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Red Bluff

I hope we can send a rep to emphasize that DWR (via the water plan and IRWM) advocates for heathy watersheds which are intrinsically more resilient and therefore adaptable to changing climate and other stressors allowing for easier human adaptation to changing hydrology.

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DEPARTMENT OF WATER RESOURCES MISSION STATEMENT

To manage the water resources of California, in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.

The California Water Action Plan (WAP) was developed to move California toward more sustainable water management. The WAP includes three objectives: 1) more reliable water supplies; 2) restoration of important species and habitat, and 3) a more resilient sustainable managed water resources system.

There is broad agreement that the state's water management system is currently unable to satisfactorily meet both ecological and human needs, too exposed to wet and dry climate cycles and natural disasters, and inadequate to handle the additional pressures of future population growth and climate change.

Solutions are complex and expensive, and they require the cooperation and sustained commitment of all Californians working together.

To be sustainable, solutions must strike a balance between the need to provide for public health and safety (*e.g.*, safe drinking water, clean rivers and beaches, flood protection), protect the environment, and support a stable California economy.

Challenges for Managing California's Water Resources

- *Uncertain water supplies –*
- *Water scarcity/drought*
- *Declining groundwater supplies*
- *Poor water quality*
- *Declining native fish species and loss of wildlife habitat*
- *Floods*
- *Supply disruptions*
- *Population growth and climate change further increase the severity of these risks*

Restore Key Mountain Meadow Habitat

The Department of Fish and Wildlife, *in coordination with other state resource agencies* , will restore 10,000 acres of mountain meadow habitat in strategic locations in the Sierra Nevada and Cascade mountain ranges, which can increase groundwater storage and provide habitat for more than 100 native species, many of which are at risk as threatened or endangered. The department will also coordinate with federal agencies, local governments, conservation organizations, tribes, and others as necessary on this action to maximize efforts and avoid duplication.

Protect and restore degraded stream and meadow ecosystems to assist in natural water management and improved habitat.

Meadows provide a natural storage opportunity, critically important with a changing climate, while properly functioning stream systems reduce downstream sedimentation and enhance critical aquatic habitat.

Encourage Flood Projects That Plan for Climate Change and Achieve Multiple Benefits

- **Projects should be developed in a manner that anticipates the extremes that are predicted to worsen due to climate change, and pursue multiple benefits as a climate adaptation strategy like increasing water supply reliability, giving rivers more room to move through widening floodways, conserving farmlands, and restoring ecosystems.**

All Californians have a stake in our water future. These actions set us on a path toward reliability, restoration, and resilience in California water. We must adapt to this “new normal” and recapture California’s resource management leadership and our economic and environmental resilience and reliability.

Climate Change

Gov. Brown's Executive Order on Climate Change B-30-15 that includes these directives:

- **The California Natural Resources Agency shall update every three years the state's climate adaptation strategy, safeguarding California, and ensure that its provisions are fully implemented.**
- **State agencies' planning and investment shall be guided by the following principles …Natural infrastructure solutions should be prioritized.**

Water Code CHAPTER 1. General State Policy

- **(a) It is hereby declared to be the established policy of the state that source watersheds are recognized and defined as integral components of California's water infrastructure.**
- **(c)(2) Recognizing the critical role of source watersheds in enhancing water supply reliability, <u>the maintenance and repair of source watersheds is eligible for the same forms of financing as other water collection and treatment infrastructure.</u>**

(3)(c) Eligible maintenance and repair activities pursuant to this section are limited to the following forest ecosystem restoration and conservation activities:

- **Upland vegetation management to restore the watershed's productivity and resiliency.**
- **Wet and dry meadow restoration.**
- Road removal and repair.
- **Stream channel restoration.**

DWR Grants:

- **IRWM**
- **Prop 70**
- **Prop 84 Prop 1**
- **Over 60 million spent to date on stream and meadow restoration.**

DWR Northern Region Office

- Grant management for over 10 million in restoration grants
- Partnering for direct work on Meadow Restoration
  - Last Chance Creek (Plumas County)
  - Thompson meadow (Plumas County)
  - Upper Pit river (Modoc County)

Last Chance Creek 2003

Last Chance Creek May 2005

Last Chance Creek May 2005

Thompson Creek Meadow

Thompson Meadow Restoration and Water Budget Evaluation Project

This project proposes to implement restoration on a 70 acre meadow along Thompson Creek and conduct detailed pre- and post-project hydrologic and environmental monitoring to evaluate the effects of stream and meadow restoration.

Purpose and Objectives

- **Plumas National Forest (PNF) and the California Department of Water Resources (DWR) are working in partnership with the Upper Feather River Watershed Roundtable on the Thompson Meadow Restoration and Water Budget Evaluation Project.**
- **The primary purpose of the project is to provide a greater understanding of meadow function restoration in changing climatic conditions in the Sierra Nevada for stakeholders, decision makers, and the public.**

Purpose and Objectives

Project Goals:

- **The objective of the Project is to improve the understanding and quantification of meadow restoration effects in the Sierra Nevada.**

- **Degraded meadows often have incised channels that alter meadow function, change base-flow conditions, and deplete shallow groundwater storage, all of which result in conversion from wet meadow to xeric landscape conditions.**

Purpose and Objectives

Project Goals:

- **Restore the natural ecosystem function of the channel/floodplain system**
- **Restore Native riparian plant communities**
- **Estimate changes in total stream flow out of the meadow before and after meadow restoration**
- **Assess the flood attenuation effects of a restored meadow**
- **Create a surface-groundwater model of the meadow to study restoration effects on both surface water and groundwater components**

Thompson Meadow (looking downstream)

Hydrologic Monitoring

- Surface water monitoring
- Groundwater monitoring
- Aquifer Characteristics
- Topography
- Meteorological
- Soil moisture monitoring

Hydrologic Monitoring

Weir and flume structure immediately downstream of the proposed meadow restoration project and is one of 3 weir structures that continuously record water elevations and flow rate.

Hydrologic Monitoring

Groundwater wells and modified surface renewal station to calculate actual evapotranspiration of meadow vegetation.

Purpose and Objectives

- **The project proposal directly supports two of California Department of Fish & Wildlife's (CDFW) Proposition 1 Watershed Restoration Grant Program funding priorities.**

- **First, it will restore a mountain meadow ecosystem in the upper Feather River Watershed, and second it will provide multiple benefits in the headwaters of the California State Water Project (SWP).**

- **The project furthers the implementation of two California Water Action Plan actions:**

- **1) protect and restore mountain meadow ecosystems**

- **2) manage headwaters for multiple benefits**

Thompson Creek DWR Tasks

- **Project planning**
- **Pre-project monitoring**
- **Project construction**
- **Post project monitoring**

Climate Change Considerations

- **Mountain meadows above reservoirs can add incremental seasonal precipitation retention to counteract the rapid run-off resulting from rain versus snow precipitation.**
- **The Project will reconnect the channel to the floodplain through a series of grade control features. Raising the channel will rehydrate the meadow by increasing groundwater levels.**
- **Floodplain access helps to attenuate floods by slowing the velocity of flow and allowing infiltration to shallow groundwater, resulting in improved function and improved habitat.**

Climate Change Considerations

- **Restoring functional meadow hydrology that is currently dysfunctional due to climate or anthropogenic effects, will improve the resiliency of the ecosystem to withstand increased variability.**
- **According to the California Water Action Plan, "...there is a critical need to address the following: Protect and restore degraded stream and meadow ecosystems to assist in natural water management and improved habitat.**
- **Meadows provide a natural storage opportunity, critically important with a changing climate, while properly functioning stream systems reduce downstream sedimentation and enhance critical aquatic habitat." (pp. 10)**

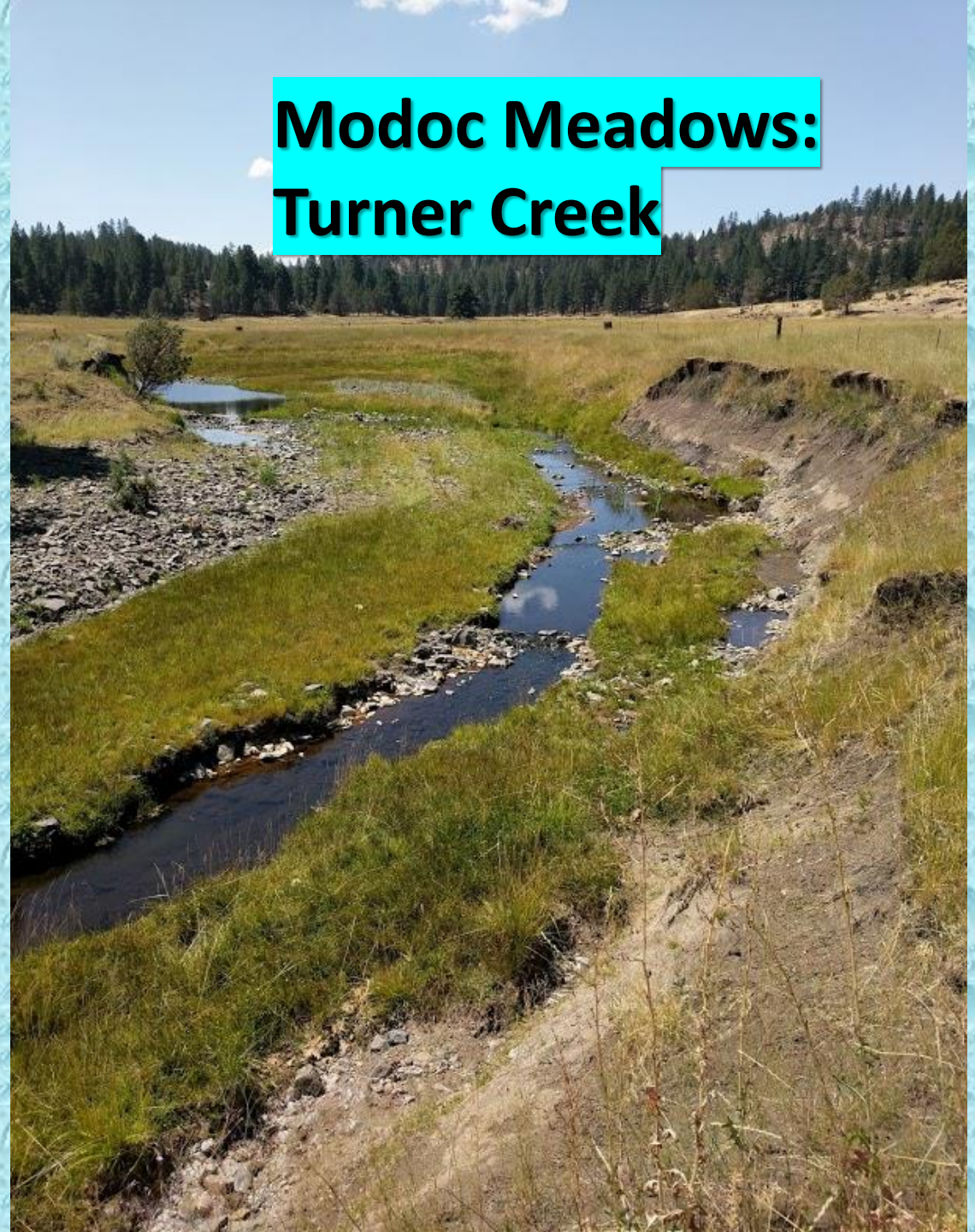
Climate Change Considerations

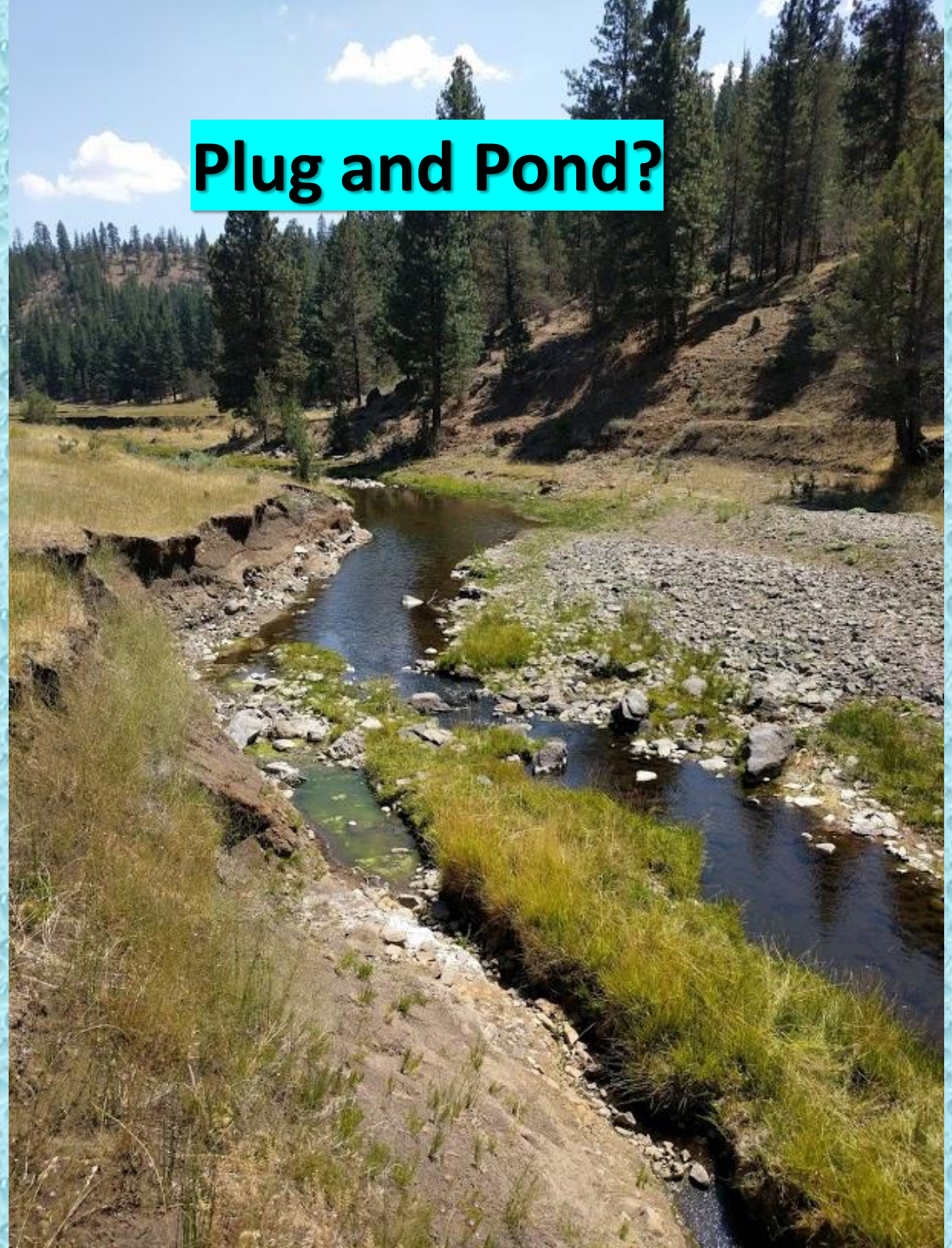
- **Once restored, groundwater should be released naturally throughout the year contributing cool water to stream base flows, which is beneficial to native fish populations.**
- **Meadow restoration also helps reduce greenhouse gases through carbon sequestration.**

Thompson Creek Timeline

- 7 years of pre-project monitoring (began 2012)
- Project Design
- CEQA/NEPA Permits 2017-2019
- Construction anticipated in July 2019
- 5 years of post-project monitoring (begin 2019)

- DWR is funding:
  - Monitoring network
  - Data collection
  - Groundwater model development
  - Data analysis
  - Final reporting of assessment


Modoc Meadows:
Turner Creek


Plug and Pond?

Patterson Meadow

Opportunities for Fen and Vegetative Mat Techniques

Fitzugh Creek


Great Opportunity for BDA's


Questions?