# Mountain Meadows & Native Trout: Maximizing Restoration Through Collaboration & Analysis


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California Trout
Trout Unlimited
University of Nevada, Reno
University of California, Davis

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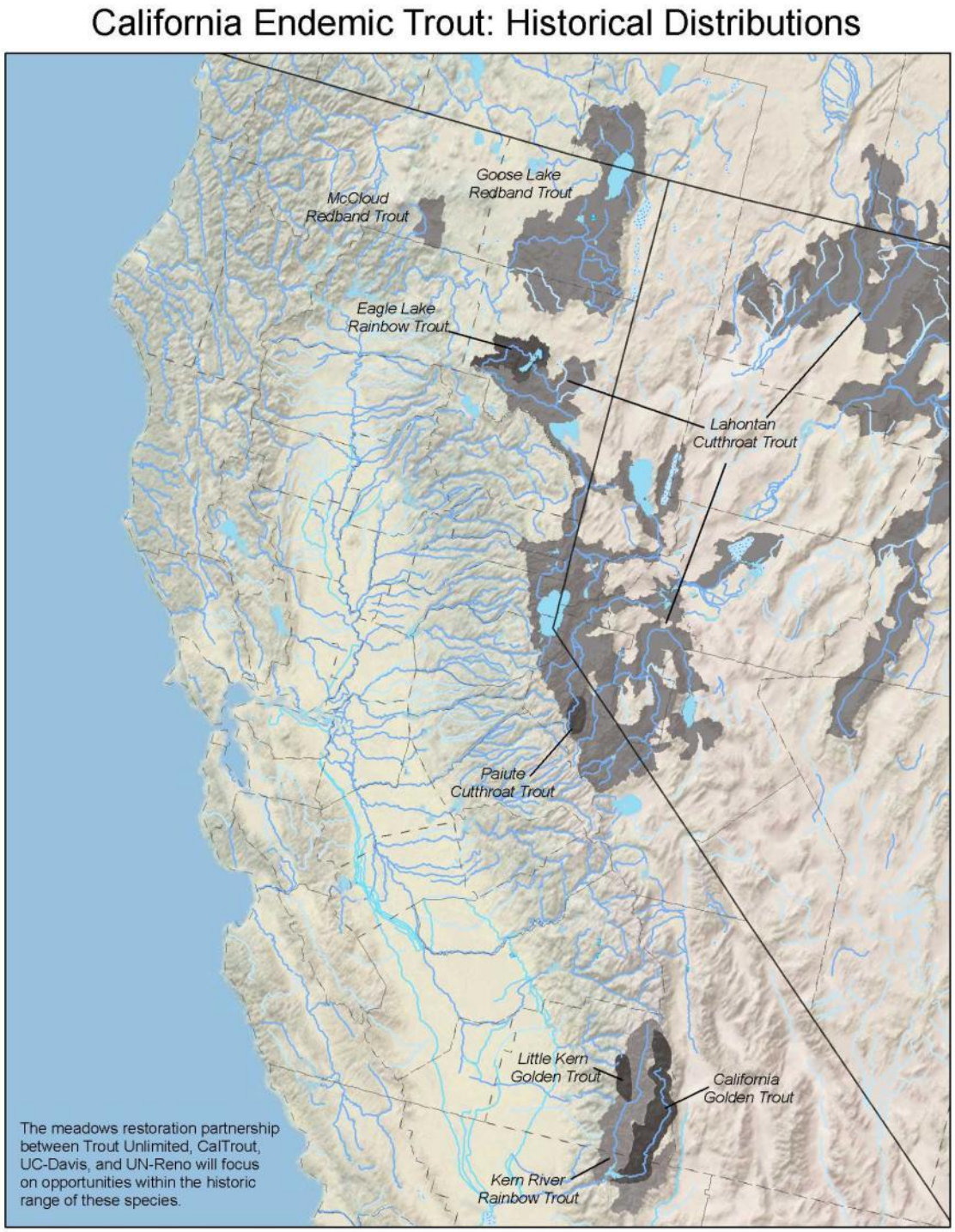
# Fish need meadows too!

- California's native trout and salmon are in serious decline. A recent assessment determined that 65% of these species were in danger of extinction within this century!
- Native inland trout species are often especially vulnerable due to limited or fragmented ranges, climate change, introduced and invasive species, land use history, etc.
- Meadows are critical components of the mountain landscapes that make up much of the critical habitat for these trout
  - Regulate flow and temperature
  - Support riparian and bank habitat, and provide structure for in stream habitat
  - Support the invertebrate prey and ecosystem functions necessary to maintain healthy fish populations
- But… native trout often overlooked as a primary focus for meadow restoration.

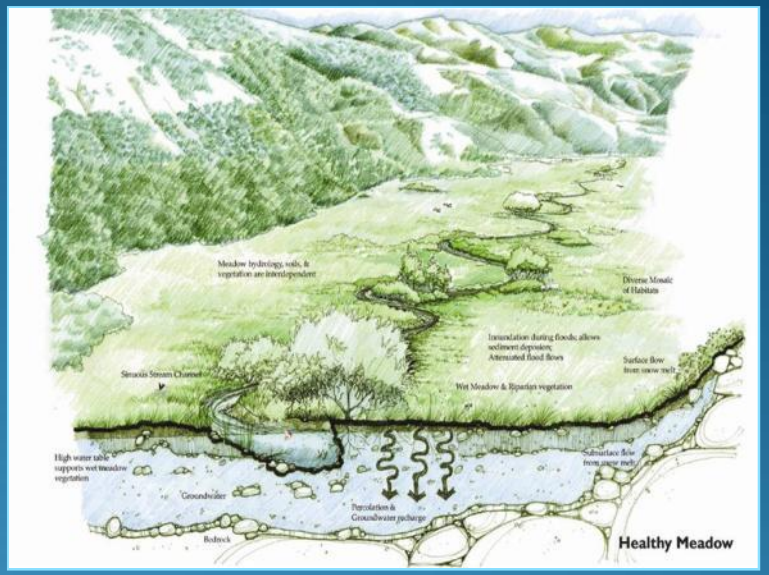
# The Players

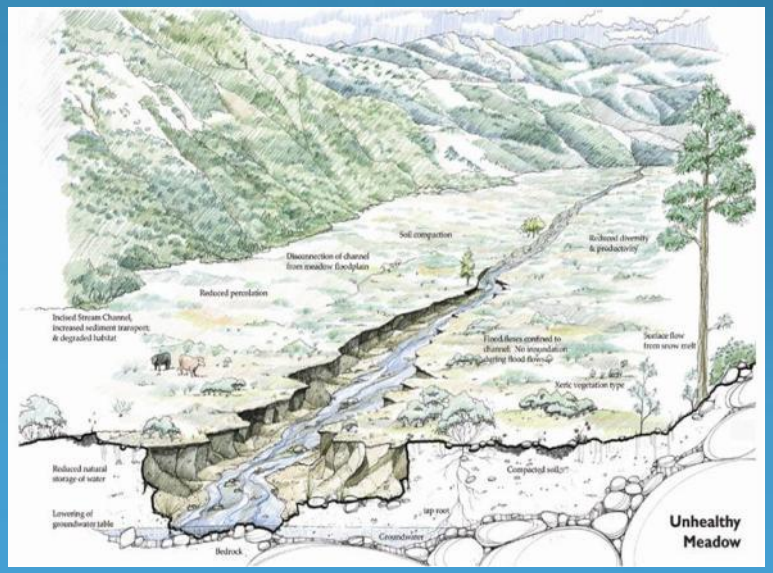
- Goose Lake Redband Trout
- McCloud Redband Trout
- Eagle Lake Rainbow Trout
- Lahontan Cutthroat Trout
- Paiute Cutthroat Trout
- Little Kern Golden Trout
- California Golden Trout
- Kern River Rainbow Trout



# Purpose

- To develop a robust and flexible set of tools that can be used to evaluate the effects of meadow restorations on fish populations pre- and post-restoration
- To broaden the scientific understanding of appropriate meadow restoration practices
- To guide restoration practices and restore resilience in meadow ecosystems in order to recover populations of California's inland native trout



# Deliverables

- **Review restoration plans** with resource managers and restoration practitioners to understand protocols of meadow restoration efforts

- **Develop methods for assessing and monitoring** a given restoration project's potential to improve structure and function of meadow systems with an emphasis on habitat conditions and the maintenance of fish populations over the long-term

- **Prioritize opportunities to restore meadows** within the ranges of CA's inland native trout, based on feasibility, likelihood of success, and the specific needs of the associated native trout species

- **Build collaboration with other NFWF projects and Meadow restoration efforts** so that deliverables support a synergistic understanding and prioritization across interests and regions.

# The Challenges:

- Wide geographic range
- Different factors limit different fish in different places
- Projects are in various states from "just being planned" to "done and forgotten"
- "*Meadow Restoration*" is a broad term – many approaches, many practitioners

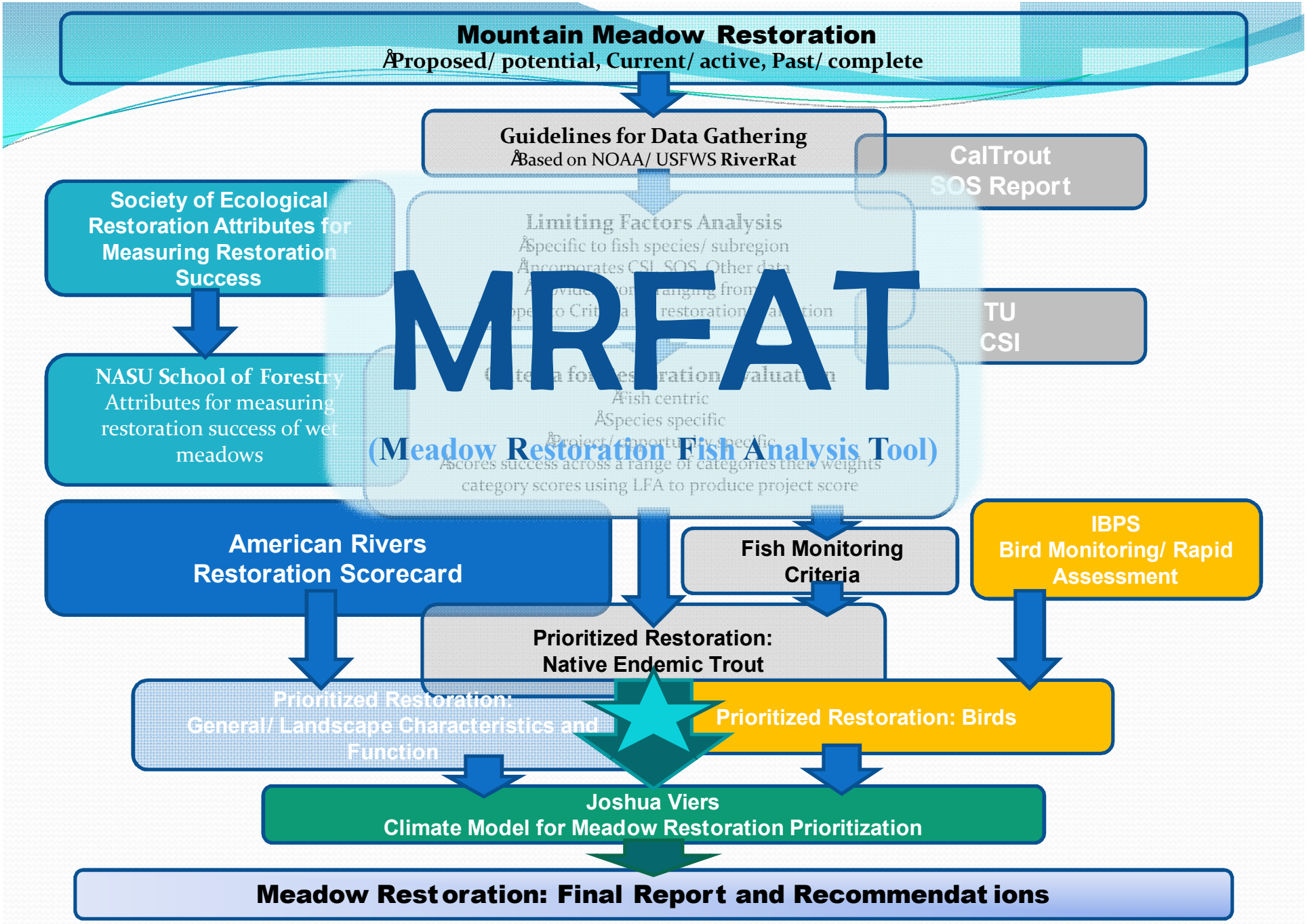
and…

- Established/ existing priorities may not consider fish!

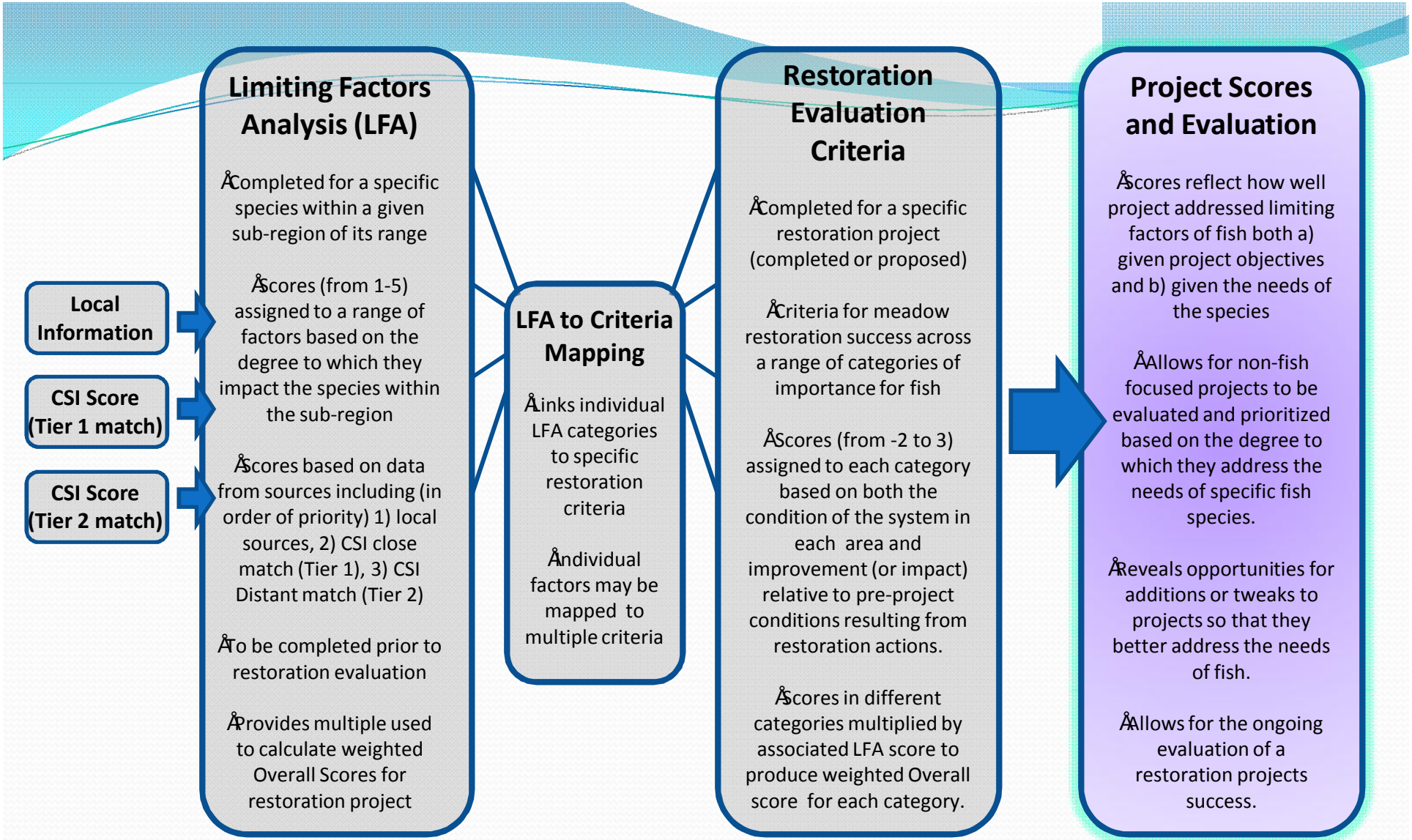
…The HORROR!!

# Tools

- RiverRAT - A 16-question tool designed to critically evaluate planned stream restorations
  - Used as a guideline for project information and data collection prior to review
- SOS - *State of the Salmonids Report* developed by UC Davis commissioned by CalTrout
  - Used as a reference for limiting factors affecting CA's eight inland native trout species
- CSI - Conservation Success Index developed by Trout Unlimited
  - Used to determine a baseline conservation status and identify threats for specific species in specific subportions of their ranges.
- MRFAT - The novel *Meadow Restoration Fish Analysis Tool* developed by our team
  - Used to 1) analyze the limiting factors for a given fish species in a specific portion of their range and 2) evaluate the effects of a specific meadow restoration project for a given fish species in the context of its limiting factors.




**Project flow for operative project components (gray/center), including overlap and synergy with other related projects under NFWF and associated evaluation schemas, both existing and in development.**




**Overview of MRFAT including a) Limiting Factors Analysis specific to species and region, b) Restoration Evaluation Criteria, c) project scoring and evaluation and d) associated inputs and mapping.**

# MRFAT - Scoring and Evaluation

- Each of the categories scored during the restoration evaluation is mapped to one or multiple specific limiting factors.

- Result - A weighted overall score in each category where:

**Restoration Score**

**x**

**Limiting Factors Score**

**= Overall Score**

**(Possible Score of -5 to 15)**

- Assessment and scoring are performed in collaboration with regional managers and practitioners

# Key Findings and Opportunities

- In many cases, restoration practitioners not considering fish
  - New awareness of potential unintended consequences (e.g. invasive species proliferation) and opportunities to take action
  - Minor enhancements (design, management, monitoring) with great potential benefit to fish (more bang for your restoration buck)
- Fish are often a great indicator of success
  - Litmus test for stream ecology, temperature, flows, and WQ
- Improving pre and post monitoring is essential
- Important to consider limiting factors on a larger scale
  - Is population migrating?
  - Genetic bottlenecks?
- Collaboration is key
  - Planning, prioritization, lasting effect
- Climate change is a critical part of the picture

# Recommendations and Next Steps

- Use MRFAT to assess new and existing projects
- Implement pre and post project monitoring to track effects and measure success
- Collaboration with other partners
- Improve existing projects
- Develop and implement new projects
- Develop Meadow Consortiums or work groups for key systems/ regions and be sure to **include the fish people**!

# Thank you!


"Sorry, pal. Illiteracy is no excuse for breaking the law."