Adaptive Management Cycle for Remediation

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SRST Expert Panel Meeting

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Remediation Proposal Comments Regarding: Emphasis, AM and Sequencing of Activities

RRM 0 to 2 Remediation ⇨ Phase 1 Remedy

Actions / Activities in addition to Bank Stabilization

- Prior to Phase 1 river activities: Waynesboro Plant Site IMs and corresponding in-river monitoring
- Current: Onsite and offsite risk assessments, and floodplain conceptual model
- Continuing: SRST Remedial Options Program to identify, evaluate and test promising remedial technologies and deployment options for banks and other environmental compartments

Adaptive Management Process

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Why Adaptive Management?

- Uncertainties in the Conceptual System Model
  - Mass balance
  - Bioavailable Pool of Mercury
  - Complexities of mercury cycling /threshold concentrations
  - In-channel MNR Processes
- Uncertainty in public acceptance of remedies
- Scale necessitates phased implementation

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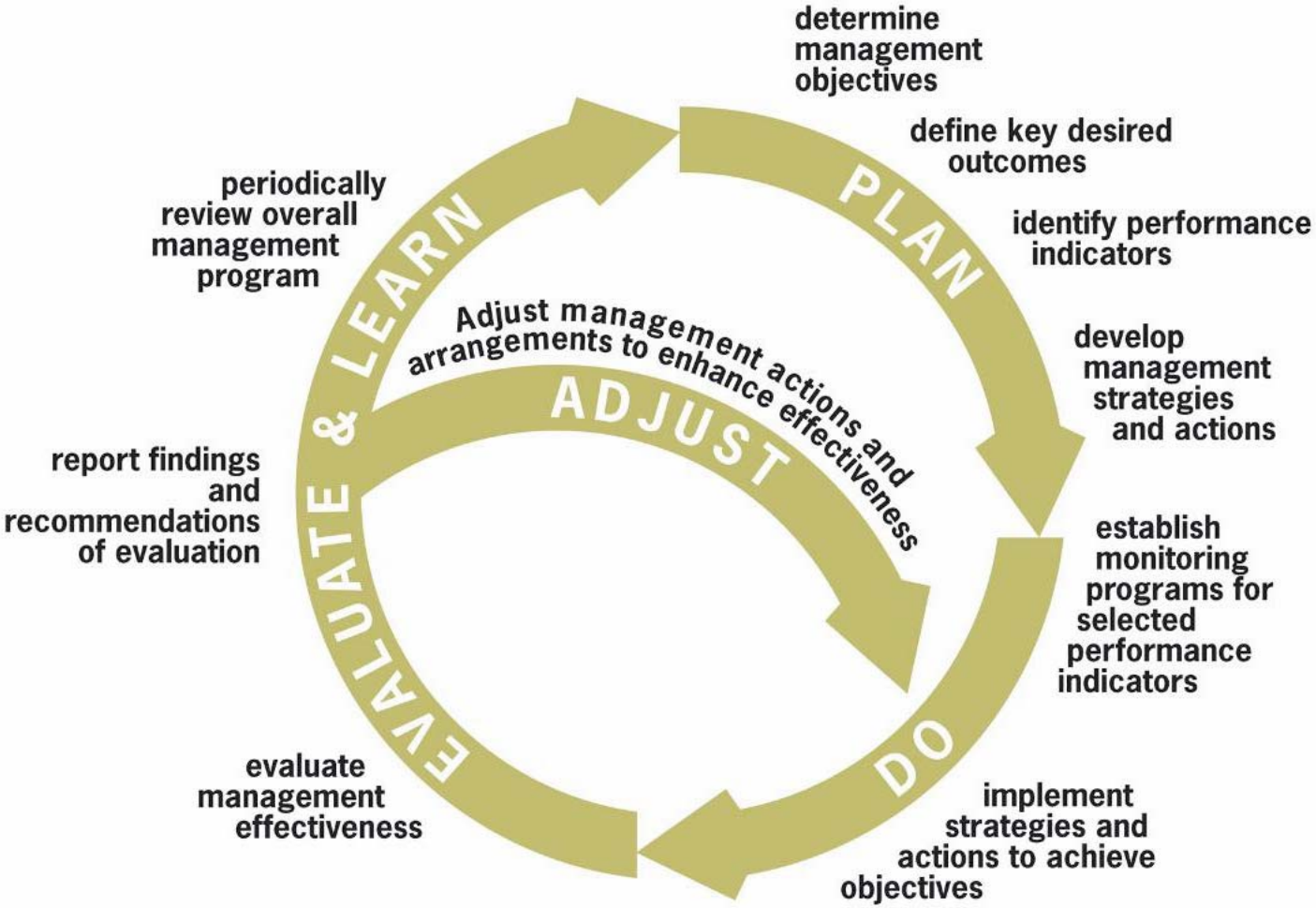
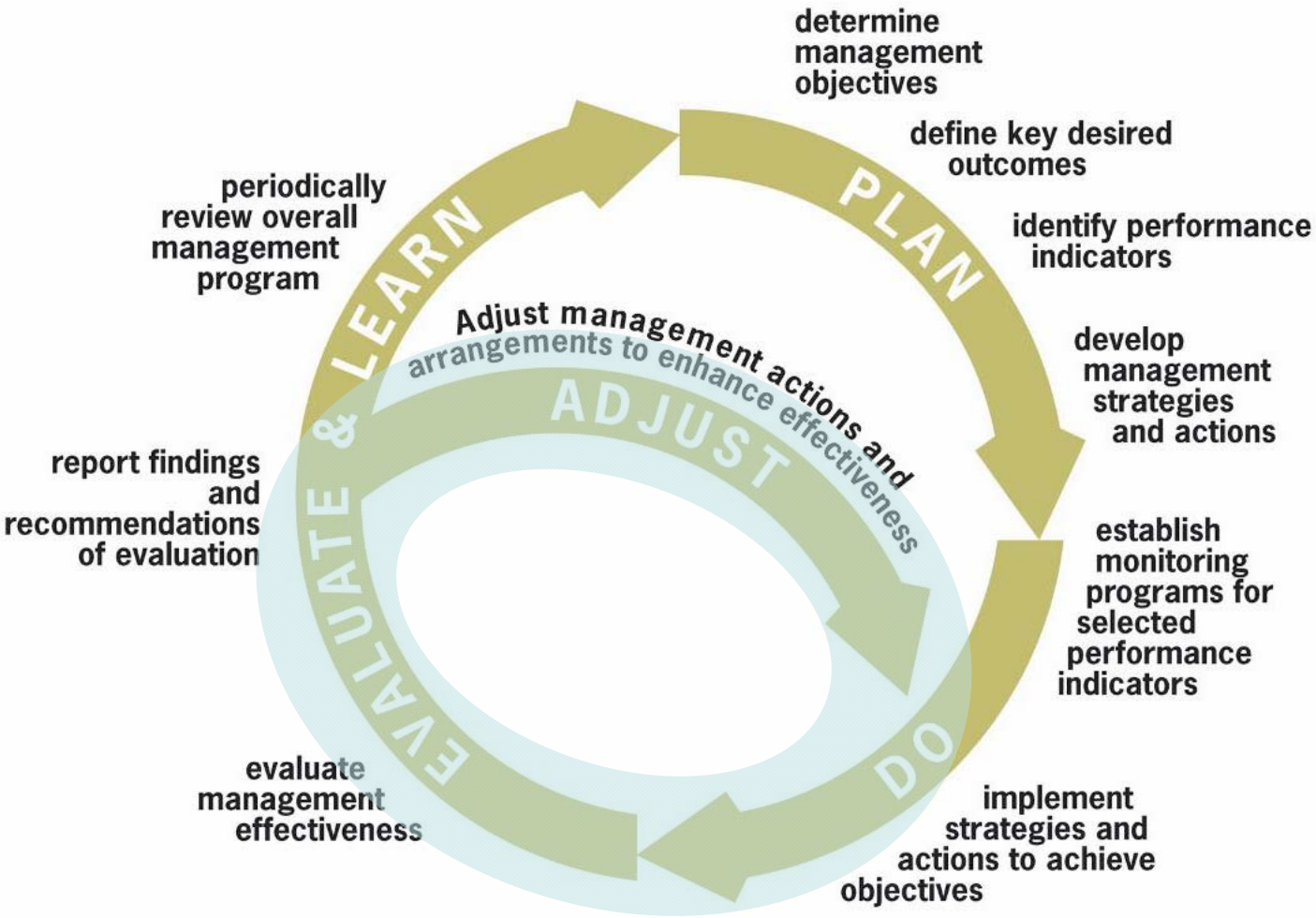
The adaptive management cycle



Jones 2005. Tasmanian Parks & Wildlife Service

Short Term Actions



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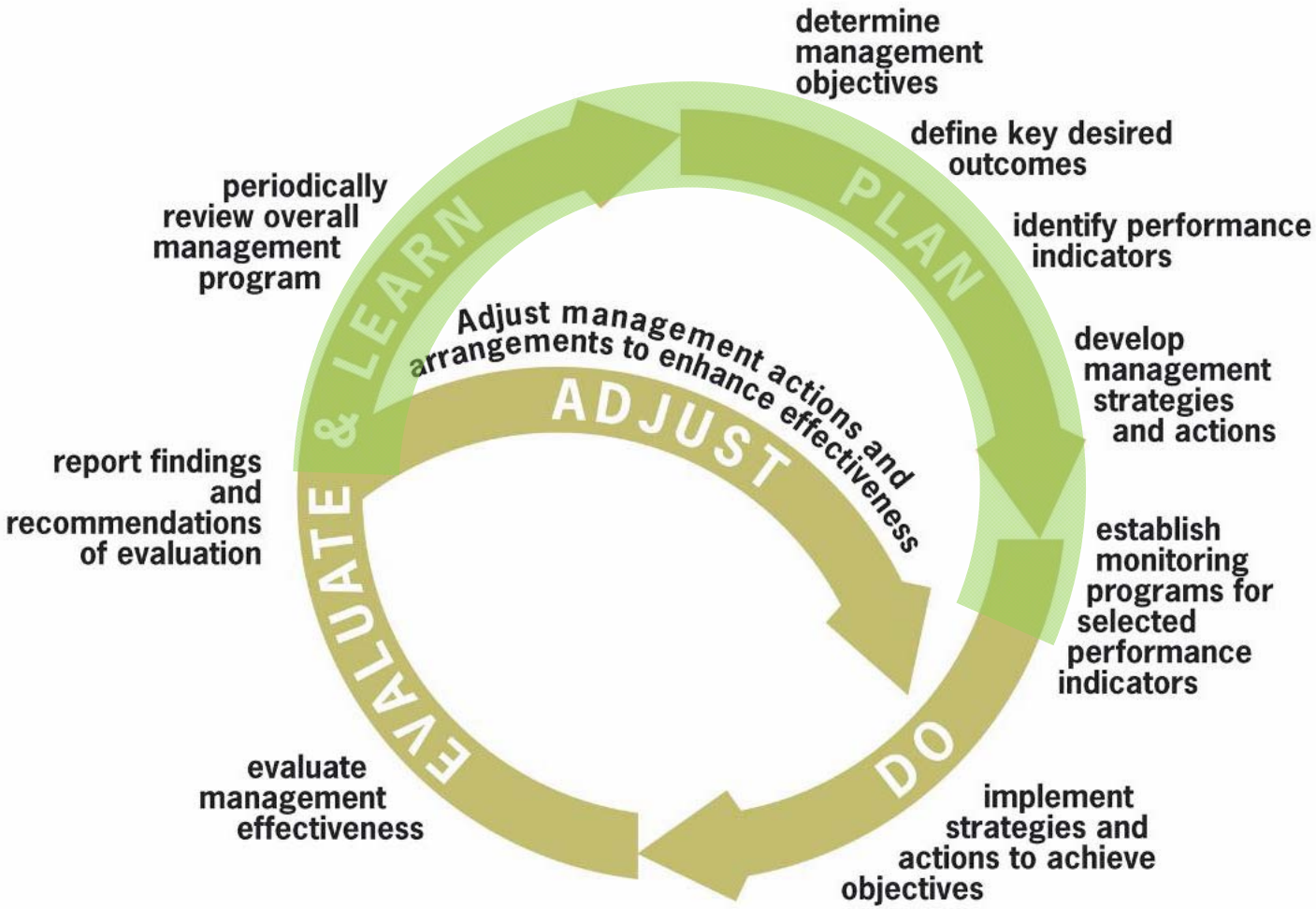
Long Term Actions



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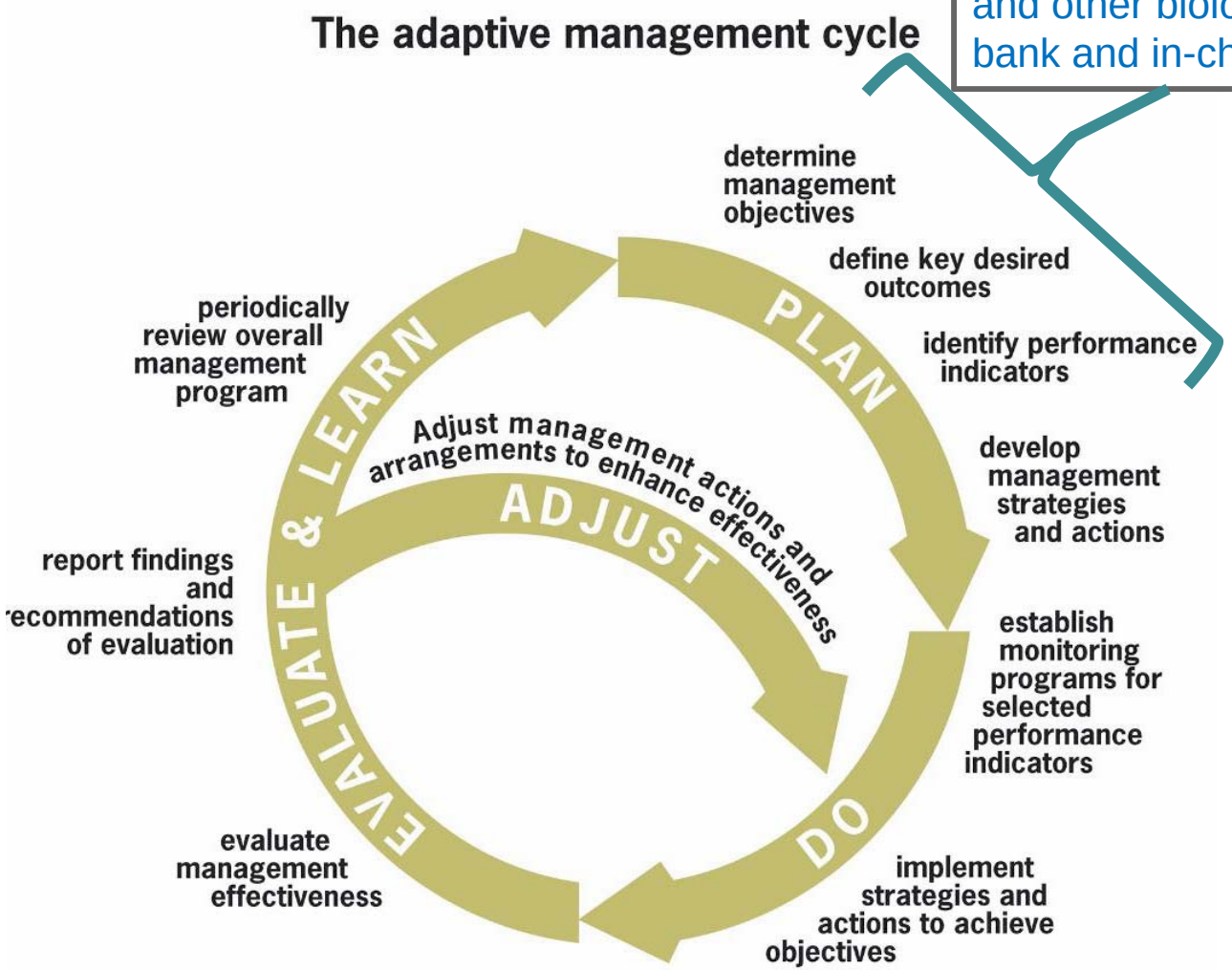
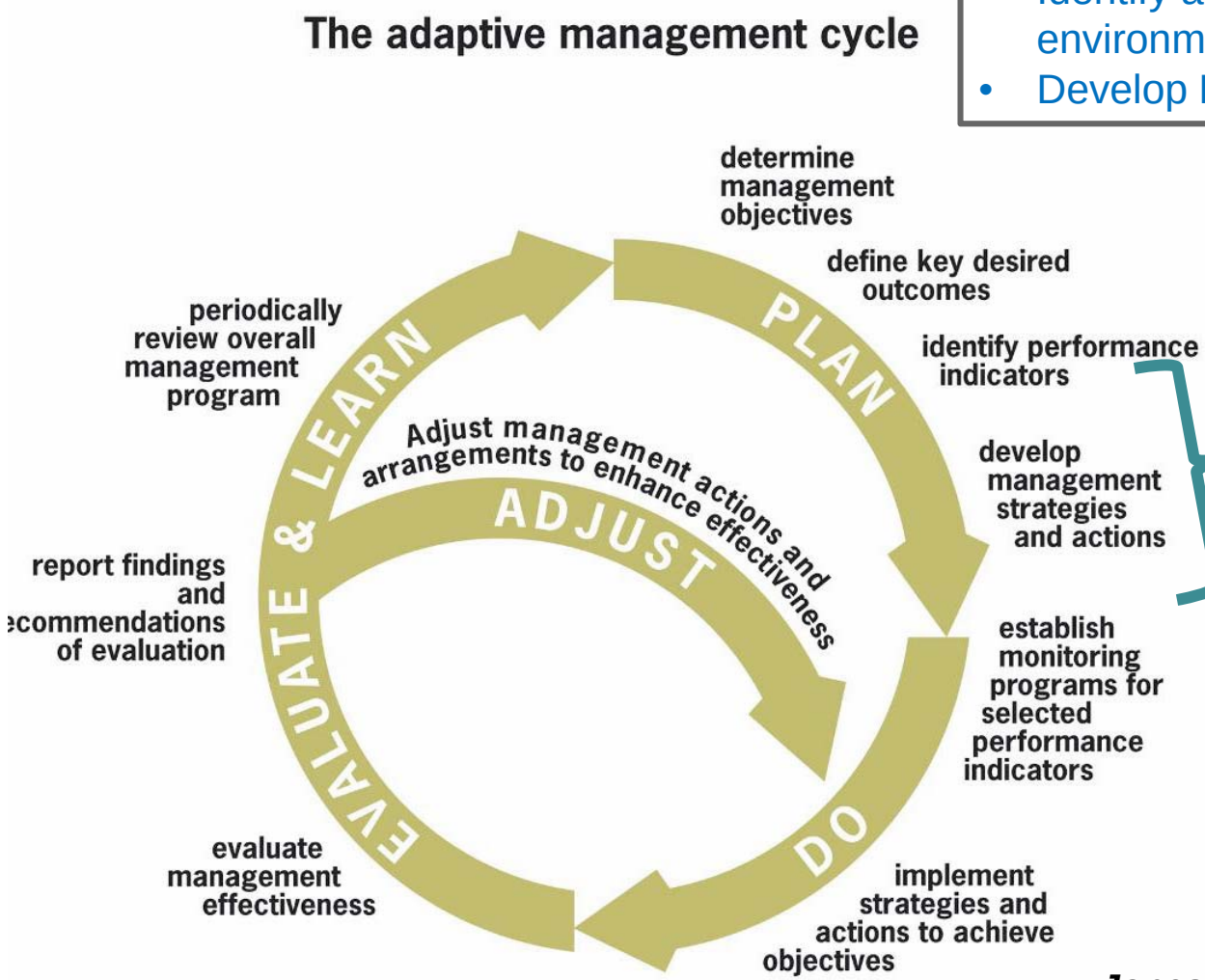
Long Term Remedial Action Objectives
Reduce MeHg exposure and improve habitat conditions throughout the SR & SFS
Performance Indicators: Reduced mercury concentrations in smallmouth bass tissue and other biological tissues; and improved bank and in-channel habitat metrics



Management Strategies

- Identify and Prioritize Actions for different environmental compartments
- Develop EAM Framework



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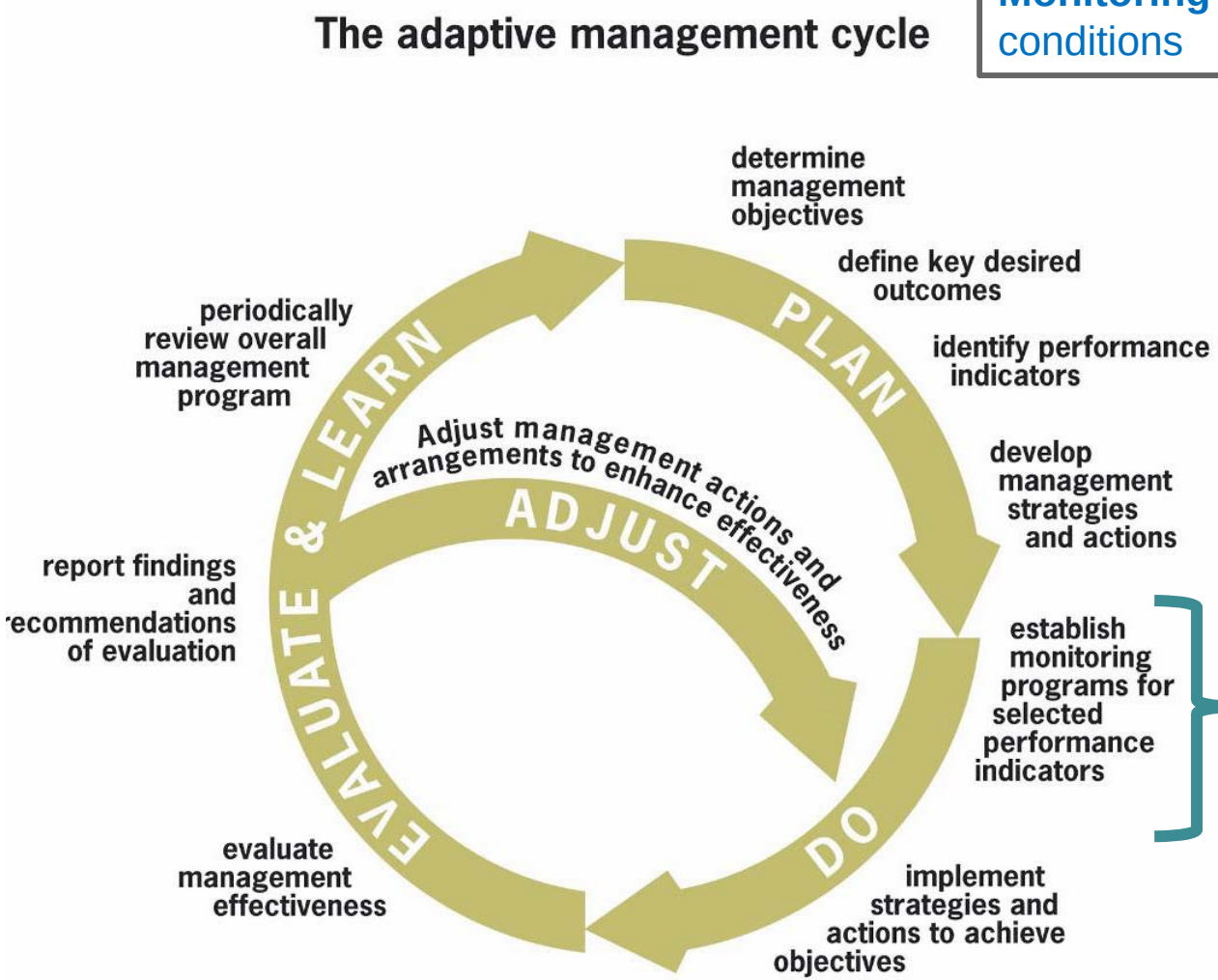
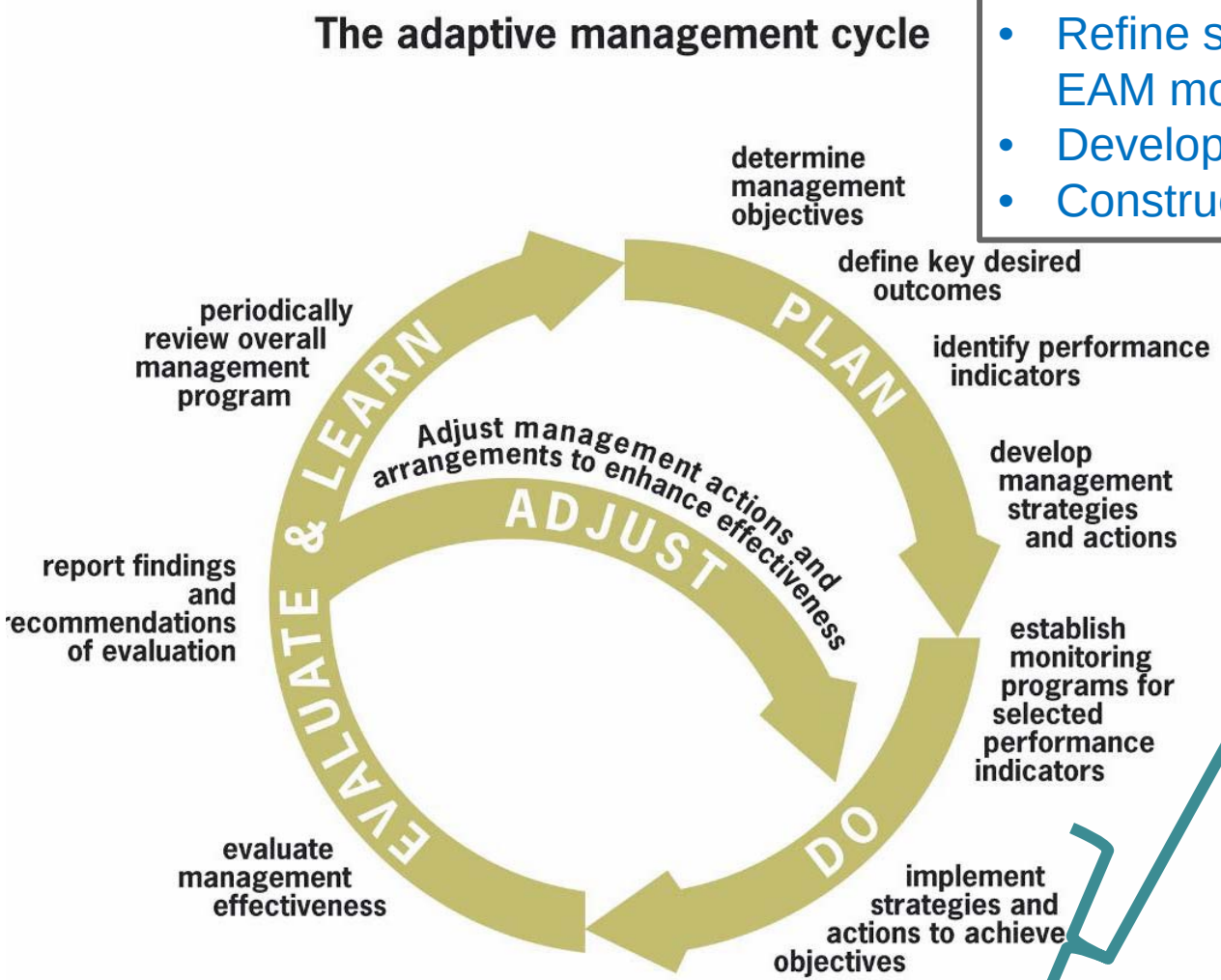
Develop Short-term and Long-term Monitoring Programs and assess baseline conditions



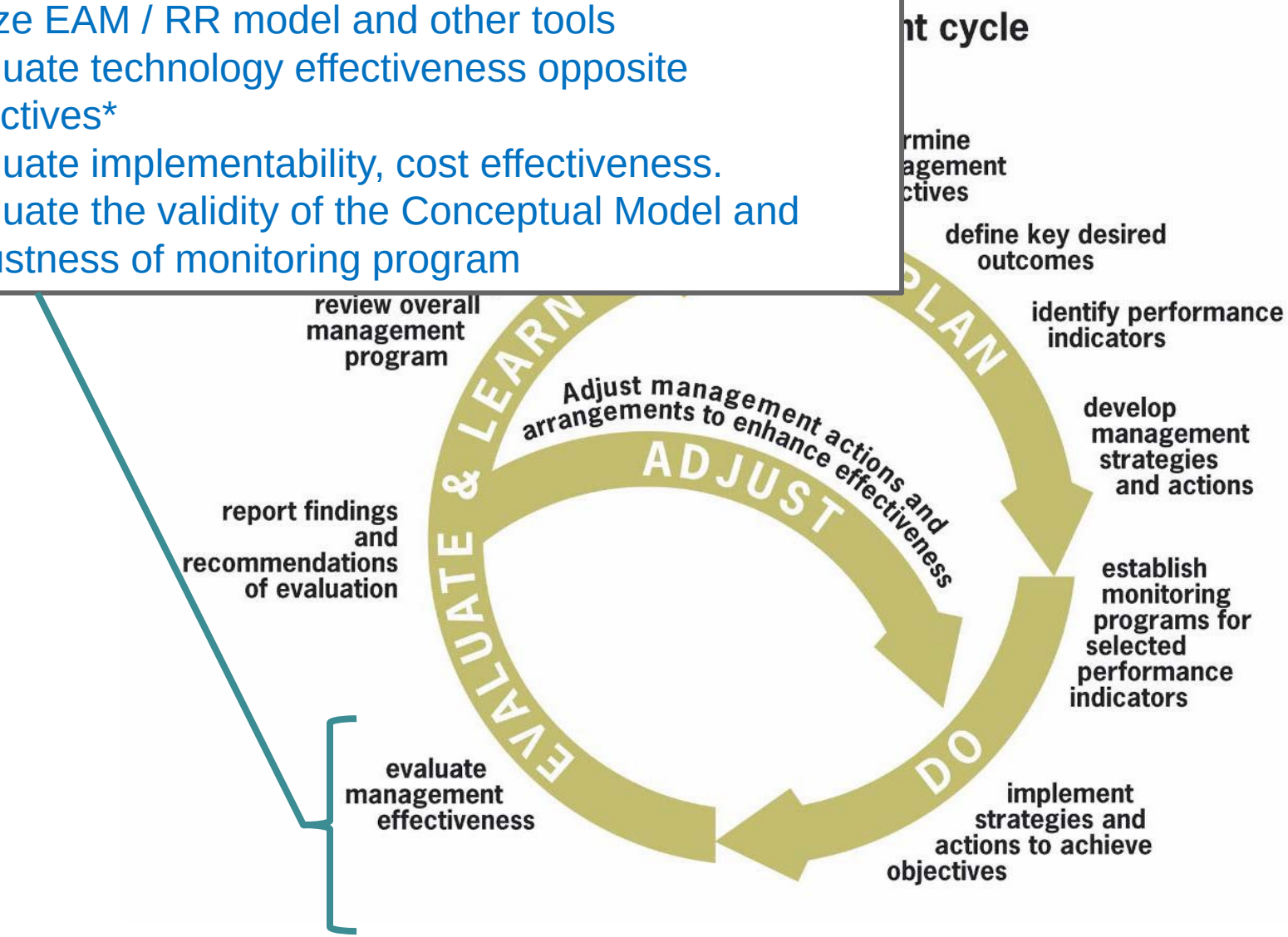
Phase 1 Remedy Design and Construction

- BMA definition & design, permitting
- Refine short-term monitoring plan and EAM model (linked with RR Model)
- Develop and implement outreach plan
- Construct



Evaluate Phase 1 Remedy

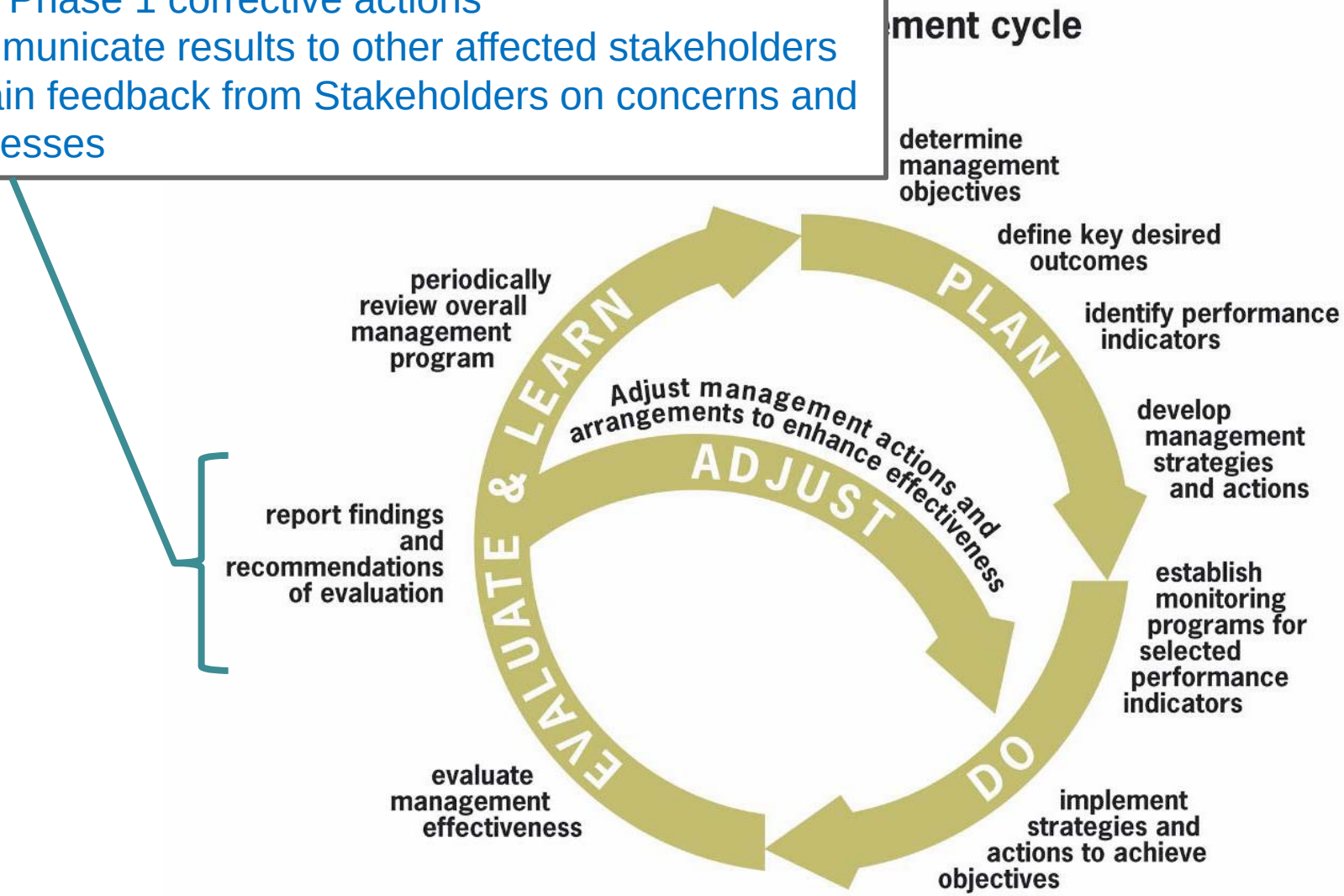
- Utilize EAM / RR model and other tools
- Evaluate technology effectiveness opposite objectives*
- Evaluate implementability, cost effectiveness.
- Evaluate the validity of the Conceptual Model and robustness of monitoring program



*Was bank stabilization constructed as intended?
*Has the ecological habitat notably improved?

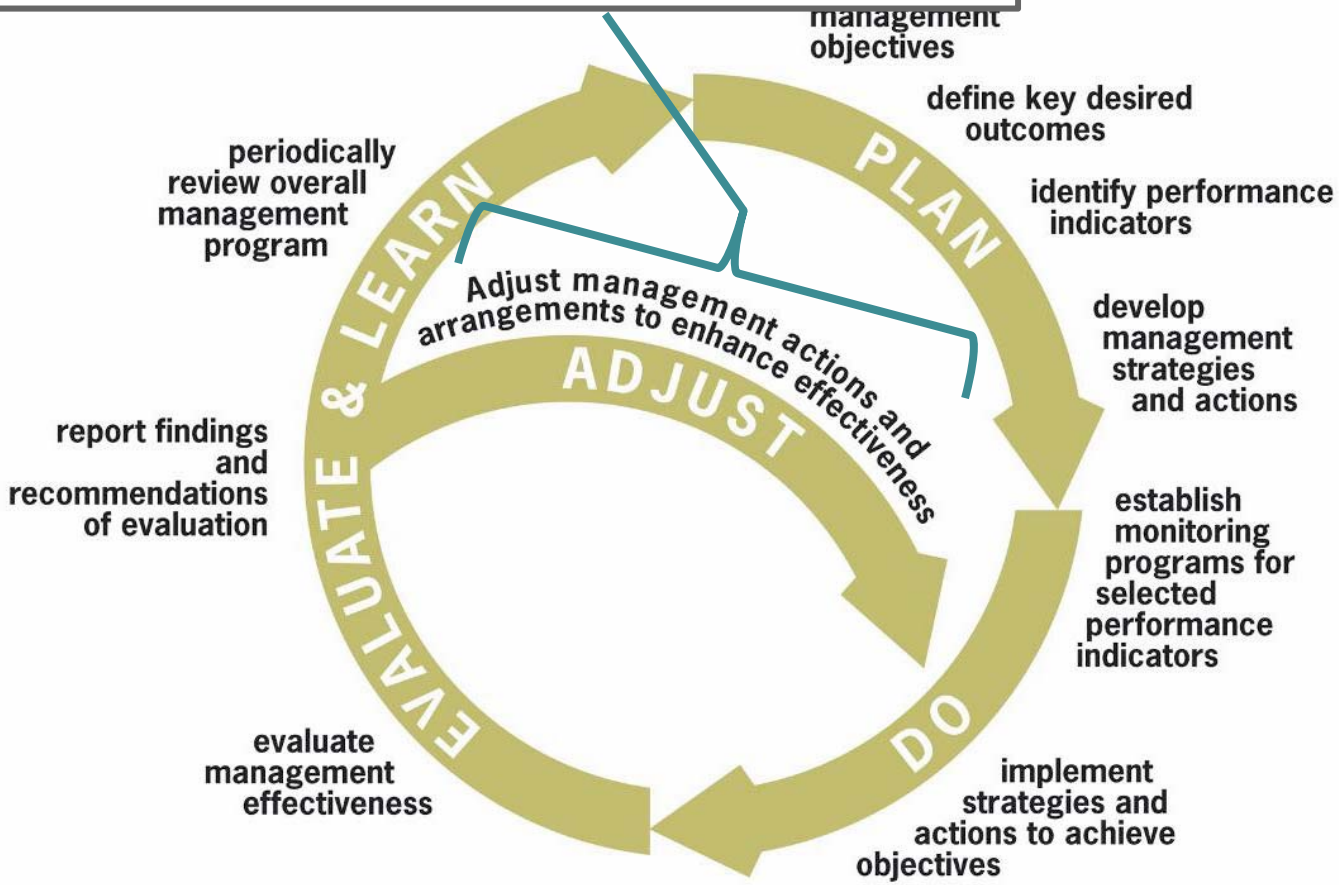
Learn and Communicate

- With SRST and Regulators, identify lessons learned from Phase 1 corrective actions
- Communicate results to other affected stakeholders
- Obtain feedback from Stakeholders on concerns and successes



Adjustments

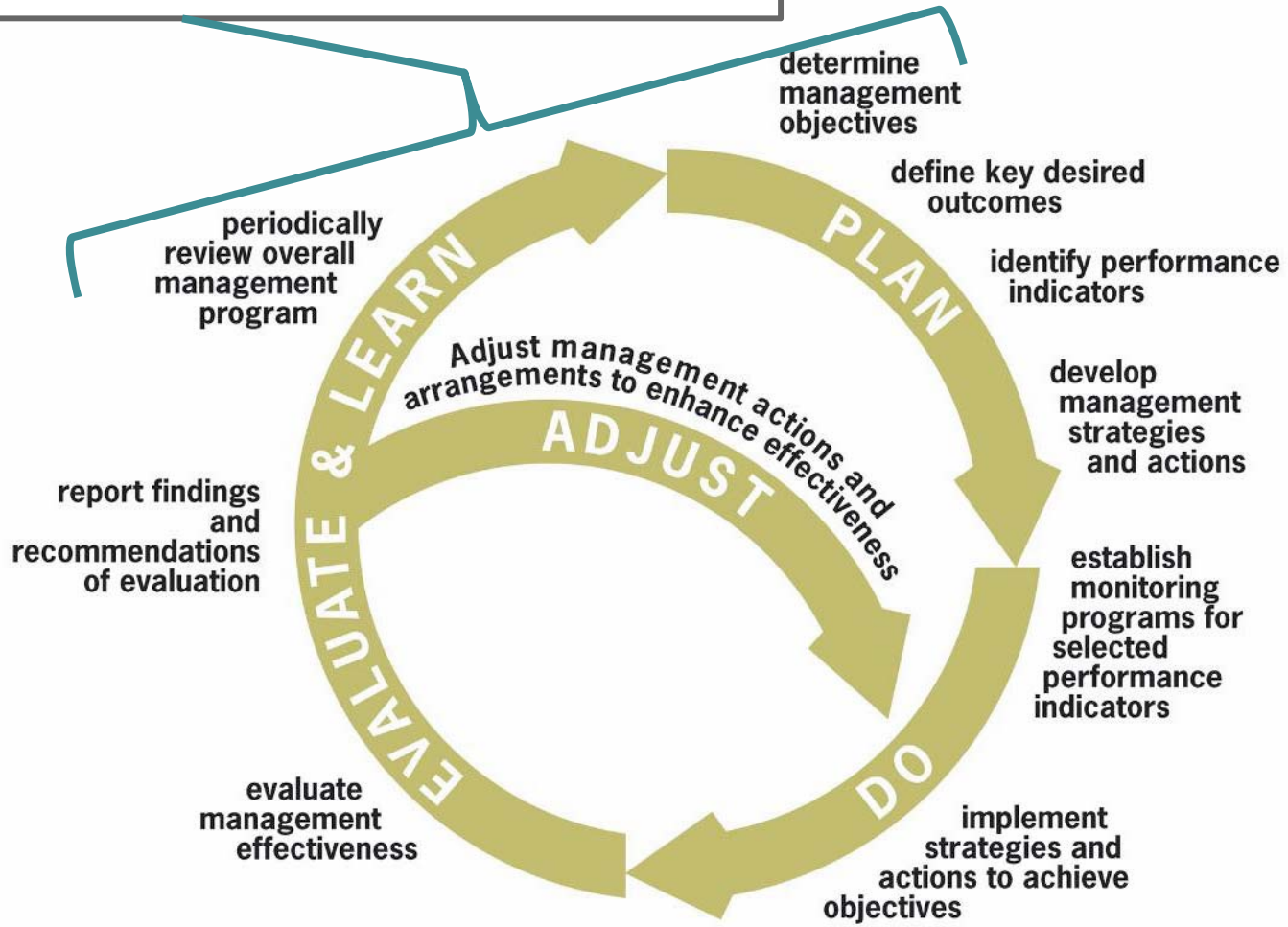
- Update the EAM / RR Models and incorporate learnings on design, permitting, CSM, etc.
- Incorporate findings from ROPs studies, as appropriate
- Review and refine outreach plan and monitoring plan, as needed
- Proceed to Phase 2 Remedy



Long-term

- Assess whether long-term monitoring parameter trends can be discerned
- Reassess or refine conceptual system model, refine performance indicators and metrics
- Review and refine Long-term objectives as indicated
- Adjust EAM / RR Model

ment cycle



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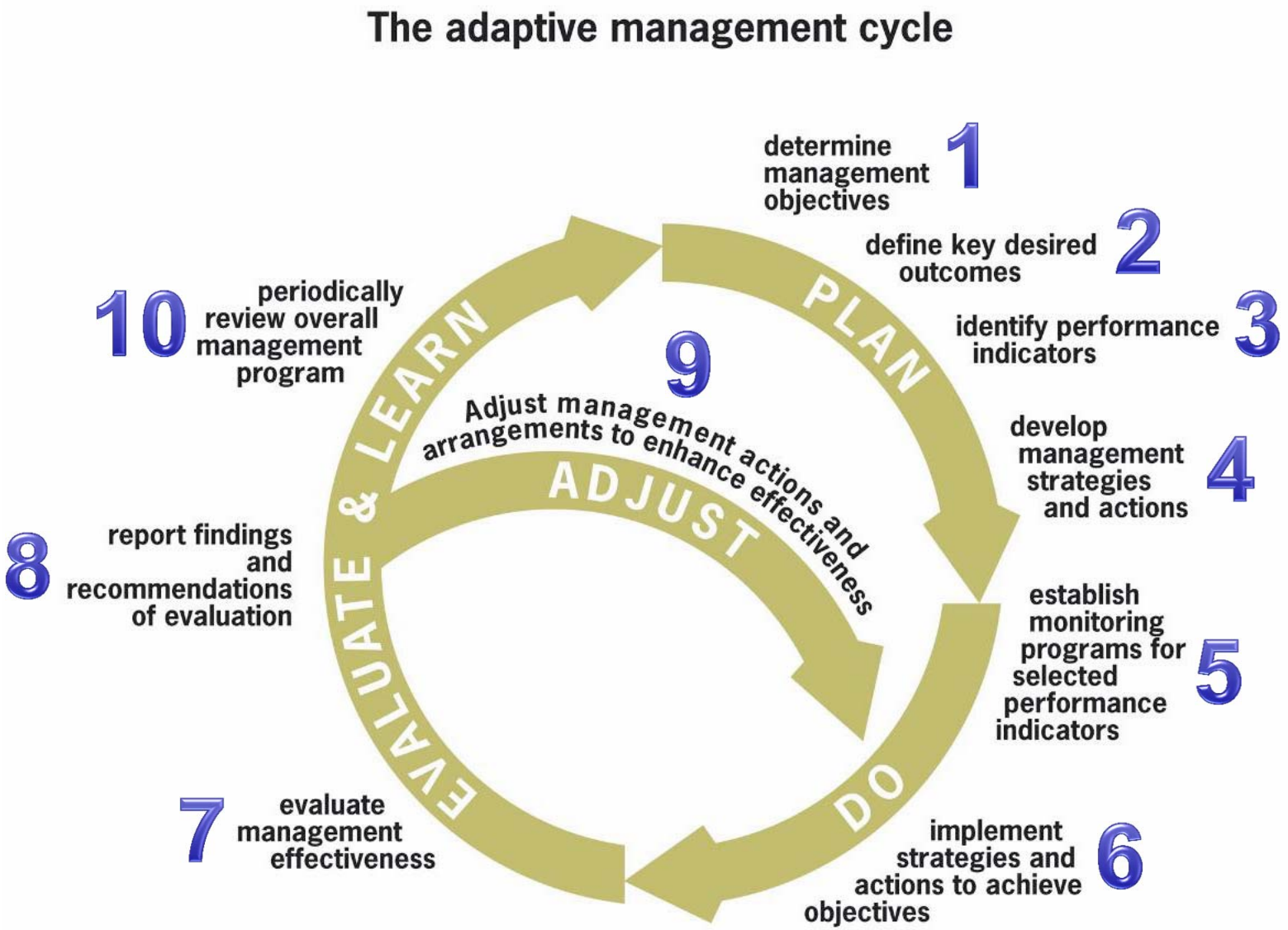

Gregory et. al. 2006
Proposed criteria for deciding whether to use AM by topic area

Spatial and temporal scale

- Duration
- Spatial extent and complexity
- External effects

Dimensions of uncertainty

- Parameter uncertainty
- Structural uncertainty
- Stochastic uncertainty
- Confidence in assessments

Costs, benefits, and risks

- Specifying benefits and costs
- Magnitude of effects
- Multiple objectives
- Perceived risks of failure

Stakeholder and institutional support

- Leadership
- Flexibility in decision making
- Avoidance of taboo trade-offs
- Institutional capacity

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Gregory et. al. 2006, Some of the Proposed Questions for use of adaptive management (AM)

1. If spatial extent or complexity is large, are there opportunities to apply AM on a subset of the problem and scale up?
2. Have potential issues related to background trends and cumulative effects of management actions been addressed in the AM design?
3. Are there profound structural uncertainties? If so, how will surprise outcomes be managed?
4. How do low-probability random natural and other causal events affect the AM design and expected outcomes?
5. Can all the costs and benefits (and risks) be documented and communicated in a manner understandable to all stakeholders?
6. Does the design and assessment of AM plans explicitly address the multiple goals of stakeholders (rather than only scientists)?
7. Can stopping rules and clear thresholds identify and/or minimize the perceived risks of failures, to species and to institutions?
8. Is there explicit leadership support for AM? Will stakeholders see AM as an effective way to deal with uncertainty?
9. Does the proposed AM design involve any trade-offs that might be considered taboo by some stakeholders?
10. Are sufficient analytical skills available (staff or contractors) to design, evaluate, and monitor AM plans?

Future Discussions and Tasks

- Advantages and Disadvantages
  - Upstream to downstream approach or
  - Worst first (highest loading banks)
- Critical Review and discussion of the Adaptive Management Approach (Gregory et al.)
- Linking the Enhanced Adaptive Management (EAM) Model and the Relative Risk Model (RRM)
- Refinement of the EAM / RRM for Phase 1 Remedy

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