2014 NFWF CalTrout Meadows Workshop Summary

Workshop Summary: In February of 2014, the National Fish and Wildlife Foundation and California Trout organized a workshop that brought together leaders from land management agencies, academia, non-profits, and source funders involved in meadow restoration efforts to identify key strategies and metrics used to enhance the health and long-term viability of Sierra Nevada and Cascades meadow ecosystems. A particular emphasis of the workshop involved synthesizing the state of work centered on meadow restoration, a summary of appropriate monitoring metrics, an evaluation of methodologies, and developing recommendations to inform National Forest plan revision processes. A secondary emphasis of the workshop included gathering information to guide and inform future revisions to the NFWF Sierra Nevada Meadows Business Plan. The principal outcome from this workshop was reaching a consensus about the need to draft a conservation strategies document that would inform future management of meadow ecosystems throughout the Sierra Nevada and Cascades.

Monday 2/3/14

Meadows Roundtable Discussion and Orientation

Session Leads: Mark Drew

On Monday evening there was an informal roundtable discussion where workshop attendants introduced themselves, their background with meadows related work, and discussed projects that they have/ or are currently involved with.

Tuesday 2/4/14

NFWF Meadows Survey Results

Session Leads: Mark Drew, Andrew Skaggs

Representatives from California Trout gave a presentation that summarized the information derived from the NFWF Meadow Survey and synthesized information about meadow assessment and restoration projects completed within the past 5 years. The objective of this session was to present and discuss the results from the NFWF meadows survey, and to share the current status of meadow assessments and restoration activities to enable participants to become familiar with the work being done, extent to which monitoring is occurring, the methods being used, and to identify obstacles for future monitoring and evaluation. For more information about the results obtained from this survey please contact: Andrew Skaggs (askaggs@caltrout.org).

Desired Meadow Conditions and Trends

Session Leads: Rene Henery, Todd Ellsworth

The objective of this session was to discuss desired conditions for meadow ecosystems, habitats, and the appropriate process for defining them. This session established the context for the workshop, through examination of the interplay between desired conditions, metrics and monitoring, and their collective role in conservation planning, adaptive management, and restoration to achieving goals.

General comments

- Need system for resolving conflicts and revisiting desired conditions
- Consider natural condition/ Range of variation
- Identify reference conditions
- Climate vulnerability and stressors
- Include special aquatic features
- Make explicit link between functions and benefits
- Include focal species as a component
- Should be spatially explicit/ variable
- From a vegetation standpoint, desired condition basically the upper (later) half of the successional gradient. Note: you can also use elevation/ water based functional group classification to stratify.
- Inclusion of "strategies" already built into plans to provide information to regional planning teams on how to implement actions and achieve objectives

Themes

- Structure - Meant to deliver ecological integrity
- Function
- Composition
- Resiliency
- Integrity
- Process/ Function
- Stability
- Change through time
- Range of scales (as with species conservation plans)

Specific Components

- Stream bank function
- Fire regime
- Hydrology
- Land use
- Herbaceous Vegetation - Fire of hydrologic disturbance needed to created willow germination + willow recruitment conditions
- Species management (e.g. fish stocking) and foodweb/ community conditions
- Meadow Area/ meadow definition
- Current conditions
- Value of riparian shrubs and progression after management
- Hydrogeomorphic wetland classification/ meadow types (based on peat) as stratification layer.

Key Questions/ Next steps

- What are the most vulnerable areas / regions?
- Potential for Sierra Cascades Dialogue on water to be more specifically focused?
- Look at natural range of variability document for meadows bioregional assessment

Outcomes from this session included an improved understanding of desired meadow conditions and their application in conservation and management, and a sense of the appropriate process for characterizing desired meadow conditions. The next steps for this conversation will be to create a sub group that identifies appropriate language and recommendation to USFS decision makers.

Data Collection and Information Gathering

Session Leads: Kurt Fesenmyer, Ryan Peek, Dave Waetjen

The objective of this session was to present two current databases and discuss the utility of common meadow related databases that are readily available. This session discussed the utility of the NFWF meadows survey and discussed how to best utilize results, manage databases, improve information gathering and data management, and discuss how to use this framework to prioritize and identify desired conditions. The main outcomes from this session included how to incorporate USFS databases into the UC Davis system, a discussion pertaining landscape level analyses, and a discussion about the opportunity to identify needs for monitoring. The next steps from this conversation are to add more data to the databases, add on option in the database to request needs for meadow monitoring, and add several additional attributes to the UC Davis dataset (ownership, climate, etc.)

Please send your data to Dave Waetjen of UC Davis!

Conservation Strategies and Metrics Moving Forward

Session Leads: Rene Henery, Jim Wilcox, Matthew Foster

The objective of this session was to present information specific to proposed metrics and monitoring efforts that have taken place and for future application of these metrics. We were short on time and weren't able to discuss specific metrics during this discussion, however it was a bigger picture integration, management, and planning conversation and therefore were unable to reach consensus about which methods and metrics should be used to track progress on meadow restoration efforts. Other outcomes included a discussion regarding the implementation of the Sierra Nevada Meadows Business Plan, current conservation strategies within the plan, and proposed changes to conservation strategies. Information derived from this session will help to inform NFWF Business Plan revisions as well as state and federal agency planning processes as it pertains to meadow restoration efforts.

Methodologies for Monitoring and Evaluating Meadows

Session Leads: Sabra Purdy, Luke Hunt, Amy Merrill

The purpose of this session was to discuss methodologies for monitoring and evaluation of meadow restoration and management. This session reviewed current monitoring tools and methodologies being used, and identified gaps and opportunities for future monitoring and evaluation. The primary outcomes from this discussion were that some "tools" are available for meadow features however these tools need to be enhanced. Indicators and metrics must be reassessed and tied to specific questions, and that integrated indicators for different scales (spatial, temporal) of response are critical to assessing monitoring indicators.

Focal Species Metrics Breakout Session

(A) Fish-Golden Trout, Lahontan Cutthroat Trout, Eagle Lake Rainbow Trout, and Redband Trout.
Session Leads: Kurt Fesenmyer, Roger Bloom, Sabra Purdy, Nina Hemphill

General comments

- Density estimate may not be that appropriate in many cases (i.e. golden trout)
- Need to differentiate between focal species and indicator species
    - Native trout focal species may not always be effective or adequate indicator species
    - Native fish assemblage or relative percentage native vs. non-native may be more effective
- Fish condition/ status a key component that is missing in some cases
- Climate considerations and vulnerability should be factored in
- Timeframe of the metric needs to be appropriate to the timeframe of the restoration approach

Specific Components

Species

- Presence/ absence
- Historic vs. current occupied area
- Limiting factors addressed
    - Identify limiting factors at project, watershed, range scales

Habitat/ Ecosystem

- Stream Bank Condition
- Food Web Relationships
- Macro Invertebrates/ prey availability
- Temperature
- Habitat heterogeneity
- Sediment/ turbidity
- Road crossing/ road density as potential surrogate
- Flow
- Retention and persistence of cold water
- Hydrologic Resilience
- Shading
- Substrate
- Cover
- Inundation
- pH and DO
- Patch dynamics/ tributary connectivity

Next Steps

- Rene to work with Roger B, and David L on:
    - Limiting factors map for target fish species
    - Proposed metrics for target species
- Fish Metrics to be compared with Amphibian and Bird for overlap as those evolve

- **(B) Birds**-Willow Flycatcher and Yellow Warbler.

  Session Leads: Helen Loffland, Ryan Burnett

The major outcomes from this discussion included developing a series of species specific goals and metrics based on habitat needs and population targets for the Willow Flycatcher, Yellow Warbler, and an additional measure of focal species richness. For additional information about focal bird metrics Helen and Ryan have drafted a summary report of their findings from this session that is available by request.

Willow Flycatcher Goals and Metrics

- # or acres of total meadow area restored
- # or acres of willow restored/created
- # of Willow Flycatcher territories added to population territories added to population through restoration or recolonization
- Average percent of each restored meadow acre with willow cover
- Average percent of each restored meadow acre with cover from standing water or sheet flow in June and July

Additional Goals and Metrics for Focal Birds

- Yellow warbler density (# of individuals per acre)
- Focal Species Richness (# of focal species per acre)

(C) Amphibians-Yosemite Toad, Sierra Yellow Legged Frog, and Mountain Yellow Legged Frog.

Session Leads: Cathy Brown, Sarah Yarnell

The major outcomes from this discussion included developing a series of species specific goals and metrics based on habitat needs and population targets for the yosemite toad, pacific coast frog, salamanders, newts, mountain yellow legged frogs, sierra yellow legged frogs, and the cascades frog. We discussed the life history and habitat preferences for each of these species and prioritized a list of metrics that included…

- Vegetation Cover
- Willow Cover
- Presence of Non-Native Species
- Presence of Crayfish
- Presence of Bull Frogs

(D) Mammals- Beaver

Session Leads: Kate Lundquist

This session discussed the importance and role of Beaver (*Castor canadensis*) with Sierra Nevada and Cascade meadow restoration projects. A list beaver metrics was summarized by the group which was drafted by Kate, and a discussion regarding the potential benefit and degradation that Beaver populations have on meadow restoration ensued. The major outcomes were the identified need to plan for beaver colonization in restoration planning, the need to educate landowners about the benefits of beaver and offer non-lethal management strategies, the need to start using beaver dam reinforcement to increase the durability of ephemeral dams, and identify the need to continue work with CDFW to adopt improved beaver management policies.

Data Market Place Conversation

Session Leads: Dave Herbst, Ryan Peek, Dave Waetjen

We had a discussion regarding what geospatial data are available (species, habitat, databases etc.), how the data can be used to enhance meadow restoration efforts, and identified key gaps in data. The "data market place", table will be available to bring and share literature, data sets, maps etc. Desired outcomes included an inventory of potential data resources and collection of meadow related materials that can be collated and made available to those interested after the workshop. Contact Dave Waetjen with all meadows related data.

Wednesday 2/5/14

Climate Change and Ecosystem Resiliency

Session Leads: Dave Herbst and Sarah Yarnell

This discussion pertained to the role of climate change and ecosystem resiliency in meadow ecosystems and identified meadow restoration practices that mitigate the effects of climate change. The main outcomes included an increased awareness of the effects of climate change on meadow ecosystems, an identification of opportunities relevant to forest planning and climate change, and to offer solutions for meadows restoration practitioners to adapt to the impacts of climate change. Sarah and Dave addressed the need for a sustainable framework for long term funding and additional monitoring metrics that take into account resiliency and adaptability from climate change (water storage and carbon storage).

Livestock Grazing and Vegetation Management (Breakout Session A)

Session Leads: Dave Weixelman, Greg Haller

This group discussed the role of livestock grazing and vegetation management in meadow ecosystems and identified opportunities relevant to forest planning. Dave presented on recent findings of meadow conditions and results from Proper Functioning Condition (PFC) analyses conducted by the Forest Service throughout the Sierra Nevada. The major outcome from this session was a recommendation to draft and identify desired conditions and future management recommendations for the future of livestock grazing and vegetation management within meadow ecosystems.

- The Forest Service has been monitoring meadows on 670 plots in the Sierra Nevada since 1999. Each of those plots are visited every 5 years and the plots are permanently marked
- Meadow condition is rated using plant species composition and amount of bare ground to determine the condition class or successional stage of the meadow.
- Results indicate that 76% of the meadow plots are meeting desired conditions, i.e. 76% of the plots are in either the Good or Excellent condition class, while 24% are in the Fair or Poor condition class.
- Results indicate that these 760 meadow plots are, on average in stable ecological condition since 1999, meaning there is no statistical trend either up or down since 1999.
- Results also indicate that plant species richness and diversity have significantly increased since 1999 on the monitoring plots.
- There was some discussion on reasons for this increase, potential reasons discussed included drying of meadows.
- There was some discussion on identifying meadows that have incised and how best to identify where those occur and how livestock grazing should be managed on those areas.

Greg Haller referenced opportunities that the new Forest Planning rule provides for protecting and restoring meadows in new forest plans. Additionally (and primarily), policy recommendations for protecting and restoring meadows such as were made, and included: The creation of meadow reserves; eliminating grazing above 1500 meters (in central and northern sierra) and 2000 meters in the southern Sierra; the establishment of new management standards in meadows and smaller refugia, including: the assertion of federal water rights, withdrawing these areas from mineral entry; prohibition of headwater impoundments, prioritization of restoration, strengthen disturbances limitations; and allow chemical application (to combat noxious/invasive plants) only as a limited exception to a general prohibition. Additionally, Greg recommended whole-meadow, larger scale grazing management actions over spatially restricted actions like exclusion fencing; include the role and ecological needs of beaver when establishing restoration criteria for meadows.

Roads, Trails, and Desired Management Conditions (Breakout Session B)

Session Leads: Sue Britting, Karen Schambach, FS

This group discussed roads and trails in meadow ecosystems and identified opportunities relevant to forest planning. The desired outcome from this session was an identification of desired conditions and future management recommendations for the future of road and trail management within meadow ecosystems.

Climate Change and the Implications of Meadow Management (Breakout Session C)

Session Leads: Dave Herbst, Sarah Yarnell

This group discussed the developing problems of meadow integrity related to the syndromes of climate change impacts, and especially to current and projected drought conditions. The major outcomes included a discussion regarding how meadow restoration strategies and approaches can be designed so that they also provide for mitigation of climate change effects on meadow ecosystems. This conversation ended with consensus among the group that increased meadow funding opportunities are necessary and a sustainable framework must be implemented to address meadow management and climate change.

Synthesis of Workshop and Next Steps

Session Leads: Mark Drew, Elizabeth Soderstrom, David Lawrence, Carly Vynne

The goal of this discussion was to synthesize information derived and collated from the NFWF meadows workshop and identify where there is agreement and remaining disagreement regarding meadows management recommendations. The group identified opportunities for increased alignment and information sharing between the state and federal government, NGO's, and academia and identified next steps to enhance the health and long-term viability of Sierra Nevada and Cascades meadow ecosystems. The take home message from the synthesis and conclusion conversation was a recommendation to start a meadows working group that could implement a Meadows Institute or draft a Conservation Strategies document to inform future management of meadow ecosystems throughout the Sierra Nevada and Cascades.

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