

Prioritizing Meadows for Restoration within the North Fork Kern River Drainage

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Natural Reserve System
UNIVERSITY OF CALIFORNIA



American Rivers
Rivers Connect Us®



The Sierra
Meadows
Partnership

Collaborative meadow
restoration and protection

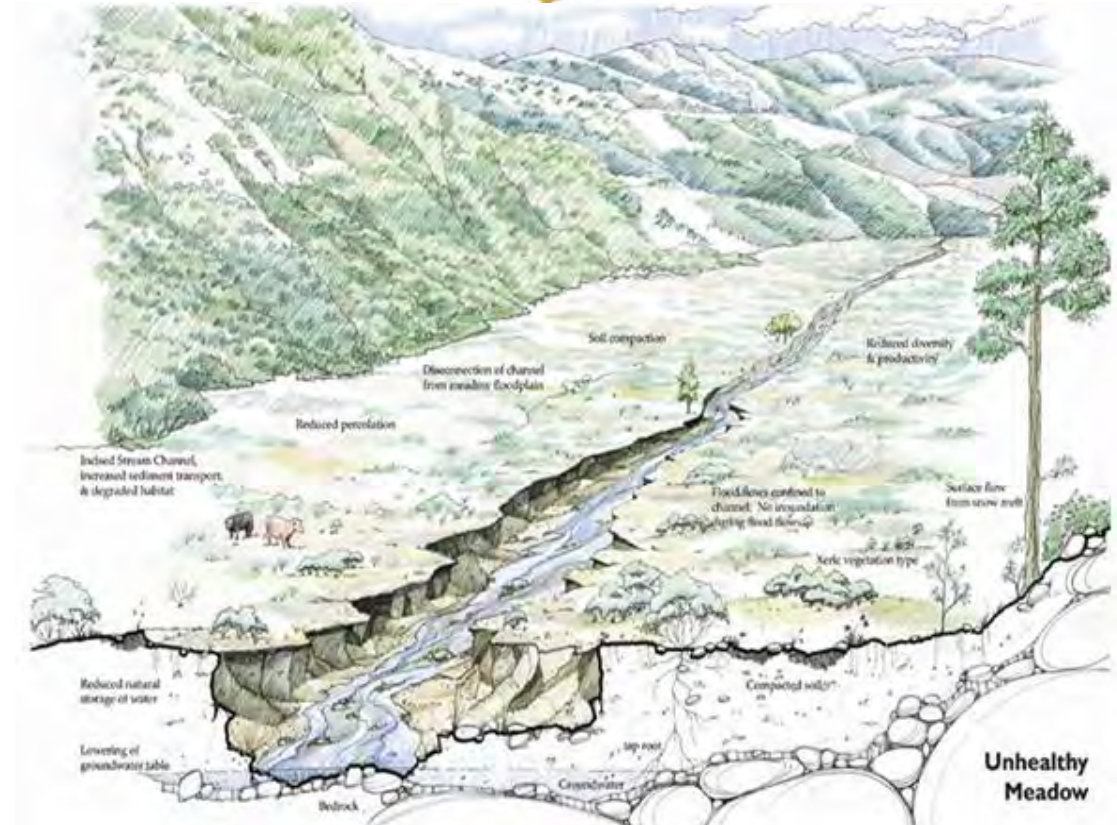


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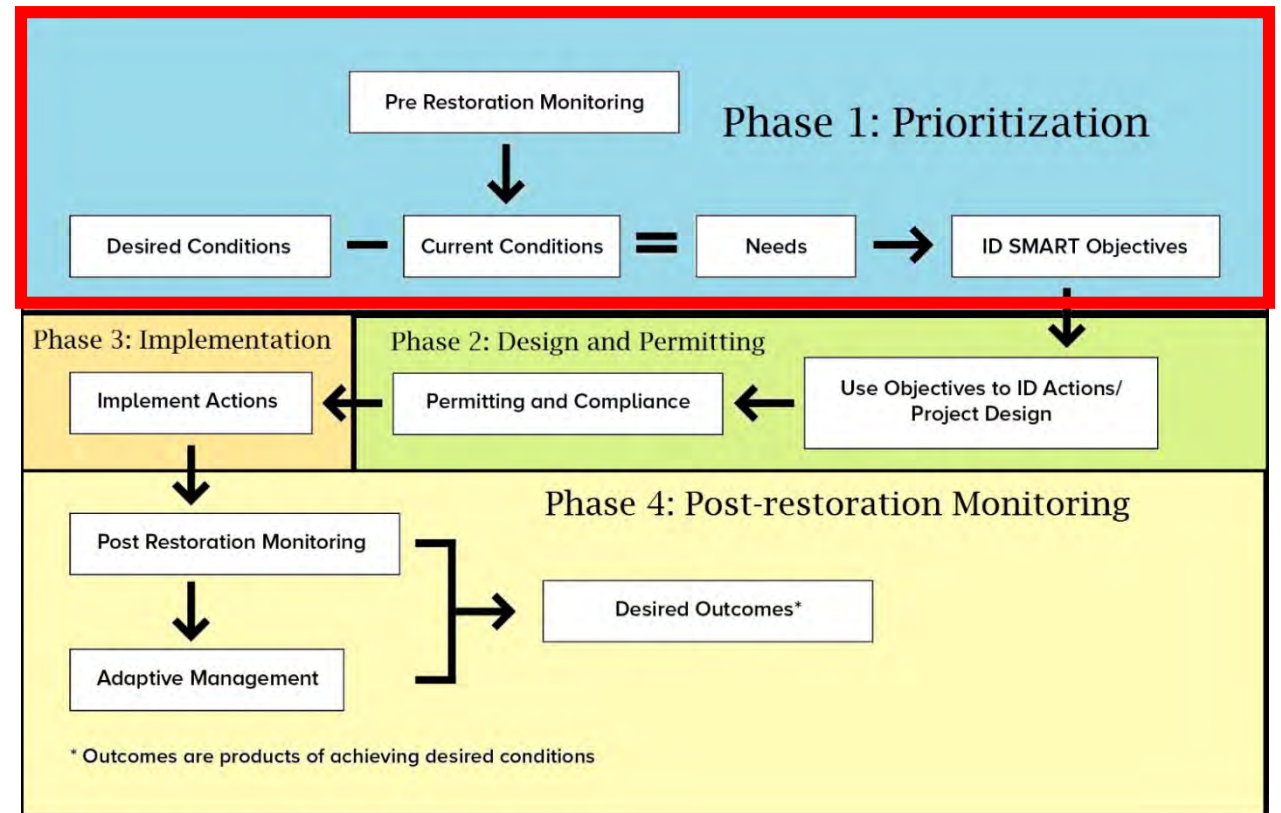
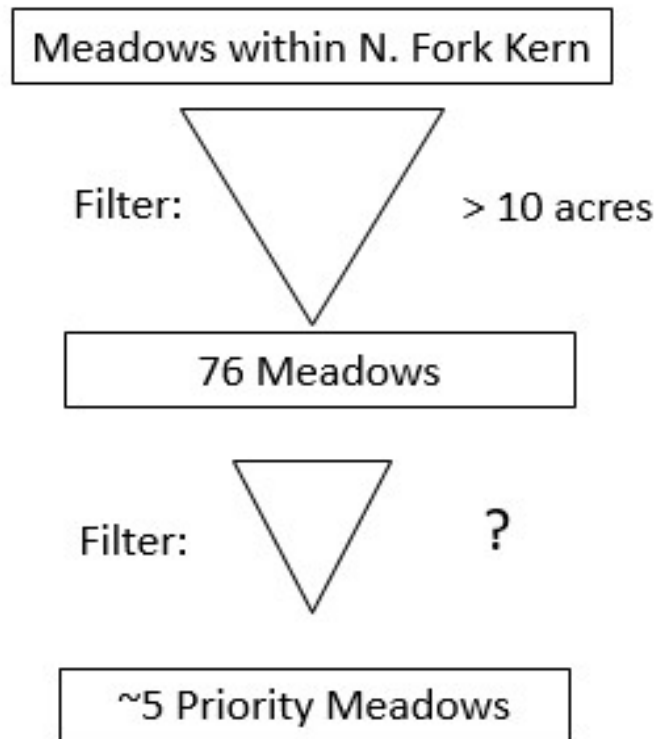
Sierra Nevada Meadows

- Dominated by herbaceous species that relies on an abundance of surface water or shallow groundwater that is generally within one meter of the soil surface
- 17 Hydrogeomorphic types based on water source and geology
- Roughly 50% of Sierra Meadows are in a degraded state

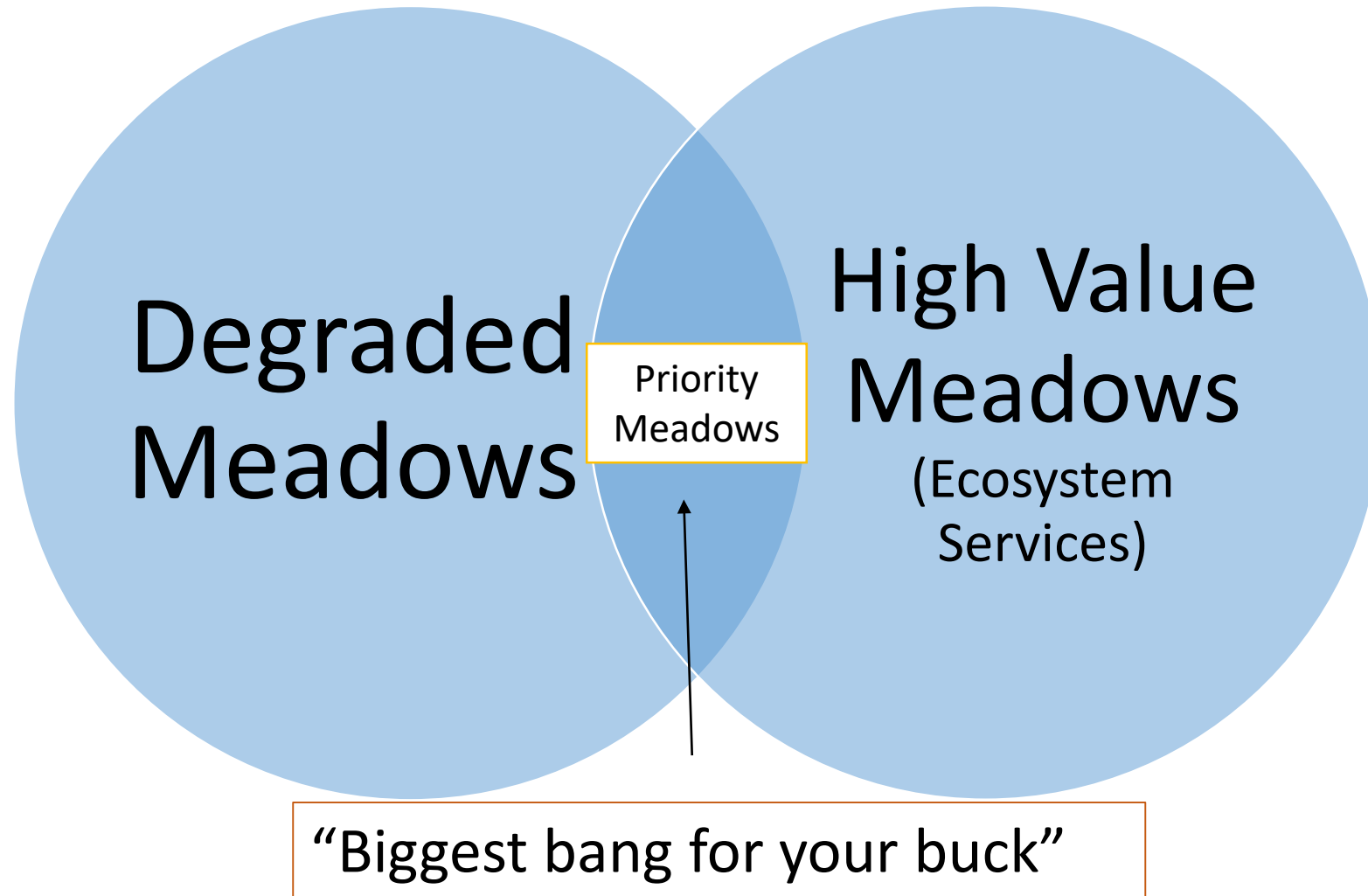


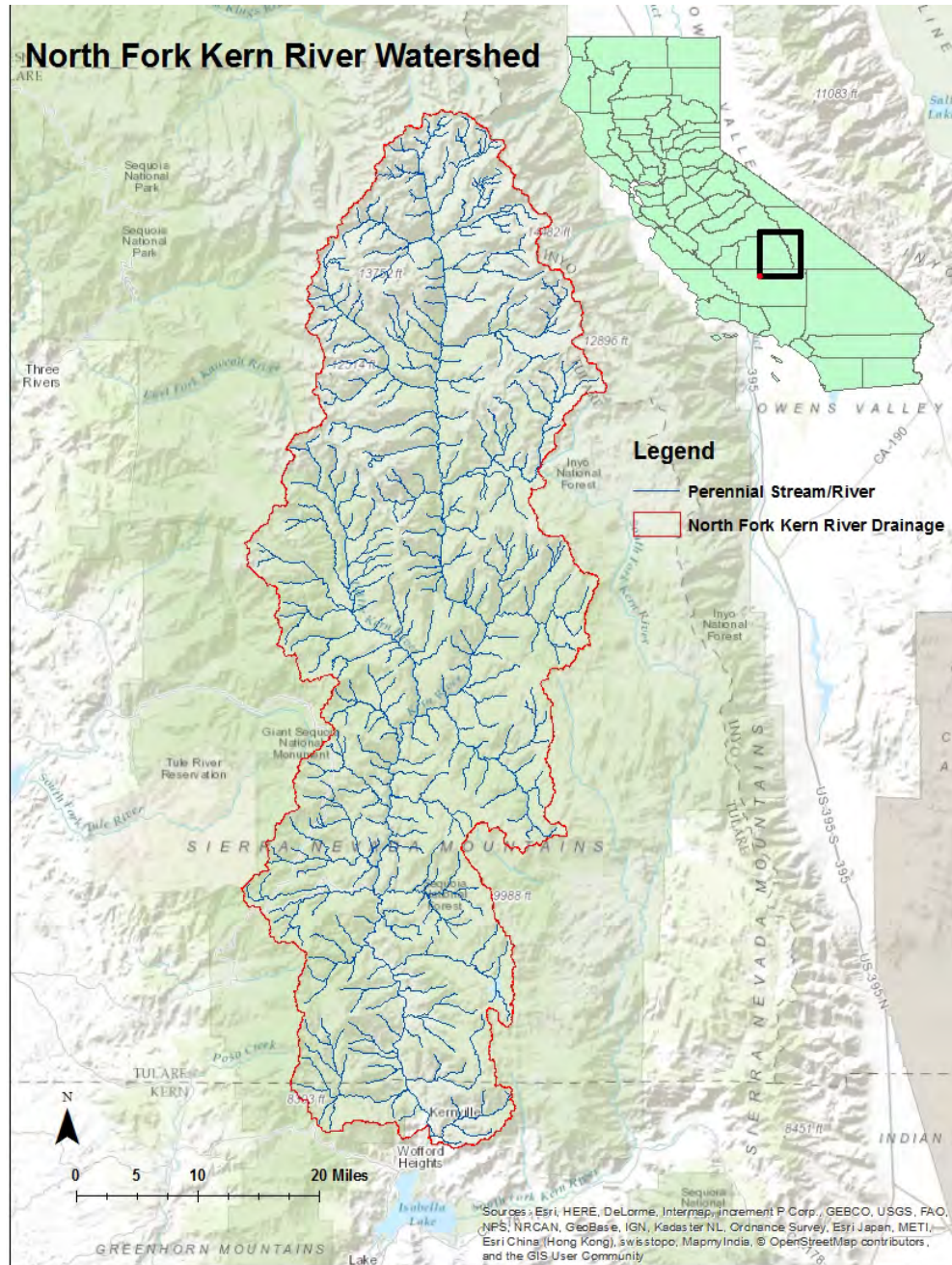
Project Objectives

- 1) A prioritized inventory of meadow restoration/protection activities to provide maximum benefits for biodiversity, soils and water quality within the N. Fork Kern River drainage.
- 2) A prioritization framework to be applied in other regions to support management decisions



Prioritization of Meadows for Restoration





Phase I- Selection of Meadows Suite

Phase I objective: ID meadows suite to be assessed with AR Scorecard in 2016.

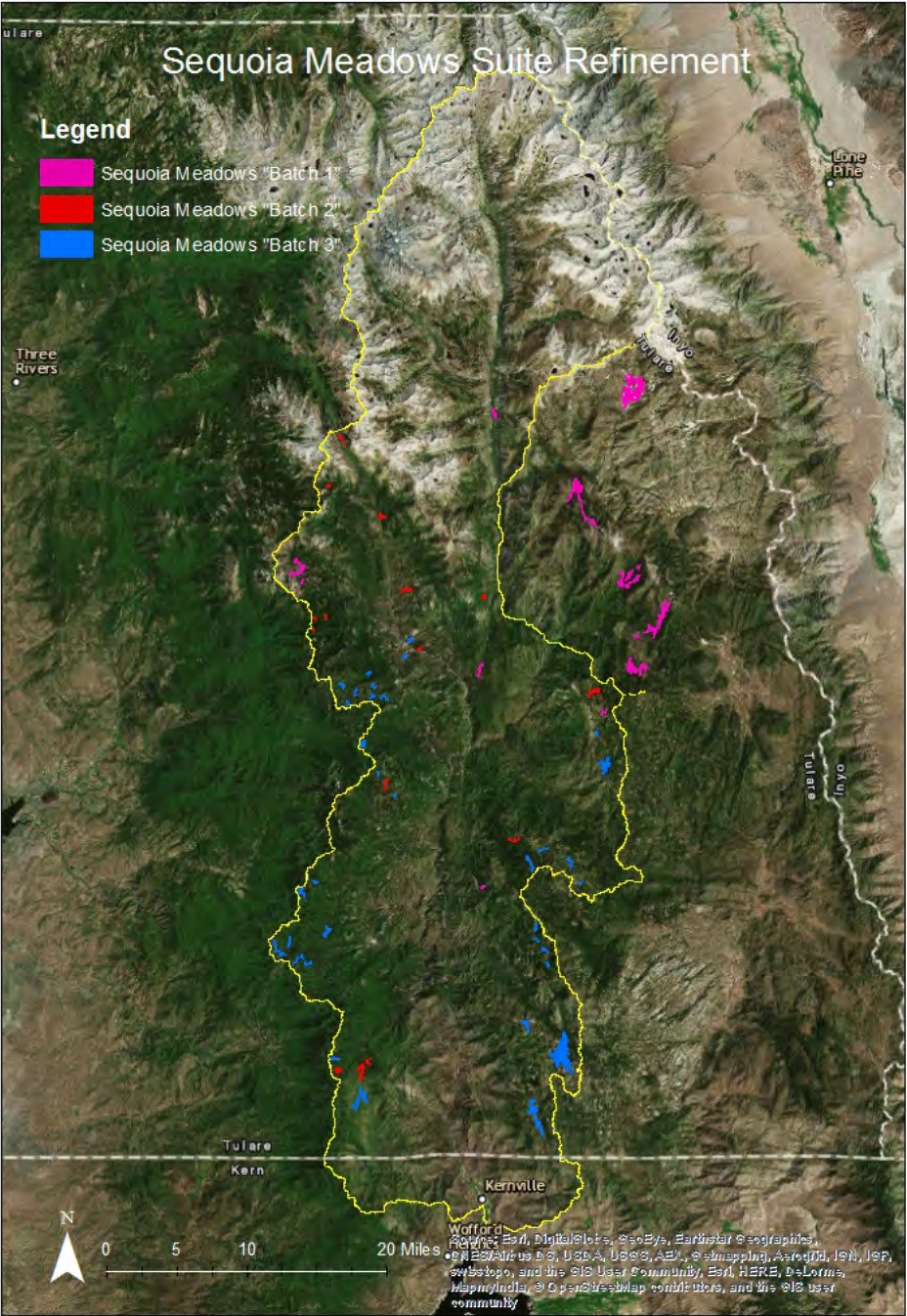
Kern River Watershed

- 1982 Watershed Improvement Needs Inventory (WINI) identified meadow restoration as a key watershed improvement need.
- Sequoia and Inyo National Forests
- Kern River rainbow trout
- Little Kern golden trout

Phase I- Refinement of Meadows Suite

Meadows Suite	Parameters	Number of Meadows
Batch I	1) In North Fork Kern River drainage and 2) greater than 10 acres	76
Batch II	Above and 1) within Sequoia administrative area, 2) not dry HGM type, 3) proper meadow polygon and 4) not currently being restored.	58
Batch III	Above and 1) assessed with the AR Scorecard, 2) larger than 5 acres (as re- delineated) and 3) majority Sequoia NF lands.	38

To the field!



Phase II: American Rivers Rapid Assessment Scorecard

Phase II Objective:
Conduct pre-
restoration rapid
assessment of
meadow conditions
and threats

Common Name	UCD/DFG ID#	Bank Height	Bank Stability	Gullies	Vegetation Cover	Bare Ground	Encroachment	Assessment Score (Points earned/points possible)
Little Horse	UCDSNM000273	2	1	3	2	2	1	0.46
Dry	2273	2	1	1	4	1	3	0.50
Big-Middle**	UCDSNM000068	4	3	1	3	1	2	0.58
Beach	UCDSNM000247	2	1	4	3	1	4	0.63
Grey	UCDSNM000362	2	3	2	4	1	3	0.63
Durwood	UCDSNM000114	3	3	3	3	2	3	0.71
Pollock	UCDSNM000336	2	3	4	3	3	2	0.71
Burnt Corral	UCDSNM000384	3	3	3	4	1	3	0.71
Big- Lower**	UCDSNM000068	4	4	4	2	1	3	0.75
Cannell	1791	3	3	3	4	2	3	0.75
Tyler	2275	3	2	3	4	2	4	0.75
Clicks	UCDSNM000350	2	4	3	3	3	3	0.75
Corral	UCDSNM000172	4	3	4	2	3	4	0.83
Loggy	UCDSNM000332	3	3	4	4	4	2	0.83
Paloma	UCDSNM000155	4	4	4	3	3	3	0.88
Mosquito	UCDSNM000090	3	3	3	4	4	4	0.88
Horse	UCDSNM000103	3	3	3	4	4	4	0.88
Crane	1413	3	3	4	4	4	3	0.88
Chester	UCDSNM000214	4	4	4	4	2	3	0.88
Log Cabin	UCDSNM000305	4	4	4	4	4	1	0.88
Pack Station	UCDSNM000314	4	3	4	3	4	3	0.88
Mule*	UCDSNM000151	4	4	4	3	4	3	0.91
West	UCDSNM000183	4	4	4	3	4	3	0.92
Big- Upper**	UCDSNM000068	3	3	4	4	4	4	0.92
Frog	UCDSNM000062	4	4	4	3	4	3	0.92
Lower Holey	UCDSNM000093	3	4	4	4	4	3	0.92
Long	UCDSNM000111	4	4	3	4	4	3	0.92
Bonita	UCDSNM000170	4	4	4	4	4	3	0.96
Round	UCDSNM000099	4	4	4	3	4	4	0.96
Horse on Salmon Ck.	UCDSNM000070	4	4	4	4	4	3	0.96
Little Big	UCDSNM000059	4	4	4	4	4	3	0.96
Upper Tyler	2274	4	4	4	4	4	3	0.96
Parker	UCDSNM000096	3	4	4	4	4	4	0.96
Upper Parker	UCDSNM000101	4	4	4	4	4	3	0.96
Ponderosa	UCDSNM000230	4	4	3	4	4	4	0.96
Upper Loggy	UCDSNM000317	4	4	4	4	4	3	0.96
Double Bunk*	UCDSNM000088	4	4	4	4	4	3	0.97
Snow Survey Cabin	UCDSNM000106	4	4	4	4	4	4	1.00
Double Bunk West	UCDSNM000088	4	4	4	4	4	4	1.00
Holey	UCDSNM000089	4	4	4	4	4	4	1.00
Coffee Mill	UCDSNM000256	4	4	4	4	4	4	1.00
Clicks Trailhead	UCDSNM000325	4	4	4	4	4	4	1.00
Average Score		3.45	3.43	3.57	3.59	3.24	3.17	0.85

Phase II: American Rivers Rapid Assessment Scorecard

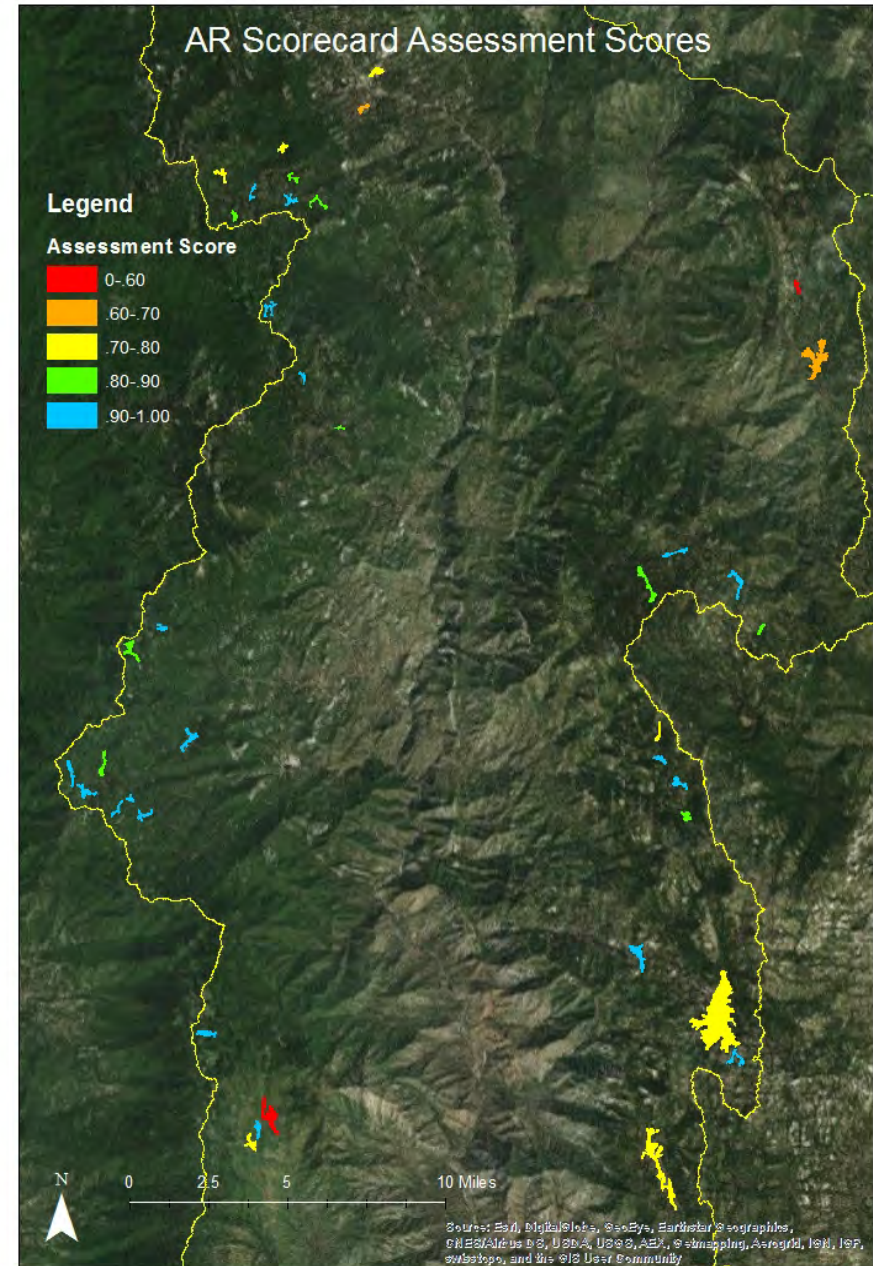
38 Meadows scorecarded

Average score= 0.85

13 meadows below average.

Larger meadows tended to have lower scores

Bare ground and encroachment scores lower than other 4 parameters

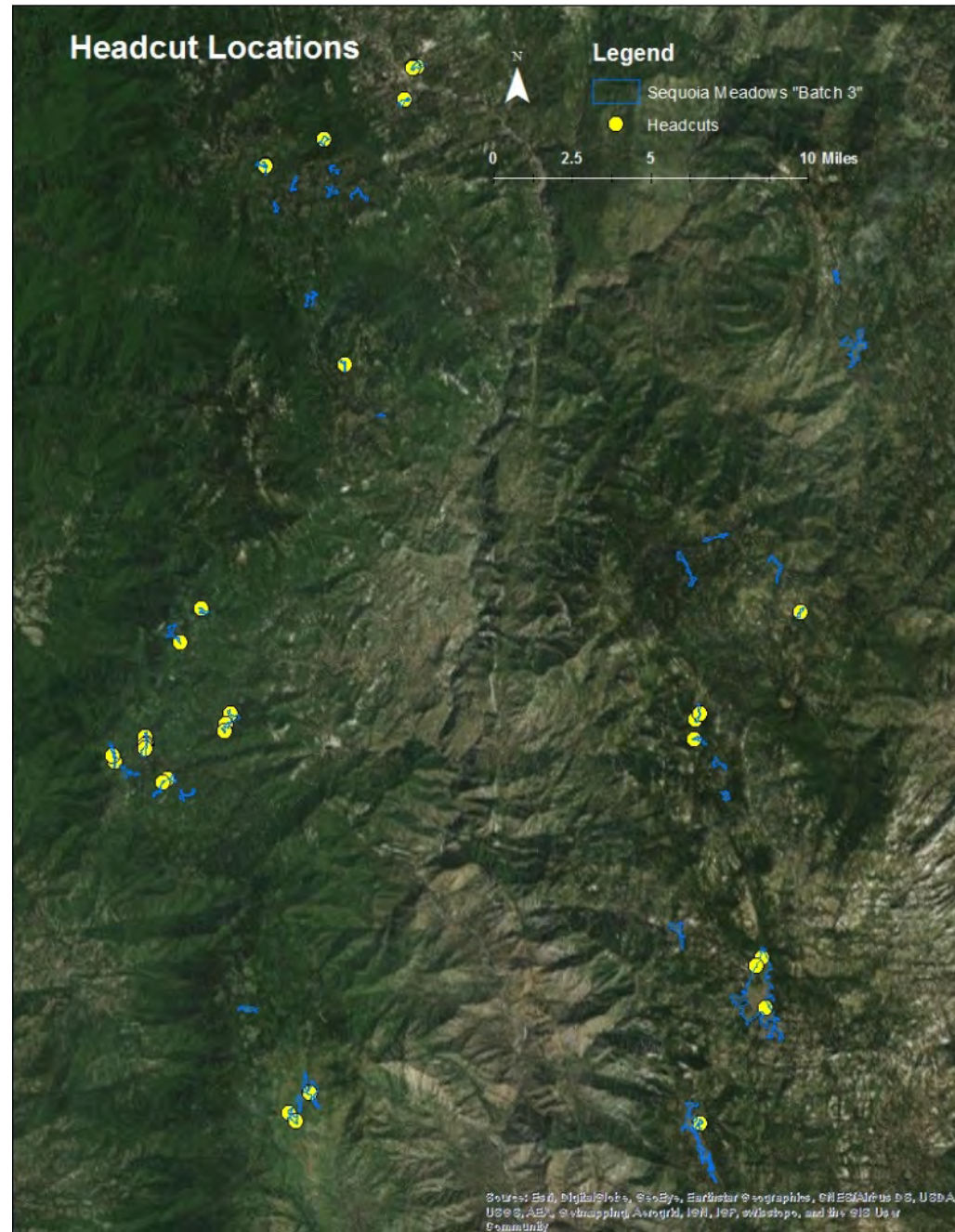


Phase II: AR Scorecard-Headcuts

Headcuts greater than 30 cm tall were marked on GPS

Area above headcut was then calculated to determine area of “at risk” soils.

These data will aid in Phase III prioritization.

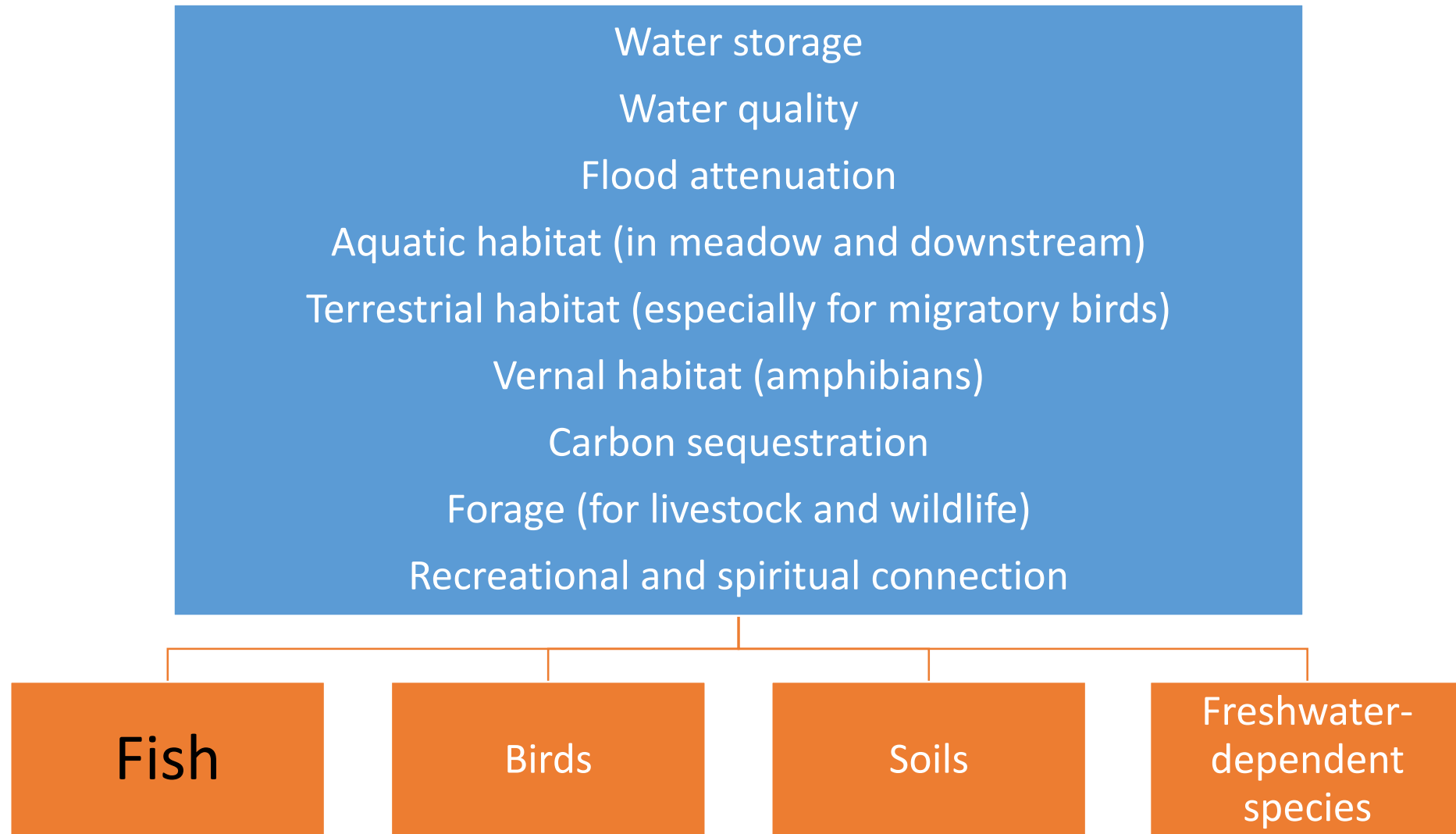


Phase III- Selection of meadows for 2017 field assessments

- Phase III Objective: Select a subset of priority meadows to be assessed in 2017.
- These meadows should be those that will offer the most benefits if restored.
- Benefits= Ecosystem Services

How do we select for meadows that have the highest potential to offer ecosystem services?

Sierra Nevada Meadows- Ecosystem Services



Increase/protect ecosystem services



4 Management Objectives (MO)



Filter Criteria (geospatial and assessment data)



20 Priority Meadows to Meet MOs

Sort

☒ My data has headers

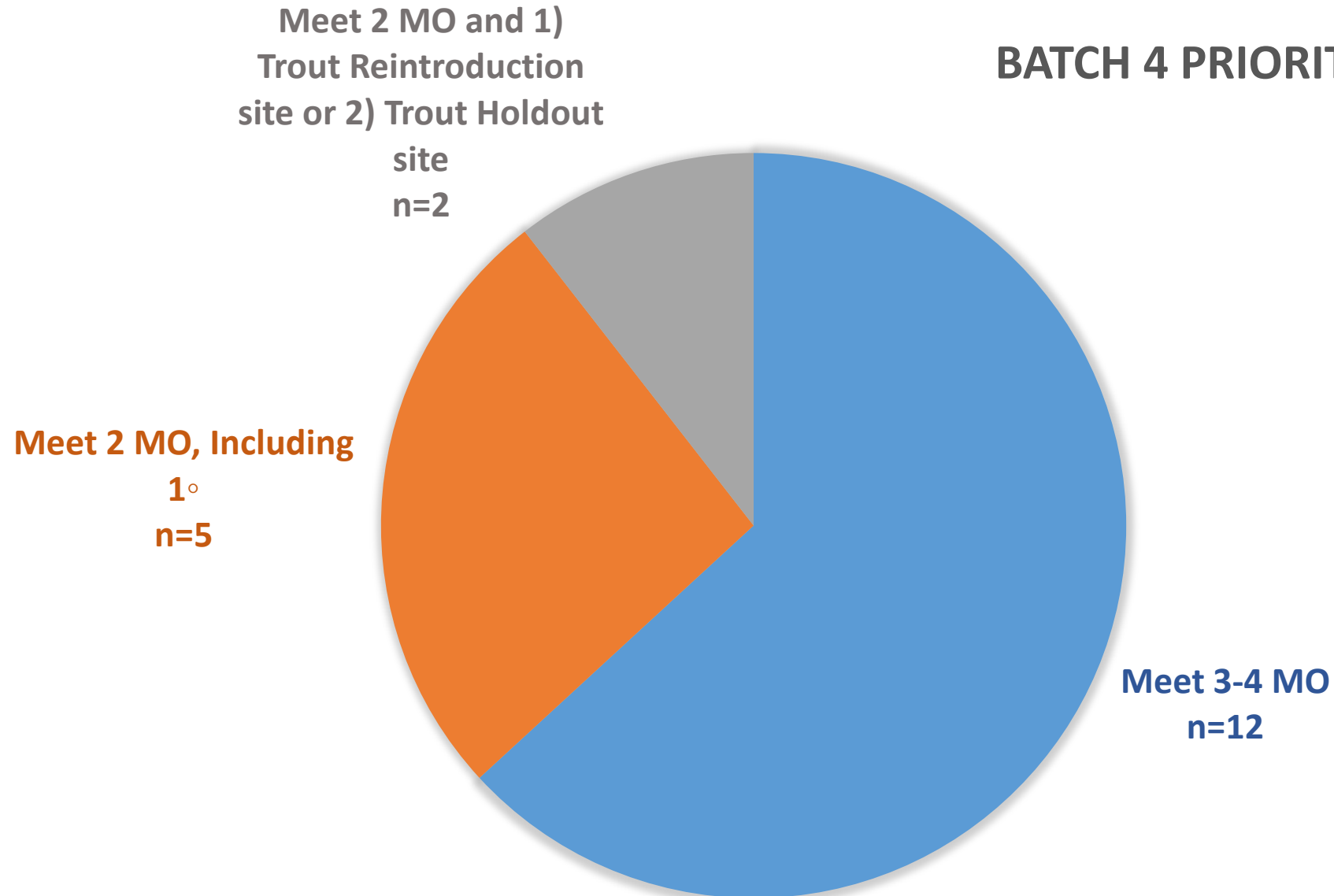
Column	Sort On	Order
Sort by	LKGT His	Values
Then by	KRRT His	Values
Then by	Mi. Perennial Stream	Values
Then by	AREA_ACRE	Values
Then by	Δ 2080	Values
Then by	Area Above Headcuts	Values
Then by	EPA HabCon	Values
Then by	EPA Vulnerability	Values

OK Cancel

	Management Objective	Criteria (in order)	Value
1	Enhance/protect native trout habitat	Historic Little Kern golden trout range	In
		Historic Kern River rainbow trout range	In
		Perennial stream miles	High
		Acreage	High
		Predicted warming by 2080	Low
		Area above headcut	High
		EPA HabCon	High
		EPA stream health	High
2	Enhance/protect native bird habitat	EPA vulnerability	Low
		Acres willow/aspen cover	High
		IBP 2000 Priority	High
3	Protect meadow soils from erosion	WIFL Buffer	In
		Grazing allotment	Active
		Area above headcut	High
4	Benefit freshwater-dependent species		
		Miles of Perennial Stream	High
		Miles of Ephemeral stream	high
		Area above headcut	High
		Richness count	High
		EPA HabCon	High
		EPA stream health	High
		EPA Vulnerability	Low

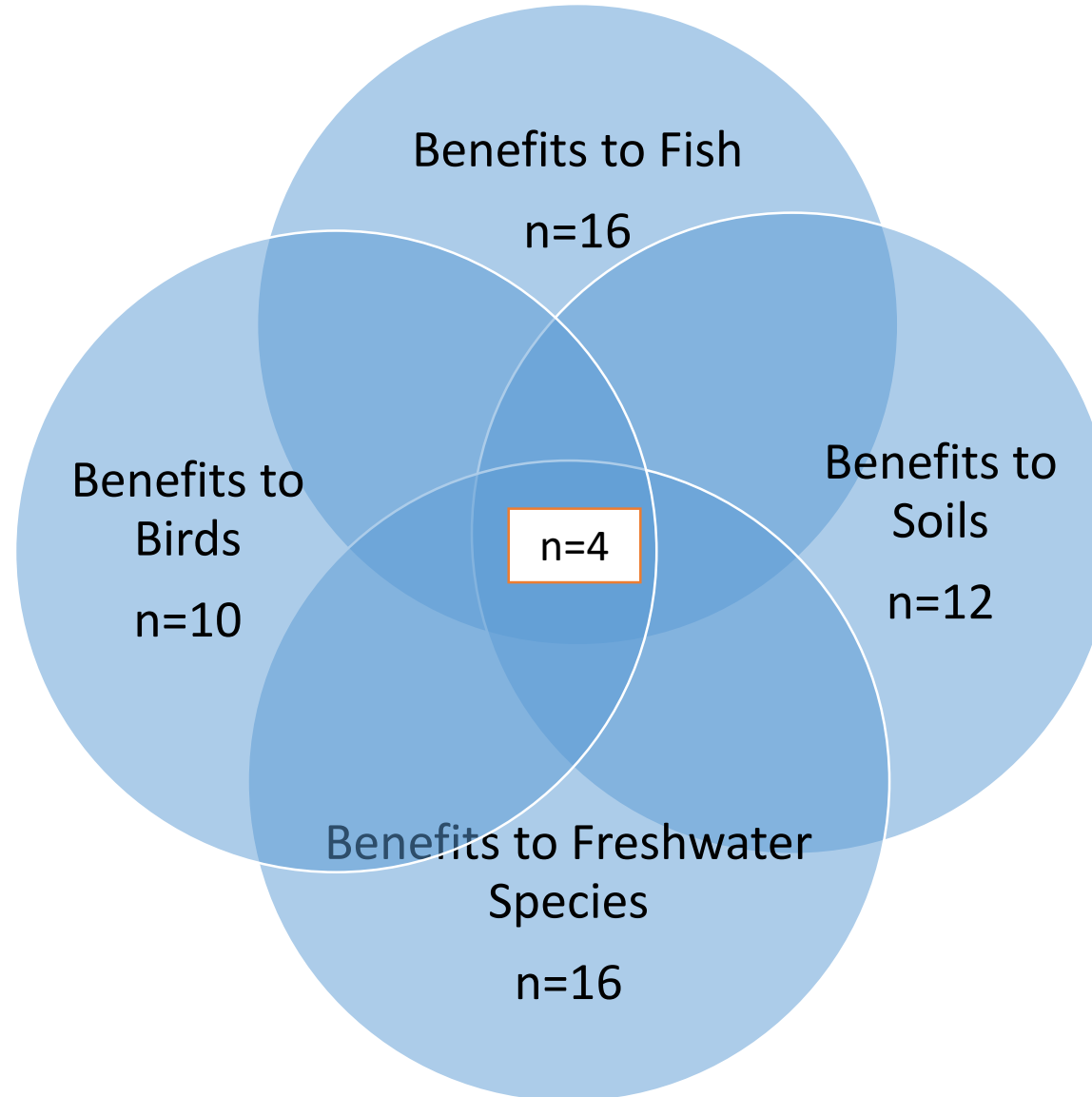
Selection of Batch 4 Meadows Suite

BATCH 4 PRIORITY MEADOWS



Phase III: Selection of Meadows for 2017 Field Assessments- “Batch IV”

*Each circle is a subset of the Batch IV meadow Suite (n=19) that were Priority Meadows according to the MO shown



Phase III: Selection of Meadows for 2017 Field Assessments.

Meadows Suite	Parameters	Number of Meadows
Batch III	Above and 1) assessed with the AR Scorecard, 2) larger than 5 acres (as re-delineated) and 3) majority Sequoia NF lands.	38
Batch IV	Above and Prioritization Frameworks (PF) to select meadows most likely to support 4 management objectives: 1) benefits to fish (F), 2) benefits to birds (B), 3) benefits to meadow soils (S) and 4) benefits to freshwater-dependent species (W). Batch IV was selected based on 1) meadows identified as priority in 3 or 4 of the PFs and 2) meadows identified as priority in 2 PFs, that met either of the following two criteria 1) meadows on potential Kern River rainbow trout (KRRT) re-introduction streams or known KRRT strongholds, or 2) meadows identified as priority for our primary MO to benefit native trout populations.	19
Batch V	Above and excluding 1) meadows with a portion private lands and, 2) meadows with conflicting usage (pack station).	14

Batch V of the meadows suite (14 sites) was selected for in-depth field assessments during 2017 field season.

These 14 sites are those meadows with the highest potential to meet the Management Objectives.

Thus, these meadows should provide the most ecosystem services when in functioning state

Phase IV- Summer 2017 Meadow Condition Assessments

Phase IV Objective: conduct in-depth pre-restoration assessments of the meadows suite to 1) collect pre-restoration monitoring data and, 2) identify priority restoration actions.

Project partners are employing methodologies to assess meadow health within 5 parameters:

Birds- How suitable is the meadow habitat to native/migratory bird species?

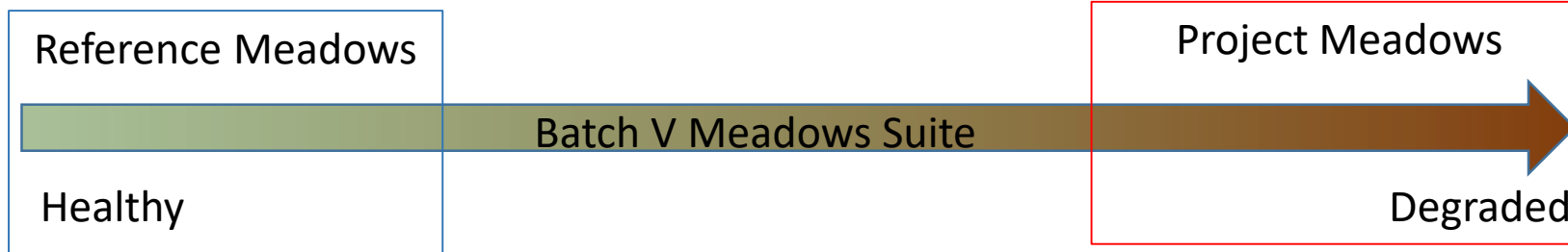
Benthic Macroinvertebrates- What does the aquatic insect community indicate about freshwater habitat health?

Beavers- How suitable is the meadow habitat for beaver? And, what is the potential to employ beaver as a restoration tool?

Fire- What risks do fuel loads pose to the meadows suite? And, what fuels management actions may benefit these meadows?

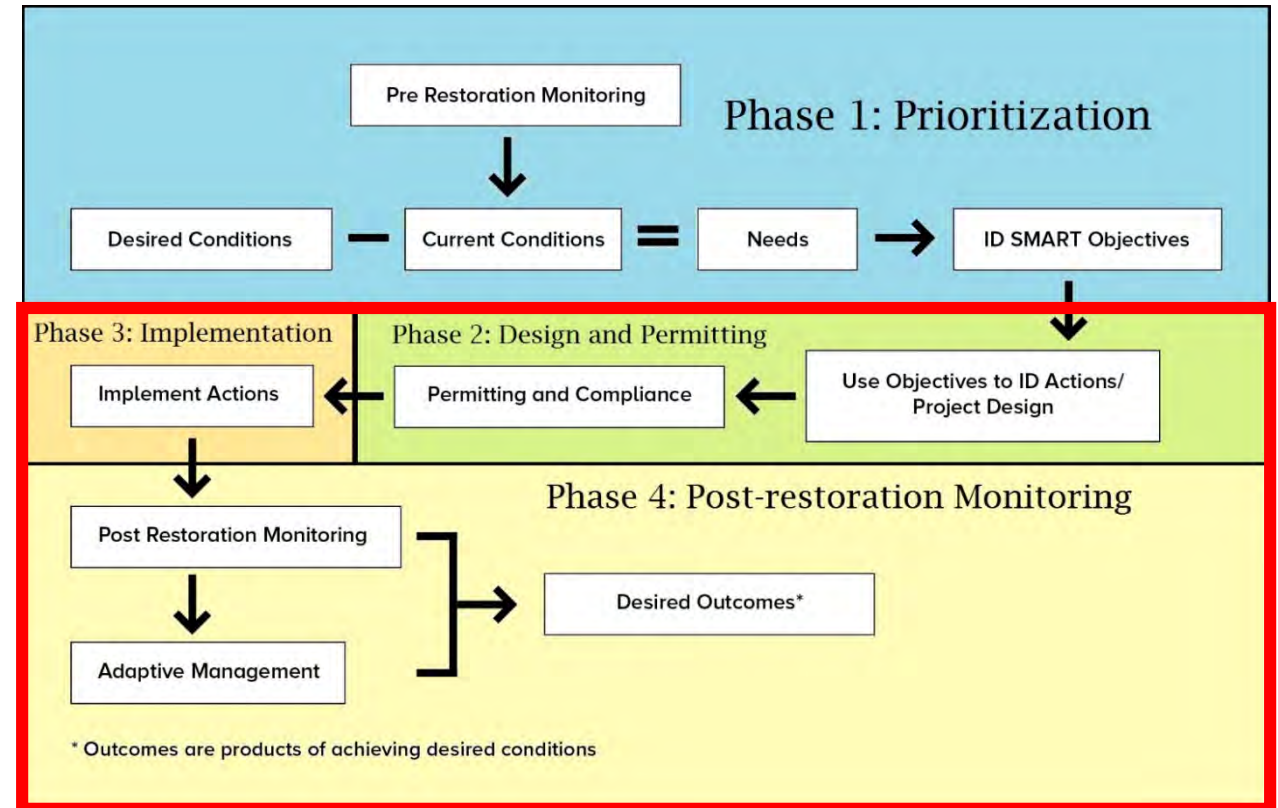
Stream Condition Inventory- What is the health of the in-stream aquatic habitat?

Phase V- Identification of restoration needs



Next Steps:

- 1) Complete 2017 fieldwork
- 2) Synthesize data to develop holistic image of each meadow in the Batch 5 Suite (14 meadows)
- 3) Identify Reference and Project meadows from assessment data
- 4) Secure funding for Design, Permitting and Implementation Phase
- 5) Design, permit and enact implementation project
- 6) Post-restoration assessments and monitoring (with identical or improved assessment methodologies)



Project Implications and Lessons Learned

- AR Scorecard shortcomings
 - Best for Riparian HGM Type
 - May exaggerate upland encroachment
 - No 2 meadows are the same
- Condition assessments as pre-restoration monitoring
 - SM WRAMP
- Remote HGM typing
 - Remotely typed riparian meadows do not indicate channel structure
- Reference vs. degraded meadows
 - How do we ID appropriate reference meadows?
 - Current and historic grazing
- Application to other ecosystem types?
- Importance of ground-truthing
- Research questions
 - How to assess discharge slopes
 - Replicable at larger landscapes?
 - Meadows as snowflakes.

Questions?



The Sierra Meadows Partnership

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restoration and protection