Receptivity to diverse cultural benefits knowledges in the Glen Canyon Dam Adaptive Management Program

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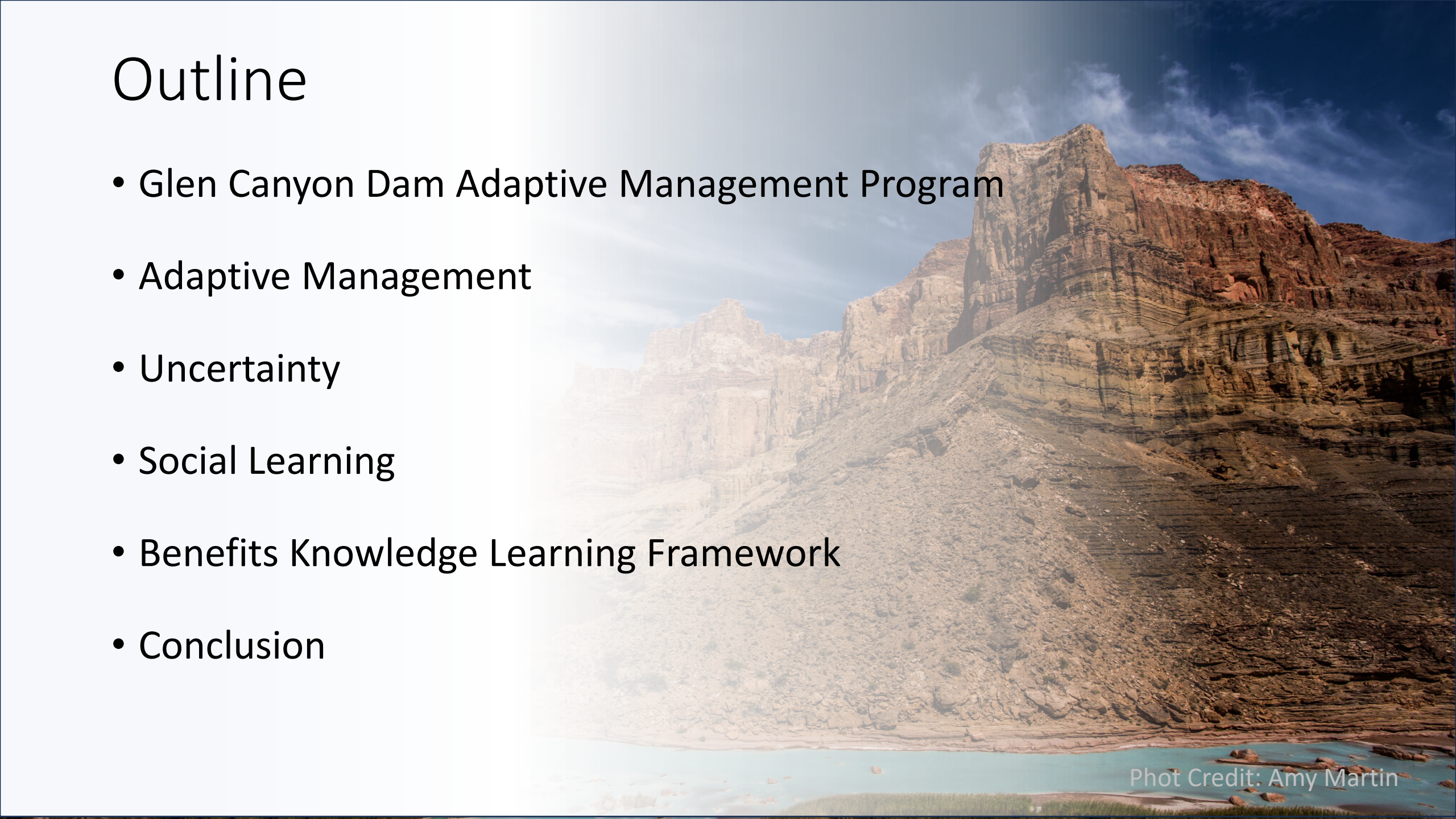
Outline

- Glen Canyon Dam Adaptive Management Program
- Adaptive Management
- Uncertainty
- Social Learning
- Benefits Knowledge Learning Framework
- Conclusion

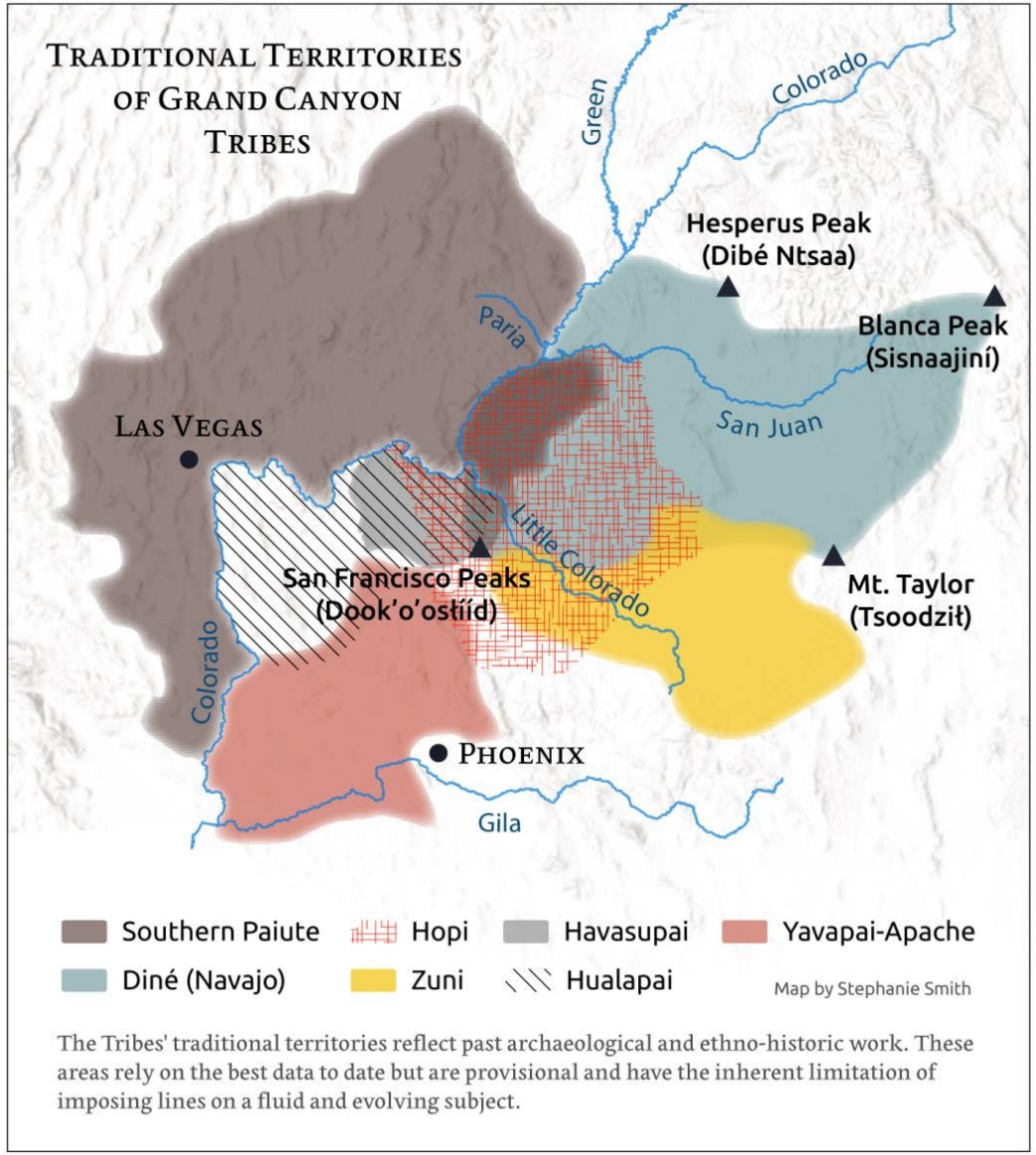


Glen Canyon Adaptive Management Program

- The GCDAMP is a collaborative effort designed to ensure that the operation of the Glen Canyon Dam balances multiple environmental, cultural, recreational, and hydropower objectives.

- A federal advisory committee of stakeholders comprised of federal and state agencies, Native American tribes, environmental groups, recreation interests, and power users.

- Recent U.S. Federal memoranda and guidance call for improved integration of the plural values of nature for well-being (White House, 2015) and the elevation of Indigenous and Traditional Ecological Knowledge (ITEK) alongside science (White House, 2021, 2022a, 2022b) in Federal decision-making.



Krakoff, S., 2020

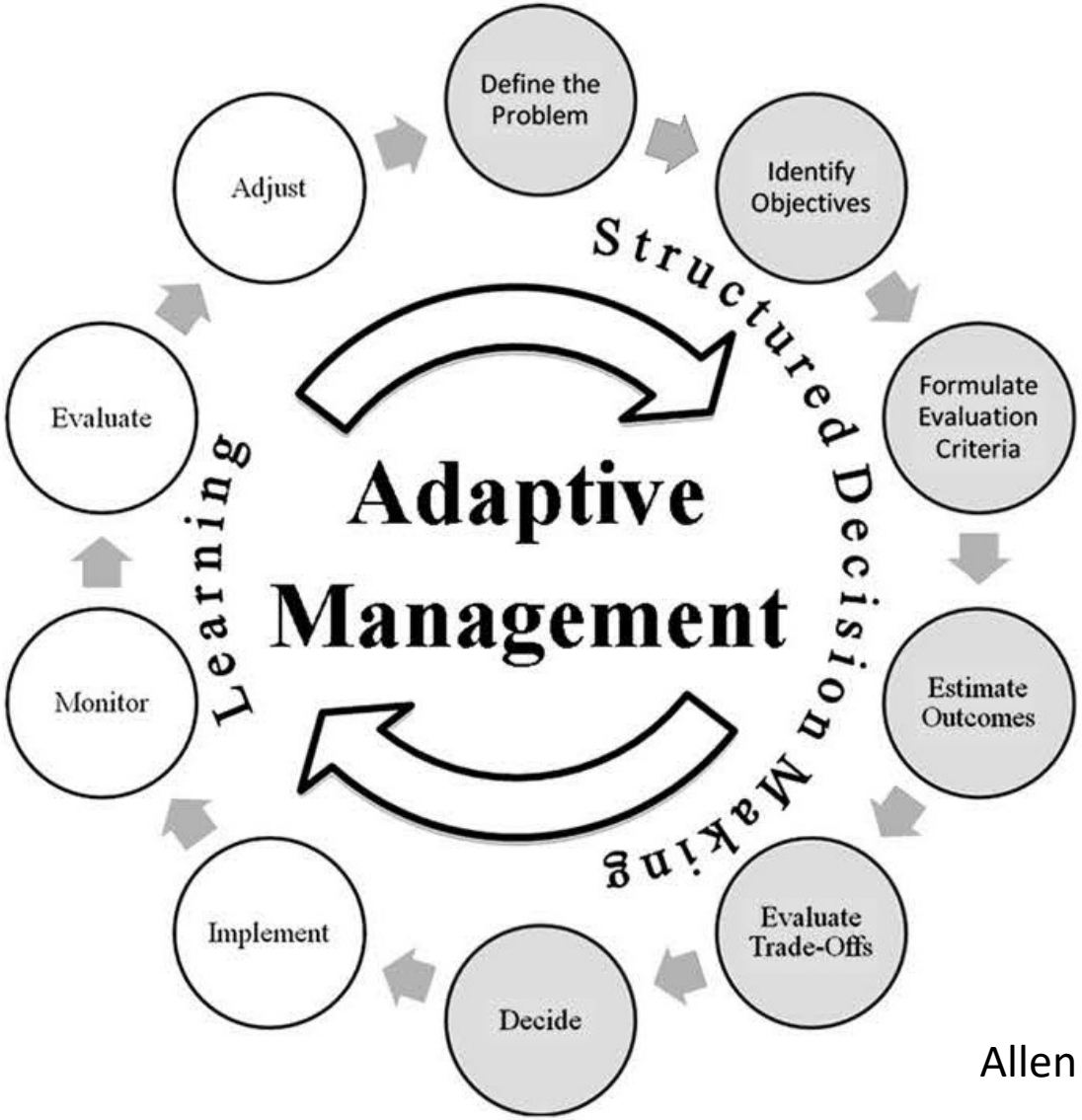
Adaptive Management

- Adaptive management (AM) is envisioned to improve management of complex social-ecological systems through reduction of uncertainty about ecosystem structures and processes.

- AM has historically focused on single-loop, technical learning to reduce structural uncertainty about how ecosystems function and how ecosystems processes respond to management actions.

- However, there are a wider suite of socio-political uncertainties, intertwined with structural uncertainty, and it can be argued that attention to this broader suite of uncertainties, or double-loop learning, is also necessary to achieve successful AM (Williams and Brown, 2018).

Success in Adaptive Management

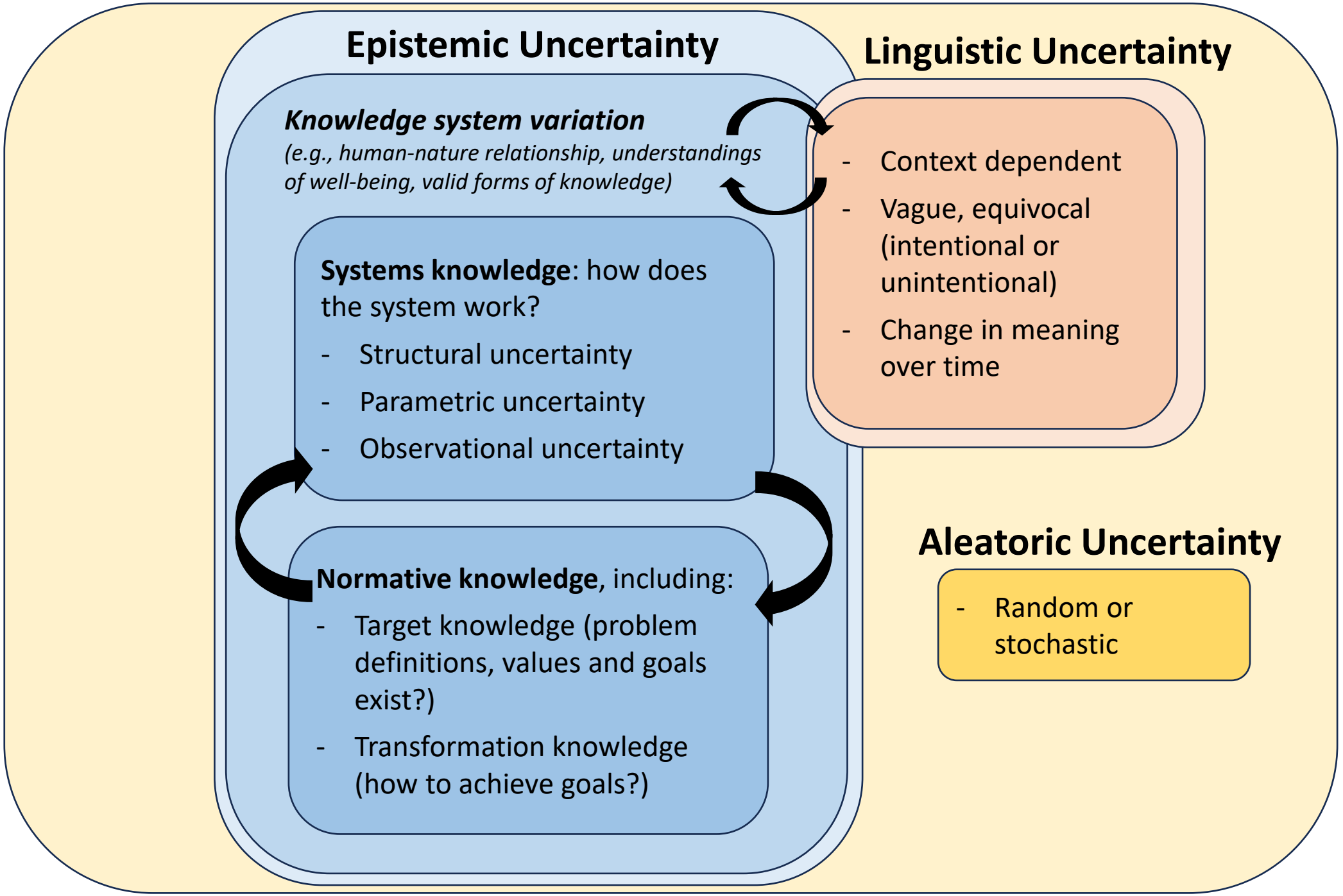


Allen et al., 2011

- Measurable ecological outputs
- Completion of adaptive management phases
  - Single-loop learning
- Learning across knowledge systems
  - Double-loop learning

Types of Learning

- Learning in AM is envisioned as the reduction of uncertainty and building of knowledge to improve management of an ecosystem over time (Allen et al., 2011).
- Across the literature, there are diverse frameworks used to understand types of uncertainty (e.g., Hayes, 2011), but most frameworks include categories related to
  - aleatoric uncertainty (stochasticity; irreducible),
  - epistemic uncertainty (reducible), and
  - linguistic uncertainty (ambiguity) (Bolam et al., 2018, others).


Epistemic Uncertainty
Linguistic Uncertainty
Knowledge system variation
(e.g., human-nature relationship, understandings of well-being, valid forms of knowledge)
- Context dependent
- Vague, equivocal (intentional or unintentional)
- Change in meaning over time
Systems knowledge: how does the system work?
- Structural uncertainty
- Parametric uncertainty
- Observational uncertainty
Normative knowledge, including:
- Target knowledge (problem definitions, values and goals exist?)
- Transformation knowledge (how to achieve goals?)
Aleatoric Uncertainty
- Random or stochastic

Social Learning

- In theory, AM builds in potential for social learning through its emphasis on iterative cycles of structured decision-making, learning, and adjustment.
- Social learning has been linked to improved environmental management in terms of five key interwoven characteristics (Keen et al., 2005)

Reflection

Systems Orientation

Integration

Negotiation

Participation

Benefits Knowledge Learning Framework

- A variety of social learning and knowledge co-production frameworks and tools are being developed to support cross-cultural and double-loop learning.

- One social learning tool that may be helpful to enhance double loop learning potential in the context of AM is the Benefits Knowledges Learning Framework (Hoelting et al., in review)

- This framework supports systematic recognition of benefits knowledge forms across groups of stakeholders and rights-holders, and the identification of opportunities to learn from these knowledge forms across phases of adaptive management and decision-making.

5. LEARNING OPPORTUNITIES

- Understand areas of opportunity for meaningful consideration of identified benefits knowledge forms (Translation, Procedural Inclusion, Cultural Comprehension)

- Identify action opportunities within the decision context
- Identify constraints and enabling factors for consideration of diverse benefits knowledge forms

1. CLARIFY THE DECISION CONTEXT

- Ecosystem definition(s)
- Actors: stakeholders/rights holders
- Decision context: values, rules, admissible knowledge forms.

2. FRAMEWORK INITIATION

- Who seeks to apply the framework and what purposes will it serve?
- What power asymmetries or conflicts are present?
- If some stakeholders or rightsholders voice opposition, how can their rights be respected in applying the framework

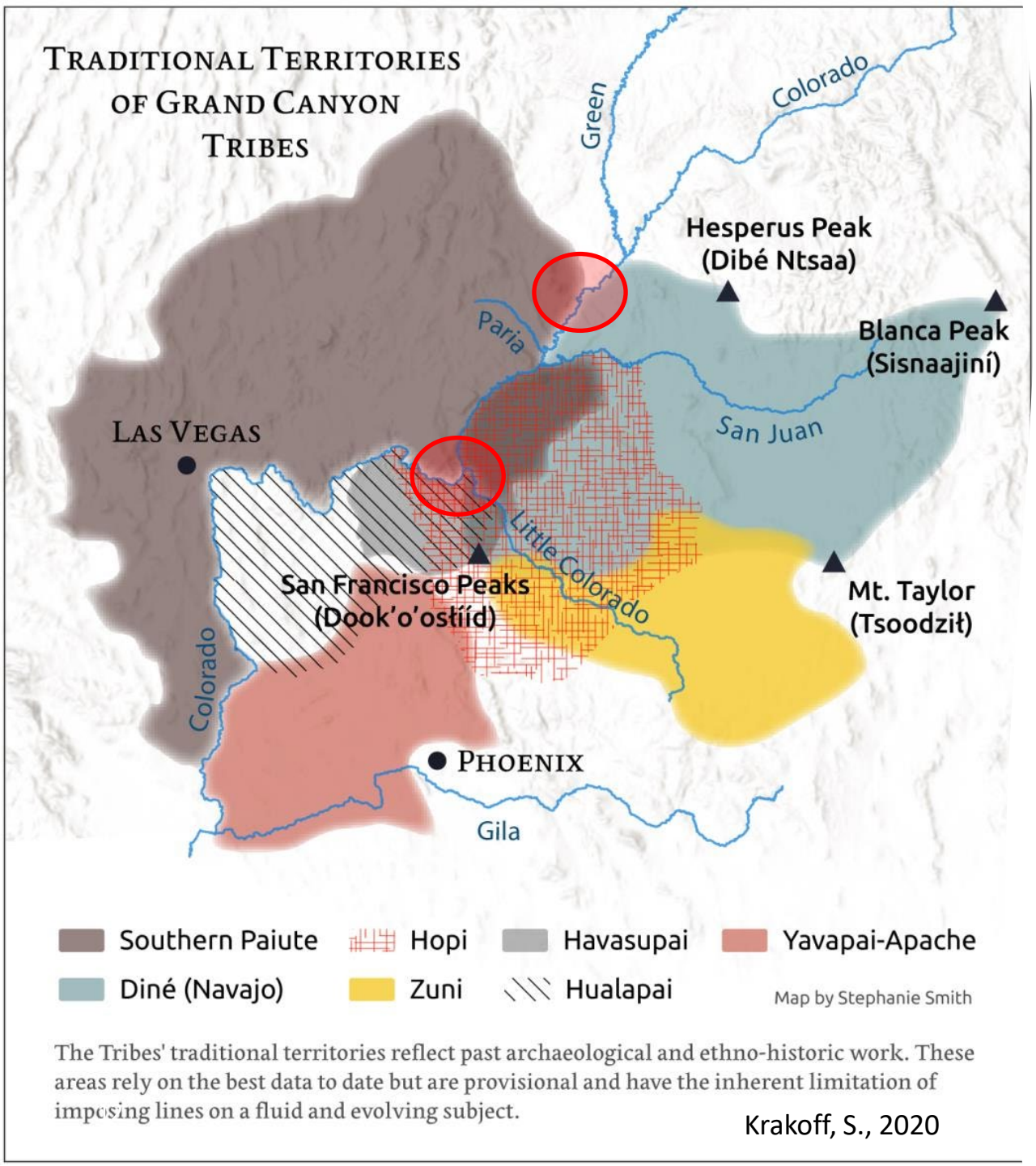
3. UNDERSTAND KNOWLEDGE SYSTEMS

- Reflection: Cultivate reflexivity
- Understand diverse epistemologies, forms of knowledge, and approaches to validation
- Understand systemic biases around valid, decision-relevant knowledge
- Build respectful relationships through mutual learning

4. IDENTIFY KNOWLEDGE FORMS

- Identify available benefits knowledge forms
- Understand the value aspects and perspectives communicated by each knowledge form
- Consider likely pathways for meaningful consideration of each knowledge form

Hoelting et al., in review



Krakoff, S., 2020

GCDAMP Example

- Learning topic – relationship between humans and fish
  - Systems knowledge
  - Normative knowledge
- Benefits Knowledge Learning Framework
  - Decision Context
  - Framework Initiation
  - Understand knowledge systems
  - Identify knowledge forms
  - Learning opportunities

Steps to Incorporate Learning Across Knowledge Systems

- Develop criteria for AM learning success evaluation (Chaffin and Gosnell, 2015).
- This includes criteria for reducing uncertainty in both systems knowledge and normative knowledge at each step in the AM process.

Adaptive Management

Uncertainty

Social Learning

Benefits Knowledge Learning Framework

Conclusion

- Incorporate multiple valid understandings of the dynamics of ecological processes and species interactions arising across worldviews (e.g., Nadasdy, 2003; Schrieber, 2013) in management to improve accuracy into system models.

- Identifying structured steps for learning across knowledge systems that can support more accurate and equitable assessment of the impacts and benefits of management.

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