Agenda Item
Knowledge Assessment Update

Purpose of Agenda Item
To increase understanding of the pilot process that the TWG is using to organize and display information about current knowledge of resource status and trends and cause-effect relationships, and uncertainties in this current knowledge.

Action Requested
Information item only; we will answer questions but no action is requested.

Presenters
Seth Shanahan, Southern Nevada Water Authority, TWG Chair
David Braun, Sound Science, Science Advisors Executive Coordinator

Previous Action Taken
The AMP community has carried out several previous Knowledge Assessments, either comprehensive or focused on individual resource topics. The most recent comprehensive assessment was in 2005-06 and the most recent limited assessment, on fish and aquatic resources, was in 2011-12.

Relevant Science
N/A

Summary of Presentation and Background Information
Knowledge assessments are a standard tool in adaptive management, with two purposes:

1. They assess the state of knowledge concerning:
   - Status and trend for resources central to an adaptive management program
   - The factors (aka ‘drivers’) that shape resource status and trends
   - The ways in which past, current, and planned future management actions affect these drivers or directly affect resource status.

2. They identify areas of uncertainty in this knowledge that the adaptive management team may want to address through additional investigations, including but not limited to field monitoring or research.

The present (FY 2017) knowledge assessment is timed to coincide with and inform the Annual Reporting process and development of the next GCDAMP Triennial Work Plan for FY 2018-2020. This knowledge assessment is testing a methodology for better organizing, displaying, and communicating its findings, potentially to carry forward to guide future knowledge assessments as well.

The presentation will cover the pilot process and some preliminary findings.
Glen Canyon Dam Adaptive Management Program:
2017 Knowledge Assessment

Seth Shanahan, TWG Chair
& David P. Braun, Sound Science LLC:
GCDAMP Executive Coordinator for Science Advisors
GCDAMP AMWG Meeting, February 15, 2017, Phoenix, AZ
Thanks to the Steering Committee Ad Hoc Group

Shane Capron
Marianne Crawford
Craig Ellsworth
Katrina Grantz
John Jordan

Vineetha Kartha
Peggy Roefer
Larry Stevens
Scott VanderKooi
Linda Whetton
The Core Issue

It’s Complicated!
Why a Knowledge Assessment?

- To respond to TWG stakeholder requests to better understand:
  - What we know
  - What we don’t know
  - Confidence in our knowledge
Knowledge Assessment

- **Objectives**
  - Summarize what is known
  - Assess ongoing needs for monitoring to sustain crucial knowledge
  - Identify critical knowledge gaps and weaknesses that require attention

- **Desired Outcomes**
  - Crucial information for work planning and budgeting
  - Tabular graphics to improve communication with stakeholders and general public
  - A standard assessment process, repeatable with minimal effort
Structure of Assessment

Eleven “Resource Topics”
- Aquatic food base
- Archaeological and cultural resources
- Humpback chub
- Hydropower and energy
- Invasive fish species
- Other native fish species
- Rainbow trout fishery
- Recreational experience
- Riparian vegetation
- Sediment
- Water quality

Tribal Cultural Values
- Addressed parallel to western science assessment
“Knowledge” Assessed

- **Status and Trend**
  - Status of the condition(s) addressed by the topic
  - Direction of any trend(s) in these conditions
- **Effects of Key Drivers and Constraints**
  - What key external factors significantly shape status and trend?
  - Strength and direction of these effects
- **Effects of LTEMP Experimental and Management Actions**
  - How will actions affect status and trend?
  - Strength and direction of these effects
- **Critical Certainties/Uncertainties in Understanding**
  - Expert confidence
LTEMP Experimental and Management Actions

- Spring HFEs $\leq 45,000$ cfs in March or April
- Proactive Spring HFEs $\leq 45,000$ cfs in April, May, or June
- Fall HFEs $\leq 45,000$ cfs in October or November
- Fall HFEs $> 96$-hr duration
- Trout management flows
- Macroinvertebrate production flows
- Humpback chub translocation
- Mechanical removal of rainbow trout from LCR reach
- Mechanical removal of invasive fish species
- Larval humpback chub head-start program
- Riparian vegetation restoration
Information Structure

• Resource Topic
  • “Resource Characteristics”
    • “Specific Measures”
      • Status & Trend (relative to benchmark)
      • Drivers & Constraints: Strength and direction of effect
      • LTEMP Experimental and Management Actions: Strength and direction of effect (known or expected)

• Data “roll-up”
  • Specific measures ➔ resource characteristic
  • Resource characteristics ➔ resource topic
Information Tools

- Spreadsheet tools for standardized data entry
- Data validation to maintain consistency
- Database for integration, comparisons, and updating
For each specific measure:

- **Status**
  - Good/Moderate Concern/Significant Concern/Unknown
- **Trend**
  - Improving/Unchanging/Deteriorating/Unknown
- **Strength of Effect**
  - Strong/Moderate/Weak/Unknown
- **Direction of Effect**
  - Positive (beneficial)/None/Negative (detrimental)/ Unknown
- **Confidence**
  - High/Medium/Low
- **Rationale** (for each entry)
Methodology Source

- National Park Service, Natural Resources Condition Assessment (NRCA) methodology
- Sacramento-San Joaquin Delta Ecosystem Restoration Program “Decision-Support Tools to Guide Ecosystem Restoration Planning and Adaptive Management”
Graphic Summary of Results (1)

<table>
<thead>
<tr>
<th>Status/Trend Symbol Set</th>
<th>Resource Status</th>
<th>Trend in Status</th>
<th>Confidence in Status &amp; Trend Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condition Warrants Significant Concern</td>
<td>Condition Warrants Significant Concern</td>
<td>Low</td>
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<tr>
<td></td>
<td>Condition Warrants Moderate Concern</td>
<td>Condition Warrants Moderate Concern</td>
<td>Medium</td>
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<td></td>
<td>Resource is in Good Condition</td>
<td>Condition is Improving</td>
<td>High</td>
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<tr>
<td></td>
<td>Status Unknown</td>
<td>Trend Unknown</td>
<td>(n/a)</td>
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- **Condition good; trend improving; confidence high**
- **Condition of moderate concern; no trend; confidence medium**
- **Condition of significant concern; trend deteriorating; confidence low**
- **Condition unknown; trend unknown; confidence low**
## Graphic Summary of Results (2)

### Driver & Constraint and Experimental & Management Action Symbol Sets

<table>
<thead>
<tr>
<th>Strength of Effect</th>
<th>Direction of Effect</th>
<th>Confidence in Strength &amp; Direction Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Effect</td>
<td>Positive (Beneficial) Effect</td>
<td>High</td>
</tr>
<tr>
<td>Moderate Effect</td>
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<td>Medium</td>
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<td>Strength of Effect Unknown</td>
<td>Direction of Effect Unknown</td>
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- **Strong, positive effect; confidence high**
- **Moderate effect, not positive or negative; confidence medium**
- **Weak, negative effect; confidence low**
- **Strength and direction of effect unknown; confidence low**
### Assessment Team Leads

<table>
<thead>
<tr>
<th>Topic</th>
<th>Western Science Lead(s)</th>
<th>Tribal Leads</th>
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<tbody>
<tr>
<td>Aquatic food base</td>
<td>Ted Kennedy</td>
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</table>
| Archaeological and cultural resources | Jan Balsom and Theresa Pasqual | Charley Bulletts  
Melinda Arviso-Ciocco  
Mike Yeatts  
Kurt Dongoske |
| Humpback chub                     | Charles Yackulic        |                                                                              |
| Hydropower and energy             | Craig Ellsworth         |                                                                              |
| Invasive fish species             | Dave Rogowski           |                                                                              |
| Other native fish species         | Brian Healy              |                                                                              |
| Rainbow trout fishery             | Mike Yard                |                                                                              |
| Recreational experience           | Lucas Palmquist         |                                                                              |
| Riparian vegetation               | Emily Palmquist         |                                                                              |
| Sediment                          | Paul Grams               |                                                                              |
| Water quality                     | David Topping (below the Dam) and Robert Radtke (Lake Powell) |                                                                              |
## Initial Results (1)

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<tr>
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Plans for Completion

- All teams to turn in spreadsheets by today (2/15/17)
- Draft graphics output returned to teams by 2/22/17
- All teams return edits (if needed) by 3/8/17
- Final report from Science Advisors-Executive Coordinator to TWG by 3/15/17
  - Timing critical to informing FY 2018-2020 Triennial Work Plan & Budget
Questions?