Integration of Grazing Approaches with Salmonid Restoration: Meadow Creek Experiment

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2 November 2016 Region 6 Ecologists' Meeting

N

I-84

La Grande

I-84

Grande Ronde River

Meadow Creek

STARKEY

OR-244

0 2 4 8

Miles

Background

- Stream systems like Meadow Creek have legacy effects from splash-dam logging, railroad logging, roads, livestock grazing, and conversion of native vegetation to exotic livestock forages, leading to dramatic changes in riparian systems.

1953 livestock forage conversion on Meadow Creek

Meadow Creek before restoration in 2012. Scouring from splash-dam logging more than 100 years ago removed most in-stream structures, which are critical for spawning and rearing of salmonids.

ESA-Threatened Salmonids

- Snake River Steelhead--spawning and juvenile rearing in Meadow Creek

- Snake River Spring/Summer Chinook Salmon--functionally extirpated from Meadow Creek but some juvenile rearing

Restoration Objectives

- Restore in-stream structures (boulders, large woody debris) important for salmonid spawning and juvenile rearing.
- Restore riparian woody vegetation important for stream shading to mediate lethal summer stream temperatures.
- Restore channel, floodplain, and riparian function.

Restoration Activities: 2012-2014

- In-Stream: ~60 clusters of boulders and large woody debris across 7.5 miles of Meadow Creek (600 large wood pieces, 285 boulders)

- Riparian: 50,000 seedlings planted (deciduous shrubs and conifers)

Restoration Activities: 2012-2014

- 3.5 miles of new livestock fencing constructed
- 9 large ungulate exclosures constructed, each ~2.5 acres
- 6 upland water sources constructed for cattle
- 1,800 small exclosures (“pods”) constructed to protect deciduous plantings; ~50% left unprotected to understand herbivory effects

Restoration Monitoring

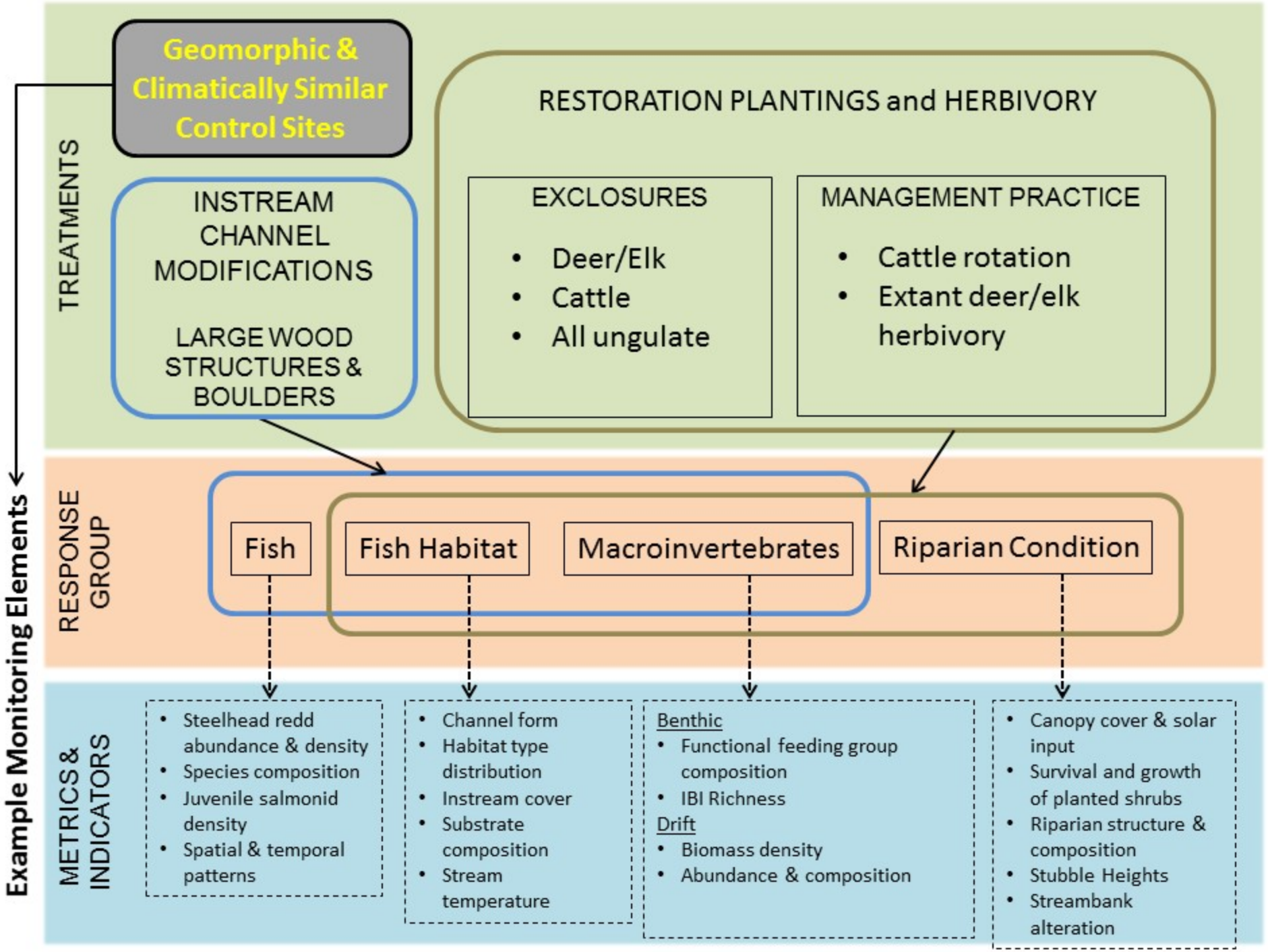
- Salmonid habitat responses (Columbia Habitat Monitoring Program – CHaMP)

- Adult spawning and juvenile rearing responses (redd counts in spring, snorkel surveys late summer)

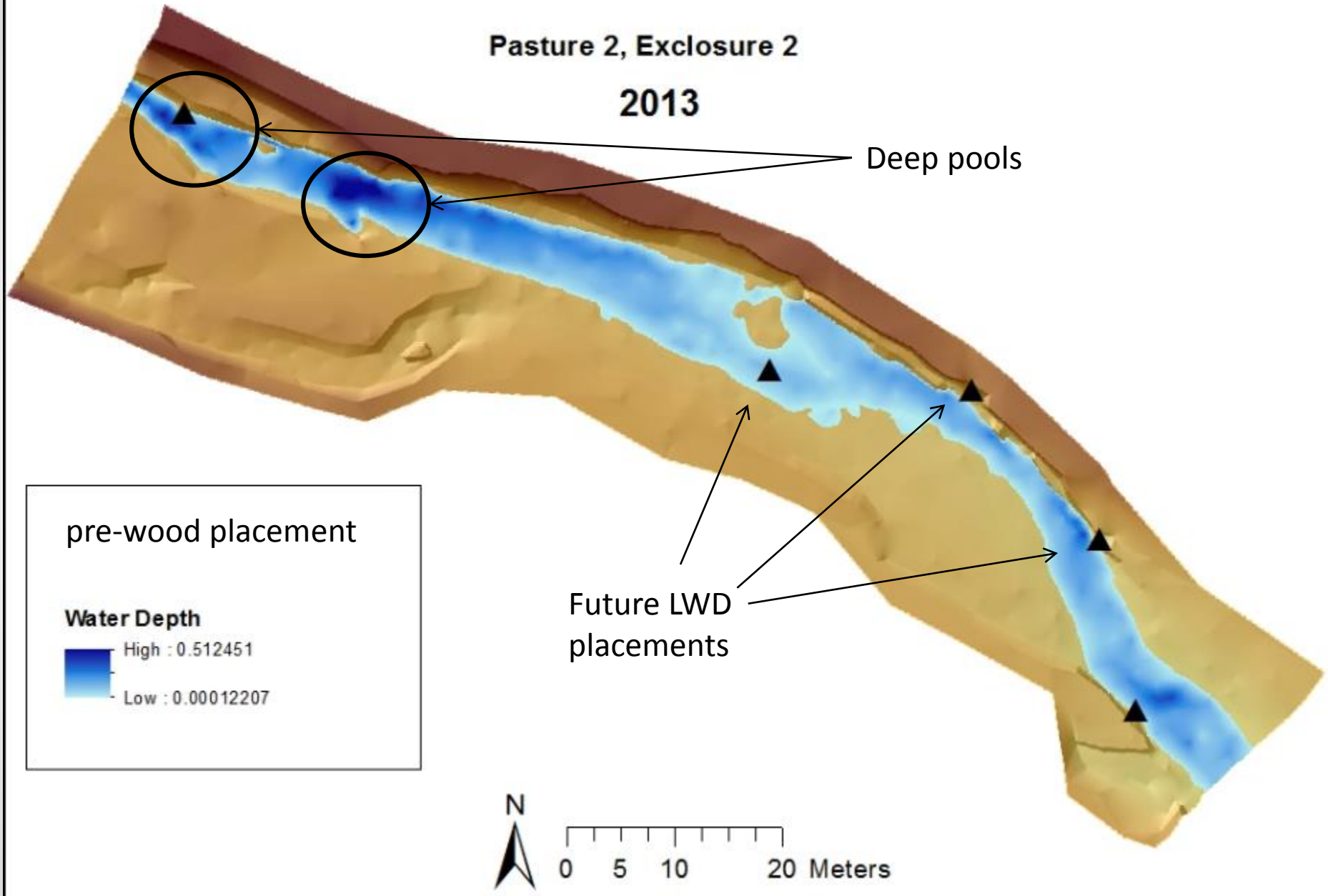
Grazing Effects Monitoring

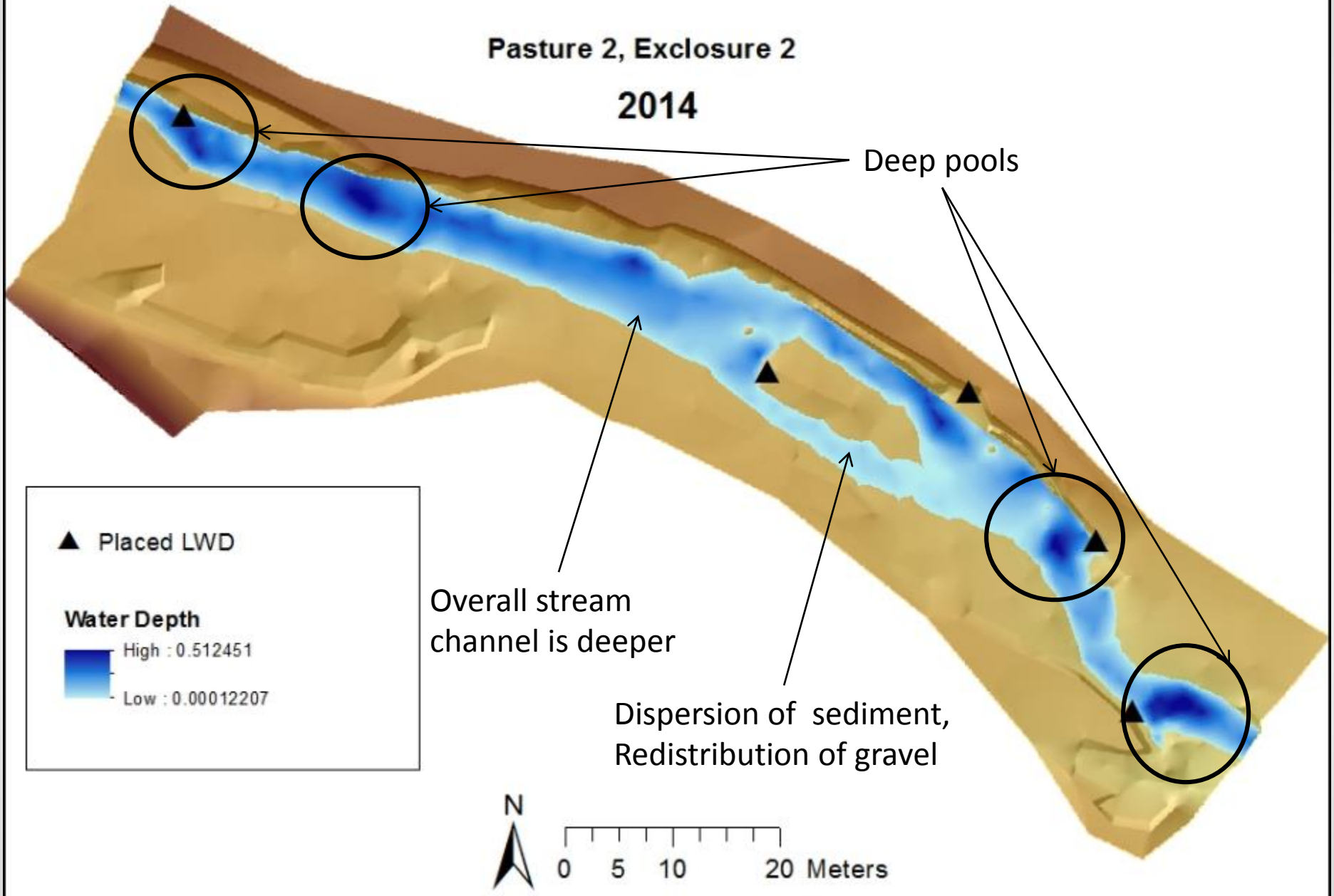
- Document effects of wild vs. domestic ungulate herbivory on riparian restoration of woody vegetation.

- Evaluate new cattle grazing practices designed to be compatible with in-stream and riparian restoration for salmonids.


Example Monitoring Elements
TREATMENTS
Geomorphic & Climatically Similar Control Sites
INSTREAM CHANNEL MODIFICATIONS
LARGE WOOD STRUCTURES & BOULDERS
RESTORATION PLANTINGS and HERBIVORY
EXCLOSURES
Deer/Elk
Cattle
All ungulate
MANAGEMENT PRACTICE
Cattle rotation
Extant deer/elk herbivory
RESPONSE GROUP
Fish
Fish Habitat
Macroinvertebrates
Riparian Condition
METRICS & INDICATORS
Steelhead redd abundance & density
Species composition
Juvenile salmonid density
Spatial & temporal patterns
Channel form
Habitat type distribution
Instream cover
Substrate composition
Stream temperature
Benthic
Functional feeding group composition
IBI Richness
Drift
Biomass density
Abundance & composition
Canopy cover & solar input
Survival and growth of planted shrubs
Riparian structure & composition
Stubble Heights
Streambank alteration

Meadow Creek In-Stream Restoration – Initial Results


Pasture 2, Exclosure 2
2013
Deep pools
Future LWD placements
pre-wood placement
Water Depth
High : 0.512451
Low : 0.00012207
N
0 5 10 20 Meters


Pasture 2, Exclosure 2
2014
Deep pools
Placed LWD
Water Depth
High : 0.512451
Low : 0.00012207
Overall stream channel is deeper
Dispersion of sediment, Redistribution of gravel
N
0 5 10 20 Meters

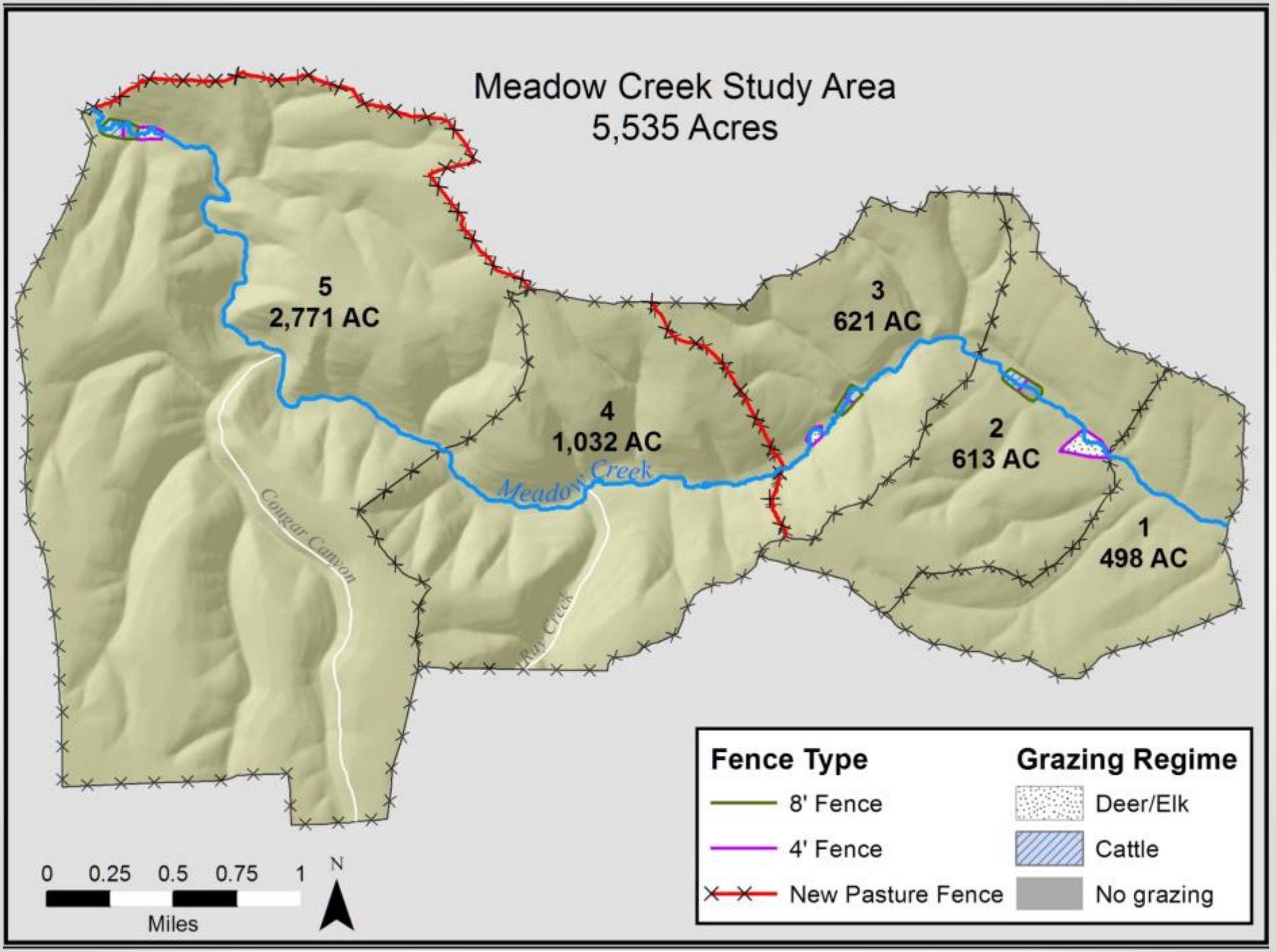
Grazing System Objectives

- Design and integrate new cattle grazing practices compatible with salmonid restoration, and evaluate effects on restoration.

- Guiding Principle: **GRAZING PRACTICES SHOULD RESULT IN REDISTRIBUTING CATTLE FROM RIPARIAN AREAS TO UPLANDS**

Meadow Creek Grazing System and Practices

- Begins 2017, following post-restoration grazing rest
- Deferred rotation across small pastures
- Short grazing periods per pasture (high intensity - short duration)
- Earlier spring turnout of cattle
- Compressed period of late-season grazing
- Well-distributed upland water and nutritional supplementation
- Systematic, regular herding to upland water
- “Real-time” utilization monitoring of key forages in riparian and uplands to guide herding and pasture rotation


Meadow Creek Study Area
5,535 Acres
5
2,771 AC
4
1,032 AC
3
621 AC
2
613 AC
1
498 AC
Meadow Creek
Cougar Canyon
Ray Creek
Fence Type
8' Fence
4' Fence
New Pasture Fence
Grazing Regime
Deer/Elk
Cattle
No grazing
0 0.25 0.5 0.75 1
Miles
N

Grazing System

- 60 cow-calf pairs (Oregon State University cattle)
- June 1-October 1 (120 days) under deferred rotation
  - —rotate from pastures 1 through 5 in 2017
  - —rotate from pastures 5 through 1 in 2018
- 60 days in Pasture 5, 15 days each in Pastures 1 to 4
- Stocking rates moderate for first year (initial test)
- Regular monitoring of herd locations and forage utilization
- Regular maintenance of fences and upland water

Herd Management Approach

- Move cattle to upland water sources upon first entry to a pasture.
- Number of cow-calf pairs assigned to an area near upland water based on cattle watering and forage capacities of the upland (“local stocking rate”).
- Regular monitoring of the riparian zone for cattle presence (e.g., ~2-3 days)

Herd Management Approach

- Monitor greenline stubble heights and riparian forage utilization when cattle show up in riparian area.
- Move cattle back to upland areas when utilization warrants.
- Monitor upland forage utilization, especially near water and supplementation sites.
- Move to next pasture based on move date - *or earlier if utilization warrants*.

Stubble Height Monitoring – Salmonid Recovery Metric

- Monitor greenline stubble heights during grazing in each pasture.
- Monitor stubble heights mid-season (post-grazing) and end of grazing season.
- Compliance with new terms and conditions for recovery of salmonids (6-8 inches herbaceous greenline stubble height)

Stubble Height Monitoring – Salmonid Recovery Metric

- Willingness of NOAA/FWS to allow lower stubble heights in some sites in light of benefits of research to grazing management in salmonid streams

- Effectiveness of stubble height as an indicator of stream and riparian health for salmonids

- Relate stubble heights to CHaMP and MIM metrics and vegetation monitoring such as streambank alteration, riparian shrub recovery, wild vs. domestic ungulate effects, etc.

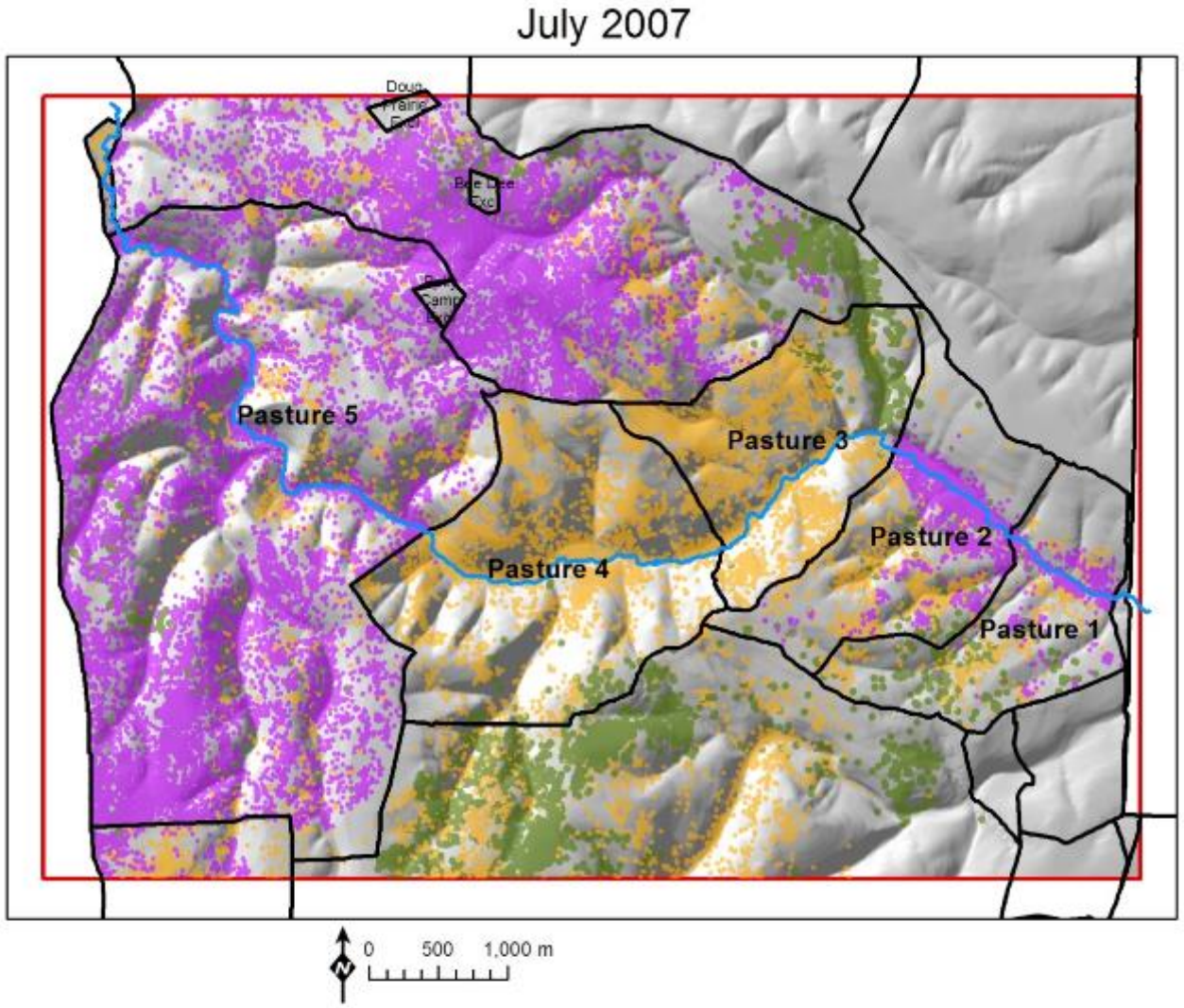
Monitoring the Grazing System, Practices, and Success

- Range rider will carry GPS unit
- 30-40 of the 60 cows will wear GPS collars
- Document time spent by cattle:
  --in uplands versus riparian areas
  --in areas near versus far from water and supplementation sites
  --in relation to a suite of other environmental conditions affecting cattle distributions and herd management.

Monitoring the Grazing System, Practices, and Success

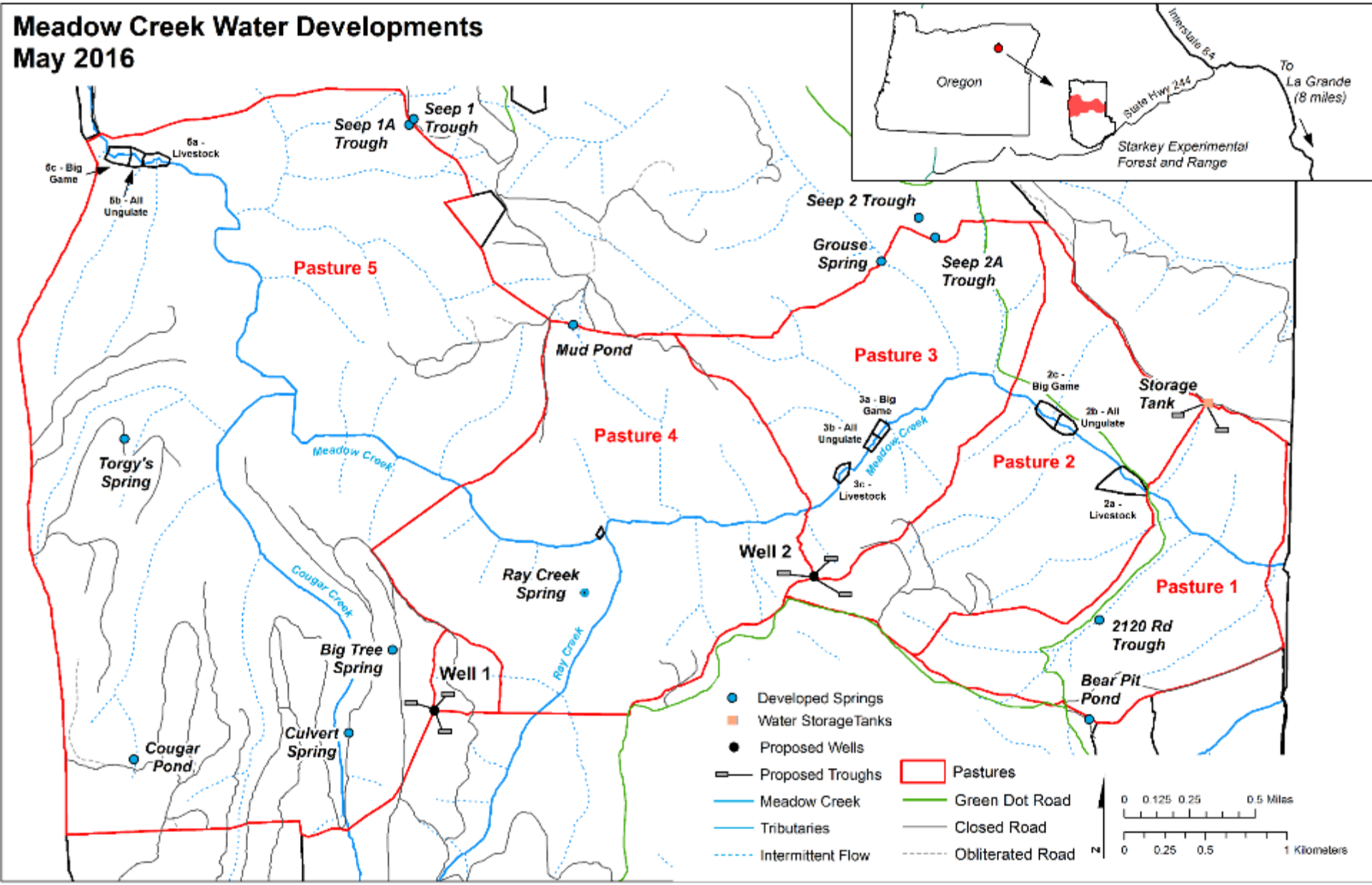
- Cattle weighed and body condition scores recorded at start and end of grazing season.

- Data analyzed for beef production in relation to labor and infrastructure costs to estimate time needed to recoup investments in grazing practices to make them economically viable.



Example telemetry locations of cattle (C), mule deer (D), and elk (E) at Starkey's Meadow Creek pastures under past grazing management with ample upland water (Pasture 5) in contrast to limited upland water (Pastures 1 and 2). Pastures 3 and 4 were not grazed by cattle.

Upland (Off-Stream) Water is Key!


Meadow Creek Water Developments
May 2016
Oregon
Interstate 84
State Hwy 244
To La Grande (8 miles)
Starkey Experimental Forest and Range
6a - Livestock
6c - Big Game
6b - All Ungulate
Seep 1A Trough
Seep 1 Trough
Seep 2 Trough
Grouse Spring
Seep 2A Trough
Pasture 5
Mud Pond
Pasture 3
Pasture 4
Pasture 2
Pasture 1
2c - Big Game
2b - All Ungulate
2a - Livestock
3a - Big Game
3b - All Ungulate
3c - Livestock
Storage Tank
Torgy's Spring
Meadow Creek
Cougar Creek
Ray Creek
Ray Creek Spring
Well 2
Well 1
Big Tree Spring
Culvert Spring
Cougar Pond
2120 Rd Trough
Bear Pit Pond
Developed Springs
Water StorageTanks
Proposed Wells
Proposed Troughs
Meadow Creek
Tributaries
Intermittent Flow
Pastures
Green Dot Road
Closed Road
Obliterated Road
N
0 0.125 0.25 0.5 Miles
0 0.25 0.5 1 Kilometers

4 Treatment Levels of Herbivory

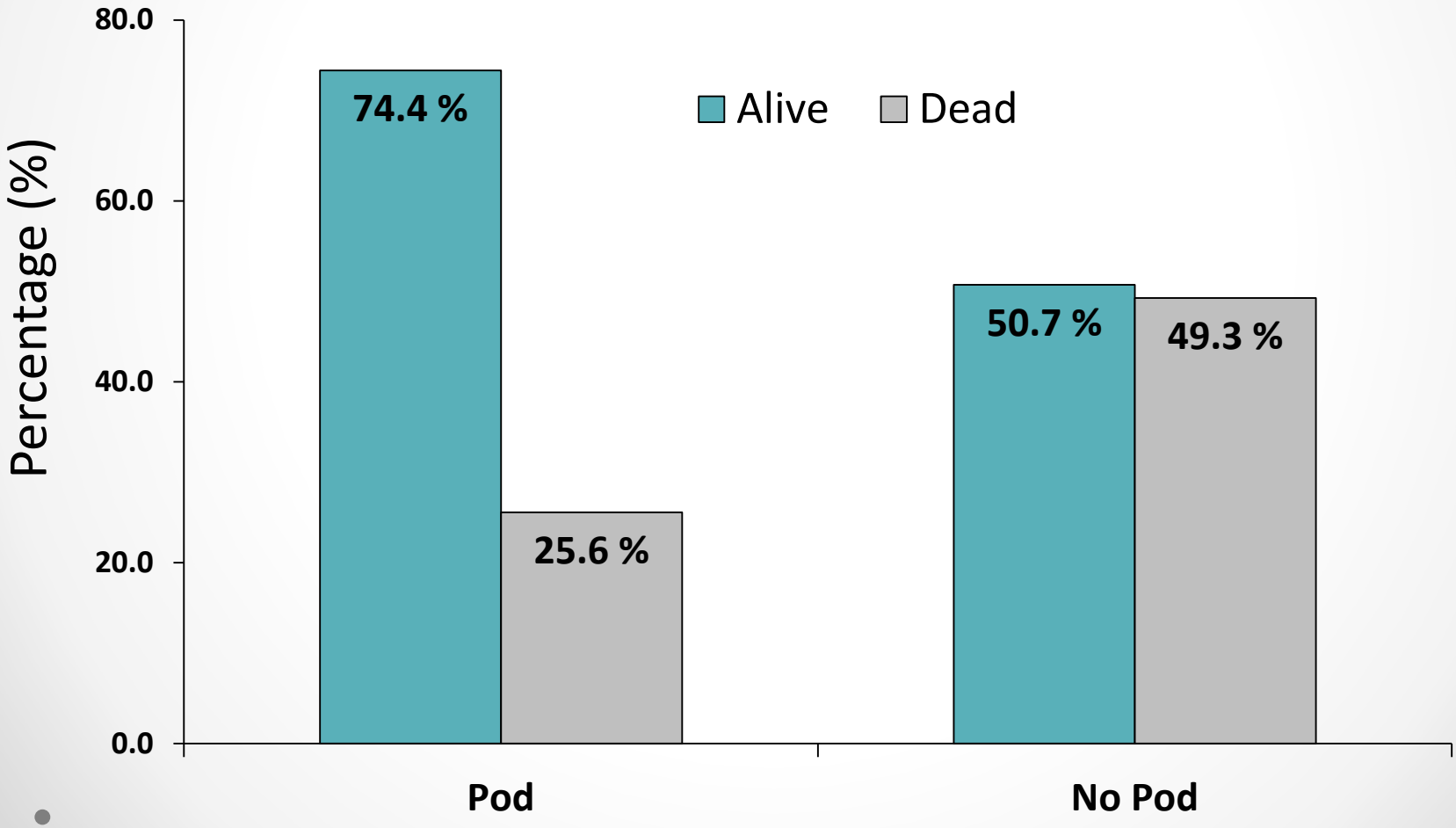
1. Deer and Elk Effect (Cattle Exclusion)
2. Cattle Effect (Deer and Elk Exclusion)
3. No Ungulate Effect (Cattle, Deer, and Elk Exclusion)
4. Cattle, Deer, and Elk Effect (Extant Grazing—includes new cattle grazing system)

Relating Grazing Effects to Multiple Responses:

- CHaMP salmonid habitat surveys
  --over 100 stream & riparian metrics
- Multiple Indicator Monitoring (MIM) surveys
  --greenline monitoring of stubble heights, streambank alteration
- Vegetation transects
  --herbivory effects on riparian plantings and on long-term vegetation

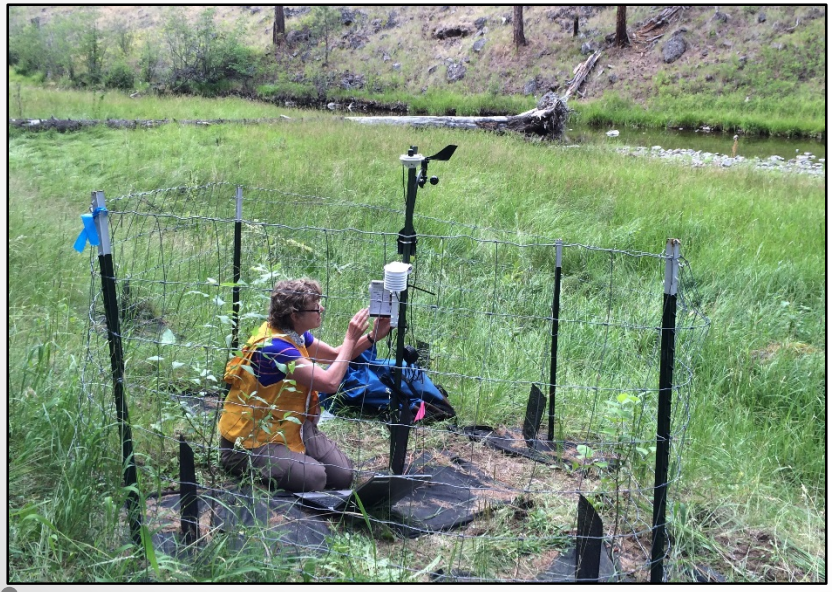
"While many of these changes in grazing management may seem impractical, their practicality and benefits remain untested across large landscapes at operational scales of livestock management."

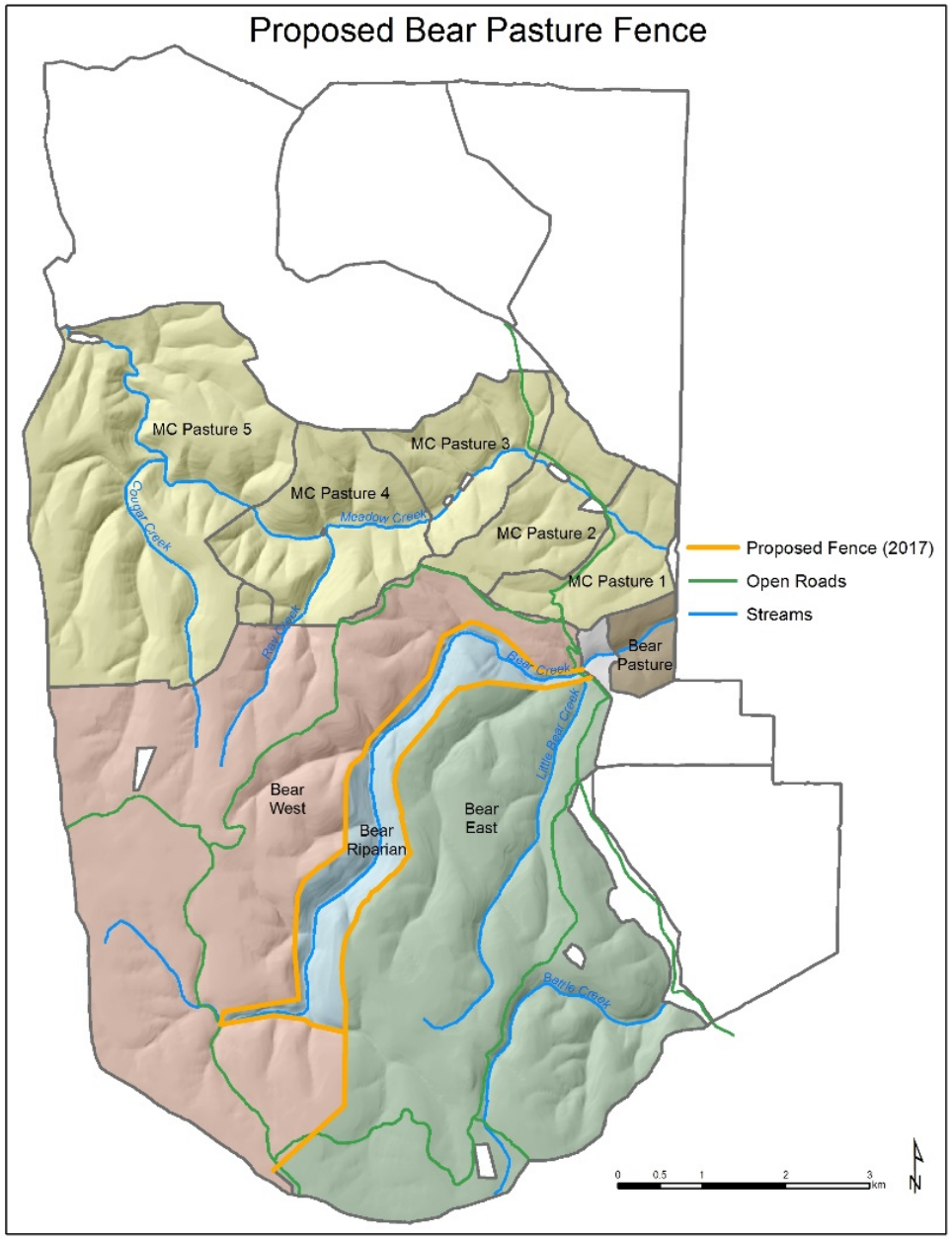
Survival of deciduous shrubs



Additional Responses to Restoration

- Native bee and small mammal abundance & diversity
- Hydrologic regime
- Stream temperature-climate change-restoration interactions
  - Build on Wondzell work in Middle Fork John Day

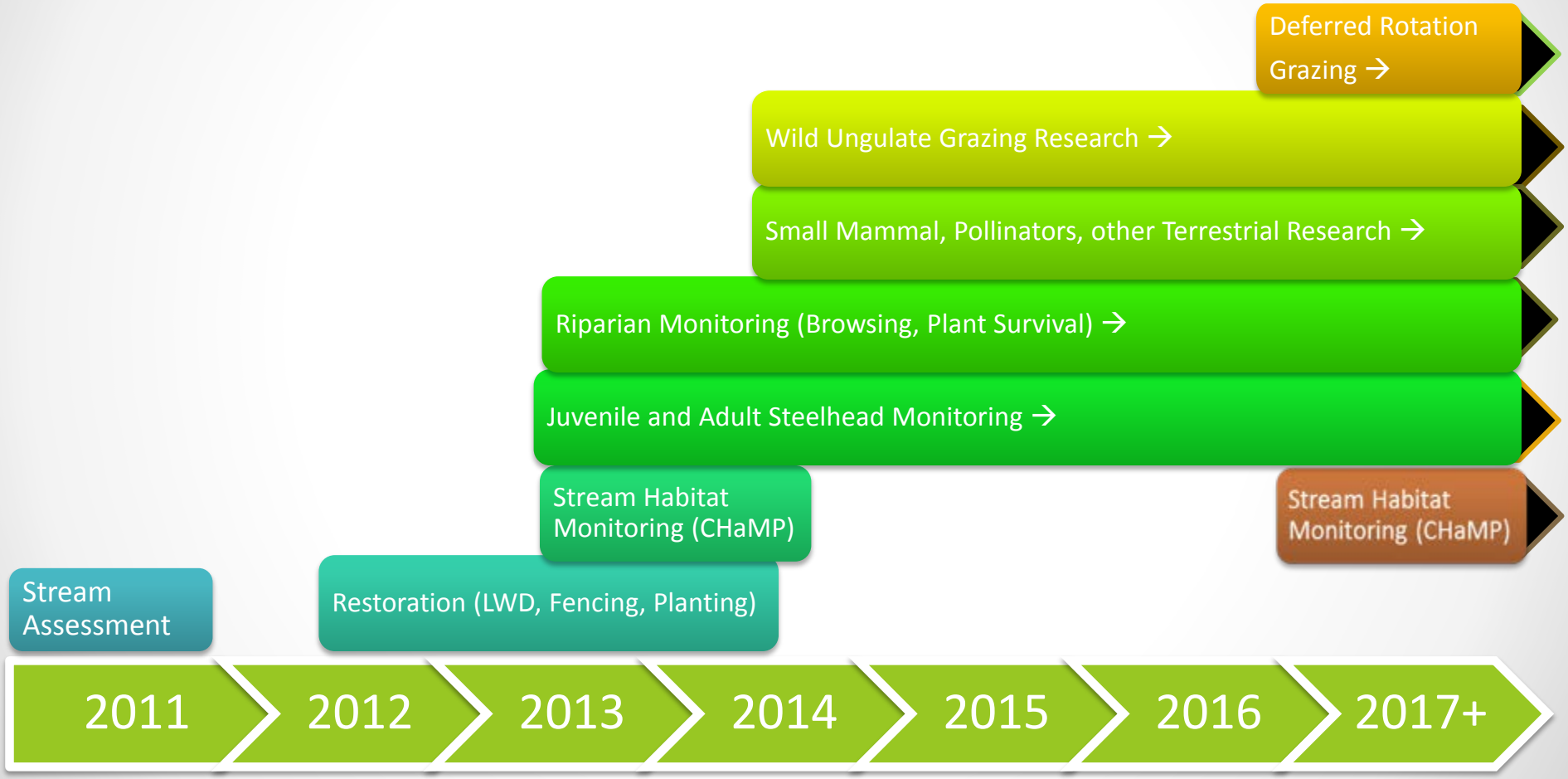




Bear Creek Riparian Fencing Proposal:

- Address terms & conditions for recovery of threatened steelhead
- Part of deferred rotational grazing system in Starkey Allotment
- Partition large Bear pasture into east and west portions
- Add riparian pasture with gates
- Allow for strategic seasonal use of riparian area as appropriate
- Meet new stubble height standards
- Different riparian grazing approach for testing in contrast to Meadow Creek approach

Meadow Creek Timeline



Questions?