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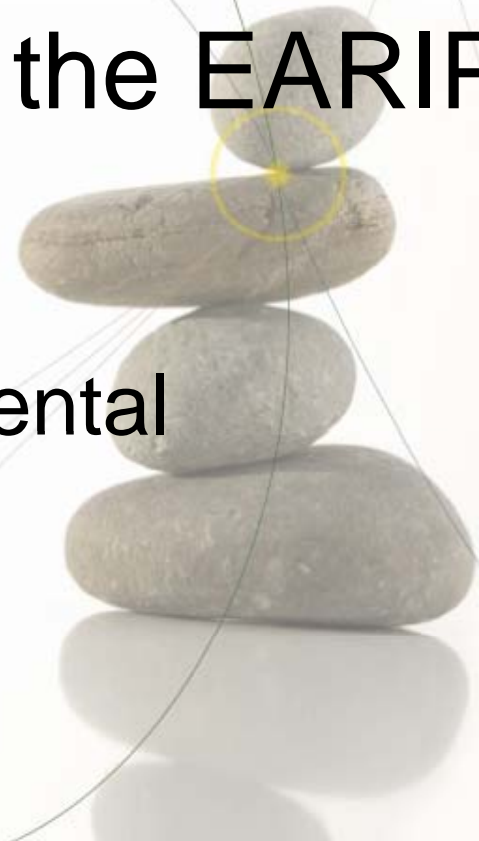
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Potential Role of Baseline and Influence Diagrams in the EARIP

Paul Fromer

RECON Environmental



DoD Environmental Baseline

- Description of the affected portions of the aquifer
- Regional and local threats to the aquifer & springs and dependent species
- Link between springflow and water usage
- Description of the hydrograph
- Effects of future growth on the aquifer

DoD Environmental Baseline

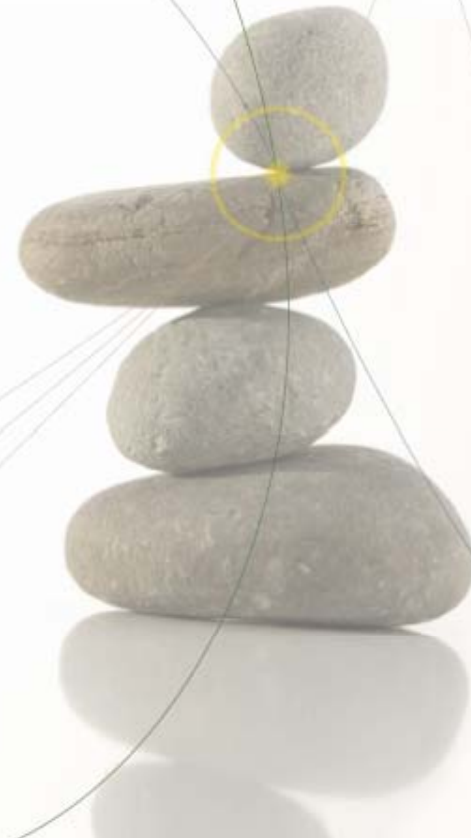
- Description of earlier and current modeling based on population/water use projections
- History of water regulation and management
- USFWS determination of take, jeopardy, and adverse modification of CH

DoD Environmental Baseline

- Description of needed springflow, as influenced by implementation of effective aquifer management plan
- Discussion of management to control limiting factors
- Discussion of water quality and potential threats
- Water Quality recommendations

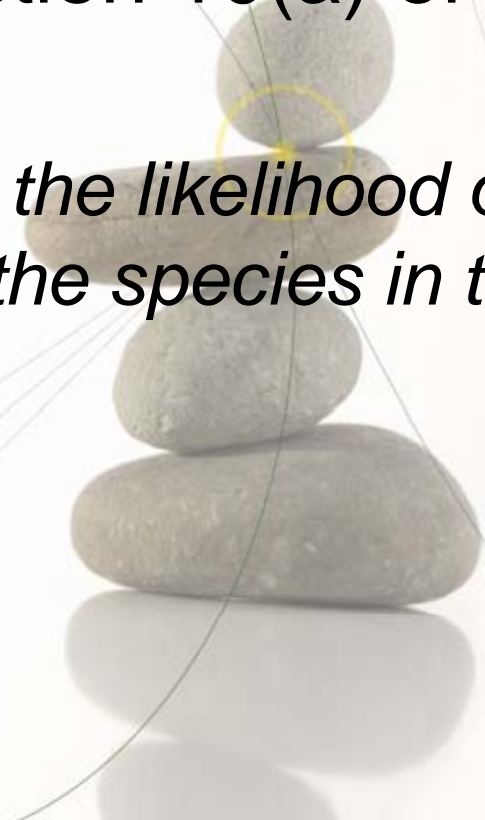
Key Elements of the EARIP Process

- EARIP HCP
- EARIP HCP EIS
- Section 7 Consultation
- Adaptive Management Plan



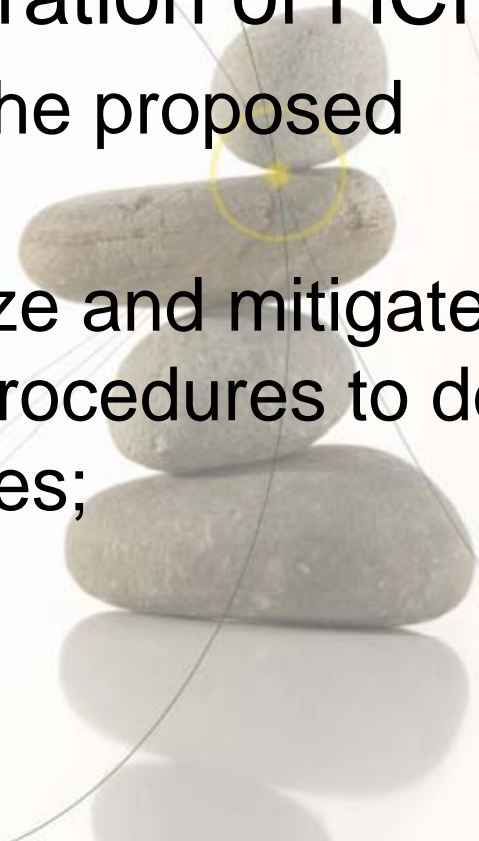
EARIP HCP

- Incidental Take Permit (Section 10(a) of the ESA)
 - *Must not appreciably reduce the likelihood of the survival and recovery of the species in the wild.*



EARIP HCP

- Requirements for the preparation of HCP
 - Impacts likely to result from the proposed taking;
 - Measures to monitor, minimize and mitigate such impacts; funding; and procedures to deal with unforeseen circumstances;



EARIP HCP EIS

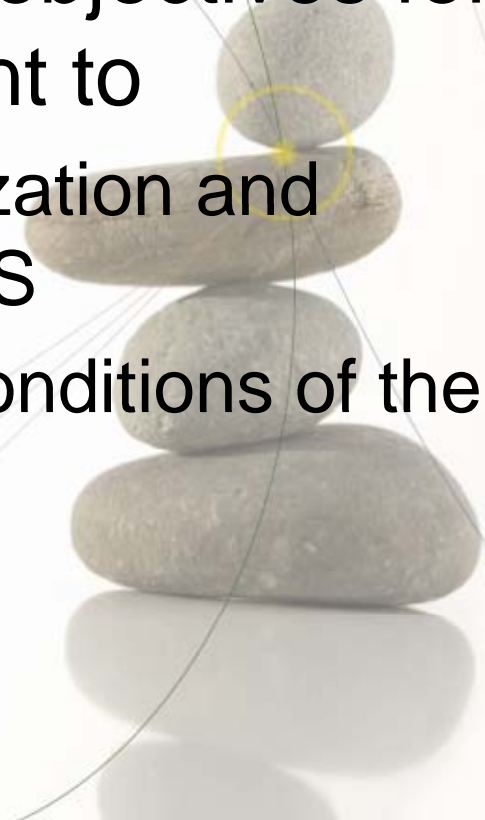
- Proposed action and Alternatives
- Affected Environment
- Environmental Consequences
- No Action alternative,
 - basis for comparison of the effects of the Proposed and other Alternatives with No Action, or current conditions without the issuance of a 10(a) permit

Section 7 Consultation

- Baseline allowing the service to evaluate whether or not the actions in the permit would
 - *be likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat..*

Adaptive Management Plan

- Species specific goals and objectives for monitoring and management to
 - achieve the goals for minimization and mitigation in the HCP and EIS
 - comply with the terms and conditions of the permit and BO



Influence Diagrams

- HCP
 - Description of species ecological requirements
 - Identification of the factors affecting species
 - Identification of measures to minimize and mitigate effects (including Adaptive Management Plan)

Influence Diagrams

- EIS
 - Refines the description of the affected environment
 - Allows comparison of alternative measures with the no action alternative



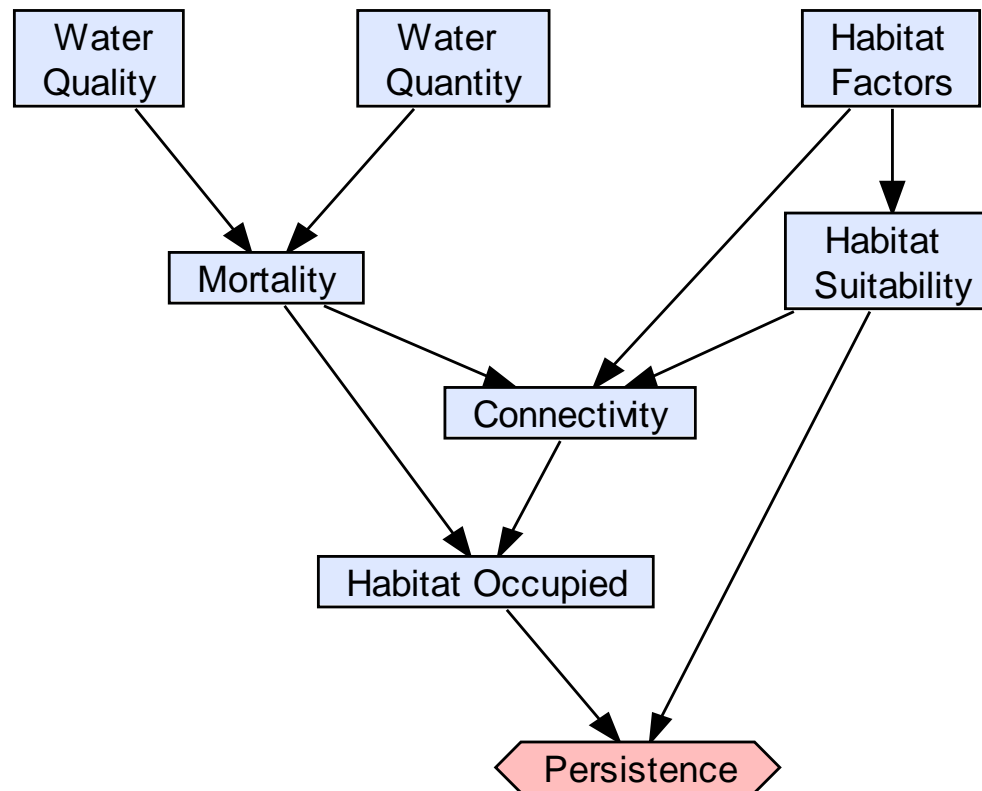
Environmental Baseline and the Comal Springs Riffle Beetle

- Factors effecting mortality and persistence require the development of specific management measures in the HCP, prioritized with respect to the importance of the factors to the species and the feasibility of implementation of these management measures.

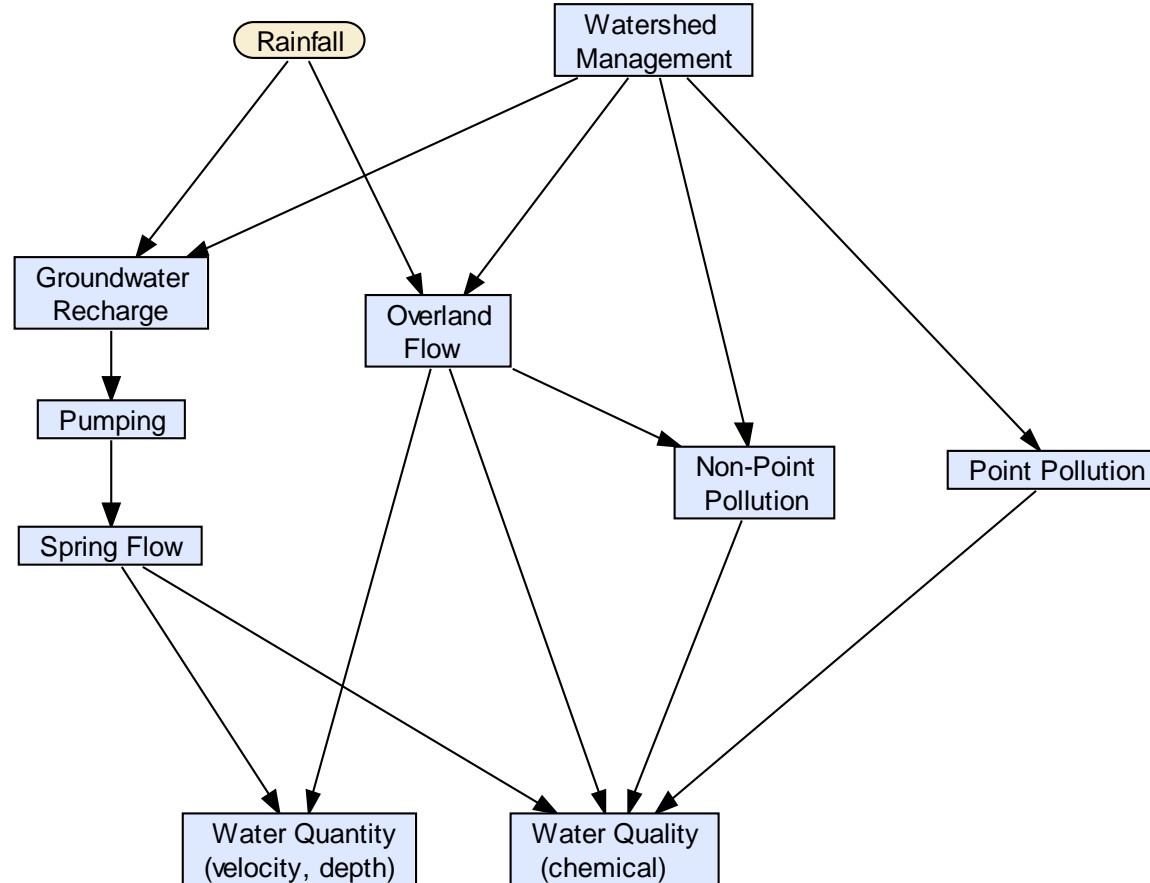
Environmental Baseline and the Comal Springs Riffle Beetle

- The occurrence or existing status of implementation of these or similar management measures is a component of the environmental baseline, to which the proposed measures in the HCP can be compared, specifically, with respect to how the species mortality and persistence is affected by the measures.

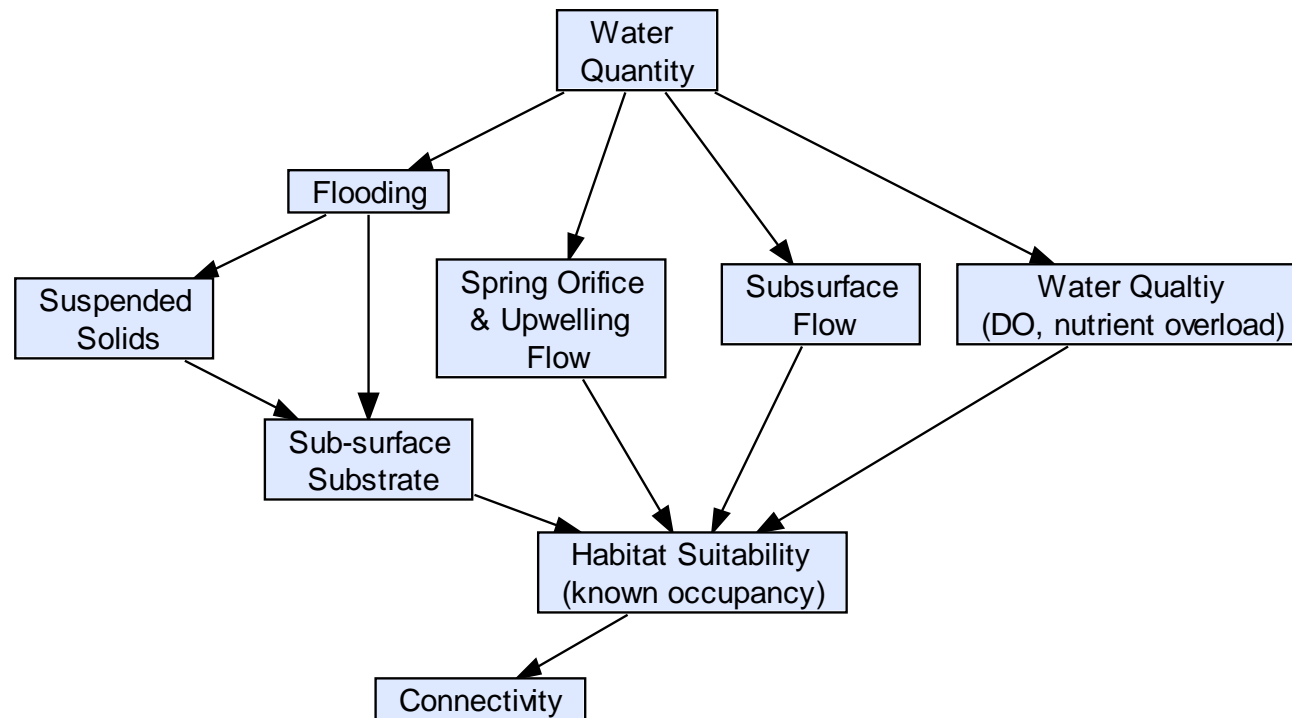
Riffle Beetle General Relationships



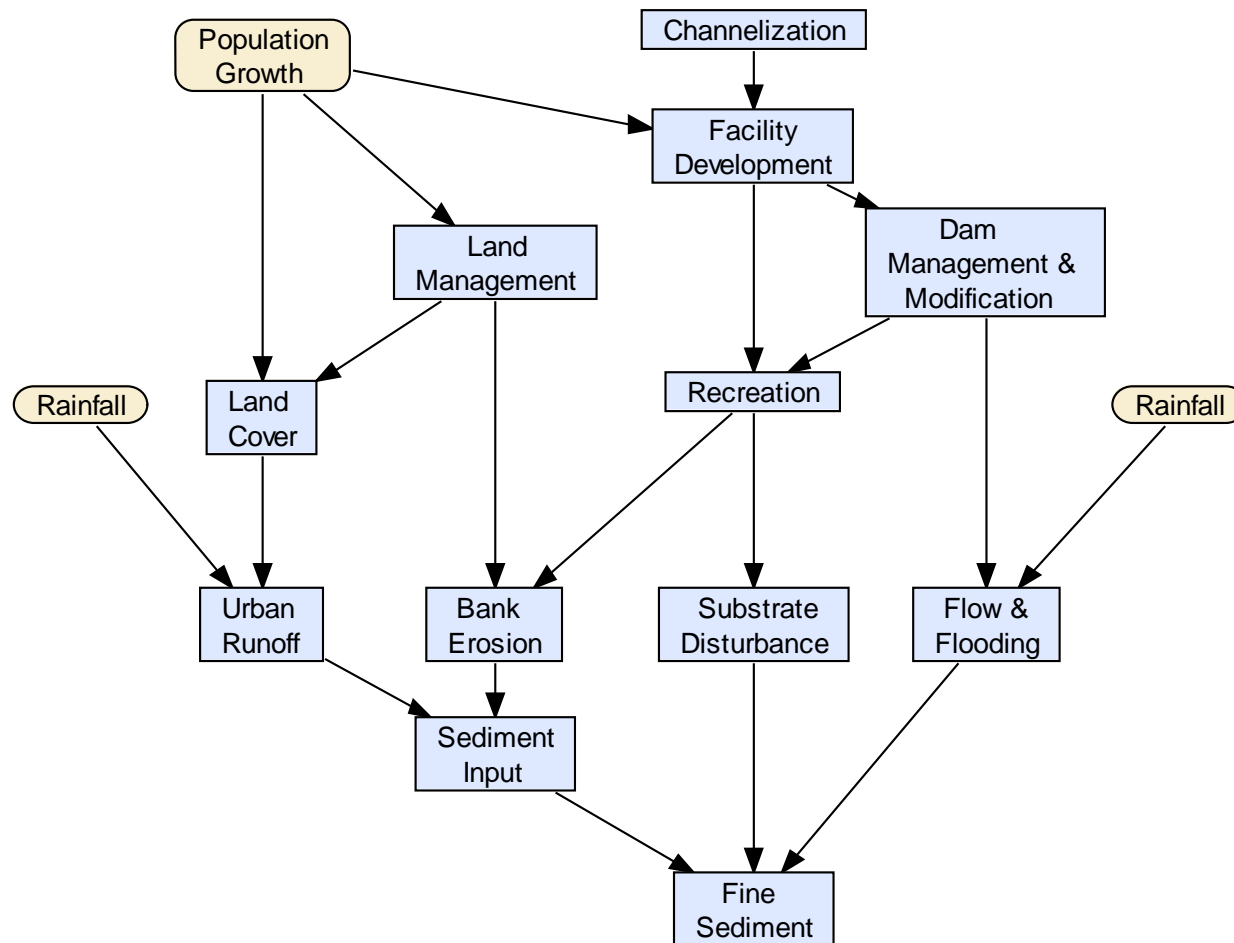
Riffle Beetle Water Quality and Quantity



Riffle Beetle Habitat Factors



Riffle Beetle Fine Sediment Input



Factors Affecting the Riffle Beetle

Rainfall
Pumping
Groundwater Recharge
Overland Flow
Non-point Pollution
Point Pollution
Water Chemistry
Water Quantity
Spring Flow
Water Depth
Water Velocity
Habitat Factors (Suitability)
Flooding
Suspended Solids
Channelization
Facility Development
Dam Management & Modification

Recreation
Substrate Disturbance
Land Management
Land Cover
Urban Runoff
Bank Erosion
Substrate Disturbance
Flow and Flooding
Sediment Input
Fine Sediment
Subsurface Substrate
Spring Orifice & Upwelling Flow
Subsurface Flow
Water Quality (DO, nutrient overload)
Connectivity
Connectivity
Habitat Occupancy

Factors in the HCP

Factors Affecting the Riffle Beetle	Existing Management Measures	EARIP Management Measures
Pumping	TBD	TBD
Groundwater Recharge	TBD	TBD
Overland Flow	TBD	TBD
Non-point Pollution	TBD	TBD
Point Pollution	TBD	TBD
Water Chemistry	TBD	TBD
Water Quantity	TBD	TBD
Spring Flow	TBD	TBD
Water Depth	TBD	TBD
Water Velocity	TBD	TBD

Factors in the EIS

Factors Affecting the Riffle Beetle	No Action	Proposed EARIP Management Measures	Alternative Management Measures
Pumping	TBD	TBD	TBD
Groundwater Recharge	TBD	TBD	TBD
Overland Flow	TBD	TBD	TBD
Non-point Pollution	TBD	TBD	TBD
Point Pollution	TBD	TBD	TBD
Water Chemistry	TBD	TBD	TBD
Water Quantity	TBD	TBD	TBD
Spring Flow	TBD	TBD	TBD
Water Depth	TBD	TBD	TBD
Water Velocity	TBD	TBD	TBD

Factors in the BO

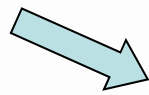
Factors Affecting the Riffle Beetle	Environmental Baseline	EARIP Management Measures
Pumping	TBD	TBD
Groundwater Recharge	TBD	TBD
Overland Flow	TBD	TBD
Non-point Pollution	TBD	TBD
Point Pollution	TBD	TBD
Water Chemistry	TBD	TBD
Water Quantity	TBD	TBD
Spring Flow	TBD	TBD
Water Depth	TBD	TBD
Water Velocity	TBD	TBD

Factors in the AMP

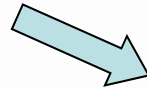
Factors Affecting the Riffle Beetle	Biological Goals and Objectives	EARIP Management Measures
Pumping	TBD	TBD
Groundwater Recharge	TBD	TBD
Overland Flow	TBD	TBD
Non-point Pollution	TBD	TBD
Point Pollution	TBD	TBD
Water Chemistry	TBD	TBD
Water Quantity	TBD	TBD
Spring Flow	TBD	TBD
Water Depth	TBD	TBD
Water Velocity	TBD	TBD

Environmental Baseline

Current Status of
Key Factors



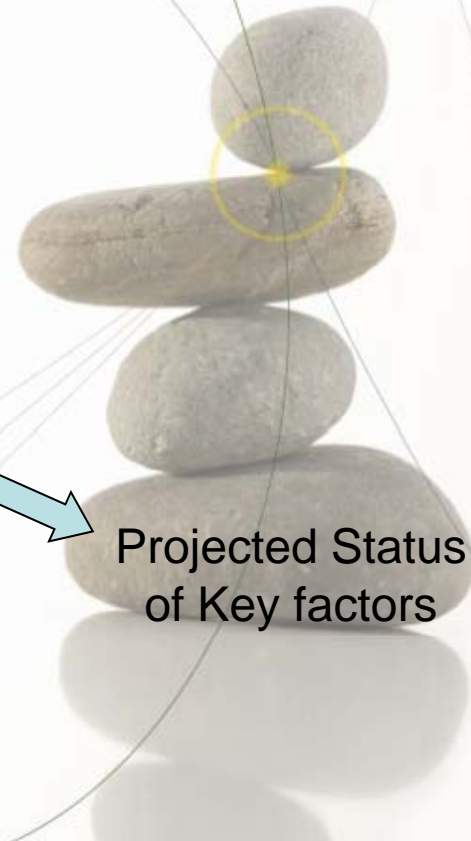
Existing
Management



Historic
Hydrograph



Projected Status
of Key factors



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Questions/Comments

