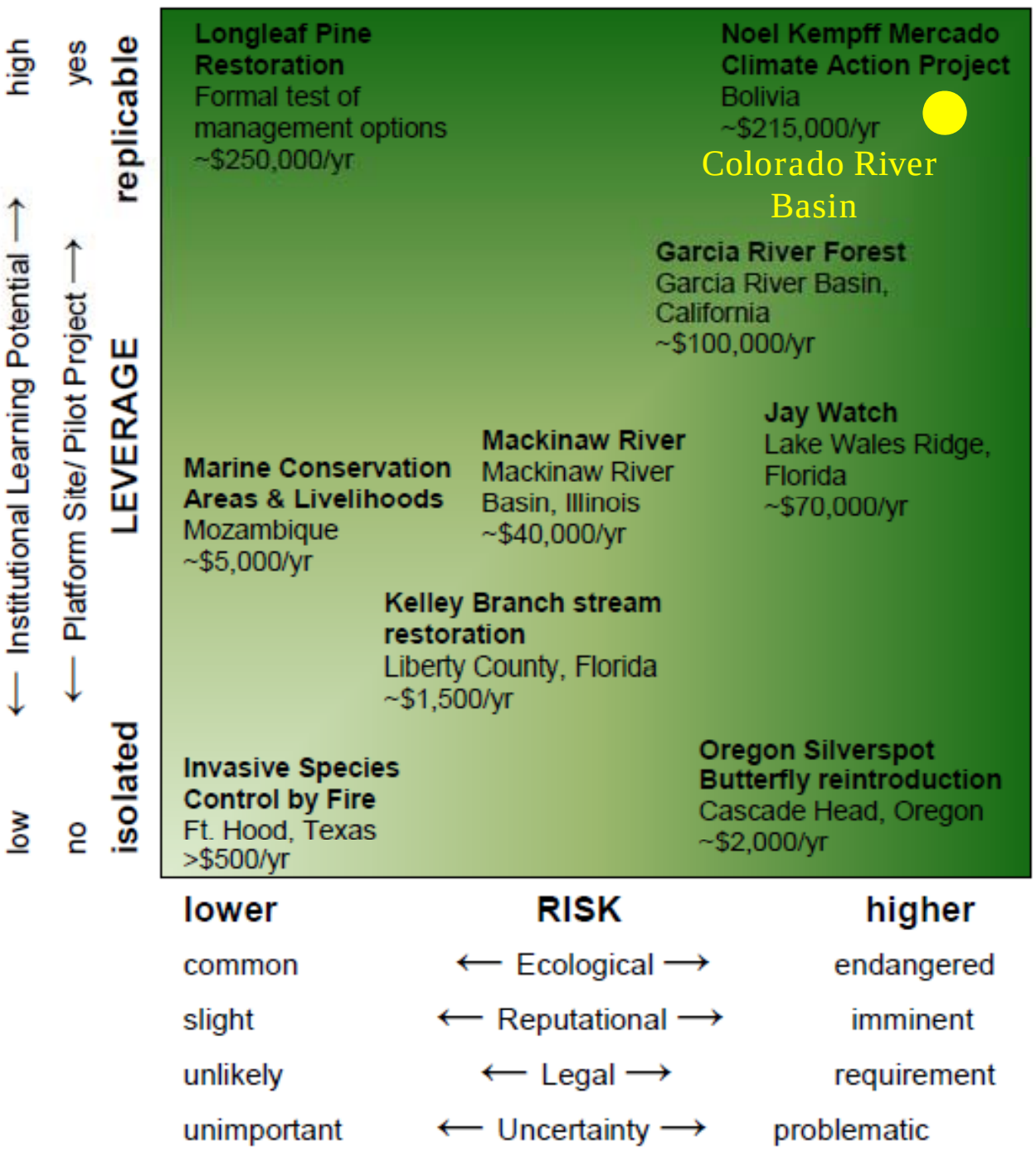
Reconciling Measures for Basin Scale Evaluation

- Identify the most important conservation goals…
  - *Are these streamflow, habitats, ecosystems, species/populations, or services?*
- Define measurable characteristics that will be sensitive to planned actions
- Balance between the need to attribute responses to actions (measures with higher sensitivity to planned actions and lower sensitivity to other factors) and monitor condition of targets (measures that integrate effects of other factors)



Monitoring Investment

MEASURES FRAMEWORK FOR COLORADO RIVER

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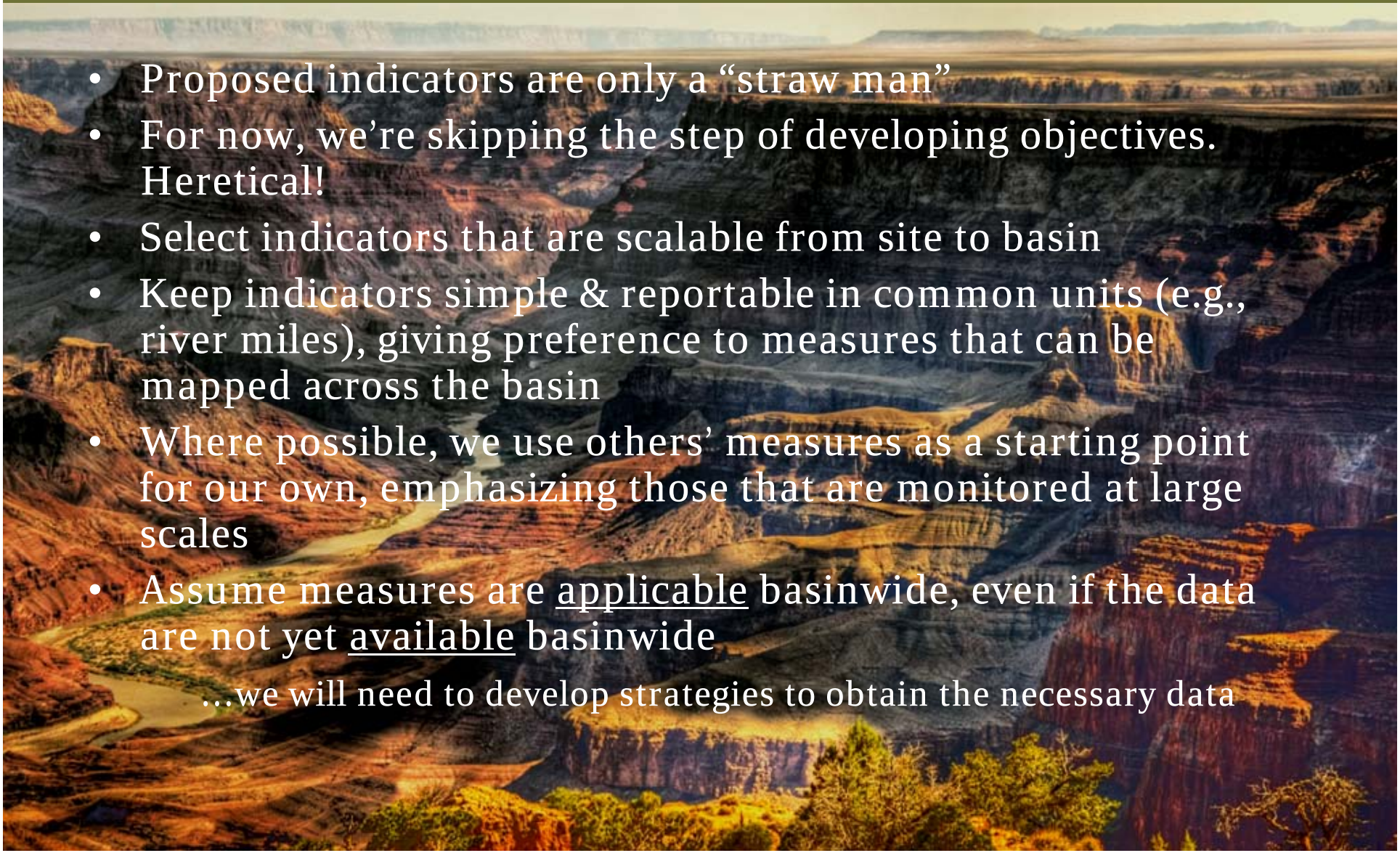
Assumptions about CRB measures



- Proposed indicators are only a "straw man"
- For now, we're skipping the step of developing objectives. Heretical!
- Select indicators that are scalable from site to basin
- Keep indicators simple & reportable in common units (e.g., river miles), giving preference to measures that can be mapped across the basin
- Where possible, we use others' measures as a starting point for our own, emphasizing those that are monitored at large scales
- Assume measures are applicable basinwide, even if the data are not yet available basinwide

  …we will need to develop strategies to obtain the necessary data

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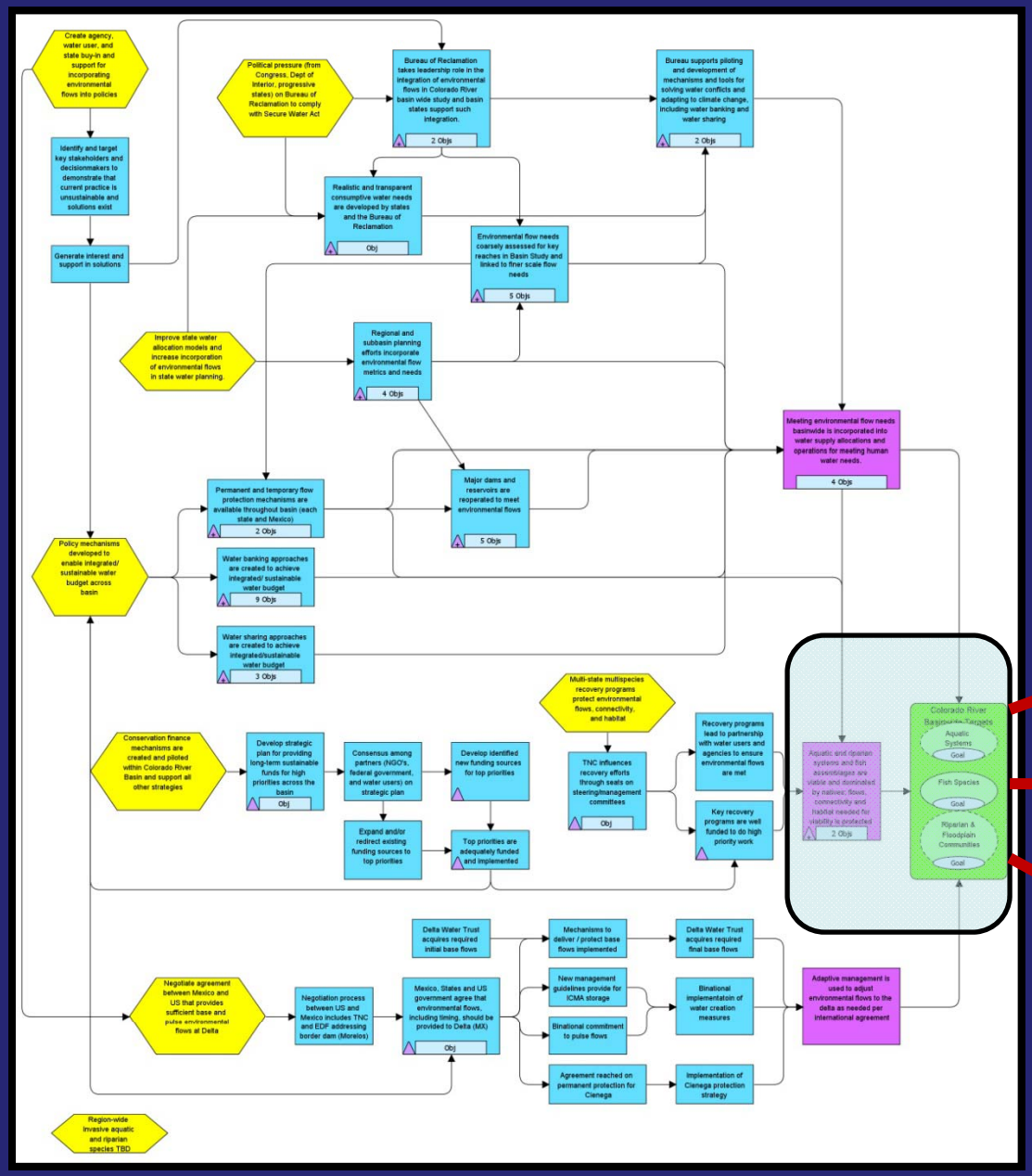
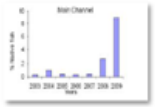
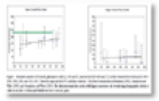
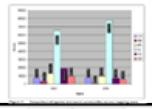
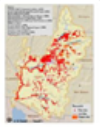
Kinds of measures in the framework

- Target impact measures
  - track the status of basinwide focal targets independent of our strategies and actions, *or*
  - track the impact of our strategies and actions on the focal targets
- Threat reduction measures
  - track the status of basinwide threats, *or*
  - track the reduction of threats in response to strategies and actions
- Strategy implementation measures
  - track the status or progress in implementing basinwide strategies and actions
  - track the status of enabling conditions at Phase 1 sites

Measures can be tracked spatially across the basin at key locations or river reaches and over time annually or at greater intervals


Create agency, water user, and state buy-in and support for incorporating environmental flows into policies
Identify and target key stakeholders and decisionmakers to demonstrate that current practice is unsustainable and solutions exist
Generate interest and support in solutions
Political pressure (from Congress, Dept of Interior, progressive states) on Bureau of Reclamation to comply with Secure Water Act
Bureau of Reclamation takes leadership role in the integration of environmental flows in Colorado River basin wide study and basin states support such integration.
2 Objs
Bureau supports piloting and development of mechanisms and tools for solving water conflicts and adapting to climate change, including water banking and water sharing
2 Objs
Realistic and transparent consumptive water needs are developed by states and the Bureau of Reclamation
Obj
Environmental flow needs coarsely assessed for key reaches in Basin Study and linked to finer scale flow needs
5 Objs
Improve state water allocation models and increase incorporation of environmental flows in state water planning.
Regional and subbasin planning efforts incorporate environmental flow metrics and needs
4 Objs
Meeting environmental flow needs basinwide is incorporated into water supply allocations and operations for meeting human water needs.
4 Objs
Permanent and temporary flow protection mechanisms are available throughout basin (each state and Mexico)
2 Objs
Major dams and reservoirs are reoperated to meet environmental flows
5 Objs
Policy mechanisms developed to enable integrated/ sustainable water budget across basin
Water banking approaches are created to achieve integrated/ sustainable water budget
9 Objs
Water sharing approaches are created to achieve integrated/sustainable water budget
3 Objs
Conservation finance mechanisms are created and piloted within Colorado River Basin and support all other strategies
Develop strategic plan for providing long-term sustainable funds for high priorities across the basin
Obj
Consensus among partners (NGO's, federal government, and water users) on strategic plan
Develop identified new funding sources for top priorities
Expand and/or redirect existing funding sources to top priorities
Top priorities are adequately funded and implemented
Multi-state multispecies recovery programs protect environmental flows, connectivity, and habitat
TNC influences recovery efforts through seats on steering/management committees
Obj
Recovery programs lead to partnership with water users and agencies to ensure environmental flows are met
Key recovery programs are well funded to do high priority work
Aquatic and riparian systems and fish assemblages are viable and dominated by natives; flows, connectivity and habitat needed for viability is protected
2 Objs
Colorado River Basin-wide Targets
Aquatic Systems
Goal
Fish Species
Goal
Riparian & Floodplain Communities
Goal
Delta Water Trust acquires required initial base flows
Mechanisms to deliver / protect base flows implemented
Delta Water Trust acquires required final base flows
Negotiate agreement between Mexico and US that provides sufficient base and pulse environmental flows at Delta
Negotiation process between US and Mexico includes TNC and EDF addressing border dam (Morelos)
Mexico, States and US government agree that environmental flows, including timing, should be provided to Delta (MX)
Obj
New management guidelines provide for ICMA storage
Binational commitment to pulse flows
Binational implementatoin of water creation measures
Agreement reached on permanent protection for Cienega
Implementation of Cienega protection strategy
Adaptive management is used to adjust environmental flows to the delta as needed per international agreement
Region-wide invasive aquatic and riparian species TBD
Fish & Aquatic Systems
Floodplain & Riparian Systems
Delta

Organizing Framework – Colorado River Basin Measures

Target Measures				Threat Measures			Strategy Measures		
Coarse Filter Target	**Fine Filter Target**	**Proposed Indicator**	**Reporting Units or Map**	**Threat**	**Proposed Indicator**	**Reporting Units or Map**	**Strategy**	**Proposed Indicator**	**Reporting Units or Map**
Fish & Aquatic Systems 	Large rivers: "4 big river fish" 	% native fish/river mile *within critical habitat* and *recruitment exceeds mortality.*  	Map by river reach or sub-basin, track annually	Altered Flows	% departure of flows from reach-specific benchmarks		Flow restoration	% of critical habitat reaches where flow needs are developed & implemented	
	Medium rivers: "3 species of concern" 			Non-native Fish	% non-native fish/river mile	Map by river reach, tracked every X years	Non-native fish control	Catch per unit effort, other indicators	
	Small streams: Native Salmonids 						Native re-introduction	Stocking catch rate as % of recovery goals 	
Floodplain & Riparian Systems 	Riparian Communities: Montane Semi-Desert Desert	% native woody riparian overstory and *natural recruitment*	 	Non-native Vegetation (tamarisk)	% floodplain area dominated by inappropriate overstory		Non-native vegetation management	Acres of successful defoliation by tamarisk beetle	
				Altered Flows & Floodplain Connectivity	% departure of flows from reach-specific benchmarks		Flow restoration	% floodplain area inundated by 5-yr flood *within important places*	Map by river reach, tracked every X years
	Neotropical Migrants 	Bird abundance trends increasing *within mapped critical habitat*							
Delta	Delta Wetlands 	Acres of inundated & vegetated wetland habitat in Cienega de Santa Clara vs. baselines of 12,000 ha & 4200 ha, respectively		Altered Flows	% departure from environ-mental flow targets: 50,000 ac-ft/yr baseflow & 250,000 ac-ft/yr pulse flow every 5 yrs	Tracked at X, Y & Z locations annually			

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CRB Measures Issues for Discussion

- *Present indicator & determine whether needed and appropriate*
- *Modify indicator, if needed,*
- *Identify any desired values (thresholds) of the indicator,*
- *Present examples of how we would like to report or map the indicator over the basin,*
- *Identify and discuss promising data sources,*
- *Highlight important data quality or coverage issues, and*
- *Elicit general suggestions on where and how often to track this indicator.*

Aquatic Systems – Target Indicator

Table

Indicator**:** % of each type in "acceptable" flow; % with "environmental flows" identified;

Do we need it? Yes for flows;

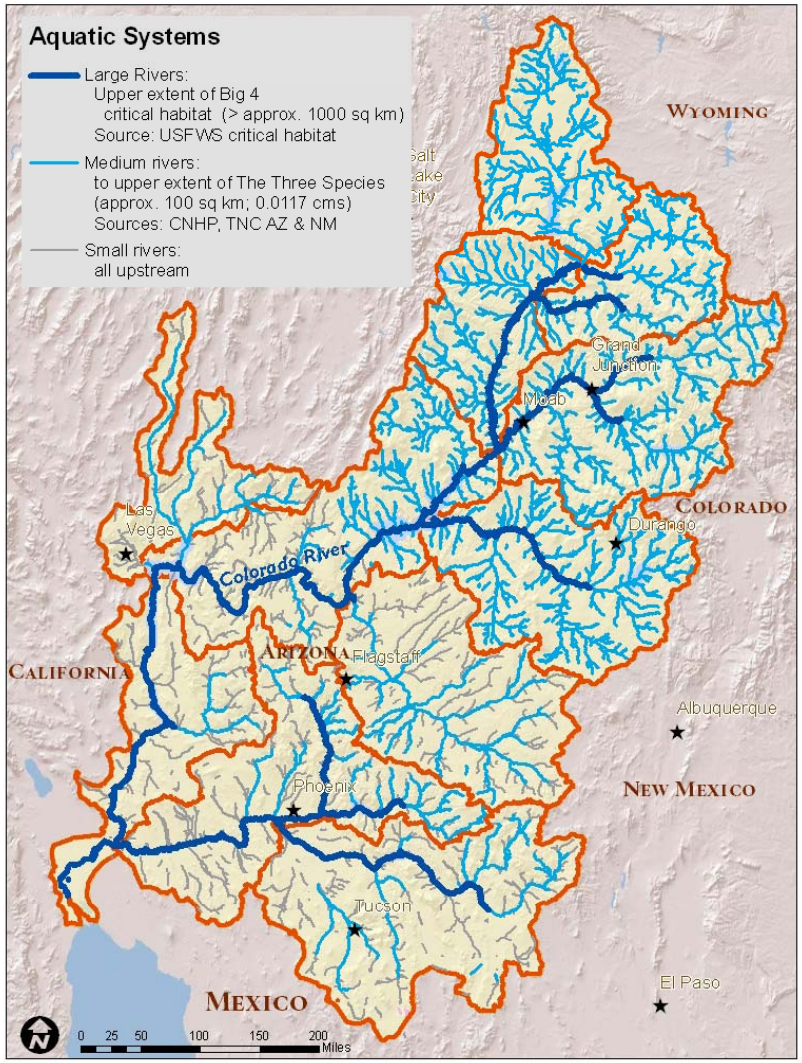
Desired value or threshold: define what is needed; Basin study has defined this for much of the upper;

Best sources: basin study;

Coverage issues: Upper Basin only at this point

Quality issues:

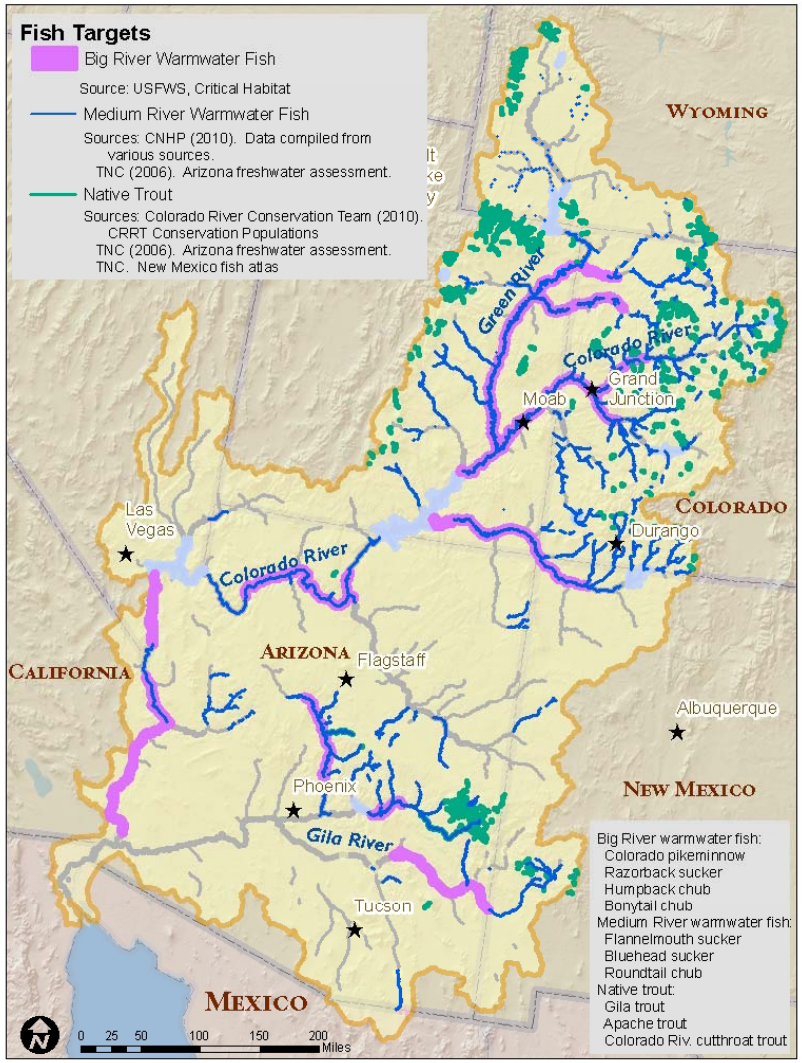
Where:
How often:



Fish – Target Indicator

Table

- Indicator: Number or percentage? of populations of each species (4 big; 5 medium; 3 salmonids) meeting "acceptable" goals with natural recruitment;
  - Do we need it? yes
- Desired value or threshold: based on recovery goals and conservation populations;
- Best sources: recovery plans;
- Coverage issues: someone else is doing this, but does this cover the whole drainage?
- Quality issues: taxomonic issues around suckers and roundtail
  - Where:
  - How often:



Big 4 Fish – Target Indicator

Table

Indicator:

Do we need it?

Desired value or threshold:

Best sources:

Coverage issues:

Quality issues:

Where:
How often:

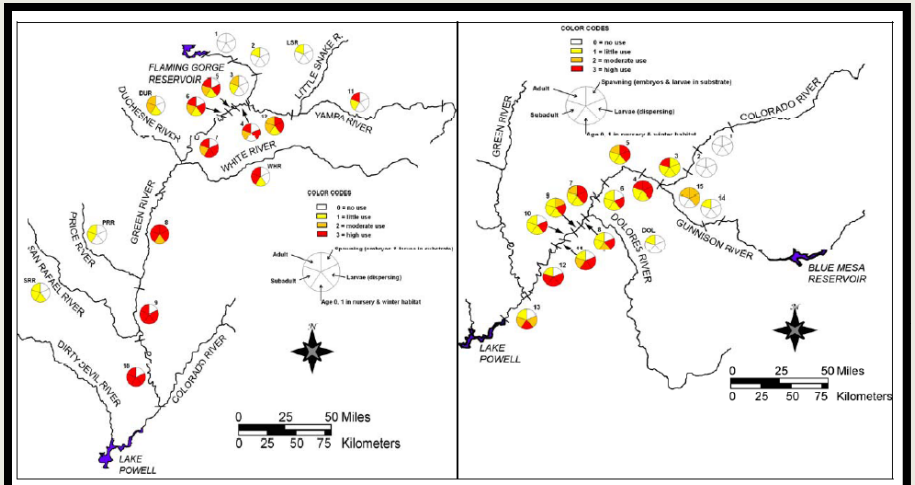


Figure 6. Location and relative use of Green River subbasin reaches (left) and Upper Colorado River subbasin reaches (right) by life stage of Colorado pikeminnow. See Table 3 above for relative use ratings.

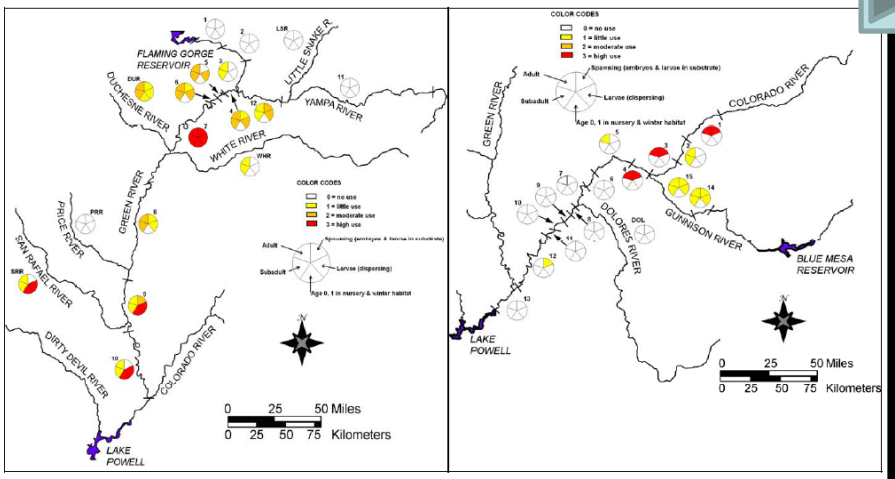


Figure 8. Location and relative use of Green River subbasin reaches (left) and Upper Colorado River subbasin reaches (right) by life stages of the razorback sucker. See Table 5 above for relative use ratings.

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"Big 4" Fish

Table

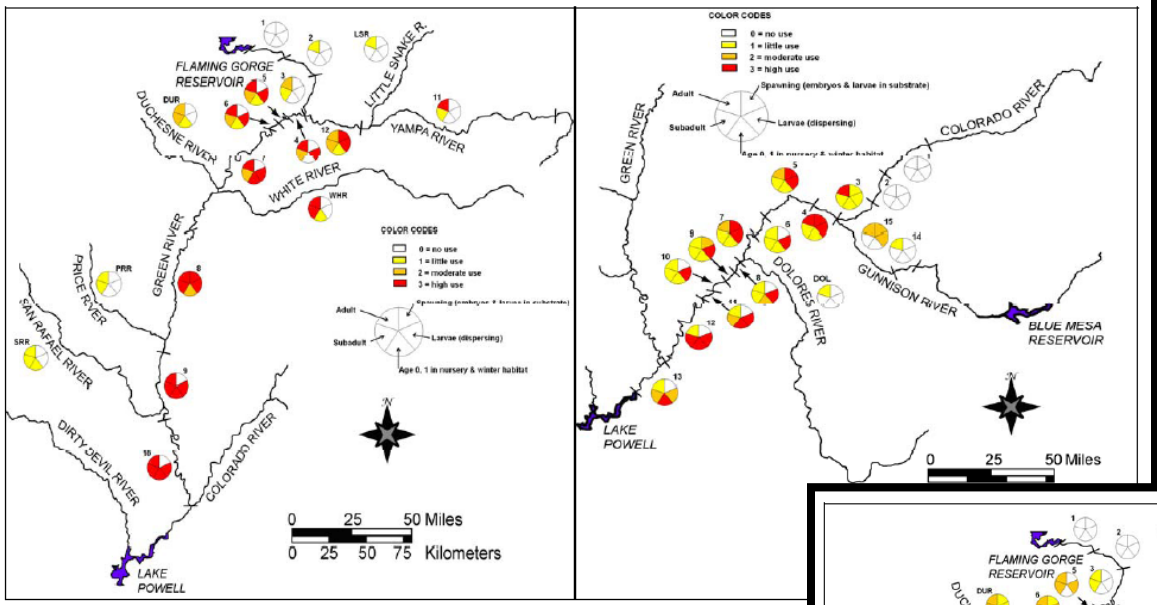

Figure 6. Location and relative use of Green River subbasin reaches (left) and Upper Colorado Rive
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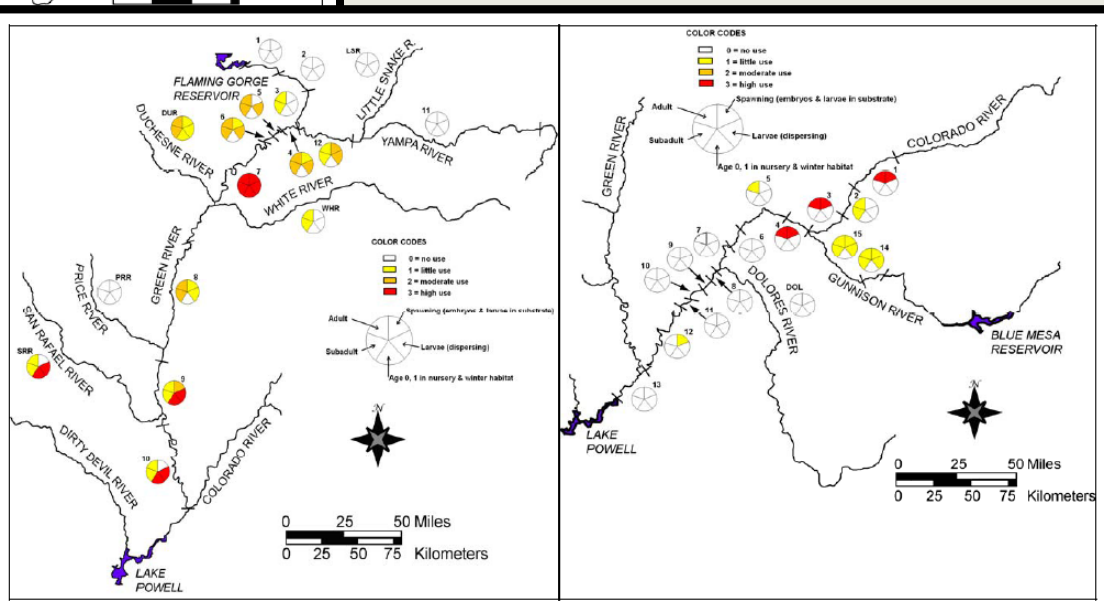


Figure 8. Location and relative use of Green River subbasin reaches (left) and Upper Colorado River subbasin reaches (right) by life stages of the razorback sucker. See Table 5 above for relative use ratings.

Native Salmonids – Target Indicator

Table

Indicator: **%** historic occupied

Do we need it? No

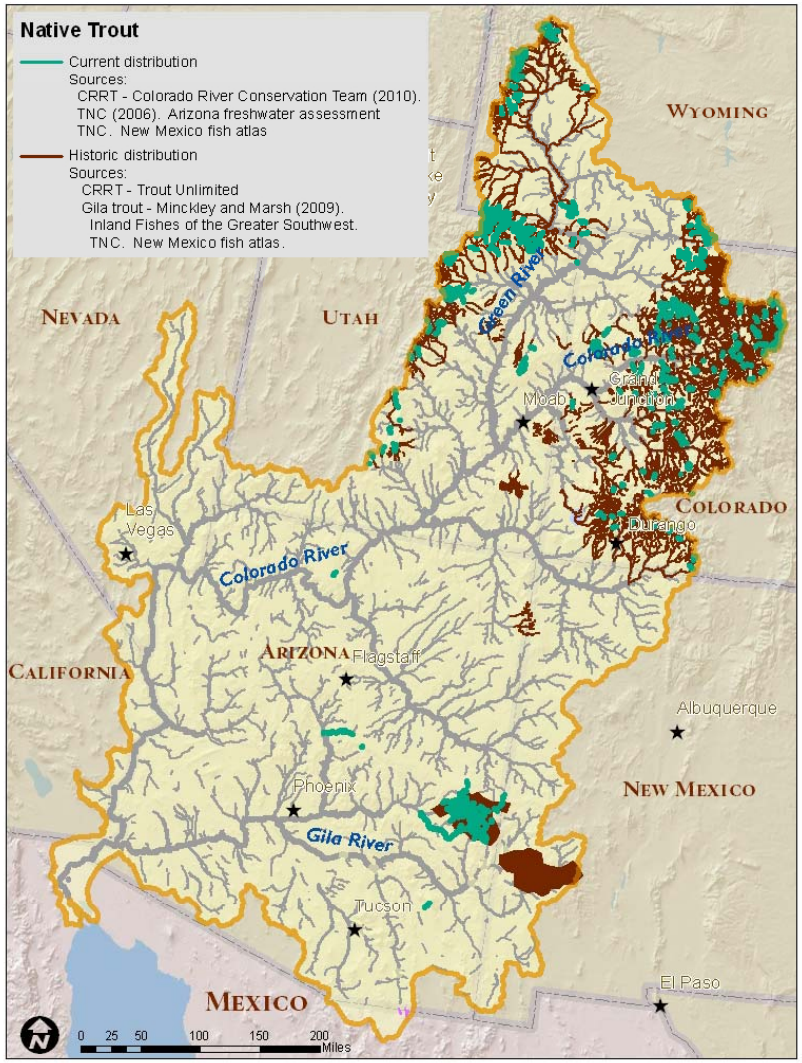
Desired value or threshold:

Best sources:

Coverage issues:

Quality issues:

Where:
How often:



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"The Three Species" – Target Indicator

Table

Indicator: **%** historic occupied

Do we need it? No

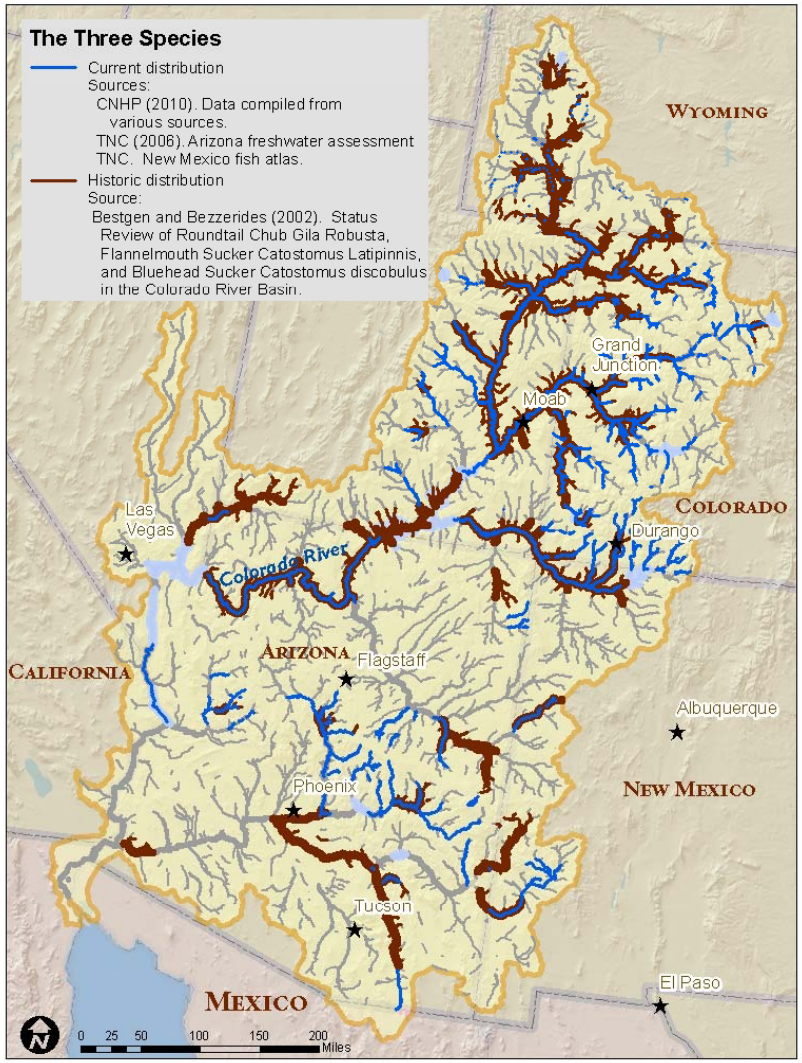
Desired value or threshold:

Best sources:

Coverage issues:

Quality issues:

Where:
How often:



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Indicator

Table

Indicator:

Do we need it?

Desired value or threshold:

Best sources:

Coverage issues:

Quality issues:

Where:
How often:

- Example indicator data

- Example reporting/map

Target Indicator -- Fish

Table

Indicator: % native fish/river mi *and* recruitment exceeds mortality

Do we need it? No

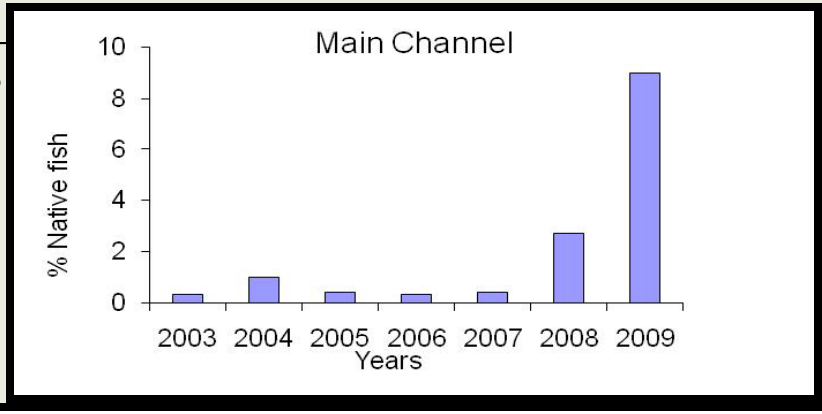
Desired value or threshold:

Best sources: Upper Basin Recovery Program,

Coverage issues:

Quality issues:

Where: Map by river reach or sub-basin
How often: Track annually



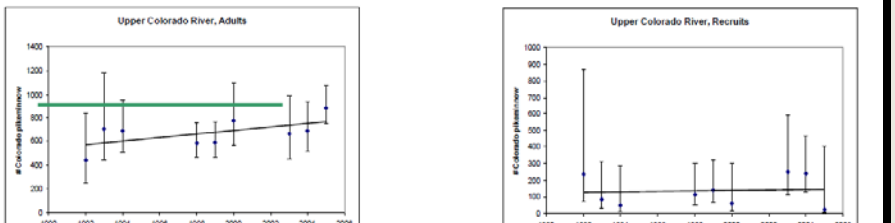
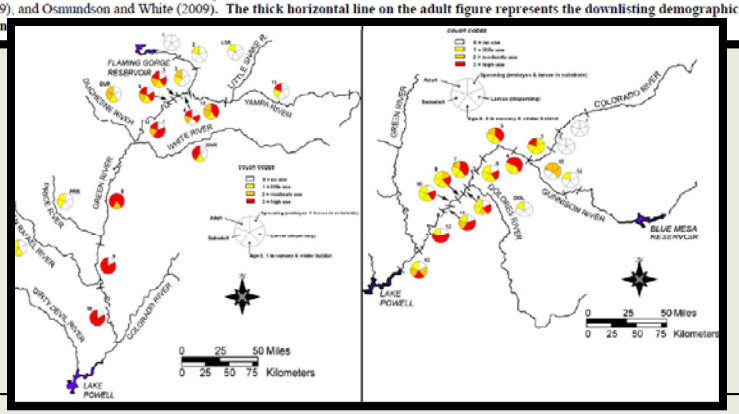


Figure 1. Estimated numbers of Colorado pikeminnow adults (≥ 450-mm TL) and recruits (400–449 mm TL) in the Colorado River subbasin for 1992–1994, 1998–2000, and 2003–2005. Error bars represent the 95% confidence intervals. Data from Osmundson and Burnham (1998), Osmundson and White (2009), and Osmundson and White (2009). **The thick horizontal line on the adult figure represents the downlisting demographic criteria as called for in**



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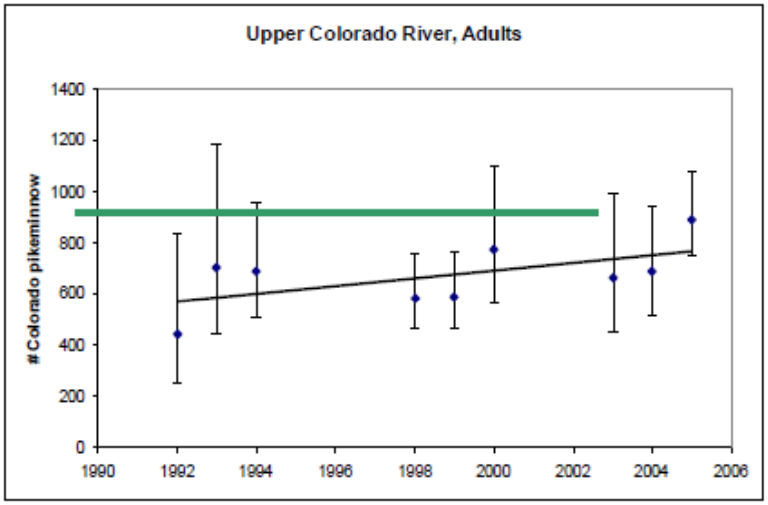
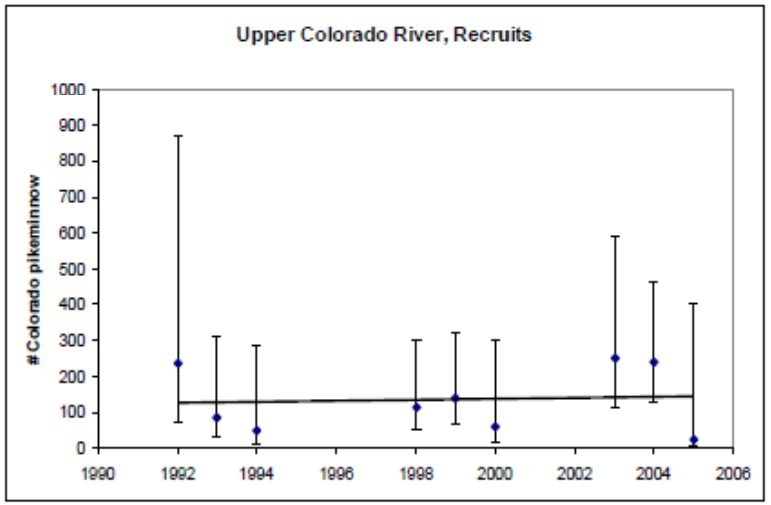
Target indicators -- Fish

Table





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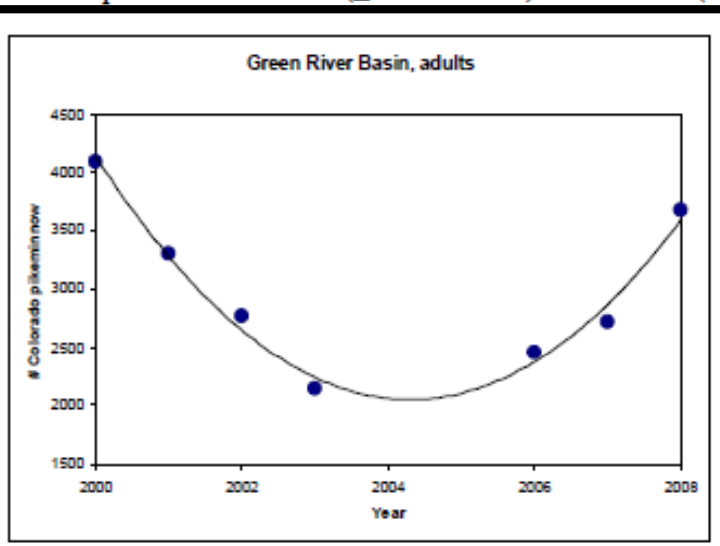
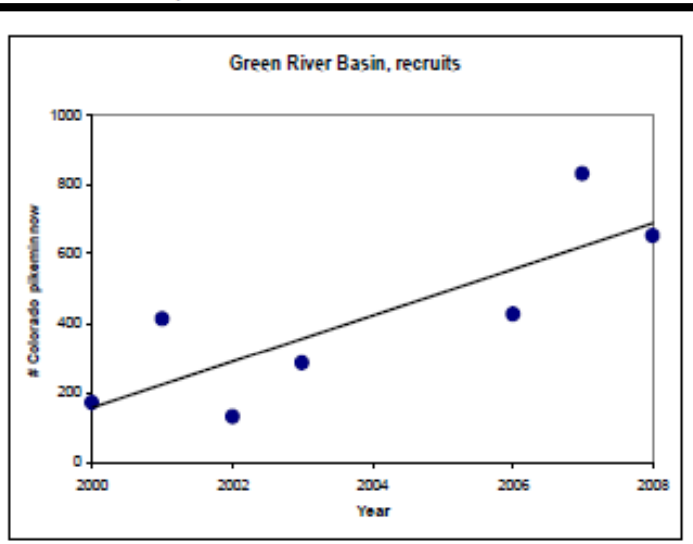
called for in the U.S. Fish and V





Threat Indicator – Altered Flows

Table

Indicator: % departure of flows from reach-specific benchmarks (fish, cottonwood or aquatic system whichever is more stringent);

- Example indicator data

Go to flow metrics spreadsheet

Do we need it? yes

Desired value or threshold: varies by node

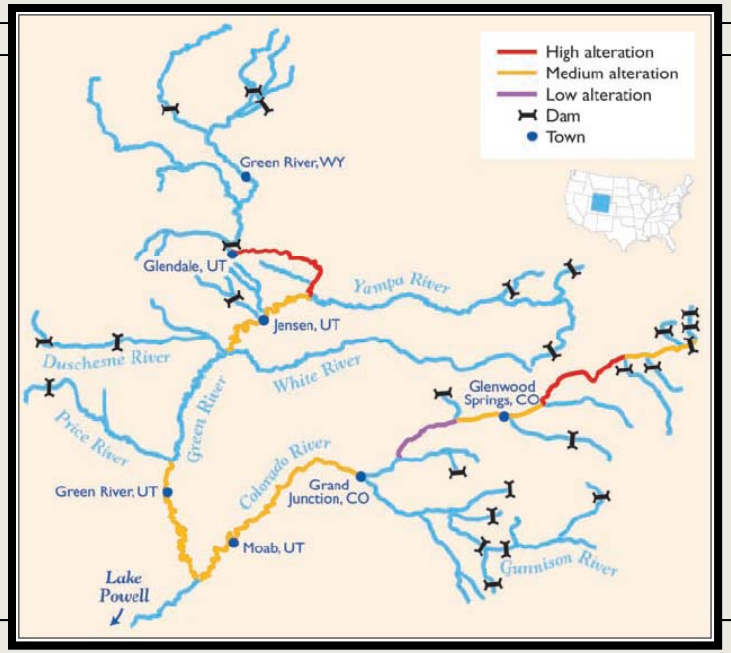
Best sources: USGS streamflow data, metrics from Basin Study

Coverage issues:

Quality issues: best metrics assume daily flow data, but modeling is monthly only

Where: Map by river reach based on CRSS nodes

How often: 5-yr moving average



Threat Indicator – Non-Native Fish

Table

Indicator: % non-native fish/river mi;

- Example indicator data

Do we need it? yes

Desired value or threshold:

Best sources: Upper Basin Recovery Program,

- Example reporting/ map

Coverage issues: not available for all medium river fish;

Quality issues: best data available for listed species; some information for conservation populations; Colorado an issue

Where: Map by river reach
How often: Track every X years

Strategy Indicator – Flow Restoration

Table

Indicator: % of conservation reaches (phase 1) where flow needs are developed & implemented (for fish targets and aquatic)

Do we need it? yes

Desired value or threshold:will be determined

Best sources: Upper Basin Recovery Program,

Coverage issues: may not be available beyond recovery programs

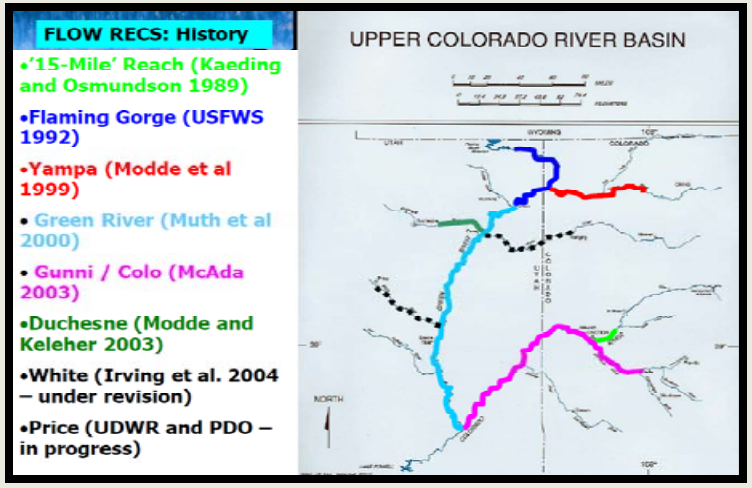
Quality issues:

Where: Map by conservation river reach

How often: Track annually

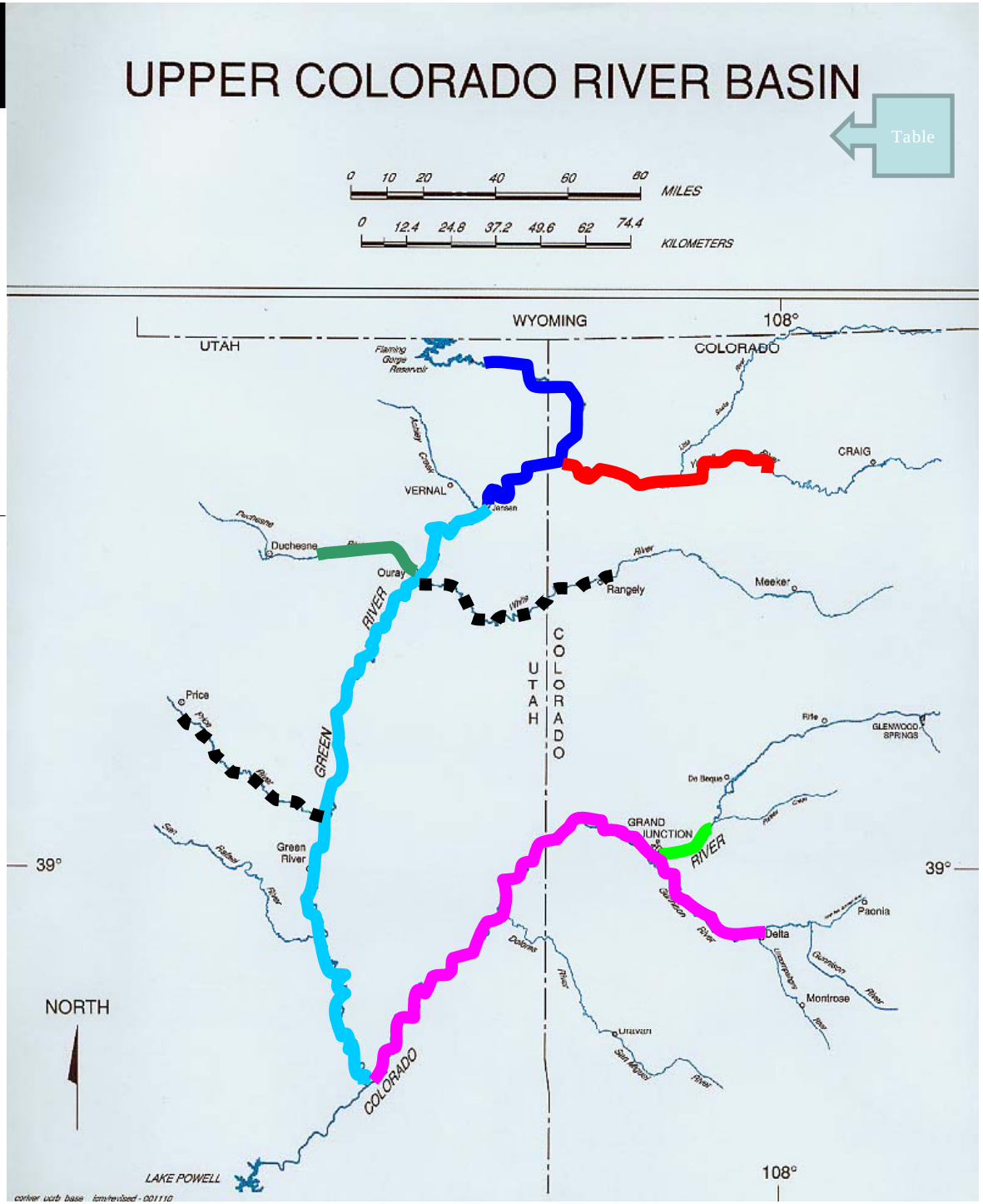
- Example indicator data

- Example reporting/map



FLOW RECS: History

- '15-Mile' Reach (Kaeding and Osmundson 1989)
- Flaming Gorge (USFWS 1992)
- Yampa (Modde et al 1999)
- Green River (Muth et al 2000)
- Gunni / Colo (McAda 2003)
- Duchesne (Modde and Keleher 2003)
- White (Irving et al. 2004 – under revision)
- Price (UDWR and PDO – in progress)



Strategy Indicator – Non-Native Fish Control

Table

Indicator: number of control programs in place (16 sites)

Do we need it? yes

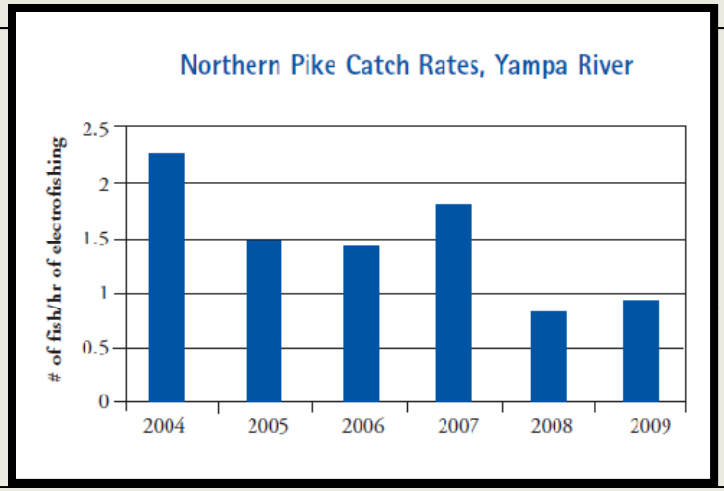
Desired value or threshold:

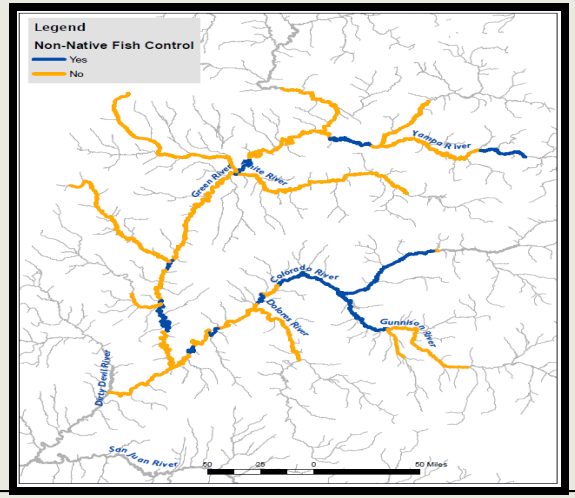
Best sources: Upper Basin Recovery Program,

Coverage issues:

Quality issues:

Where: Map by site
How often: Track annually

- 

- Example reporting/map


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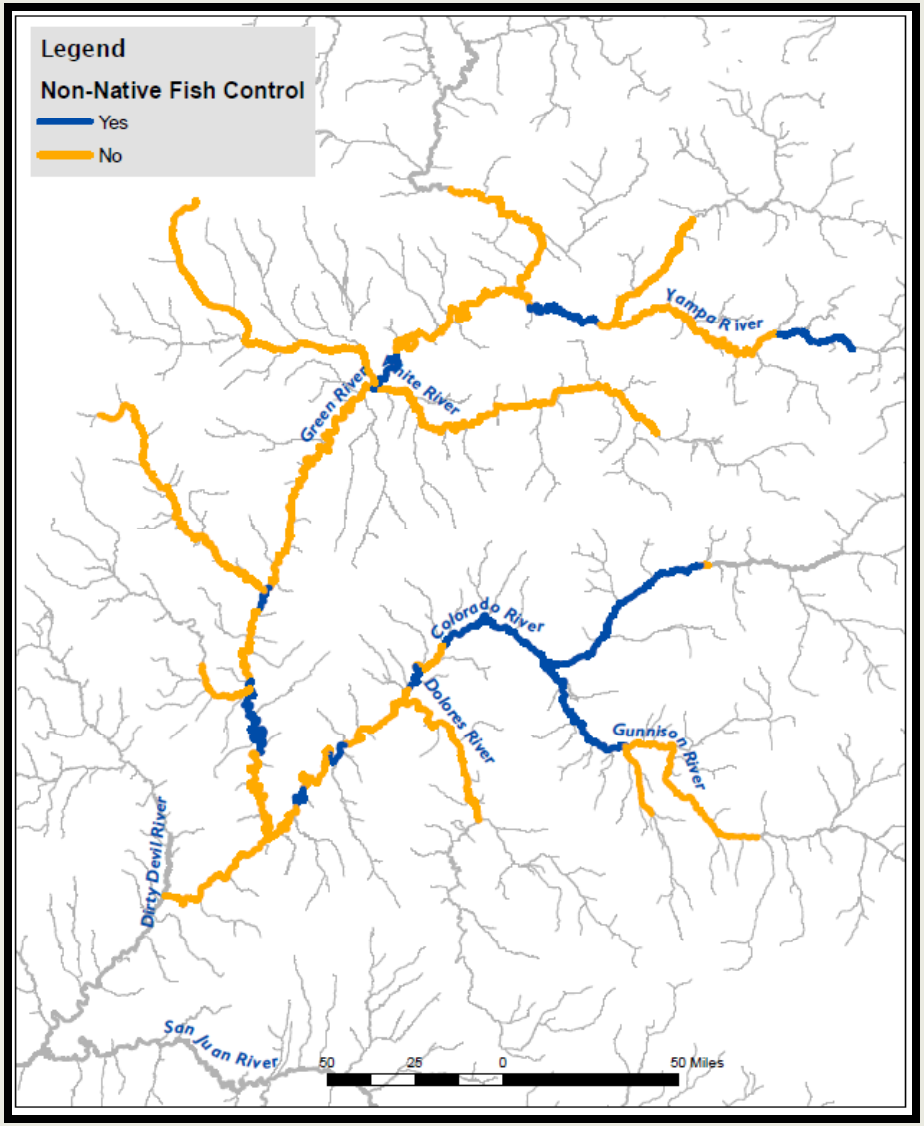
Strategy indicator – Non-native fish control

Table



Strategy Indicator – Native Fish Re-introduction

Table

Indicator: Number of existing stocking programs in place that are meeting goals; long-term goal is to eliminate the need for stocking programs;

Do we need it? No, unless recruitment is not happening, then you might look at a site to judge why population size goals are not met

Desired value or threshold:

Best sources: Upper Basin Recovery Program,

Coverage issues: available for endangered fish programs

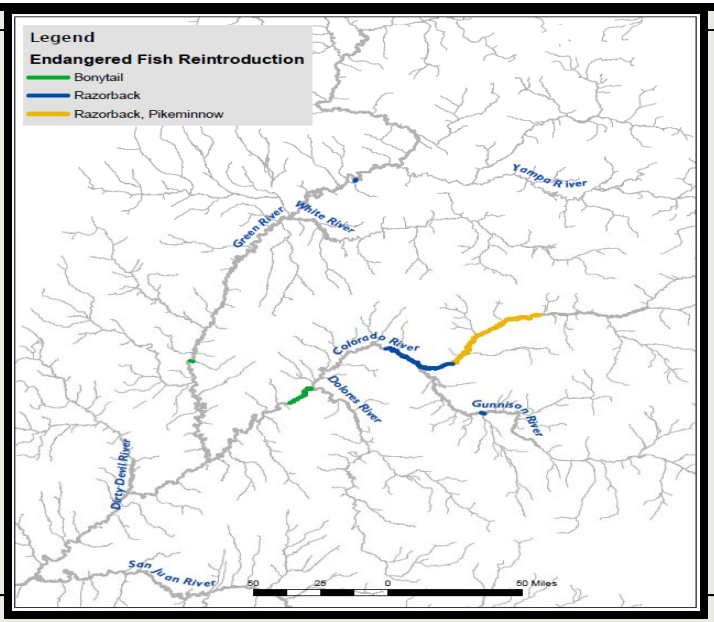
Quality issues: assumes "goals" are biologically relevant

Where: Map by critical river reach
How often: Track annually

- Program's Performance to Meet Annual Bonytail Stocking Goals (%)

	Green River		Colorado/Gunnison Rivers
	Middle	Lower	
2005	112	58[1]	114
2006	95	61	104
2007	101	101	105
2008	143	100	111
2009	101	100	95

Shaded cells indicate years when stocking goal was not met (i.e., <100%)
[1] Fish were stocked in other locations.

- 

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Strategy Indicator – Native Fish Re-introduction

Table

Program's Performance to Meet Annual Bonytail Stocking Goals (%)

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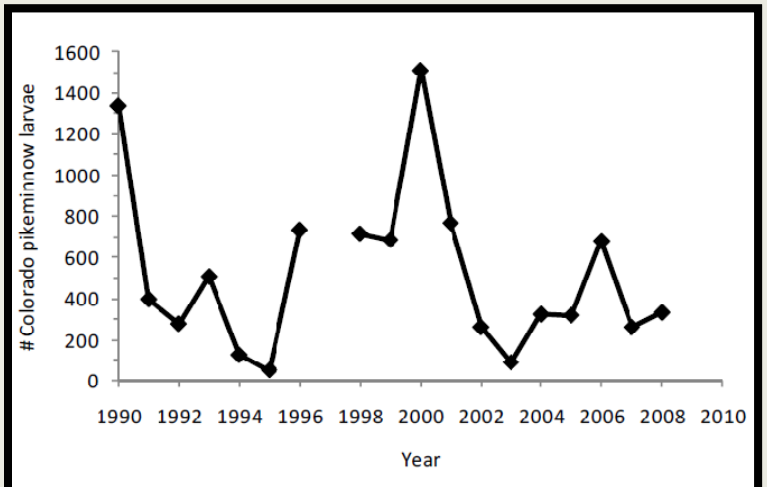
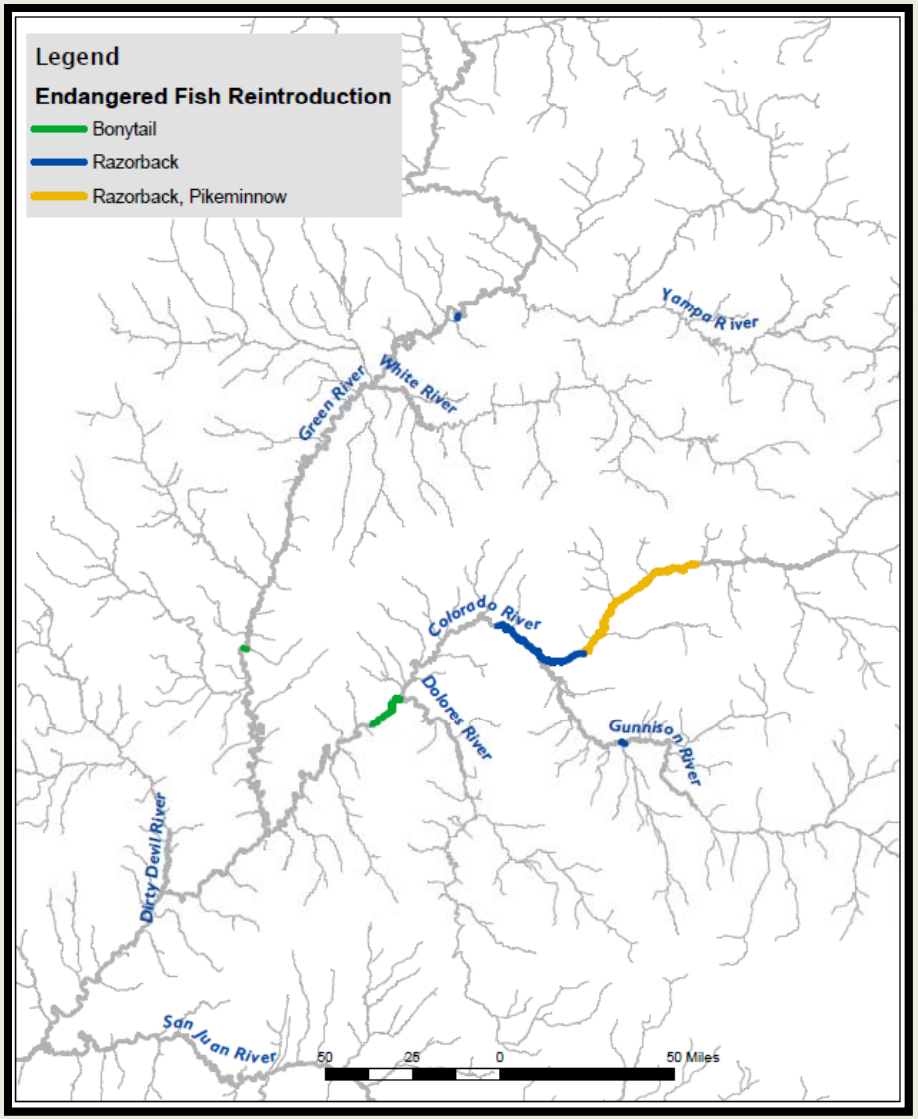




Riparian Systems – Coarse Target Indicator

Table

Indicator: % or acres of each expanded type in "acceptable" condition; acceptable based on native dominated cover;

Do we need it? yes

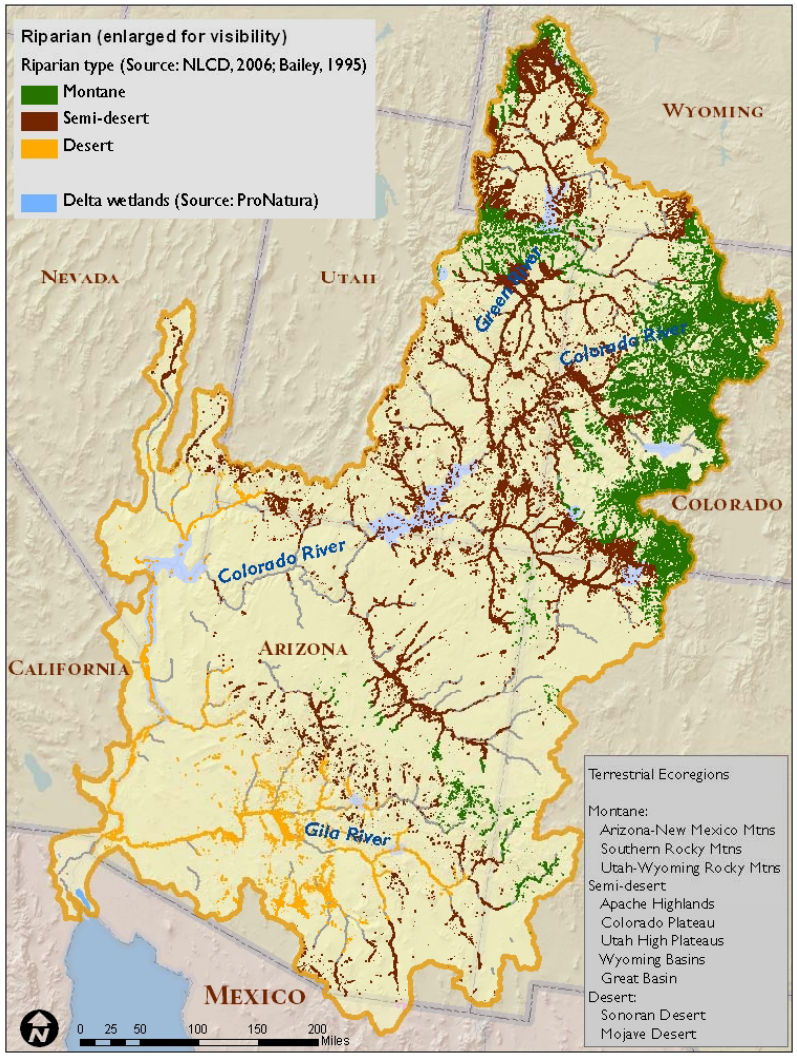
Desired value or threshold:

Best sources:

Coverage issues:

Quality issues: issues around not picking up riparian with this data set where lots of rock

Where: at phase 1 and across the basin
How often:

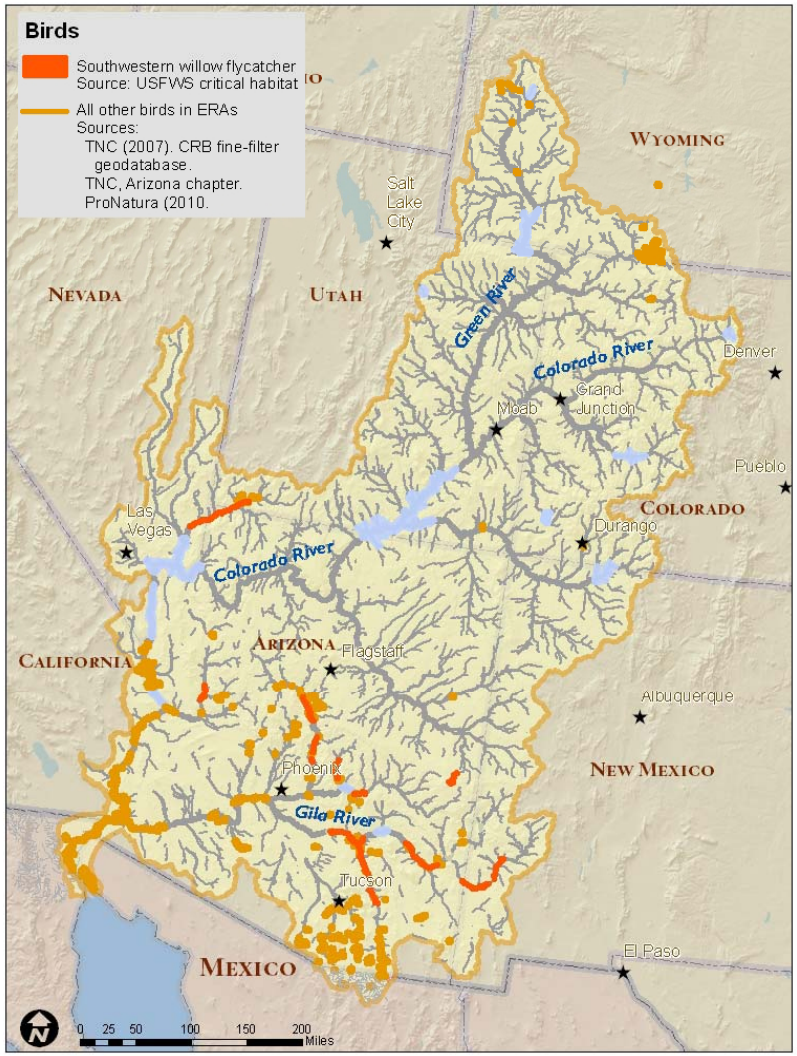


Neotropical Migrants – Target Indicator

Table

Indicator: progress toward recovery goals for SW willow flycatcher; for upper and lower basin – riparian is adequate for rest of species;

- Do we need it? yes
- Desired value or threshold:
- Best sources:
- Coverage issues:
- Quality issues:
- Where:
  How often:



Target Indicator – Riparian Communities

Table

Indicator: % native woody riparian overstory by system type (i.e. montane big river) and *natural recruitment (Merritt and Poff methods?); in future, could be age class based on lidar?*

Do we need it?yes

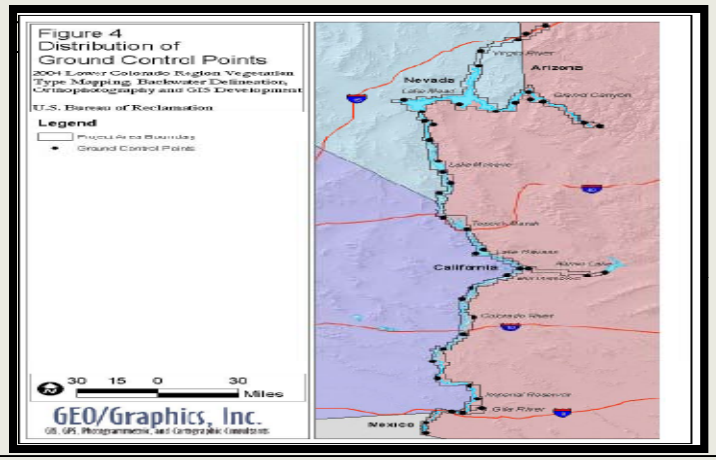
Desired value or threshold:

Best sources:

Coverage issues: not available

Quality issues: variable to nonexistent

Where: Map by river reach
How often: Track every five years

- 

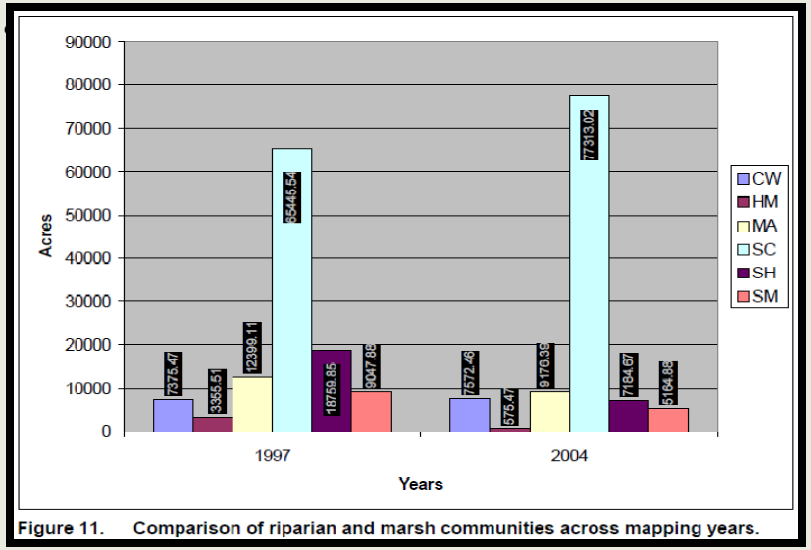


Figure 11. Comparison of riparian and marsh communities across mapping years.

Target Indicator – Neotropical Migrants

Table

Indicator: Bird abundance trends increasing *within mapped critical habitat*

Do we need it?no

Desired value or threshold:

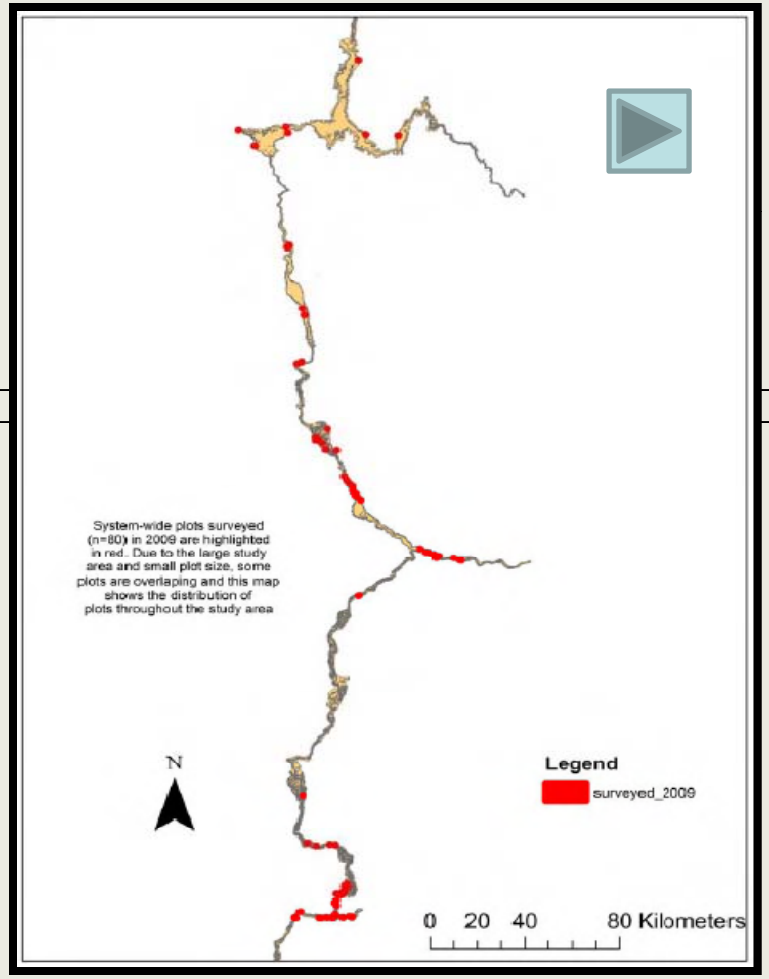
Best sources:

Coverage issues: Lower basin only?

Quality issues:

Where: Map within critical habitat
How often: Track every five years

- Example indicator data



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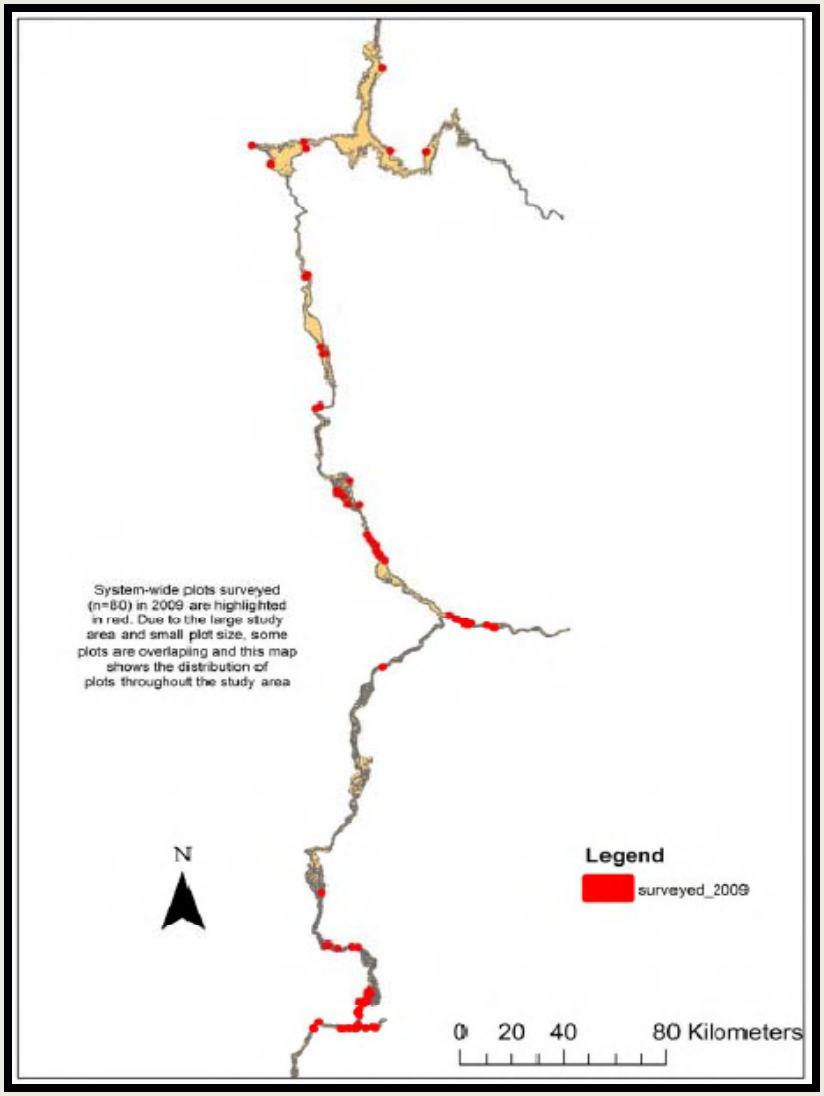
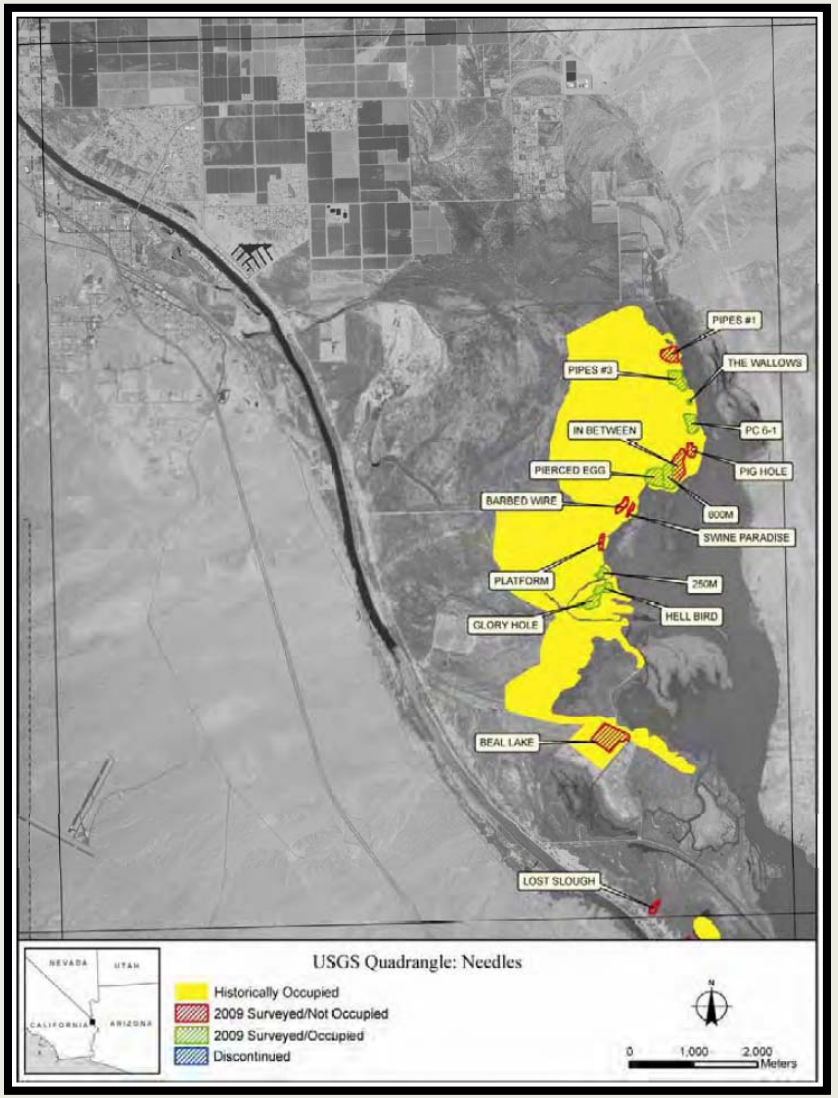
Target Indicator – Neotropical Migrants

Table





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Threat Indicator – Tamarisk

Table

Indicator: number phase 1 sites with "adequate" woody control programs

Do we need it? yes

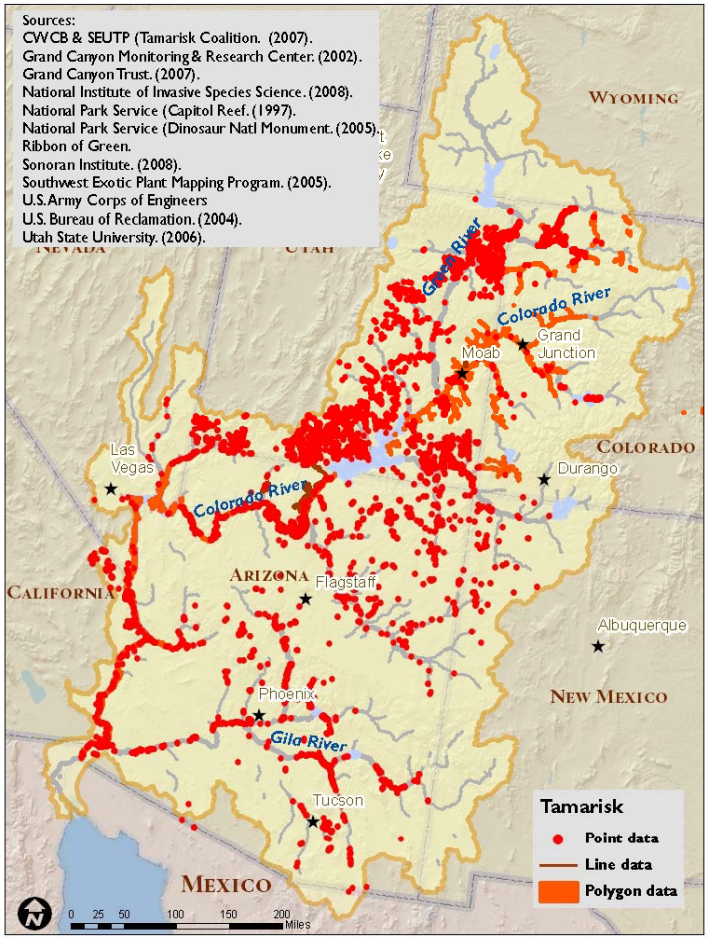
Desired value or threshold:

Best sources:

Coverage issues:

Quality issues: tamarisk mapping is very inconsistent;

Where:
How often:



Threat Indicator – Altered Flows & Floodplain Connectivity

Table

Indicator: % departure of flows from reach-specific benchmarks for riparian

Do we need it? yes

Desired value or threshold: varies by node

Best sources: USGS streamflow data, metrics from Basin Study

Coverage issues:

Quality issues: best metrics assume daily flow data, but modeling is monthly only

Where: Map by river reach based on CRSS nodes

How often: 5-yr moving average

- Example indicator data

Go to flow metrics spreadsheet

- Example reporting/map

Strategy Indicator – Floodplain Restoration

Table

Indicator: Number of sites where woody invasives treatment and riparian restoration work is occurring; Progress at each site (acres of treatments and restoration);

Do we need it? Yes (duplicates slide 66)

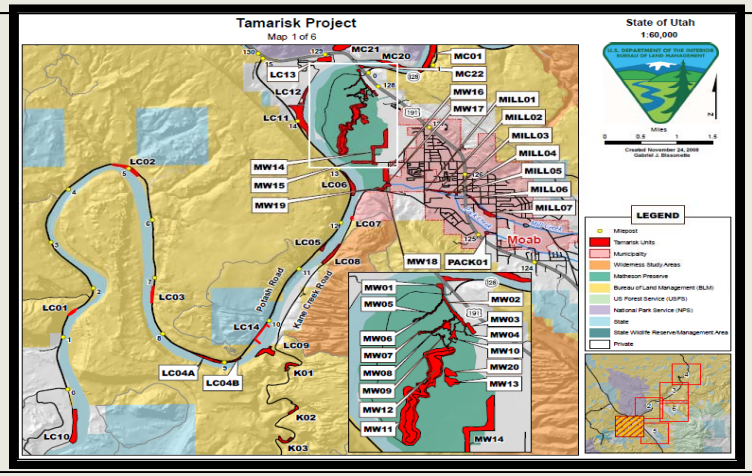
~~Desired value or threshold~~:

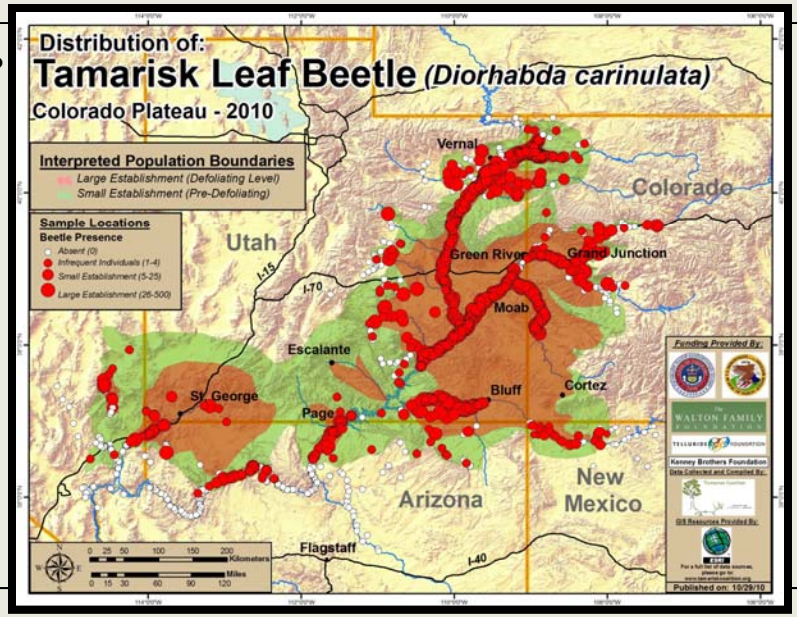
Best sources: tamarisk coalition for beetles

Coverage issues:

Quality issues: not peer reviewed;

Where: Map by river reach
How often: Track every five years

- 

- 

Strategy Indicator – Flow Restoration

Table

Indicator: % floodplain area inundated by 5-yr flood *within important places (e.g., Ouray NWR);*

Do we need it? No – more of site based metric and not current basin-wide strategies

Desired value or threshold:

Best sources:

Coverage issues:

Quality issues: can you get to geomorphology changes?

Where: Map by river reach
How often: Track every ten years

- Example indicator data

- Example reporting/map

Target Indicator – Delta wetlands

Table

Indicator: Acres of inundated & vegetated habitat

Do we need it?

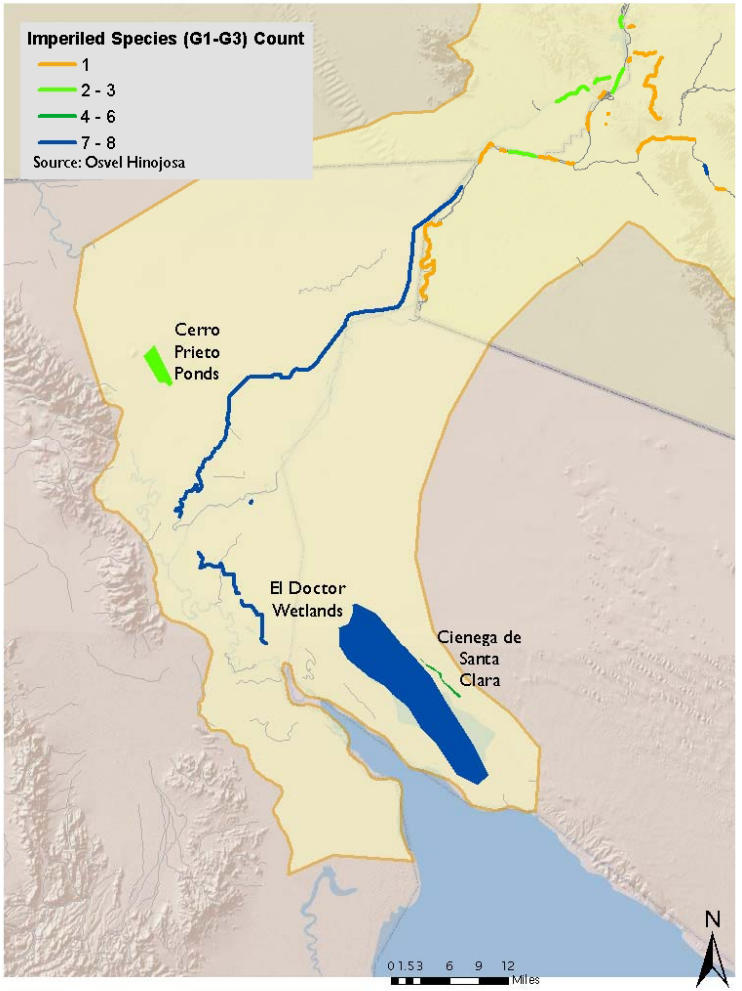
Desired value or threshold: 12,000 ha inundated, 4200 ha vegetated

Best sources:

Coverage issues:

Quality issues:

Where: Cienega de Santa Clara
How often: Track every five years



Threat Indicator – Altered Flows

Table

Indicator: % departure from environmental flow targets for Delta riparian systems

Do we need it?

Desired value or threshold: 50,000 ac-ft/yr baseflow; 250,000 ac-ft/yr every 5 yrs

Best sources:

Coverage issues:

Quality issues:

Where: Track at X location
How often: annually

- Example indicator data

- Example reporting/map


OTHER MEASURES

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Progress measures from the results chain

Example:

Intermediate Result:

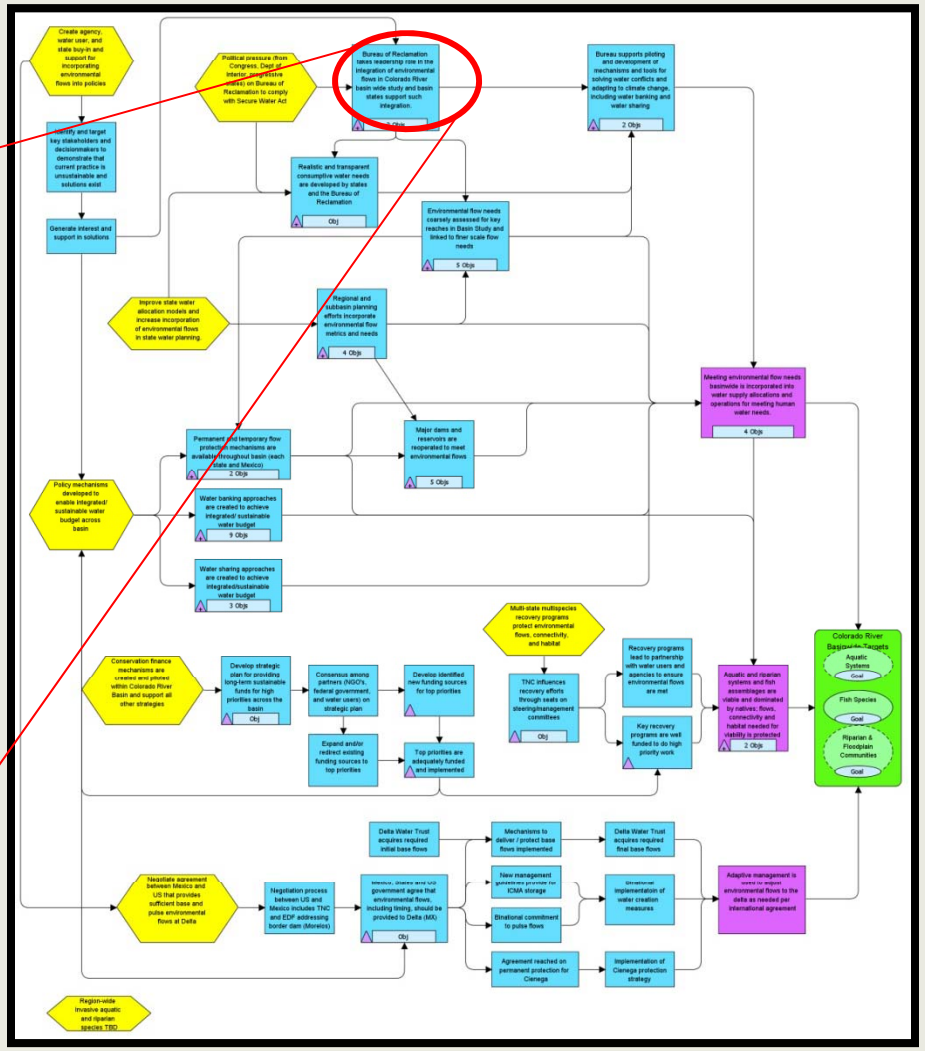
Bureau of Reclamation takes leadership role in the integration of environmental flows in Colorado River basin study and basin states support such integration.

Objective:

By 2011, the Bureau of Reclamation and all basin states support the concept of incorporating environmental flow metrics and needs into the Basin Study

Indicator:

 # states supporting environmental flows in Basin Study



Miradi Table

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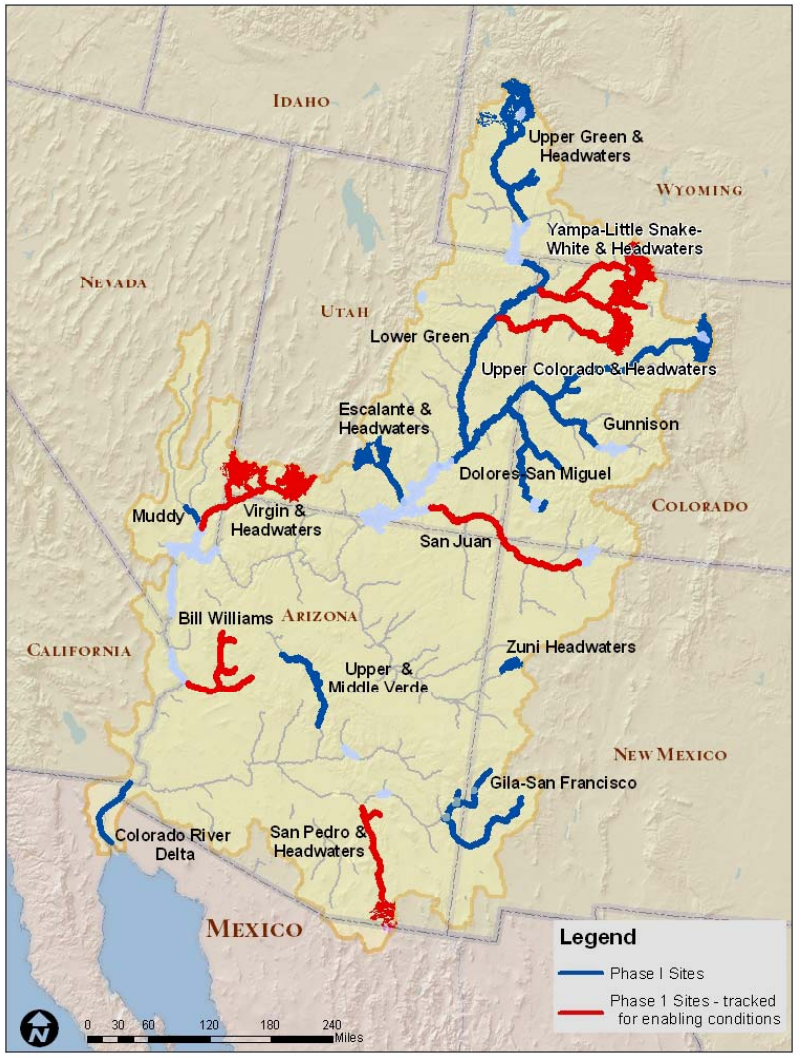
Measures to track status of "enabling conditions" at Phase I sites

- Basin maps showing number of phase I sites:
  - with CAPs completed through measures
  - with public/private funding in place to implement site-specific strategies
  - with key actions implemented (e.g., flow needs determined, flow restoration, non-native fish control, woody invasives control)
  - with measures & monitoring in place to evaluate effectiveness of key interventions
  - Capacity, especially project management/coordination
  - No of sites participating in communication network?



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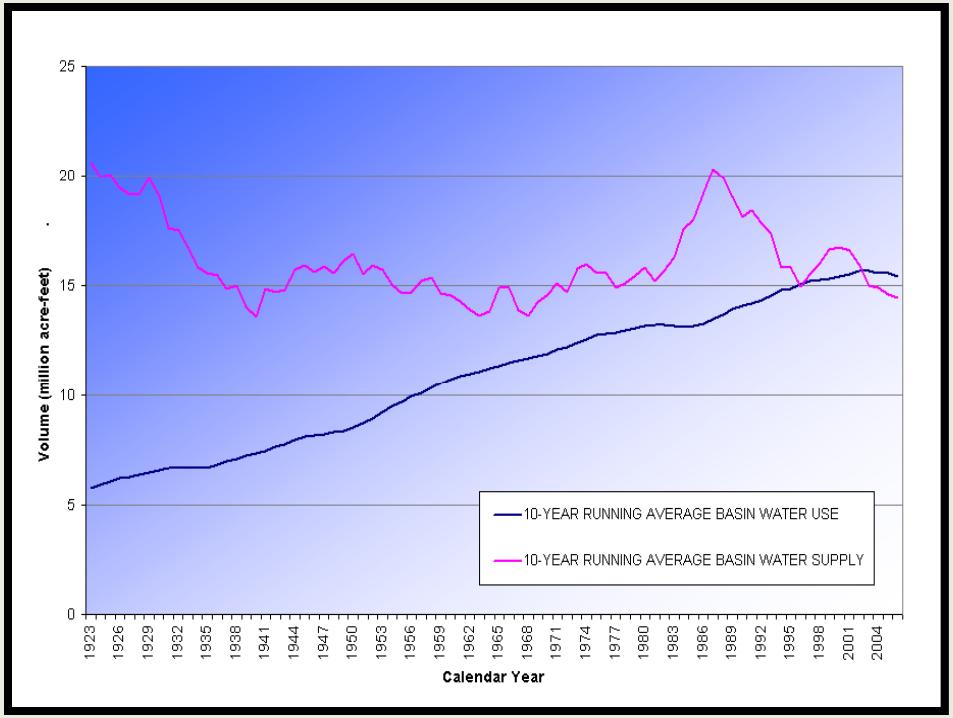
Example

Integrated Water Management: Balancing human & environmental needs

- From results chain:
  - "Reduce risks that the water needs of humans and the river ecosystem cannot be met simultaneously under a changed climate"
  - "Meeting environmental flow needs basinwide is incorporated into water supply allocations and operations for meeting human water needs"
- From vision: "Indicators of sustainability include healthy ecosystems, biological diversity, adequate and reliable water supplies for healthy communities and strong economies, and interconnections between and among the River and its users"
- Suggestions for indicators:
  - % reduction in human-environmental flow conflicts
  - % departure from established ecological flow benchmarks
  - % of flow-dependent targets needs met by responses to water deficits

Do we need to measure this outcome separately?



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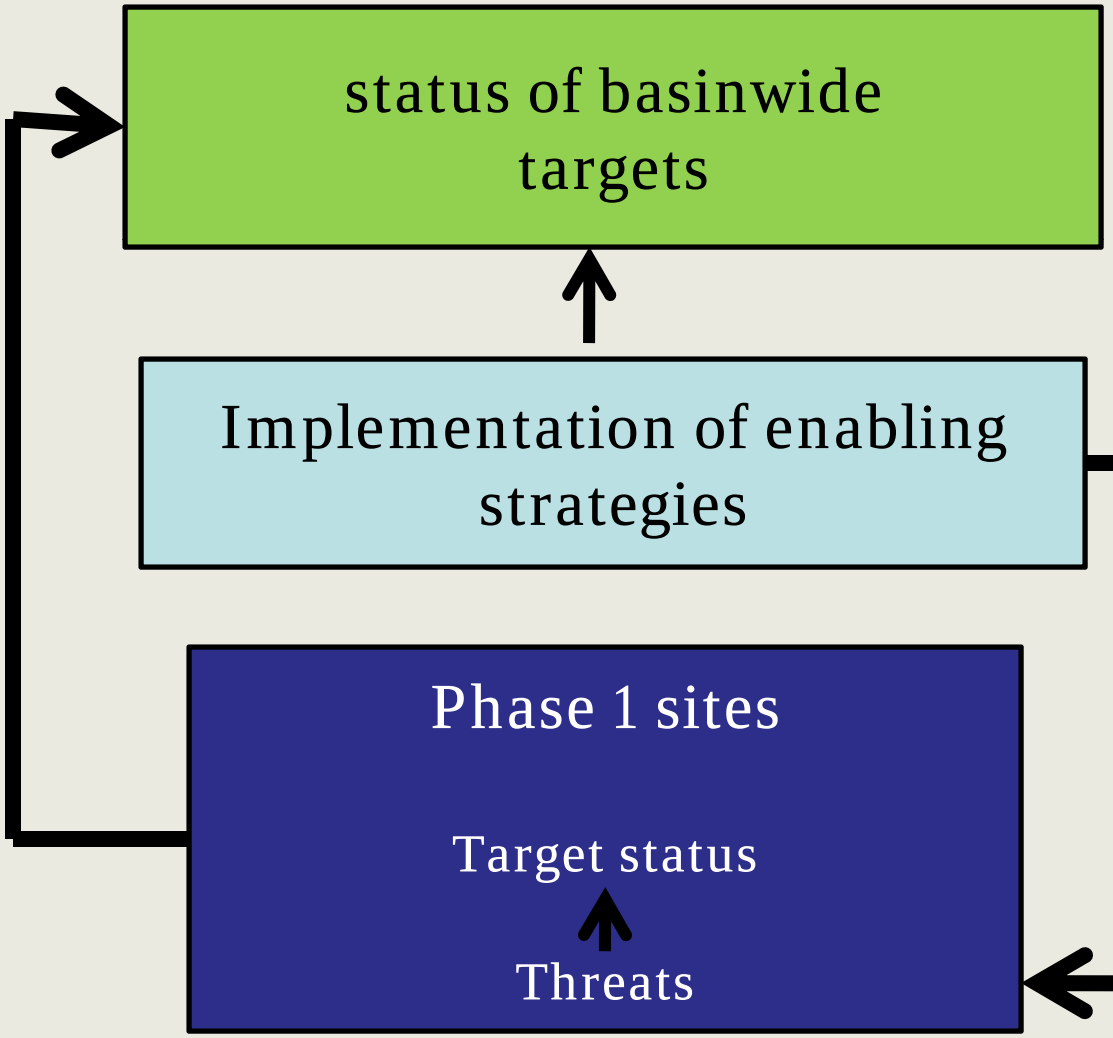
How it fits together



Measures

biological health

progress

biological health

threat reduction

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Next Steps

- Summary report from this workshop (how far did we get, some refinement, gaps) – march 2011
  - Refine Delta indicators
- Floodplain connectivity indicator
- Refine objectives & indicators in results chain
- Identify basinwide tamarisk strategy, if there is one – Terri to take this on as needed, inc. results chain. Focus on basinwide enabling (funding): recovery programs, extending control act, etc.
- Feedback on & edits to Miradi table – Robert to take lead on this. Including possile refinement of indicators for benefits provided to humans
- Developing framework for "state of the basin" report, summarizing the status of our measures.
- Next cut on "new" basinwide goals and extent to which phase 1 sites contribute, including new maps with targets and sites overlain – Terri, Jan, John
  - Revise basinwide targets to combine aquatic & riparian and re-map
- Develop plan for data management and acquisition – do we contract, do in-house, influence/piggyback on agencies & partners, etc. Scope this in March 2011 report.
- Need to revisit need for indicators for human benefits
- Send out workshop materials, including maps, to group

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Workshop review

<u>What we liked</u>

- Maps, strawman
- Liked materials on table
- Good info to take back to partners
- Strawman was helpful, as were maps
- Liked quick flyovers, previews of all related indicators
- More productive than June; smaller, more managable scope to bite off
- Deeper dive into science
- Appreciated work put into it in advance (3)
- Conceptually easier to follow

<u>What we would change</u>

- Have materials in advance (3)
- Too hung up on data availability
- Overwhelming at times, needed more time to review and reflect in advance