

UPDATE FROM THE SCIENCE ADVISORY PANEL



SCIENCE ADVISORY PANEL

- Who we are
- Our role
- Example deliverables
- Dive deeper into an ongoing task



SCIENCE ADVISORY PANEL – SUBJECT MATTER EXPERTS

- Lead scientist / project manager – Tarita Harju, Alta Science and Engineering
- Landscape ecologist – Jocelyn Aycrigg, Moonlighting for Alta; University of Idaho day job
- Botanist – Rich Alward, Aridlands
- Biostatistician – Seth Harju, Heron Ecological
- Desert riparian specialist – Chris Rasmussen, EcoMainstream
- Desert tortoise biologist – Danna Hinderle, Senna Biological

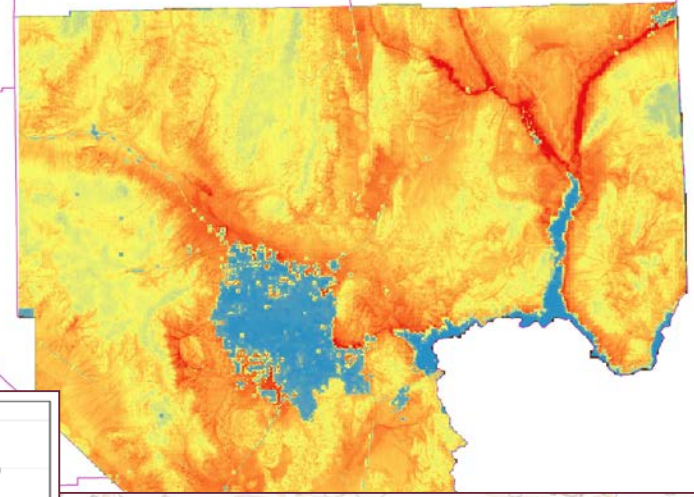




SCIENCE ADVISORY PANEL - OUR ROLE

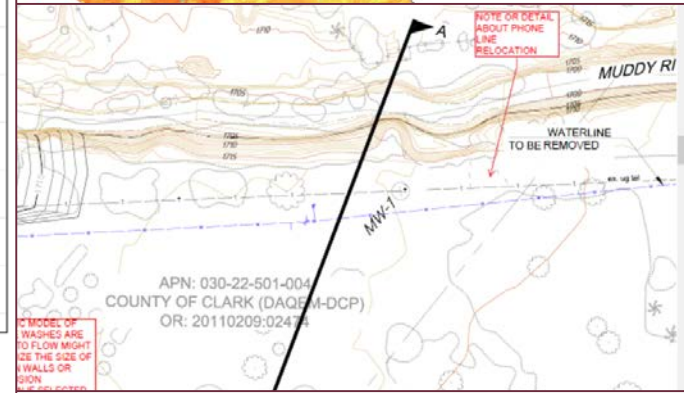
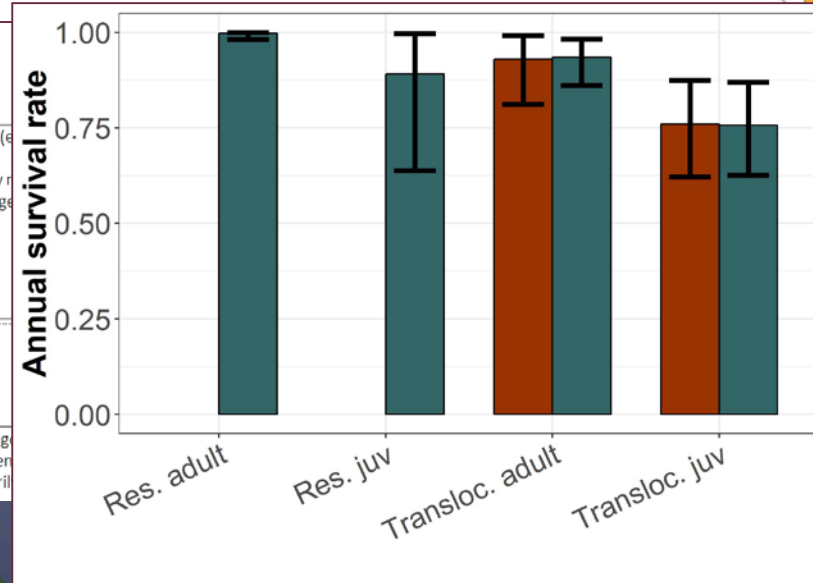
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- Required in the MSHCP
 - Objective & independent science advice
 - Focus on our specialties
 - Programmatic analysis

EXAMPLE WORK



Overview of Potential BGO Frameworks—Structured

Name	Description	Example	Pros	Cons
Category	Multiple 'categories', 'themes', or 'types' of goals	Goals are developed/assigned to a specific category or conservation need, e.g.: 1.) 'Desert tortoise', 2.) 'Riparian wildlife habitat', or 3.) 'Native upland plant communities'	-May match up with existing County management, USFWS thinking, or MSHCP language -May make sense ecologically or implementationally -Goals can include a range of desired outcomes (conservation needs, etc) -Specifically link objective(s) to each category	-May be overly precise (e.g., by matching specific components of ecology) and generate unfeasible large number of goals and objectives
Geographic level	Hierarchical geographic levels; ≥1 goal per level, related to how the Program Vision works at that level	Goals that are applicable to a specific level: 1.) County-wide 2.) Reserve units / easements 3.) Treatment plots	-Same as above -Can be a subgoal to a category goal	-Same as above
Timeline	Delineate timelines that	Goals to be achieved within:	-Same as above	-Timeline for achieving goals is more of a management construct, not necessarily

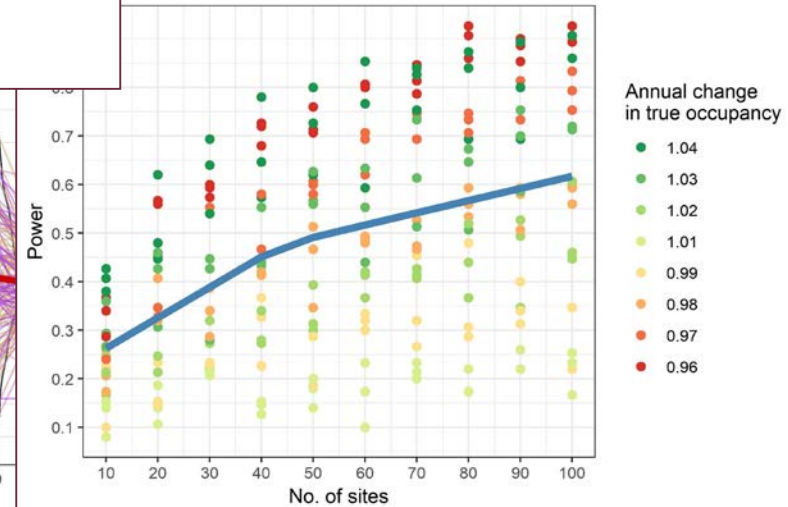
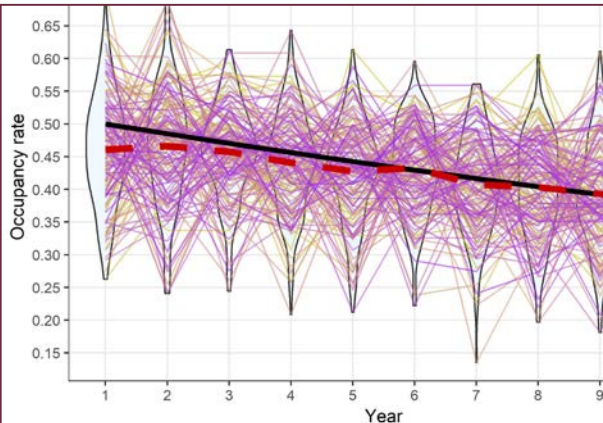
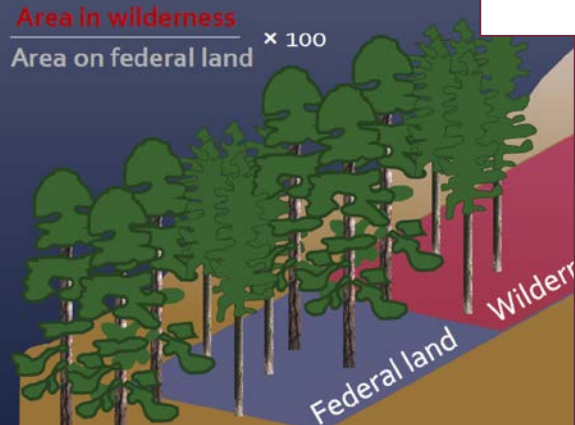


Redundancy

Keep backups to guard against complete species or habitat
A hedge against the failure of any individual species population or habitat type



Ecosystem representation = 30%



DELIVERABLES TIE TOGETHER

- Biological Goals and Objectives (BGOs)- Workshop
- Adaptive Management and Monitoring Plan (AMMP)
- Evaluation every 4 years

BGOs

AMMP

Evaluation

BIOLOGICAL GOALS & OBJECTIVES

BGOs

- riparian objectives (10 objectives)
- desert objectives (13 objectives)

AMMP

Evaluation

Table 1. Biological Goals and Objectives for the MSHCP

Goal R 1: Maintain, improve, and expand habitat for the MSHCP-covered species on riparian reserve system lands
Objective R 1.1: <i>Monitor MSHCP-covered species occupancy</i>
Objective R 1.2: <i>Maintain and/or increase suitable breeding habitat for MSHCP-covered birds</i>
Objective R 1.3: <i>Incorporate elements of natural riparian processes into restoration design and implementation</i>
Objective R 1.4: <i>Inventory, remove, and control invasive and non-native plant species</i>
Objective R 1.5: <i>Reduce habitat fragmentation and/or improve connectivity and habitat quality through restoration design and implementation</i>
Goal R 2: Maintain stable or increasing populations of federally-listed threatened and endangered (T&E) species on riparian reserve system lands
Objective R 3.2: <i>Promote responsible recreation (e.g., signage, education)</i>
Goal R 4: Promote ecological resiliency on riparian reserve system lands
Objective R 4.1: <i>Identify critical uncertainties and address these through planning and adaptive management, when feasible (land use changes, catastrophic events–fire, climate change)</i>
Objective R 4.2: <i>Identify critical connectivity corridors for covered species, prioritize acquisition and/or conservation where feasible</i>
Goal D 1: Maintain, improve, and expand habitat for MSHCP-covered species on desert upland reserve system lands
Objective D 1.1: <i>Monitor MSHCP-covered species occupancy</i>
Objective D 1.2: <i>Maintain existing intact functioning habitat and restore degraded habitat (D 1.1 determines degree of habitat functionality)</i>
Objective D 1.3: <i>Protect and conserve habitat for covered plants and physically protect plants with specific requirements</i>
Objective D 1.4: <i>Inventory, remove, and control invasive and non-native plant species</i>
Objective D 1.5: <i>Reduce habitat fragmentation and/or improve connectivity through restoration design and implementation</i>
Goal D 2: Maintain stable or increasing populations of Federal T&E-listed species on desert upland reserve system lands

Objective R 1.3 – Incorporate elements of natural riparian processes into restoration design and implementation

ADAPTIVE MANAGEMENT & MONITORING PLAN

current reserve system and no known nests adjacent to the reserve system. The BCCE, however, may serve as foraging habitat for peregrine falcons. Monitoring and maintaining high-quality upland desert habitat (Section 2.6.2) will be considered a surrogate for monitoring peregrine falcon populations directly.

2.5.5 Other MSHCP-Covered Bird Species

Other MSHCP-covered bird species that occur in riparian habitats include the summer tanager (*Piranga rubra*), vermilion flycatcher (*Pyrocephalus rubinus*), Arizona Bell's vireo (*Vireo bellii arizonae*), phainopepla (*Phainopepla nitens*), and blue grosbeak (*Passerina caerulea*). These species occur in cottonwood-willow habitat and associated desert washes composed of shrubby woodland habitat, such as mesquite, oak, and non-native tamarisk.

Surveys for these MSHCP-covered bird species should be conducted annually according to standard point count survey methods (Ralph et al. 1995, Rosenstock et al. 2002, MacKenzie 2006) in suitable or potentially suitable habitat. Point count stations should be established in riparian habitat, spaced a minimum of 250 m apart. Point count methods allow for the estimation of species occupancy or abundance/density estimation (e.g., distance sampling, count regression models, N-mixture modeling incorporating imperfect detection [Royle 2004]). A sufficient number of point count stations should be determined on reserve system lands to allow for robust statistical inference. Multiple visits, separated by a minimum of 5 days, should be made to each station during the general bird breeding season (early-mid April through mid-June). Because of the specific habitat and high attention requirements of federal protocols for surveying for southwestern willow flycatcher and yellow-billed cuckoo, other MSHCP-covered bird species must be surveyed separately.

2.5.6 Bats

All three MSHCP-covered bat species (silver-haired bat [*Lasiorycteris noctivagans*], long-eared myotis [*Myotis evotis*], and long-legged myotis [*Myotis volans*]), may use riparian areas for foraging, day roosts, and maternity roosts. Silver-haired bats may also use riparian areas for hibernacula as they are known to hibernate under sloughing bark in low elevation, xeric habitats. Two of the species (long-eared myotis and long-legged myotis) may use desert upland areas for foraging and roosting habitat and may hibernate in surrounding caves, abandoned mines, cliff crevices, and rocky outcrops.

All three bat species would be most efficiently monitored using an occupancy approach via passive acoustic monitoring during summer (i.e., during the breeding season; Weller 2008). They all also have the potential to hibernate within Clark County and use the reserve system lands prior to, after, and potentially during winter so it may be advantageous to conduct surveys in late fall or early spring to document their use of reserve system lands during these seasons in

BGOs

- riparian objectives
e.g, R1.1 – Maintain and/or increase suitable breeding habitat for MSHCP-covered birds
- desert objectives
e.g., D3.2 – Promote responsible recreation

AMMP

- species and habitat monitoring
- “how to” - determine success in achieving BGOs & species metrics
- project effectiveness & individual project monitoring

Evaluation

ADAPTIVE MANAGEMENT & MONITORING PLAN

BGOs

- riparian objectives
e.g. R1.1 – Maintain and/or increase suitable breeding habitat for MSHCP-covered birds
- desert objectives
e.g., D3.2 – Promote responsible recreation

- species and habitat monitoring
- “how to” - determine success in

Goals and Objectives	Performance Period(s)	Performance Criteria
Goal D 2: Maintain stable or increasing populations of Federal T&E-listed species on desert upland reserve system lands		
<i>Objective D 2.1: Monitor and adaptively manage for desert tortoise populations</i>	Monitor desert tortoise populations in all suitable habitat every <u>1</u> year(s) Evaluate progress towards objective using AM framework every <u>4</u> years	Demonstrate stable or increasing desert tortoise populations across desert upland reserve lands
<i>Objective D 2.2: Augment populations through translocation programs</i>	Evaluate progress towards objective using AM framework every <u>4</u> years	Demonstrate positive contribution of translocated desert tortoise populations to the overall desert tortoise population across desert upland reserve lands
Goal D 3: Foster community and stakeholder engagement to benefit covered species		
<i>Objective D 3.1: Collaborate with stakeholders on work</i>	Evaluate progress towards objective using AM framework every <u>4</u> years	Demonstrate a stable or increasing number of collaborators
<i>Objective D 3.2: Note damage to resources (e.g.,</i>	Evaluate progress towards objective using AM framework every <u>4</u> years	Sign repair is completed within <u>60</u> days of damage reported Demonstrate a stable or decreasing number of negative law enforcement encounters per unit effort
Goal D 4: Promote ecological resiliency on desert upland reserve system lands		
<i>Objective D 4.1: Identify critical uncertainties and address these through planning and adaptive management, when feasible</i>	Conduct comprehensive uncertainty analysis every <u>4</u> year(s) Evaluate progress towards objective using AM framework every <u>4</u> years	An analysis of critical uncertainties at the scale of the desert upland reserve lands is conducted every <u>4</u> year(s) and when a new project is initiated Desert upland projects demonstrably identify and address critical uncertainties during planning and implementation

Goals and Objectives	Performance Period(s)	Performance Criteria
<i>Objective D 3.2: Promote responsible recreation (e.g., signage, education)</i>	Evaluate progress towards objective using AM framework every <u>4</u> years	Sign repair is completed within <u>60</u> days of damage reported Demonstrate a stable or decreasing number of negative law enforcement encounters per unit effort

Evaluation

ADAPTIVE MANAGEMENT & MONITORING PLAN

Monitoring survey	Covered species group	Species	Target	Target achieved?	Trigger
Occupancy sampling	Desert upland reptiles ^a	Desert tortoise	Stable or increasing metric across desert upland reserve lands during the assessment period		Decreasing metric across desert upland reserve lands during the assessment period
		Great Basin collared lizard			
		Desert iguana			
		Large-spotted leopard lizard			



- “how to” - determine success in achieving BGOs & species metrics
- project effectiveness & individual project monitoring



Monitoring survey	Covered species group	Species	Target	Target achieved?	Trigger
		Vermillion flycatcher	Stable or increasing metric across reserve lands during the assessment period		Decreasing metric across reserve lands during the assessment period
		Arizona Bell's vireo			
	Bats	Silver-haired bat	Stable or increasing metric across reserve lands during the assessment period		Decreasing metric across reserve lands during the assessment period
		Long-eared myotis			
		Long-legged myotis			
	Desert upland plants	Sticky ringstem	Stable or increasing metric across reserve lands during the assessment period		Decreasing metric across reserve lands during the assessment period
		Las Vegas bearpoppy			
		White bearpoppy			
		Rosy king sandwort			
		Threecorner milkvetch			
		Alkali mariposa lily			
		Blue Diamond cholla			
		Forked (Pahrump Valley) buckwheat			
		Sticky buckwheat			
		White-margined beardtongue			
TBD ^b	Riparian	Habitat quality	Stable or increasing habitat quality across riparian reserve lands during the assessment period		Decreasing habitat quality across riparian reserve lands during the assessment period
TBD ^b	Desert upland	Habitat quality ^c	Stable or increasing habitat quality across desert upland reserve lands during the assessment period		Decreasing habitat quality across desert upland reserve lands during the assessment period

ADAPTIVE MANAGEMENT & MONITORING PLAN

BGOs

- riparian objectives
e.g, R1.1 – Maintain and/or increase suitable breeding habitat for MSHCP-covered birds
- desert objectives
e.g., D3.2 – Promote responsible recreation

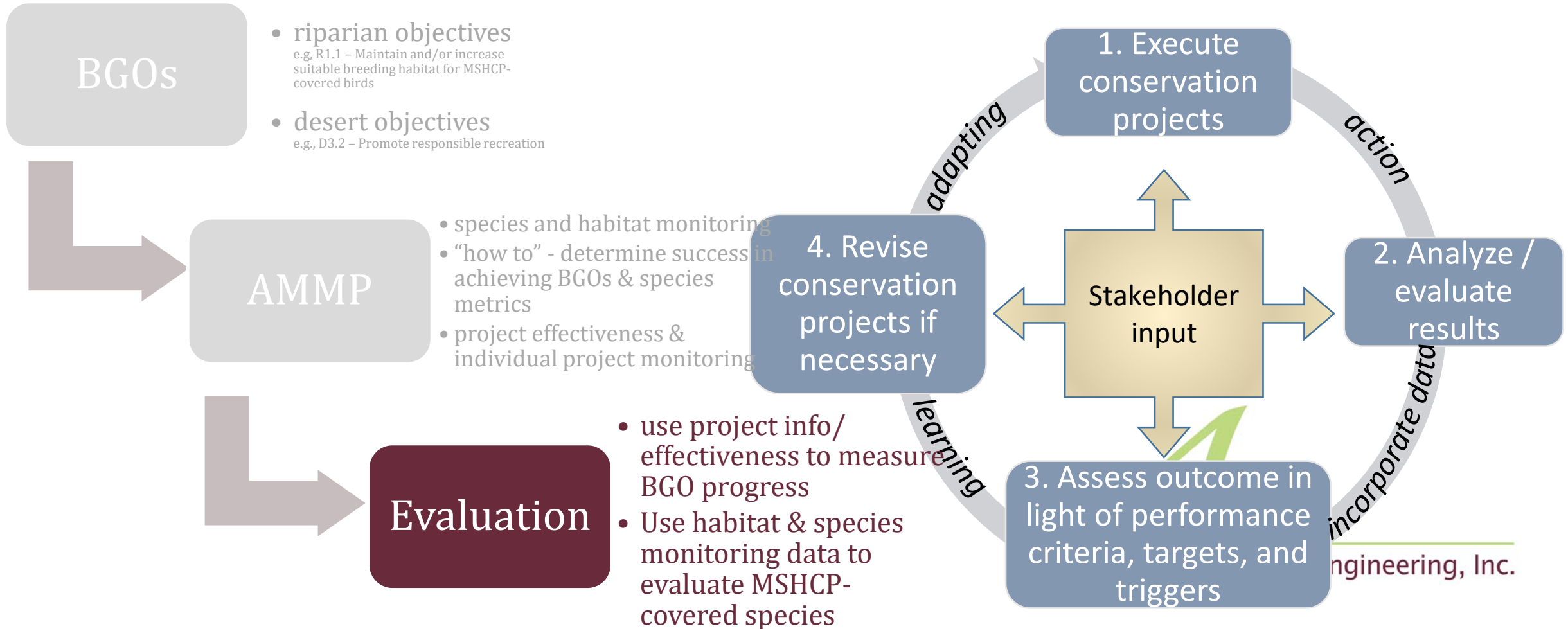
AMMP

- species and habitat monitoring
- “how to” - determine success in achieving BGOs & specific metrics
- project effectiveness & individual project monitoring

Evaluation

1	Worksheet B1. Project-Level Performance Periods, Performance Indicators, and Indicator Results*			
2	Muddy River Restoration Project			
3	Goals and Objectives	Project-Specific Performance Period(s)	Project-Specific Performance Indicators	Performance Indicator Results
4	Goal R 1: Maintain, improve, and expand habitat for the MSHCP-covered species on riparian reserve system lands			
5	Objective R 1.2: Maintain / increase suitable breeding habitat for ...birds	Restoration area is predicted to reach full efficacy for <u>breeding habitat</u> in 10 years.	After 10 years, project-specific habitat and species monitoring should demonstrate a stable or increasing acreage of suitable breeding habitat for MSHCP-covered birds	
6	Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation	Restoration area is predicted to reach full efficacy for <u>riparian processes</u> in 5 years	Maintained soil stability post implementation Maintain native vegetation and provide for the potential for natural recruitment Reconnect approximately 10 acres of floodplain to the river Project specific monitoring should demonstrate that: -80 % of total floodplain acres remain successfully connected;	
7	Objective R 1.5: Reduce habitat fragmentation ...	Restoration area is predicted to reach full efficacy in 10 years.	Increased patch size of native vegetation	
8	Goal R 2: Maintain stable or increasing populations of federally-listed threatened and endangered (T&E) species			
9	Goal R 3: Foster community and stakeholder engagement to benefit covered species			
10	Goal R 4: Promote ecological resiliency on riparian reserve system lands			
11				
12				
13				
14				
15				

ADAPTIVE MANAGEMENT EVALUATION— EVERY 4 YEARS



SCIENCE ADVISORY PANEL – MUDDY RIVER AS AN EXAMPLE



- Select which BGOs each project will contribute to
- Realistic timeframe to evaluate project
- Tangible performance metrics

Worksheet B1. Project-Level Performance Periods, Performance Indicators, and Indicator Results*

Muddy River Restoration Project

Goals and Objectives	Project-Specific Performance Period(s)	Project-Specific Performance Indicators	Performance Indicator Results
Goal R 1: Maintain, improve, and expand habitat for the MSHCP-covered species on riparian reserve system lands			
Objective R.1.3: Maintain /	Restoration area is predicted	After 10 years, project-specific habitat	

Goals and Objectives	Project-Specific Performance Period(s)	Project-Specific Performance Indicators	Performance Indicator Results
Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation	Restoration area is predicted to reach full efficacy for riparian processes in 5 years	Maintain native vegetation and provide for the potential for natural recruitment Reconnect approximately 10 acres of floodplain to the river Project specific monitoring should demonstrate that: -80 % of total floodplain acres remain successfully reconnected.	



SCIENCE ADVISORY PANEL – MUDDY RIVER AS AN EXAMPLE

Link
Projects to
BGOs

Evaluate
Project
Performance

Incorporate
Information into
BGO progress

Objective - Incorporate riparian processes into design & implementation

Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation

Riparian Processes
in 5 years

Restoration area is predicted to reach full efficacy for riparian processes in 5 years

Plan for 10 acres floodplain connection; Successful if 80% of the acres remain connected

Reconnect approximately 10 acres of floodplain to the river

Project specific monitoring should demonstrate that:
-80 % of total floodplain acres remain successfully connected;

Muddy River Restoration		
Goals and Objectives	Project-Specific Performance Period(s)	Project-Specific Performance Indicators
Goal R 1: Maintain, improve, and expand habitat for the MSHCP-covered species on riparian reserve system lands		
Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation	Restoration area is predicted to reach full efficacy for <u>riparian processes in 5 years</u>	Reconnect approximately <u>10 acres</u> of floodplain to the river Project specific monitoring should demonstrate that: <u>-80 % of total floodplain acres remain successfully connected;</u>
Objective R 1.5: Reduce habitat fragmentation ...	Restoration area is predicted to reach full efficacy in 10 years.	Increased patch size of native vegetation

SCIENCE ADVISORY PANEL – MUDDY RIVER AS AN EXAMPLE

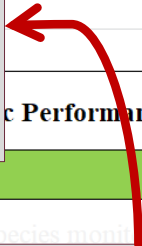
Goals and Objectives	Performance Period(s)	Performance Criteria	Performance Indicators
Goal R 1: Maintain, improve, and expand habitat for the MSHCP-covered species			
<u>Objective R 1.1: Monitor MSHCP-covered species occupancy</u>	Monitor MSHCP-covered lands every <u>1</u> year(s) Evaluate progress toward (AM) framework every <u>1</u> year(s)		
<u>Objective R 1.2: Maintain and/or increase suitable breeding habitat for MSHCP-covered birds</u>	Monitor changes in suitable lands every <u>2</u> year(s)	Demonstrate stable or increasing patch size of suitable breeding habitat across riparian reserve lands for all MSHCP-covered birds	system lands
<u>Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation</u>		Riparian restoration projects plans demonstrably include elements of natural riparian processes as appropriate Riparian restoration projects demonstrate functionality after <u>6</u> years or as established during project initiation	soil stability
<u>Objective R 1.3: Incorporate elements of natural riparian processes into restoration design and implementation</u>		Restoration area is predicted to reach full efficacy for <u>riparian processes in 5 years</u>	Reconnect approximately <u>10 acres</u> of floodplain to the river Project specific monitoring should demonstrate that: <u>-80 % of total floodplain acres remain successfully connected;</u>
<u>Objective R 1.5: Reduce habitat fragmentation</u>		Restoration area is predicted to reach full efficacy in <u>10 years</u>	Increased patch size of native vegetation

Performance Criteria:

- Projects include riparian processes
- Projects demonstrate functionality as established for each project

Objective - Incorporate riparian processes into design & implementation

After 5 years, did 80% of the 10 acres floodplain stay connected?



SCIENCE ADVISORY PANEL – SUBJECT MATTER EXPERTS



Monitoring survey	Covered species group	Species	Target	Target achieved?	Trigger
Occupancy sampling	Desert upland reptiles ^a	Desert tortoise	Stable or increasing metric across desert upland reserve lands during the assessment period		Decreasing metric across desert upland reserve lands during the assessment period
		Great Basin collared lizard			
		Desert iguana			
		Large-spotted leopard lizard			

g, Inc.

THANK YOU

Questions?