E R R C

Eel Russian River Commission
501 Low Gap Rd., Rm. 1010 ♦ Ukiah ♦ California 95482 ♦ (707)463-4441 ♦ fax (707)463-7237

HUMBOLDT COUNTY	MENDOCINO COUNTY	SONOMA COUNTY	Lake County
Estelle Fennell – Chair	Carre Brown	James Gore – Vice Chair	Jim Steele
Rex Bohn	John McCowen	Lynda Hopkins	

AGENDA

DATE: November 17, 2017

TIME: 10:30 A.M

PLACE: Sonoma County Permit and Resource Management Hearing Room
2550 Ventura Avenue
Santa Rosa, CA

1. **ROLL CALL**

2. **APPROVAL OF MEETING MINUTES**
   2a) June 8, 2017, Regular Meeting

3. **CATASTROPHIC FIRES UPDATE AND REMEDIATION EFFORTS**
   Presenter/s: Mr. Drew Coe, Forest Practice Monitoring Program Coordinator, CAL FIRE
   (30 Minutes)

4. **POTTER VALLEY PROJECT FISHERIES STUDY UPDATE**
   Presenter/s: Mr. Paul Kubicek, Senior Consulting Scientist, Pacific Gas and Electric Company; and Mr. Park Steiner, Fisheries Biologist, Steiner Environmental Consulting
   (30 minutes)

5. **POTTER VALLEY PROJECT FERC RELICENSING UPDATE**
   Presenter/s: Ms. Susan Kester, Project Manager, Pacific Gas and Electric Company
   (30 minutes)

6. **SOUTH FORK EEL RIVER SALMON HABITAT RESTORATION PRIORITIES**
   Presenter/s: Mr. Allan Renger, Senior Environmental Scientist (Supervisor), California Department of Fish and Wildlife; Southern Humboldt and Mendocino Counties Freshwater Fisheries

7. **REPORT ON SUSTAINABLE GROUNDWATER MANAGEMENT PLANS**
   7a) Regional Updates

8. **COMMISSIONER REPORTS**

9. **OTHER BUSINESS**
   9a) ERRC Audit Discussion
   9b) Lake County Alternate

10. **PUBLIC EXPRESSION**
    The Commission limits testimony on matters not on the agenda to 3 minutes per person and not more than 10 minutes for a particular subject at the discretion of the Chair of the Commission.

Any materials related to items on this agenda distributed to the Commissioners of the Eel Russian River Commission less than 72 hours before the public meeting, are available for public inspection at the Commission's office located at: 501 Low Gap Road, Room 1010, Ukiah. Upon request, these materials may be made available in an alternative format to persons with disabilities. An electronic copy of the agenda may be viewed online at: http://www.mendocinocounty.org/government/planning-building-services/mendocino-county-water-agency

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Directions to the Sonoma County Permit and Resource Management Hearing Room located at:
2550 Ventura Ave., Santa Rosa, CA 95403

From the North:

- Take US-101 S to exit 491 for Steele Ln Guerneville Rd
- Use the middle lane to turn left onto Guerneville Rd/Steele Ln
- Use the left 2 lanes to turn left onto County Center Dr
- Turn right onto Administration Dr
- Turn left onto Ventura Ave

From the South:

- Take US-101 N to exit 491B for Bicentennial Way
- Keep right at the fork, follow signs for Bicentennial Way/E Sonoma Co Admin Center and merge onto Bicentennial Way
- Turn right onto Ventura Ave

Thank you for your interest in the proceedings of the Eel Russian River Commission.

Eel Russian River Commission

Agenda Summary

ITEM NO.: 2a

TO: Eel Russian River Commission

AGENDA TITLE:

June 8, 2017, Regular Meeting

MEETING DATE: November 17, 2017

ITEM TYPE: Minutes **TIME ALLOCATED FOR ITEM**: 5 min

ACTION:

MOTION: **2nd**

E e l R u s s i a n R i v e r C o m m i s s i o n
501 Low Gap Rd, Room 1010, Ukiah, California, 95482 ♦ (707)463-4441 ♦ fax (707)463-5649
Website: **www.eelrussianriver.org** Email: **errc@co.mendocino.ca.us**

HUMBOLDT COUNTY
Estelle Fennell – Vice Chair
Rex Bohn

MENDOCINO COUNTY
Carre Brown – Chair
John McCowen

SONOMA COUNTY
James Gore
Lynda Hopkins

DRAFT SUMMARY MINUTES – June 8, 2017

Mendocino County Board of Supervisors Chambers
501 Low Gap Rd, Room 1070, Ukiah, CA 95482

Agenda Item No. 1 - Roll Call (9:03 A.M.)
The following Commission members were present: Chair Carre Brown, Mendocino County Representative; Vice Chair Estelle Fennell, Humboldt County Representative; and James Gore, Sonoma County Representative. Chair Carre Brown presiding

The Clerk noted that Lake County Supervisor Jim Steele was also present at the dias. Supervisor Steele announced his intention to serve as a Commissioner from this point forward.

Also Present:

Ms. Maritza Flores Marquez, Mr. Paul Kubicek, Mr. Park Steiner, Ms. Susan Kester, Ms. Laurel Marcus, and Ms. Pam Jeane.

Agenda Item No. 2 - Approval of Minutes for October 26, 2016 Meeting

Upon motion by Commissioner Fennell, seconded by Commissioner Gore, and carried unanimously; IT IS ORDERED IT IS ORDERED that the October 26, 2016, minutes of the Eel Russian River Commission are hereby approved.

Agenda Item No. 3 - Sustainable Groundwater Management Act

a) **Ukiah Valley Groundwater Basin Water Budget** – Presenter: Ms. Maritza Flores Marquez.

Ms. Flores Marquez provided an overview of process for developing a groundwater budget study including methodology and data sources; as well as an overview of agricultural and municipal water use in the Basin. Ms. Flores Marquez noted that the average aquifer recharge is much greater than the average aquifer extractions and that groundwater storage levels have remained fairly stable in the past 25 years; concluding that the Basin is not in overdraft. Ms. Flores Marquez further concluded that Russian River gains river November-June and loses river July-October and that there is groundwater connectivity between the Ukiah Valley Groundwater Basin and the Hopland Valley Groundwater Basin.

Commissioner Steele raised issues regarding basin levels and rate of recharge in the monitoring wells and suggested that it be taken into consideration in the study. Commissioner Gore asked if cannabis related water use use was accounted for in the study, Ms. Flores Marquez stated that it was not.

b) Humboldt County Update – Presenter: Commissioner Fennell

Commissioner Fennel stated that a Groundwater Sustainability Agency has not yet been formed in Humboldt County.

c) Mendocino County Update – Presenter: Chair Brown

Chair Brown stated that the Ukiah Valley Basin Groundwater Sustainability Agency has been formed and that the Ukiah Valley Basin Groundwater Sustainability Agency will hold a public hearing on June 15, 2017.

d) Sonoma County Update – Presenter: Commissioner Gore

Commissioner Gore stated that there are currently three Groundwater Sustainability Agencies in Sonoma County: Petaluma, Sonoma Valley, and Santa Rosa Plain. Commissioner Gore provided a brief overview on the challenges associated with each agency.

e) Lake County Update – Presenter: Commissioner Steele

Commissioner Steele reported that groundwater basins are not a primary area of concern for Lake County at this time.

Agenda Item No. 4 - Potter Valley Project Fisheries Study Update – Presenter: Mr. Paul Kubicek and Mr. Park Steiner.

Mr. Steiner gave an overview of hydrological conditions between Lake Pillsbury and Lake Mendocino. He stated that Lake Pillsbury did not fill in Water Year 2016, despite being a good water year. He characterized Water Year 2017 as an excellent water year and that the Water Year 2016 flow variance ended, Lake Pillsbury filled, early closure of gates at Scott Dam, a block water release was made in May-June. The fish ladder sustained damage during the winter storms and was forced out of service.

Mr. Kubicek noted that 435 Chinook salmon and 59 Steelhead arrived at Van Arsdale this past season. The low Steelhead numbers were related to the damage to the fish ladder. The Chinook Salmon Carcass Survey took place on Eel between November 3rd and December 7th, and the survey was shortened due to high water levels. The survey of Tomki Creek observed low number of Chinook Salmon. The scope of the summer surveys will be changing and is currently in discussion with National Marine Fisheries Service; fish rearing monitoring sites will be reduced and tributary sites will be revisited, and no changes are expected to Pikeminnow monitoring and suppression. Mr. Steiner also noted that two of the four Bald Eagle nest sites are occupied and have young.

Commissioner Fennell commented on the devastating effect of Pikeminnow and expressed enthusiasm for revisiting the tributary sites. Supervisor Steele commented on Pikeminnow populations and also asked if it would be possible to perform Pikeminnow stomach surveys. Mr. Steiner replied that it could considered in the Potter Valley FERC relicensing.

Agenda Item No. 5 Potter Valley Project FERC Relicensing Update – Presenter: Ms. Susan Kester.

Ms Kester provided an overview of the relicensing process, activities, and term; including an overview of the relicensing schedule from 2017 to 2022.

Supervisor Steele initiated a discussion on study criteria guidance. Commissioner Gore noted that he previously attended a similar presentation. Commissioner Fennell inquired about the process for submitting study requests.

Recess: 10:46-10:54 A.M.

Agenda Item No. 6 - "The Russian River Independent Science Review Panel – A Summary of Findings" - Presenter: Ms. Laurel Marcus.

Ms. Marcus provided an overview of funding, Independent Science Review Panel (ISRP) member selection, and tasks. Ms. Marcus presented background information on the features, climate, geology, historical conditions, changes along the river, groundwater basins, stream types, water use of the Russian River. Ms. Marcus presented the recommendations from the project. Ms. Marcus concluded that just below Coyote Dam would be a recommended focus area for future restoration projects as it is not feasible to restore cold water conditions to the remaining reaches of the Russian River.

Supervisor Steele thanked Ms. Marcus for the presentation. Commissioner Fennell thanked Ms. Marcus for the presentation and remarked on the challenges associated with unregulated water use related to cannabis cultivation. Commissioner Gore commented on the merits of the scope of the ISRP and was interested in how it could inform the Russian River Confluence. Commissioner Gore requested clarification on the peer review process. Ms. Marcus stated that seven applications were received for the four seats, a review panel reviewed and selected the applicants.

Agenda Item No. 7 – Report on the Invasive Species Management Plans

a) **Regional Updates** – Presenter: Ms. Pam Jeane.

Ms. Jeane reported that the Army Corps has $600,000 of planning money available. Ms. Jeane also reported that mussel dogs will be at the lakes through September and that there are no new infestations to report.

Commissioner Steele noted efforts in Lake County to prevent the spread of invasive mussels. Park Steiner noted that an annual survey is conducted at Lake Pillsbury to detect invasive mussels. Commissioner Fennell noted that there are currently no invasive Mussels at Ruth Lake.

Agenda Item No. 8 – Commissioner Reports – Presenter: Eel Russian River Commission.

Commissioner Fennell remarked on the positive effects of the significant rainfall this past winter and noted that Ruth Lake is filled. Chair Brown complimented the work of Patrick Higgins on the Eel River Recovery Project.

Agenda Item No. 9 – Other Business

a) **Eel Russian River Commission Budget** – Presenter: Chair Brown.

Chair Brown noted that the bills for clerk time have been paid for 2014, 2015, and 2016. Chair Brown noted an account balance of $8,400 and proposed that dues not be collected for 2017.

Upon motion by Commissioner Fennell, seconded by Commissioner Gore, and carried unanimously; IT IS ORDERED IT IS ORDERED that the Eel Russian River Commission shall not collect dues for 2017.

b) **Election of Officers** – Presenter: Chair Brown.

GENERAL CONSENSUS OF THE COMMISSION to appoint Commissioner Fennell as Chair of the Eel Russian River Commission and to appoint Commissioner Gore as Vice Chair of the Eel Russian River Commission.

Chair Fennel presiding at 11:54 A.M.

c) **Eel Russian River Commission Joint Powers Agreement** – Presenter: Commissioner Brown.

Commissioner Brown emphasized the importance of having a discussion regarding the Joint Powers Agreement on a future meeting agenda of the Eel Russian River Commission.

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501 Low Gap Rd, Room 1010, Ukiah, California, 95482 ♦ (707)463-4441 ♦ fax (707)463-5649
Email: **errc@co.mendocino.ca.us**

Agenda Item No. 10 – Public Comment – Presenters: Ms. Brenda Adelman, Mr. Mark Wheatley, and Chair Fennell.

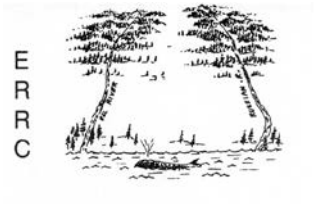
Ms Brenda Adelman complemented the presentations and expressed concern regarding Temporary Urgency Change Orders and toxic algae, and requested a report be given on those topics.

Mr. Mark Wheatley introduced himself to the Eel Russian River Commission as the new City Manager for the City of Fortuna.

Chair Fennell asked Commissioner Steele to select an alternate, if possible.

The meeting of the Eel Russian River Commission adjourned at 12:03 P.M.

_____
Nicole French, Clerk



Eel Russian River Commission

Agenda Summary

ITEM NO.: 3

TO: Eel Russian River Commission

FROM: CAL FIRE

AGENDA TITLE:

Catastrophic Fires Update and Remediation Efforts

MEETING DATE: November 17, 2017

PRESENTER/S: Mr. Drew Coe **PHONE:** (530) 224-3274

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: 30 min

ACTION:

MOTION: **2nd**

ADDITIONAL INFORMATION AVAILABLE AT: https://app.box.com/s/23l97tuagrlqhxeell4hx49yi1exuits.

State of California

Watershed Emergency Response Team (WERT) – Nuns Fire

Post-Fire WERT Evaluation

EXECUTIVE SUMMARY

2017-CA-LNU-010104 – Nuns WERT Evaluation

The Nuns Fire burned area was rapidly evaluated by an interagency WERT comprised of geologists, civil engineers, hydrologists, soil scientists, foresters, and GIS specialists. The WERT evaluated the burned watersheds to rapidly assess post-fire conditions, potential values at risk (VARs) related to human life-safety and property, and the potential for increased post-fire flooding and debris flows. The team also preliminarily evaluated potential emergency protection measures to help reduce the risks to those values.

The 2017 Nuns Fire started on October 8, 2017 in Sonoma and Napa counties and burned a total of 56,556 acres. The fire was fully contained on October 31, 2017. Approximately 1,000 buildings (residences, outbuildings and commercial buildings) were destroyed or damaged. The fire burned in watersheds that drain to Oakmont in the City of Santa Rosa, the Highway 12 corridor between Nuns Canyon and the City of Sonoma, Bennett Valley, and the western portion of Napa Valley. Land ownership within the Nuns Fire burn area includes:

• *County*	*1,753 acres*	*3.1 %*
• *Federal*	*397 acres*	*0.7 %*
• *Non-Profit*	*1,354 acres*	*2.4 %*
• *Private*	*44,841 acres*	*79.3 %*
• *Special District*	*1,457 acres*	*2.6 %*
• *State*	*6,755 acres*	*11.9 %*
• *Total*	*56,556 acres*	*100 %*

The fire area is located on both the west and east flanks of the northwest trending Mayacamas Mountains, draining into the Sonoma and Napa valleys. The fire area is also located on the Sonoma Mountains, draining into the Bennett Valley area, and in the Santa Rosa Creek watershed in the eastern portion of Santa Rosa. Overall the fire encompasses moderate to steep terrain, while the northern portion in the Hood Mountain area is characterized as very steep terrain. The fire area contains approximately 2,500 feet of vertical relief and ranges in elevation from about 200 to 2,730 feet. Vegetation in the burn area is largely comprised of coastal oak woodland, mixed chaparral, mixed hardwood/conifer forest, grassland, and vineyards. The burn area has been subject to moderate levels of the recent drought and sudden oak death.

Summary of the WERT Key Findings

- There are approximately 19,738 acres (34.9%) of unburned/very low soil burn severity, 25,846 acres (45.7%) of low soil burn severity, 10,124 acres (17.9%) of moderate soil burn severity and 848 acres (1.5%) of high soil burn severity within the fire perimeter.

- Hydrophobic soil conditions were common, though highly variable, within moderate and high burn severity areas.
- Eighteen sub-watersheds (i.e., pour points) were analyzed for increased post-fire flood hazards, including downstream areas in the Sonoma and Napa valleys. Post-fire 10-year return interval streamflows were estimated to increase from 1 to 73 percent. Smaller sub-watersheds with high to moderate burn severities showed the greatest increases.
- 255 sub-watersheds were modeled for post-fire debris flow hazards. Using a 0.94 inches/hour (24 mm/hr) threshold, 9 of the 255 basins (3.5 percent) have a likelihood of 60% or greater to produce post-fire debris flows.

The burn area was analyzed with two surface erosion models. For a 2-year recurrence storm event, the fire as a whole was modeled to have an average post-fire erosion rate of 12.1 tons/acre the first year following burning. This equates to at least a 10-fold increase in erosion the first post-fire winter compared to pre-fire conditions with this level of probability.

The different soil burn severity categories reflect changes in soil properties and are a key element WERT specialists use to determine if post-fire threats exist. High and moderate soil burn severity categories have evidence of severe soil heating and the consumption of organic material. Increased runoff due to ground cover reduction, burned soils and hydrophobic conditions is reflected in the flood flow analysis conducted for these watersheds. In summary, field observations and modeling of the high and moderately burned area support a general trend of increased flood flows, sedimentation, erosion, debris flows, and shallow landslides due to post-fire effects.

Identified Values at Risk, Threats, and Emergency Conditions

Emergency post-fire conditions for the Nuns Fire identified by the WERT include threats to the values at risk resulting from the potential for increased flood flows, increased erosion and sediment delivery, and debris flow occurrence. Most of the specific observations are reported as points, however 26 areas of potential flooding and debris flows are reported as polygons. Overall, 87 specific values at risk were identified, including:

- Over 200 homes (some are located in flood zones previously mapped by FEMA and DWR or post-fire modeled by the USGS)
- Over 20 culverts along State Highway and County Corridors
- 5 road-related areas
- Several miscellaneous structures (e.g., campground areas, recreational areas, outbuildings)

Over 30 of the values at risk were identified as being at high risk to life or property. Several watercourse crossings (either State Highways or County roads) were identified as moderate risk to property.

Key areas of concern are (1) possible debris flow and flooding impacts to the Adobe Canyon and Pythian Road areas, (2) flooding in the City of Sonoma and along Highway 12, and (3) sedimentation to local streams, Sonoma Creek, the Napa River, and Laguna de Santa Rosa. These observations are intended to be used as a preliminary indication of some of the most obvious areas of potential concern for follow-up work and more detailed evaluations by responsible federal, state, and local agencies. Specific observations are summarized in Appendix D.

Additionally, the potential for toxic laden runoff generated from burned homes and other structures in Bennett Valley, Kenwood, and Glen Ellen is a significant concern to domestic water supplies.

Nuns WERT General Recommendations

The WERT's objectives for the burned area are to quickly identify potential post-fire life-safety threats, including those from debris flows and flooding. General recommendations include:

- Utilizing early warning systems available to homeowners, particularly those located in flood prone areas.
- Performing storm patrols and monitor road drainage infrastructure.
- Properly locating temporary housing when rebuilding.
- Closing campground and recreational area access during storm events.

PROCEDURAL GUIDE
FOR

WATERSHED
EMERGENCY RESPONSE TEAMS

California Natural Resources Agency
California Department of Forestry and Fire Protection

October 10, 2017

Table of Contents

Background Information

Post wildfire evaluation work on non-federal lands in California has been conducted by the California Department of Forestry and Fire Protection (CAL FIRE) in numerous ways over the past 60 years, beginning with Emergency Watershed Protection (EWP) assessments. As per statute, CAL FIRE can conduct post burn rehabilitation work as part of its EWP program. Public Resources Code Sections 4675 and 4676 authorize CAL FIRE to establish and maintain vegetative cover on watershed lands and to maintain watercourse channels free of natural impediments or destructive materials during peak flood flows. The intent of activities conducted under this authority is to (1) conserve water and soil, and (2) prevent destructive floods. Examples of past work include post fire seeding for erosion control in high hazard areas and channel clearance to prevent over-bank flooding in populated areas.

Earlier CAL FIRE EWP efforts generally consisted of aerial applications of annual ryegrass seed to create surface cover following large wildfires. However, since the year 2000, the use of wide spread aerial grass seeding has been eliminated because numerous studies have shown that the seed does not sprout and grow quickly enough to prevent most of the erosion that comes in the first winter after a fire. The planted grass also competes with natural vegetation and can lead to less effective long-term cover conditions. Straw and wood mulch, which establishes cover prior to the first fall rains, has been shown to be much more effective in preventing post fire erosion. These treatments are expensive, however, and generally are only applied to very limited parts of a fire (0-2%) with identified high value assets. In addition, emphasis shifted after 2000 towards protection of lives and property following intense wildfires. Greater importance was placed on using hydrologists and geologists to assess conditions as well as utilizing early warning systems (e.g., ALERT rain gauges) and warning notices to evacuate or warn residents of debris flow and flooding potential, as determined by licensed geologists and hydrologists participating in the post fire evaluations.

State agency teams, patterned after USFS Burned Area Emergency Response (BAER) teams, were formed in 2007 and 2008 for numerous large fires in southern California (denoted as State Emergency Assessment Teams or SEAT teams). This process, however was viewed as expensive and slow in developing emergency protection measures. Little post fire evaluation work was conducted from 2009 to 2014, largely due to a limited number of large fires in southern California, lack of Presidential disaster declarations, and limited funding for this type of work, including no direct funding for the post fire mitigation work (leaving that to private landowners, the counties, NRCS, and others).

In 2007, CAL FIRE watershed staff developed a draft prioritization form to use to select which fires presented the highest risk to lives and property, which was revisited in 2015.

In the right situations, small state teams of licensed geologists, civil engineers, hydrologists, and GIS specialists can be assembled to assess risk to lives and property from debris flows and hyper-concentrated flood flows. In 2015, it was determined that post fire watershed emergency response was needed for the devastating Valley and Butte Incidents in Lake and Amador/Calaveras Counties, respectively.

Post fire Watershed Emergency Response Team work following major fires with significant threats to lives and property begins with obtaining a Burned Area Reflectance Classification (BARC) map (http://www.fs.fed.us/eng/rsac/baer/barc.html), field checking and refining the map, and then surveying the high severity burned areas and downstream values-at-risk to identify post-fire hazards. High value areas include homes, businesses, bridges and culverts, highways, campgrounds and resorts, water conveyance structures, power generating plants, and water supply reservoirs. Where protective vegetation and groundcover has been burned away, both erosion and runoff are increased and there is often a greater chance of shallow landsliding/debris flows from steep slopes and drainages. The increased flows following a fire can cause downstream flooding and can flush accumulated sediments from channels in mud-filled debris flows and torrents. The identification of areas at risk for surface erosion, flooding, and impact from debris flows is the critical first step toward developing emergency protection measures (EPMs).

Even when emergency protective measures are in place, weather is the dominant controlling factor determining what happens after a wildfire. A winter with gentle rains may produce little in the way of erosion or downstream problems, and may allow a burned area to recover with little additional damage (e.g., 2007 Angora Fire). Moderate to intense rain storms, however, can overwhelm even the most intensive of treatments, and cause damage that is as severe, or more severe, than the fire itself (e.g., 2012 Bagley Fire). Wildfire can significantly alter the hydrologic response of a watershed to the extent that normal rainstorms can produce dangerous flash floods and debris flows. As winter approaches, it is critical that people who live in and downstream from large fires implement emergency protection measures where appropriate, remain steadfast and alert of weather conditions, and be ready to evacuate if necessary during large winter storms.

In recent years, it has also become apparent that wildfires can result in the production of considerable amounts of toxic material, presenting a hazard to downstream water quality. Dependent on the number of burned structures and facilities, a limited hazmat evaluation may be appropriate in areas with high value domestic water sources.

In order to avoid duplication of efforts and make the most of funding opportunities, it is critical that watershed emergency response team efforts coordinate and compliment the efforts underway by federal and local agencies.

Screening Process for Prioritizing Wildfires for WERT Evaluations

Major wildfires primarily located on non-federal lands in California are to be **prioritized** for WERT evaluations based on several factors. These include:

- Fire size, location in relation to values at risk, and burn severity.
- Proximity of burned area to downstream housing developments.
- Potential damage to homes, businesses, and other values at risk from debris flows and flooding.
- Likelihood of debris flows and flooding based on geology, topography, climate, etc., with particular emphasis on potential threats to human life during the first winter season.

When these factors are considered, most fires will not require a formal WERT evaluation.

The key question to address is whether post-fire effects will pose a large enough threat to life, safety, and property to mobilize the WERT process. It is necessary to note that the procedure can be expanded or shrunk as appropriate (i.e., a full Phase I and II effort, or an abbreviated Phase I effort with a small state team).

Specific factors to consider include:

- High landowner percentage of non-federal lands (i.e., no federal BAER team to complete an assessment)
- Large percentage of the fire burned at moderate and high soil burn severities (or estimated to have burned at moderate to high severities)
- Slope steepness (percentages in low, moderate, high)
- Significant number of homes/subdivisions potentially impacted by debris flows and/or flooding.
- Transportation networks (e.g., highways, rail lines), water supply systems, power generating plants and conveyance systems, campground/resorts, and other high value sites expected to be at risk due to post-fire debris flows and/or flooding.

The determination for WERT evaluations are to be based on health and safety concerns. In cases where a WERT evaluation is recommended, a subsequent determination is needed to decide what specialist positions are needed for a Phase I Team, and if a Phase II team is needed. Large, destructive fires that are declared Presidential or state disasters will have a greater chance of WERT deployment, due to the hardships already experienced by homeowners in the fire area.

Watershed Emergency Response Teams (WERT)

Currently, Watershed Emergency Response Teams (WERTs) are assembled and deployed to better coordinate local assistance to ensure a rapid response in identification of life-safety threats, and potential environmental impacts resulting from large and damaging fires. The main objective is to conduct an all-inclusive rapid identification of exigent life safety hazards affiliated with the burn areas.

The effects of a wildfire on watersheds within burn areas can present conditions under which the threat of flooding, erosion, and debris flows is greatly increased. The WERT plays a major role and is the first step necessary to identify areas that hold the potential for adverse impacts to lives and property. This information is intended to be used as a guide that emergency management agencies can use to complete more detailed evaluation and develop post-fire emergency response plans. Critical to successful WERT function are cooperation, communication, efficiency and transparency. The following are WERT expectations for all cooperating agencies:

WERT Expectations:

- All cooperating agencies and organization shall make every effort to be all-inclusive, maintain open communication, cooperation, transparency and efficiency.
- The primary focus is to (1) identify hazards that represent an immediate threat to life, public health and safety, and public and private property, and (2) promote implementation of appropriate emergency protection measures.
- The WERT effort supports the development of emergency protective measures and supports implementation or project construction of emergency protective measures.
- The Phase I effort will be streamlined, efficient, and focus on identifying life safety hazards to support implementation of emergency protection measures.
- The Phase II effort will prioritize and focus on those life safety hazards sites identified in Phase I in order to identify and document potential impacts to affiliated natural resources.
- Phase II information specific to natural resources affiliated with Phase I hazard sites will be provided to those entities responsible for implementing emergency protective measures.

- Each agency cooperating in the Phase II effort with regulatory jurisdiction will take every opportunity to share information and communicate options in permit streamlining to expedite emergency protection measures (EPMs).

- Each agency cooperating with the WERT effort will take actions based on their statutory authority and jurisdictional responsibilities.

WERT Phase I and Phase II Objectives

Post fire watershed emergency response and recovery operations can be identified as a phased approach to distinguish between the initial rapid geologic and hydrologic analysis focused on life safety hazards and development of emergency protective measures needed to prevent identified threats (Phase I), and the effort focused at identifying natural resource impacts (biological, botanical, archeological, etc.) at the life safety hazards sites identified in the first phase (Phase II). The last step is emergency protection measure (EPM) project implementation. The implementation step is based on the availability of disaster recovery funds and involves construction and establishment of EPMs identified in Phase I. While no direct State funding source is currently available for EPMs, channel clearance work can be conducted by CAL FIRE Conservation Camp crews, structure protection work often utilizes funding from NRCS's Emergency Watershed Protection Program with local sponsors, and installation of ALERT rain and stream gages may occur through assistance by the USGS. The following are the specific objectives of each phase:

Phase I Objectives

- Teams are to identify and inventory on-site and downstream threats to public health or safety from landsliding, debris flows, flooding, erosion, road hazards, and other fire-related impacts.
- Teams are to develop preliminary emergency protection measures needed to avoid life-safety threats. The observations and emergency protection measures are not intended to be comprehensive or conclusive, but rather to serve as a preliminary tool to assist emergency management agencies in development of more detailed post-fire emergency response plans.

Phase II Objectives:

Primary Focus - Life Safety Hazards

- Teams are to prioritize and focus on identifying the natural resources affiliated with the life safety hazards identified in Phase I.
    - These life safety hazards represent an immediate threat to life, public health and safety, and public and private property.
    - These hazards have a greater potential for implementation of emergency protection measures.

- Identifying the potential impacts to the natural resources affiliated with these life safety threats can streamline resource protection and project design/development when implementing emergency protection measures.

Secondary Focus

- Teams are to provide regulatory guidance and streamlining for project implementation involving emergency protective measures. Each agency with regulatory authority should provide information pertinent to the necessary permitting to facilitate this effort.

Tertiary Focus

- Teams are to comply with their statutory requirements and jurisdictional responsibilities regarding post fire watershed emergency response. This may involve review of non-life threatening impacts to natural resources within the burn areas. Every effort should be made to streamline and efficiently complete this review.

Phased Approach

The phased approach is used to streamline the initial life safety hazard detection effort completed in Phase I. The process is described as a phased approach only because the prioritized life-safety hazard evaluation (Phase I) can be completed separate from, overlap, or be concurrent with the evaluation of natural resources (Phase II). The Phase II effort is not secondary; but involves agency personnel with different natural resource expertise than required in Phase I. In some situations, only a small Phase I effort will be required.

The phased approach is managed according to the Incident Command System (ICS) and designed to expand and contract with need and complexity. Developing and initiating Phase II during the Phase I effort allows for efficient inclusion of resources and personnel needed to accurately and timely complete both phases of the WERT. A co-team leader or deputy team leader may be established to assist in managing team activities. If necessary co-team leaders in Phase I can transition into the Phase II team leaders. Co-team leaders will also provide for an efficient and transparent transition between Phases I and II.

WERT Agency Involvement and Staffing

All agencies participating in the WERT effort are considered part of the emergency response team. Each agency has specialized resources necessary for post fire emergency response. All agencies involved have roles and responsibilities based on statutory authority that should focus their objectives. The intent is to efficiently provide accurate, complete and timely information on emergency protective measures.

CAL FIRE can act as the lead agency coordinating the WERT in cooperation with all contact agencies. Specialized personnel with qualifications in civil engineering, engineering geology, hydrology, GIS, forestry (including fire line safety), and water quality are required for Phase I to rapidly complete the detection of life safety hazards. Personnel with prior experience and local knowledge are also recommended. The Phase II effort focuses on natural resources impacted by the fire, further develops and builds on emergency protection measures identified in Phase I. CAL FIRE and Cal OES staff initiate the coordinated implementation of emergency protective measures based on available funding. In Presidential disaster declarations, FEMA also assists with EPM funding and implementation.

Special interest and stakeholder groups should also be encouraged for participation with the WERT effort. This may include local Native American Tribes and local environmental groups.

WERT Contact Agencies

California State Agencies

- California Department of Forestry and Fire Protection (CAL FIRE)
- California Office of Emergency Services (Cal OES)
- California Department of Fish and Wildlife (DFW)
- California Geological Survey (CGS)
- California Department of Water Resources (DWR)
- California State Parks and Recreation (DPR)
- Regional Water Quality Control Boards (RWQCBs)

Local Agencies

- County
- City

Federal Agencies

- Federal Emergency Management Agency (FEMA)
- Natural Resource Conservation Service (NRCS)
- Bureau of Land Management (BLM)
- USDA Forest Service (USFS)
- US Army Corps of Engineers (USACE)
- Bureau of Indian Affairs (BIA)

WERT Training Information

Safety training will be required for non-CAL FIRE agency staff before they serve on WERT teams conducting field evaluations. Safety training can be accomplished in several ways, including:

- A detailed safety briefing conducted by a qualified CAL FIRE Battalion Chief, Assistant Chief, or other Chief Officer familiar with the local fire conditions present (mandatory).
- A detailed safety briefing conducted by a qualified CAL FIRE Helitack Fire Captain regarding helicopter flight safety procedures prior to any helicopter flight assessments (mandatory).
- A detailed briefing by the Team Leader on communication systems to be used by the WERT team (cell phones, CAL FIRE Handi-Talkie radios, etc.) (mandatory).
- Completion of both online Incident Command System (ICS) 100--Introduction to Incident Command System (https://training.fema.gov/is/courseoverview.aspx?code=IS-100.b), and ICS 200--ICS for Single Resources and Initial Action Incidents (https://training.fema.gov/is/courseoverview.aspx?code=IS-200.b) (recommended).
- Completion of an 8 hour course titled “Fireline Safety Awareness for Hired Vendors” (recommended) [recorded presentation to be obtained if possible].
- Completion of a 4 hour short course titled “Emergency Incident Awareness.” This class is provided to non-safety personnel. It explains fire shelter deployment, proper use of personal protective equipment (PPE), and other basic safety information (recommended).
- Review of CAL FIRE Fireline Suppression Repair (FSR) Safety PowerPoint presentation to address other safety concerns (marijuana grows, hazardous driving, etc.) (recommended).

All agency staff will be required to have basic safety equipment, including Nomex shirt and pants, hard hat, gloves, and leather boots with Vibram soles (key PPE components).

WERT Command and Control

CAL FIRE WERT members and CAL FIRE support resources (e.g., Handcrews) shall be ordered by the incident ordering manager, or hosting Unit, through the Resource Ordering System of Record. WERT members and support resources from other state agencies shall be mission tasked by Cal OES through the Sacramento Command Center (Sac CC). The CAL FIRE Deputy Chief, State and Federal Programs, shall be engaged in WERT mission tasking requests.

CAL FIRE resources assigned to WERT operations may be released, and/or reassigned, to higher priority incidents if necessary.

Mission Tasking

Mission task objectives should allow Departmental flexibility to maximize resource use. Tangible and achievable objectives for the mission task shall be clearly identified, and milestones or timeframes to achieve the objectives shall be delineated (in past WERT efforts, review of historical Cal OES mission tasking records identified language in the "objectives" that caused concern as to the ability to measure milestones or declare the mission complete).

WERT Detailed Procedures--Phase I and Phase II

Introduction

Severe wildfire causes several impacts to wildland watersheds, including loss of vegetation, loss of surface cover, and often the formation of a water repellent layer that reduces infiltration. These physical changes lead to an increased risk of surface soil erosion, debris flows, and flooding. How much occurs the first few winters after the fire is dependent on geologic and soil conditions, topography, as well as rainfall intensities and durations. Post-fire debris flows and flooding can occur with very little warning and move very rapidly, producing destructive impacts to downstream infrastructure in the flow path. As such, identification of areas where this may occur is information needed by emergency management agencies in order to develop post-fire response plans and mitigations.

The primary objective for the Phase I Watershed Emergency Response Team (WERT) effort is to report observations made during rapid, limited, and general assessment of downstream and downslope areas in a position that could be affected by flooding, debris flows, and/or surface erosion generated from basins burned by a wildland fire. These Phase I observations are not intended to be comprehensive or conclusive, but rather to serve as a preliminary tool to assist emergency management agencies in development of more detailed post-fire emergency response plans. The WERT efforts consist of a rapid assessment that (1) identifies on-site and downstream threats to lives and property from debris flows, flooding, erosion, road hazards, and other fire-related problems; and (2) provides a general guide that emergency management agencies can use to complete their own more detailed evaluations, and develop comprehensive emergency response plans and mitigations.

If a wildfire affects significant amounts of federal land, or federal land with high resource values, a federal Burned Area Emergency Response (BAER) Team will be deployed by the affected federal land management agency(s) (e.g., USFS, BLM, NPS). The BAER teams conduct generally similar assessments to the WERT effort (http://www.nifc.gov/BAER/Page/NIFC_BAER.html). Therefore, some post-fire assessments may have both BAER and WERT teams, each focusing on their respective geographic areas (e.g., federal and non-federal lands). In these cases, it is imperative for the two teams to work closely and collaboratively to share information and data, and to not perform redundant assessments.

Tasks for the Phase I Post Fire Evaluation

1. **Prior to leaving for the fire area**:

    a. The team leader should assemble a team with appropriate licensed and experienced professionals to evaluate threats to life and property. For a

large fire-impacted area, the team should include one Senior Engineering Geologist, two Engineering Geologists, one Water Resources Engineer, one GIS specialist, a Forester III or II with hydrology and/or post fire evaluation knowledge, and a resource professional from a state or federal agency (e.g., NRCS) with local knowledge (**Table 1**). The licensed professionals should be experienced in evaluating potential risks associated with post-fire debris flows, flooding, and erosion, and should have received training prior to team assignment. A minimum of six (6) individuals are recommended so that the teams can divide into two working sub-groups with three members to expedite data collection in the field. Two Engineering Geologists, or an Engineering Geologist and a Professional Engineer, must be included on each sub-group in order to make evaluations regarding public safety. Designate an overall WERT Phase I team leader (typically a Forester III or II with hydrology and/or post fire evaluation knowledge), WERT technical co-leader (typically a geologist with considerable post fire evaluation knowledge), as well as the WERT team members as soon as possible. Ensure that the team leader make team members aware of field logistics.

b. The team leader will arrange for office space that is accessible 24/7 and has (1) large tables, (2) WiFi for high speed internet access, (3) sufficient power outlets, (4) printers, and (5) access to a plotter so that maps can be printed out at a large scale.

c. The team leader will obtain relevant information from the fire Incident Commander (IC) regarding potential post-fire life and property concerns, as well as other information pertinent to the post-fire assessment (e.g., access limitations, etc.).

d. The GIS team member will obtain ArcGIS data consisting of:

    i. A Burned Area Reflectance Classification (BARC) map from CAL FIRE's Fire and Resource Assessment Program (FRAP) GIS Analyst or the USFS BAER Team. The GIS layers (classified into four burn severity classes – unburned, low, moderate, and high) should contain raster data that can then be layered onto a variety of maps generated by the team GIS specialist. Obtain a composite map showing combined overlapping polygons of slope ≥ 43% and BARC categories for moderate to high burn severity.

    ii. A digital Erosion Hazard Rating (EHR) map, using BOF Technical Rule Addendum No. 1 (procedure for estimating surface soil erosion hazard rating) from CAL FIRE GIS staff in Santa Rosa or Sacramento.

iii. Final fire perimeter ArcGIS data from the incident (as it may have changed depending on when the BARC map was generated).

e. The GIS team member will obtain office maps, ArcGIS layers, and reports related to assessment of post-fire debris flow risk, flooding, and erosion for the fire area. Use of a checklist will be helpful, ensure consistency, and reduce critical data gaps. The purpose of each data type, their limitations, underlying assumptions, and their inter-relationships should be articulated as GIS metadata. The data may include, but are not limited to, topographic maps; published geology maps; LiDAR (where available); Digital Elevation Models (DEMs); USGS peak flow information and reports; FEMA floodplain maps; DWR flood awareness maps; and fire history, CalVeg, GIS road and hydrography layers.

f. The GIS team member will generate and print on a plotter large scale (4 x 5 foot) paper maps (at least three copies for field teams and office planning) showing BARC soil burn severity classes, the complete road layer, and other features aiding in field identification. In addition to field work use, these maps are to be placed on a wall or table to allow team members to (1) collectively discuss how the burn areas will be accessed, and (2) discuss findings at the end of each day, and (3) reference specific sites observed to locations on the printed map in the office. Make geo-referenced pdf maps or equivalent base maps and load them onto smart phones with the Avenza PDF Maps application and the ArcGIS Collector application (if available).

g. The CAL FIRE FRAP GIS Analyst will divide the fire area into HUC 12 watersheds (or smaller if appropriate) for hydrologic analysis and will produce relative metrics and statistics as part of this process (e.g., watershed drainage acreage, acreage burned at each soil burn severity level, etc.). This method should be set up as an automated GIS process.

h. The GIS team member will make arrangements for USFS GeoWEPP and USGS Debris Flow modeling to be conducted once the BARC map is field checked, and refined. Depending on the fire location and potential concerns, consider making a recommendation for more detailed flood modeling by the DWR or USACE. Team geologists, hydrologists, and engineers will field check areas of concern as determined by the models and review their validity.

i. The GIS team member will follow established data management procedures to include; file names, locations, metadata, versioning or archiving, and preserving the availability of final GIS data and products for retrospective studies.

j. The GIS team member will ensure that appropriate computer programs are available to conduct the field assessment, including ArcGIS and Adobe Acrobat Pro. Additionally, iPad and iPhones or Android smart phones are essential when conducting field work. Smart phones are necessary for field safety, field work, and allow for easy transfer of data points and geo-referenced photos to the team GIS specialist (alternately Garmin GPS units and digital cameras can be used, but they are significantly less desirable). iPads or other GPS- equipped tablets are desirable for similar reasons, as well as the ability to input more detailed field information. The GIS team member will ensure that appropriate software/apps, such as Avenza PDF Maps, ArcGIS Collector (if available), and Google Earth, are installed on the smart phones and tablets and are available for unfettered use. The GIS team member will ensure that field personnel are trained in the proper data collection and data transfer. The GIS team member will be responsible for data management.

k. If available, incorporate data collection schema (fields) for field data collection software such as PDF Maps and ArcGIS Collector. These would be based on Figures 1 through 3, attached.

l. Bring the items listed in **Table 2**.

2. Arrange for and conduct an initial meeting with County officials, engineers, GIS analysts; local flood control district representatives; federal agency representatives (e.g., USFS, BLM, NRCS); and other appropriate local and regional agency staff. It is important to have open communications with these officials who will likely be leading post-fire response planning. Obtain useful GIS layers from these agencies (e.g., roads, parcel, and watercourse crossing layers). Obtain information regarding flooding, landsliding, and other concerns that have occurred in the general area prior to the fire. The GIS team member will screen the complied data to ensure that only the most complete, up-to-date, and accurate data are used.

3. The team leader should coordinate with the CAL FIRE Unit Chief or other appropriate CAL FIRE Chief to arrange for a helicopter flight to view the fire area to (1) obtain an overview of soil burn severity, and (2) locate values at risk in areas with high soil burn severity. The WERT team should take the flight as soon as it is available.

4. The team leader should conduct or arrange for a safety briefing, identifying particular hazards to the fire area (e.g., mine shafts). Coordinate team logistics, organize communication methods, set meeting times, etc. The team leader must ensure that all field personnel arrive safely each night from the field. Gather and distribute required safety equipment (e.g., Nomex clothing, radios, phone/contact list, etc.).

5. Identify areas on the large paper map to systematically field check the BARC map, focusing on high and moderate soil burn severity areas, but including spot checks of low burn severity areas. Depending on the burn area size, divide the areas into two logical sections for two sub-teams to evaluate in the field. If federal agencies have been mobilized (e.g., BAER Team), coordinate with the federal agencies (e.g., USFS, BLM, NPS) to ensure that BARC map field verification is efficient and non-repetitive.

6. After field training from staff with experience evaluating hydrophobic soils to ensure that the group is calibrated using the same procedure, verify (ground truth) the BARC map burn severity categories using the form in Appendix B of Parsons et al. 2010 (**Figure 1**). Attempt to evaluate both burned and unburned areas for comparison. The field check should be limited to two days for large fires, using a minimum of 30 field sites. Each field site can have up to 10 observations for hydrophobic conditions. The minimum polygon size in general should be 40 acres, but it may be as large as 100 acres or more for large fires. Following field verification, develop the final soil burn severity map. Follow the procedures outlined in the safety briefing. It is important to field verify the BARC data even if the USGS has already completed the debris flow modeling.

7. If the USGS Post Fire Debris flow model has not yet been conducted, send the corrected BARC map polygons, along with field verification data and possible data available from federal agencies, in an Excel spreadsheet (**Figure 2**) to the CAL FIRE FRAP GIS Analyst, who will forward the corrected soil burn severity map to (1) USGS research scientists in Boulder, CO who conduct modeling for emergency assessment of post-fire debris-flow hazards, and (2) USFS researchers in Moscow, ID who conduct GeoWEPP analysis of surface erosion hazard. The USGS will generate debris flow models and corresponding maps showing hazard risk at the watershed and segment scale for 15-minute rainfall intensities 15-minute storm intensities. USGS Post Fire Debris Flow Hazard model information is posted at: http://landslides.usgs.gov/hazards/postfire_debrisflow/. Watershed-based GeoWEPP maps showing relative erosion potential and erosion volumetric information should be generated either by the USFS or CAL FIRE (see: http://geowepp.geog.buffalo.edu/custom-versions/for-arcgis-9-x/geowepp_baer/ http://geowepp.geog.buffalo.edu/custom-versions/ http://www.treesearch.fs.fed.us/pubs/43830 http://forest.moscowfsl.wsu.edu/fswepp/WEPPlinks.html.

8. Once the USGS debris flow modeling is obtained in ArcGIS format, generate maps showing potential modeled debris flow hazard locations relative to previously obtained layers (e.g., roads, flood zone layers). Prepare geo-referenced pdf maps or other digital base maps for team members to use in the field. Also, print maps on a plotter so that they can be used for discussion in the office prior to and after field evaluation. Export maps results to KMZ for ease of use in Google Earth in order to accomplish Item 12, below.

9. Load the new ArcGIS map with the USGS debris flow segment model on smart phones with the Avenza PDF Maps and/or ArcGIS Collector applications.

10. If available, follow the same procedures in steps 8 and 9 with the GeoWEPP results and digital EHR maps.

11. The team leader and co-leader are to explain to team members and other appropriate personnel that (1) the USGS and USFS models are watershed-based and do not necessarily capture the smallest watersheds, individual areas within each watershed, or the areas downstream of the modeled watersheds; and (2) a test of reasonableness should be applied to evaluate site specific and downstream concerns (e.g., even though a watercourse immediately downstream of a modeled watershed was not modeled, it may have a hazard similar to that of the upstream watershed). The team leader and co-leader should explain the criteria for the test of reasonableness and how to report the findings.

12. In the office using paper and digital maps, Google Earth, local information, etc., identify high value areas potentially at risk that were affected by the fire and that correspond with high soil burn severity from the BARC map, high surface erosion potential, high risk of debris flows, and/or high risk of flooding. These features can include: homes, businesses, power plants, bridges/culverts, domestic water supplies/high value reservoirs, highways, etc. **Initial investigation work in this step, as well as initial work on steps 13-16 and 20, may take place while the debris flow modeling is occurring if necessary.**

13. Conduct an office assessment of surface erosion potential. Use BOF Technical Rule Addendum No. 1 (procedure for estimating surface soil erosion hazard rating), GeoWEPP data, and/or published soil maps available on the NRCS website (http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm). In areas of concern where interpretations require additional evaluation, estimate surface erosion rates for selected high risk watersheds, using the Erosion Risk Management Tool (ERMiT): http://forest.moscowfsl.wsu.edu/cgi-bin/fswepp/ermit/ermit.pl

14. Conduct field training with senior staff explaining to junior team members how to conduct rapid field evaluations of areas with potential threats to life and property, and how to record data in a consistent manner on the hazard data form (**Figure 3**).

15. Depending on burn area size, divide into two teams and conduct a comprehensive field investigation of potential high risk sites. Two Engineering Geologists, or an Engineering Geologist and a Professional Engineer, must be included on each sub-group in order to make public safety evaluations. Follow procedures outlined in the safety briefing.

16. **Field check locations that potentially present a risk to lives and property/infrastructure identified in the office (step 12).** Record pertinent information on the hazard data form (**Figure 3**), including possible emergency protection measures. **Note that this is a rapid "first impression" of possible emergency measures to provide a general guide to subsequent more detailed evaluations.** Map the locations digitally with the Avenza PDF Maps and/or ArcGIS Collector applications. Note that other evaluations for archeology, wildlife, botany, etc. will not generally be conducted as part of this rapid Phase I evaluation process but can be conducted as part of the Phase II effort. Note on the hazard data form recommendations for Phase II evaluations.

17. Conduct meetings as needed with county and other emergency response agency representatives to document their needs and concerns.

18. Obtain additional local information (see step 2) from county officials, CAL FIRE Unit staff (e.g., local Battalion Chief), and others regarding flooding and landsliding that occurred in the general area prior to the fire.

19. Summarize the life and property risk information from the field work in a detailed Excel spreadsheet included as an appendix in the final report. Include columns for:

    site #, community/local area, specific at-risk feature, feature category (e.g., home, bridge, culvert, etc.), street address, GPS location (lat, long), potential hazard/field observation, located in mapped FEMA 100 year floodplain (Y or N), USGS debris flow hazard segment for adjacent stream segment or nearby/upstream basin (include return interval, Y or N), likelihood, potential risk to life (Y or N), potential risk to property (Y or N), and preliminary or possible emergency protection measure(s). In some cases, larger areas may also be identified as a polygon or segment (e.g., communities with elevated flood hazard)

    Generate an ArcGIS file with the mapped locations of the hazards identified in the field.

20. Estimate pre-fire and post-fire peak flows for selected recurrence interval flood events (e.g., 5, 10 year) for the HUC 12 or smaller watersheds using the corrected BARC soil burn severity map for high, moderate, and low soil burn severity data. Use the most appropriate methodology(s) for post fire flow estimation; see Kinoshita et al. 2013; Foltz et al. 2009,; and http://forest.moscowfsl.wsu.edu/BAERTOOLS/ROADTRT/Peakflow/.

21. Using the information from step 20, determine where the greatest flood risk areas are located in and downstream of the fire area. To assist in this determination, use the FEMA 100 year floodplain map if it is available, and information from the following webpages for broader 100 year floodplain delineation: http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/awareness_floodplain_maps/

http://gis.bam.water.ca.gov/bam/. Combine this information with the outputs from the digital EHR and GeoWEPP models to identify areas where flood flow may have high volumes of entrained (bulked) sediment from modeled high erosion hazard watersheds/areas (thus resulting in a further elevated flood risk). Additionally, relate flood information to the areas identified as having high debris flow hazards as identified by the USGS debris flow hazard model.

22. Compile all information in a detailed draft report; follow the report outline shown in **Table 3** (make modifications where appropriate). Include information on general observations and recommendations, such as early warning systems that can be used, storm patrols, etc., as well as detailed information on the high risk sites found in the field. Include general findings and recommendations at the end of the field table (Figure 3). Include pertinent maps and links to pertinent data. Make it clear in the document what areas were not assessed (e.g., burned structures, areas that did not have access, etc.). Include the purpose of each data type, their limitations, underlying assumptions, and their inter-relationships.

23. Submit the draft report to the post fire project coordinator for review. Develop a final report incorporating needed changes.

24. Release the final report in a timely manner to emergency response/management agencies including OES, with the clear understanding that they are the leads for coordinating and implementing appropriate emergency actions (e.g., local and regional emergency response agencies that are responsible during winter storm events). Additionally, emergency response agency coordination with NRCS is needed, since funding for post fire recovery measures for exigent work is available under NRCS's Emergency Watershed Protection (EWP) Program. CAL FIRE or the appropriate local agency can serve as an EWP sponsor (see: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/).

25. Conduct meetings with post-fire emergency response agencies to present the final report and answer questions regarding report information and recommendations.

26. Debrief with team members after the completion of the evaluation to gather all data, discuss lessons learned, ideas for greater efficiencies, issues that arose, etc.

27. The team leader shall retain all GIS layers and maps used and generated for Phase I in a centralized location for ease of access to data and for passage of information to subsequent team phases.

28. Archive data and field information.

Tasks for Phase II Post Fire Evaluation

1. Phase II is an expansion of the Phase I effort. The Team Leaders/Team members should follow the same Phase I procedures regarding equipment, materials, reporting format and communications.

2. Prioritize and focus on identifying the natural resources affiliated with the life safety hazards identified in Phase I because they represent an immediate threat to life, public health, and safety.

3. Focus on further developing and describing the emergency watershed protection measures identified in Phase I. These hazard sites have the highest likelihood for the construction or implementation of emergency protection measures.

4. Identify the potential impacts to the natural resources affiliated with these life safety threats and the recommended emergency measures to streamline resource protection and project design when implementing emergency protective measures. Be as specific as possible.

5. Provide regulatory guidance and streamlining for project implementation. Each agency with regulatory authority is to provide information pertinent to the necessary permitting to facilitate this effort.

6. Comply with agency statutory requirements and jurisdictional responsibilities regarding post fire watershed emergency response. This may involve review of non-life threatening impacts to natural resources within the burn areas. Every effort should be made to streamline and efficiently complete this review.

7. Compile all information in a detailed draft report; follow the report outline shown in **Table 4** (make modifications where appropriate). The Phase II report is to be identified as an addendum to the Phase I report.

8. Submit the draft report to the post fire project coordinator for review. Develop a final report incorporating needed changes.

References

Foltz, R.B., P.R. Robichaud, and H. Rhee. 2009. A synthesis of post-fire road treatments for BAER teams: Methods, treatment effectiveness, and decision making tools for rehabilitation. Gen. Tech. Rep. RMRS-GTR-228. Fort Collins, CO. USDA Forest Service. Rocky Mountain Research Station. 152 p. http://www.fs.fed.us/rm/pubs/rmrs_gtr228.pdf

Kinoshita, A.M., T.S. Hogue, and C. Napper. 2013. A guide for pre- and postfire modeling and application In the western United States. National Technology and Development Program-2500—Watershed, Soil and Air Management. 1325 1802—SDTDC. 62 p. https://dl.dropboxusercontent.com/u/14808672/2014_KinoshitaHogueNapper_GuideforPreandPostfireModeling.pdf

Parsons, A.; Robichaud, P.R.; Lewis, S.A.; Napper, C.; Clark, J.T. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p. http://www.fs.fed.us/rm/pubs/rmrs_gtr243.pdf

Figures and Tables

Figure 1. Appendix B form from Parsons et al. 2010, used for recording soil burn severity assessment field data.

Soil Burn Severity Assessment Field Data Sheet			**Fire name:**					**Observers:**		
Date:	**Site ID:**		**GPS coordinates:**					**BARC classification:**		
Observation point	**Ground cover (1)**	**Surface color and ash depth (2)**	**Soil structure (3)**	**Roots (4)**	**Soil water repellency (5)**			**Observed soil burn severity class (6)**	**Photo #**	**Other comments**
EXAMPLE	*20 to 50%*	*white, 1 mm*	*no change*	*intact*	*I*	*3 mL*	*surf*	*Mod*	*23*	*homogenous*
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Average/majority for site (7)										

Site characteristics:	Aspect (deg):	Slope %:	
Slope length (ft or m):	Slope position: Lower Middle Upper Ridge Other		

Soil texture class: clay loam, silt loam, loam	**Dominant pre-fire vegetation type**	**Pre-fire vegetation density**	**Vegetation comments:**	Other **notes:**
Surface rock %:	Chaparral	Low		
Soil comments:	Forest	High		
	Sagebrush/grassland	Other		
	Other			

Data Form Columns:

(1) **Ground cover**: Record an estimated percentage of cover (greater than 50%; 20 to 50%; or less than 20%). Ground cover means effective organic cover as it pertains to mitigation of runoff and erosion and includes litter, duff, and woody debris.

Example: "20 to 50%"

(2) **Surface color and ash depth**: Include a brief note on color and depth of ash (inches or cm), if any.

Example: gray, 5 cm

(3) **Soil structure**: Has it changed from pre-fire structure? The most common change is from a granular structure in the surface horizon to a loose- or single-grained soil in areas where heat residence time was long and organic matter was consumed.

Example: "changed (loose)" or "no change"

(4) **Roots**: Have they been altered from pre-fire condition?

Example: "scorched," "no change," or "very fine consumed"

(5) **Soil water repellency**: Use the infiltrometer (I) or water drop penetration time method (W) and record volume of infiltration or how long water takes to infiltrate, respectively. If repellency is observed, note the depth tested (inches or cm).

Example: "I/3mL/at surface" or "W/25 sec/ at 1-2 cm"

(6) **Observed Soil Burn Severity Class**: Record the soil burn severity class at the observation point.

Example: "Unburned," "Low," "Moderate," or "High"

(7) **Average/Majority for Site:** Estimate the most frequent or average of the 10 observations.

Figure 2. Excel spreadsheet to summarize BARC map field verification data.

BARC Map Field Verification

Datum: NAD 83

Site Number	Date	BARC Map Classification	GPS location		Ground Cover %	Surface Color	Ash Depth (mm)	Soil Water Repellancy				Site Description					
			Latitude (N)	Longitude (W)				Test type	Surface Repellancy Time (sec)	Subsurface Repellancy Time (sec)	Subsurface Repellancy Depth (in)	Slope (%)	Surface Rock %	Veg Type	Pre-Fire Veg Density	Observed Soil Burn Severity Class	Comments

Figure 3. Hazard field form for recording high risk, high value locations. Note that an additional column is needed for recording initial calls on preliminary emergency protection measure determinations.

Burn Site Evaluation Summary Fire Name : **Bold where risks are high** *note: Datum used is WG84*								
Site Number	At-risk Feature	Address	GPS location Latitude N	GPS location Longitude W	Hazard	Likeli-hood	Risk to Lives	Risk to Property
General Observations and Recommendations								
# 1								
# 2								
# 3								
# 4								
# 5								

Table 1. Suggested team composition for Phase I Watershed Emergency Response Team (WERT) composition.

Classification	Function	Agency	Expertise
Forester III or II	Team Leader, Safety Officer	CAL FIRE	Forestry and Hydrology/Post Fire Evaluation Process and Procedures, Fire Line Safety
Senior Engineering Geologist	Co-Leader	CGS	Engineering Geology
Engineering Geologist	Team Member	CGS	Engineering Geology
Engineering Geologist	Team Member	RWQCB	Engineering Geology
Engineer, Water Resources	Team Member	DWR	Civil Engineering
Forester I or II, Senior Environmental Scientist, Research Analyst I, etc.	Team Member	CAL FIRE, DWR, other	GIS Specialist (GISS)
Forester II (e.g., Unit Forester), District Conservationist, etc.	Team Member	CAL FIRE, NRCS, etc.	Local Knowledge Expertise, Fire Line Safety

Table 2. List of items to bring to the fire area.

Smart phone or iPad
Laptop computer with appropriate software (Microsoft Office, ArcGIS (if available), Acrobat Pro, etc.), Google Earth, etc.
External hard drive, flash drives, and peripheral cables
Appropriate field gear, including hard hat, leather boots, sun glasses, sun screen, multiple pairs of field pants and shirts, Nomex shirt and pants-if available
Forestry equipment (vest with clinometer, compass, etc.
GPS and digital camera (if smart phone or tablet are not available)
Four wheel drive vehicles for each sub-team (2 minimum)
Soil sampling equipment, including trowels, water droppers, etc.
CAL FIRE radios (at least two, can be obtained from the local CAL FIRE Unit)
Field books
CAL FIRE uniforms (for CAL FIRE staff)
Personal items required
Office materials (tape, paper, wall pins, etc.)—Team leader only

Table 3. WERT Phase I report outline.

I	Introduction
	Team Members
II	Fire Summary Information
III	Physical Setting
	Geographic Setting, including Climate data
	Fire History
	Geologic Setting/Potentially Hazardous Materials
	Soil and Erosion Information
	Flooding Information
IV	Field Observations/Methods
V	Debris Flow Modeling and Results
VI	Flood Flow Modeling and Results
VII	Surface Erosion Modeling and Results
VIII	General Observations and recommendations regarding identified Values at Risk
IX	Specific Observations and recommendations regarding identified Values at Risk
X	Emergency Response Planning
XI	References
XII	List of Contacts
	Appendices
A	BARC map with field sites and verification spreadsheet
B	Observations/values at risk spreadsheet and map containing:
	BARC raster data
	USGS debris flow hazard segment modeling data
	Other useful data layers
C	HUC 12 watershed (or smaller) map and hydrologic data
D	Photographs
E	Geologic map(s), including hazardous materials
F	Other appropriate maps and plates

Table 4. WERT Phase II report outline (report is identified as an addendum to the Phase I report).

I	Executive Summary				
II	Acknowledgments				
	Team Members				
III	Specialist Reports Finding Summary				
	Fish and Wildlife				
	Engineering				
	Water Quality				
	Archeology				
IV	Site Table				
V	Site Reports Identified in Phase I				
VI	Appendix				
	Site Maps				

Eel Russian River Commission

Agenda Summary

ITEM NO.: 4

TO: Eel Russian River Commission

FROM: Pacific Gas and Electric Company and Steiner Environmental Consulting

AGENDA TITLE:

Potter Valley Project Fisheries Study Update

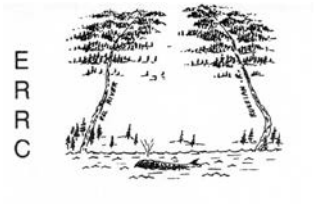
MEETING DATE: November 17, 2017

PRESENTER/S: Mr. Paul Kubicek; and Mr. Park Steiner

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: 30 min

ACTION:

MOTION: **2nd**



Eel Russian River Commission

Agenda Summary

ITEM NO.: 5

TO: Eel Russian River Commission

FROM: Pacific Gas and Electric Company

AGENDA TITLE:

Potter Valley Project FERC Relicensing Update

MEETING DATE: November 17, 2017

PRESENTER/S: Ms. Susan Kester

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: 30 min

ACTION:

MOTION: **2nd**

Potter Valley Hydroelectric Project
FERC Project No. 77

Potter Valley Project Relicensing Status

Susan Kester
Pacific Gas and Electric Company

Eel Russian River Commission
November 17, 2017

Potter Valley Project

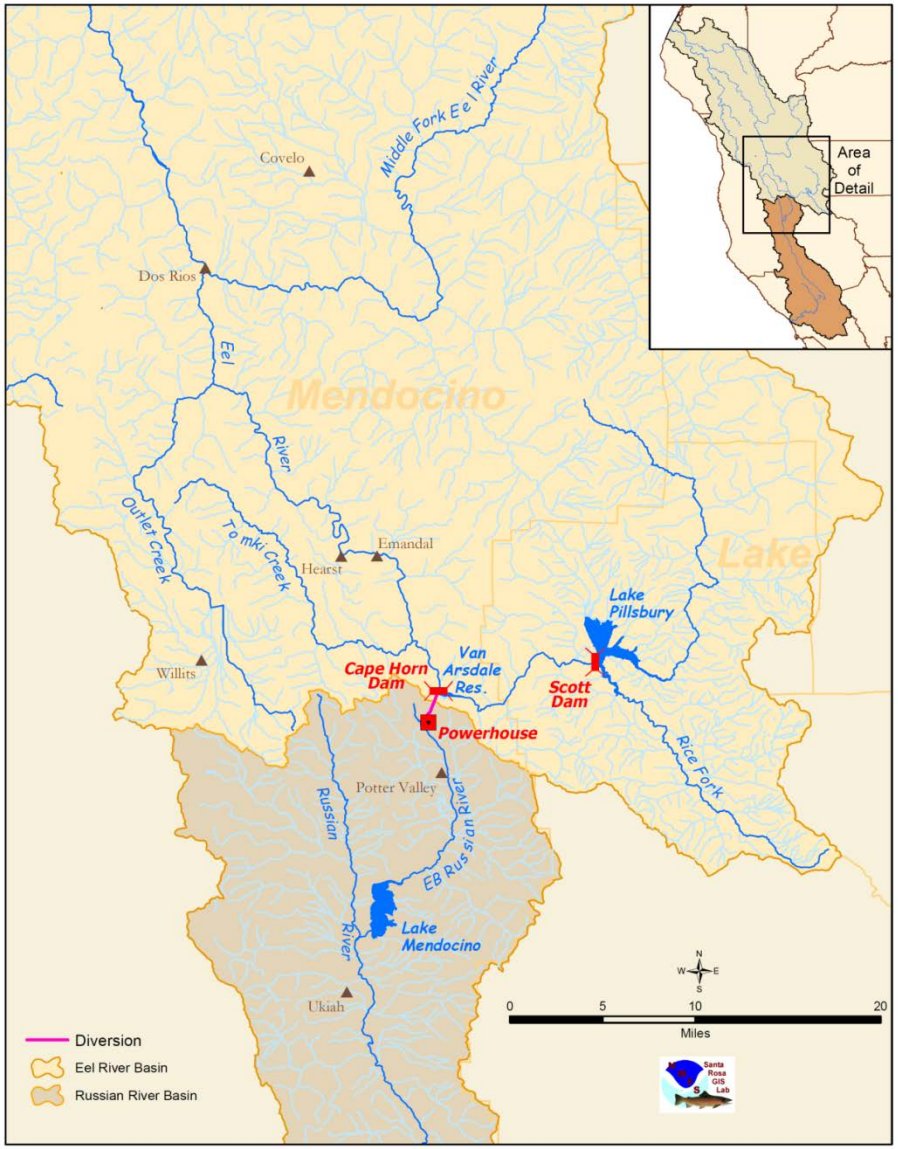


Figure 2. Potter Valley Project, Eel-Russian River Diversion

Pacific Gas and Electric Company

Potter Valley Project

Major Relicensing Activities (Years 1 - 5+)

Year 1

- Applicant Files NOI and PAD
- FERC Public Scoping
- Study Plan Development

Years 2-3

- Applicant Conducts Studies
- Report Results of Studies
- Applicant Prepares and Files License Application

Years 4-5+

- Commission Processes License Application

Study Plan Development

Applicant includes list of potential studies in PAD

↓

Participants file study requests in response to FERC's scoping notice

↓

Applicant files proposed study plans

↓

Parties meet to resolve any study disputes

↓

Applicant files revised study plans

↓

FERC issues study plan determination*

*Process includes additional step for Formal Dispute Resolution, if needed

Proposed Study Plan

- PG&E prepared Proposed Study Plan (PSP) based on review of information from:
  - PG&E's Pre-Application Document (PAD)
  - FERC's Scoping Document 1 (SD1) and scoping meetings
  - Comment letters filed regarding the PAD, SD1, and study requests
  - Comments received at agency consultation meeting (June 28, 2017)
  - Studies conducted for other hydroelectric projects in California
  - General scientific literature

Proposed Study Plan

- PG&E filed PSP, September 14, 2017
  - Comment matrix (Appendix A)
  - Study request consistency with FERC criteria (Appendix B)
  - Rationale for not adopting specific study requests (Appendix C)
  - Proposed study plans (Appendix D)
- FERC issued Scoping Document 2, September 18, 2017
  - Revision of SD1 based on stakeholder comments

Proposed Study Plan

Aquatic Resource Studies	
AQ 1	Hydrology and Project Operations Modeling
AQ 2	Water Temperature
AQ 3	Water Quality
AQ 4	Geomorphology
AQ 5	Instream Flow
AQ 6	Lake Pillsbury Fish Habitat
AQ 7	Fish Passage
AQ 8	Fish Entrainment
AQ 9	Fish Populations
AQ 10	Special-Status Amphibians and Aquatic Reptiles
AQ 11	Special-Status Aquatic Mollusks
Cultural Resource Studies	
CUL 1	Cultural Resources
CUL 2	Tribal Resources
Land Resource Studies	
LAND 1	Roads and Trails Assessment
LAND 2	Visual Resource Assessment
LAND 3	Hazardous Fuels Reduction Assessment
Recreation Resource Studies	
REC 1	Recreation Facility Assessment
REC 2	Reservoir Recreation Opportunities
REC 3	Whitewater Boating Study
Terrestrial Resource Studies	
TERR 1	Botanical Resources
TERR 2	Wildlife Resources

Study Plan Meetings

- General study plan meeting & first Technical Working Group (TWG) meeting held September 26, 2017
- An ongoing series of TWG meetings to discuss, clarify & agree on study plans
  - Meetings held during the PSP comment period (October – November 2017)
  - Facilitated and open to all participants
  - Discipline-specific TWGs
    - Aquatic – 5 full meeting days
    - Cultural – 1 -2 meetings
    - Land – 1-2 meetings
    - Recreation – 1-2 meetings
    - Terrestrial – 1-2 meetings

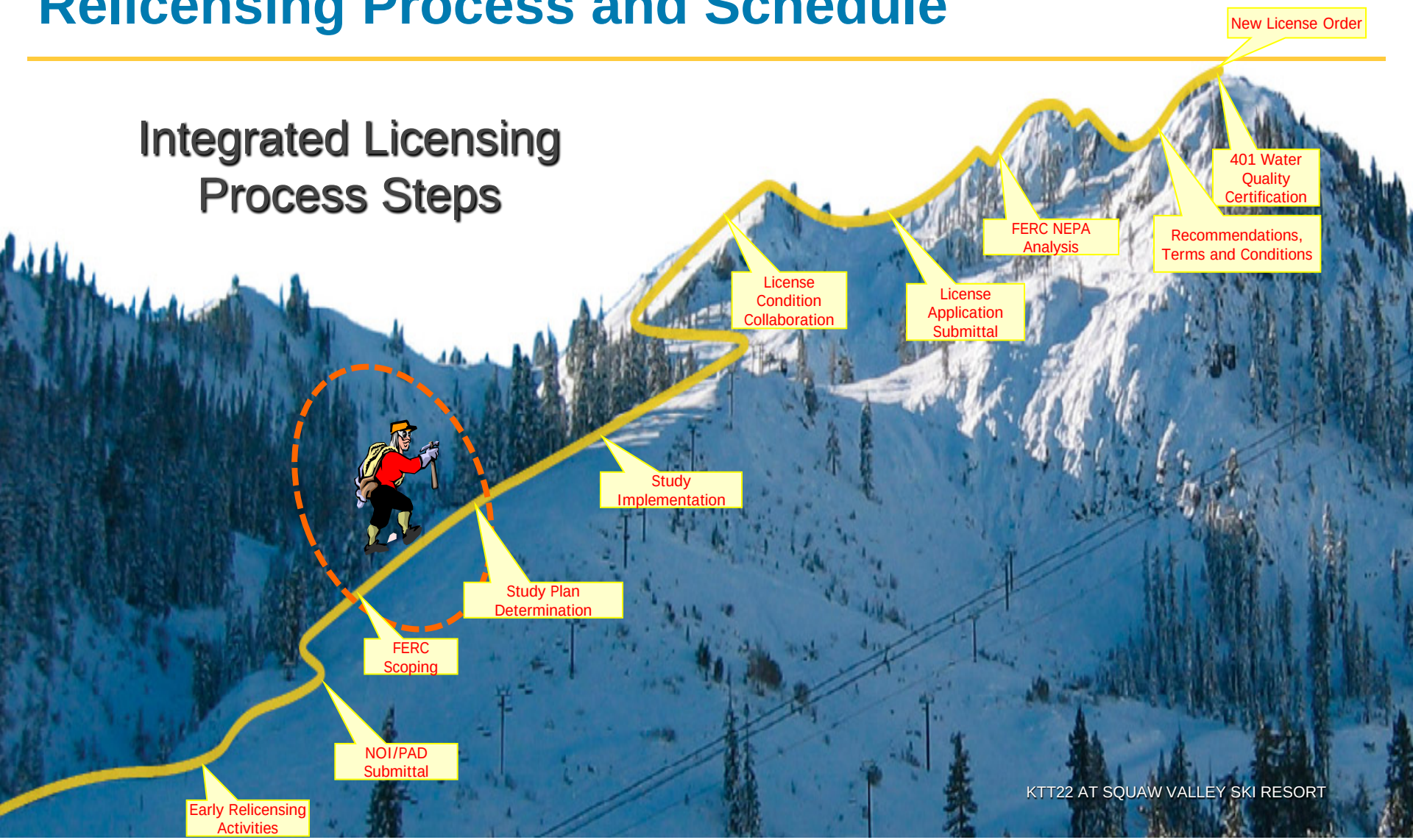
Next Steps

- Continue study plan development meetings (TWGs)
- Participants file comments with FERC (December 17, 2017)
- Applicant files Revised Study Plan (January 16, 2018)
- Participants file comments on Revised Study Plan (January 31, 2018)
- FERC issues Study Plan Determination

Relicensing Process and Schedule

Potter Valley Relicensing ILP Schedule	
Date	**Activity**
April 6, 2017	PG&E files NOI and PAD
June 5, 2017	FERC issues Scoping Document 1 (SD1)
June 27, 2017	FERC conducts public scoping meeting in Ukiah
June 28, 2017	FERC sponsors Project site visit
August 4, 2017	Participant's comments on NOI/PAD and study requests due
September 18, 2017	PG&E files proposed study plan
September 19, 2017	FERC issues Scoping Document 2 (if needed)
October 18, 2017	PG&E conducts study plan meeting with participants
December 17, 2017	Participant's comments on PG&E's proposed study plan due
January 16, 2018	PG&E files revised study plan
January 31, 2018	Participant's comments on PG&E's revised study plan due
February 15, 2018	FERC issues study plan determination
March 27, 2018	Study plan dispute resolution begins (if needed)
May 15, 2018	FERC issues determination on disputed studies
Spring/Summer 2018	PG&E conducts year one studies
Spring/Summer 2019	PG&E conducts year two studies
April 14, 2020	PG&E files final License Application
April 14, 2022	Current License Expiration

Relicensing Process and Schedule



Eel Russian River Commission

Agenda Summary

ITEM NO.: 6

TO: Eel Russian River Commission

FROM: California Department of Fish and Wildlife; and Southern Humboldt and Mendocino Counties Freshwater Fisheries

AGENDA TITLE:

South Fork Eel River Salmon Habitat Restoration Priorities

MEETING DATE: November 17, 2017

PRESENTER/S: Mr. Allan Renger; and Southern Humboldt and Mendocino Counties Freshwater Fisheries

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: N/A

ACTION:

MOTION: **2nd**

Allan Renger
Fisheries Supervisor, CDFW
Allan.renger@wildlife.ca.gov

SHaRP in the South Fork Eel River: The Next Step for Recovery Implementation

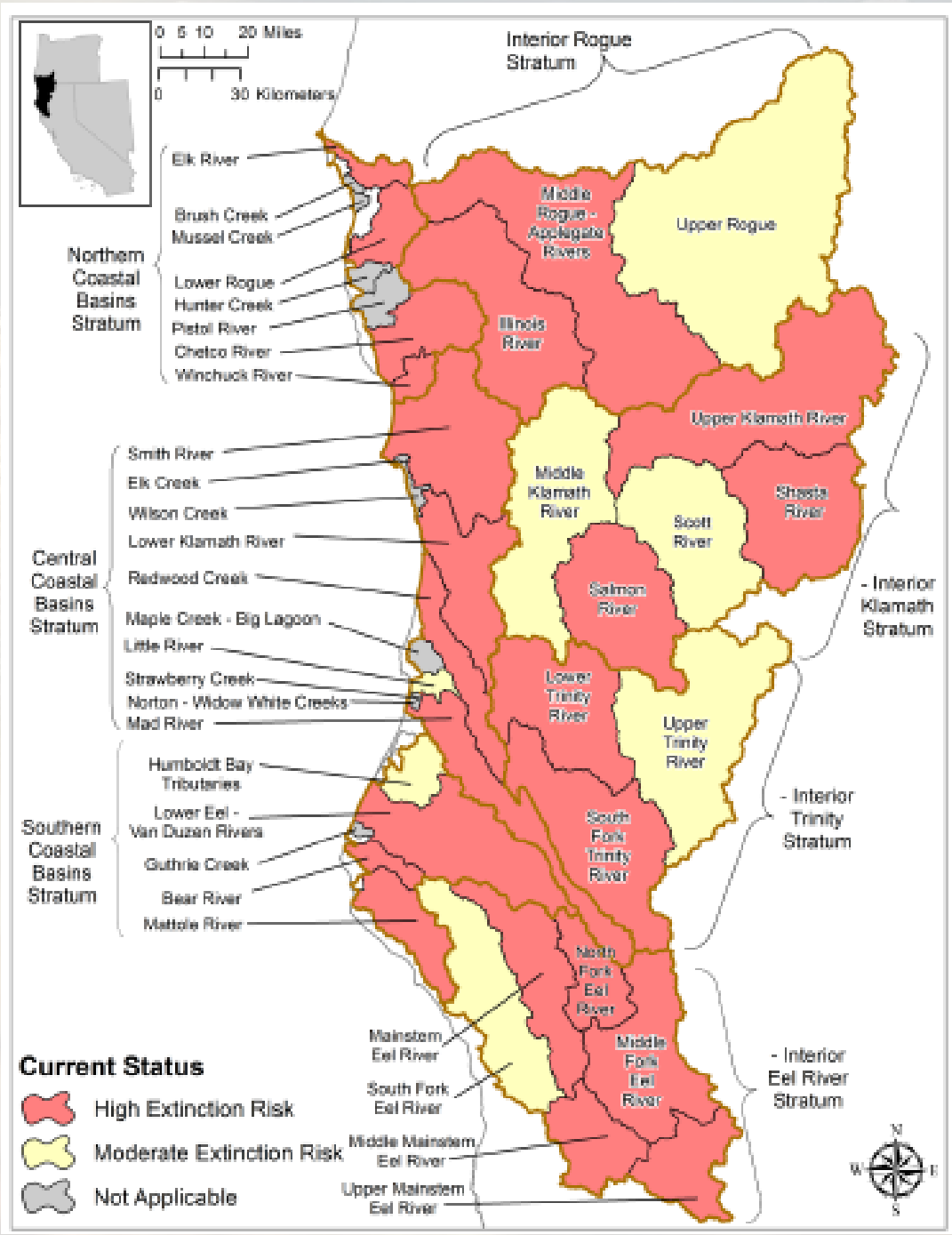
Partners
CDFW
NOAA Fisheries
NOAA Restoration Center

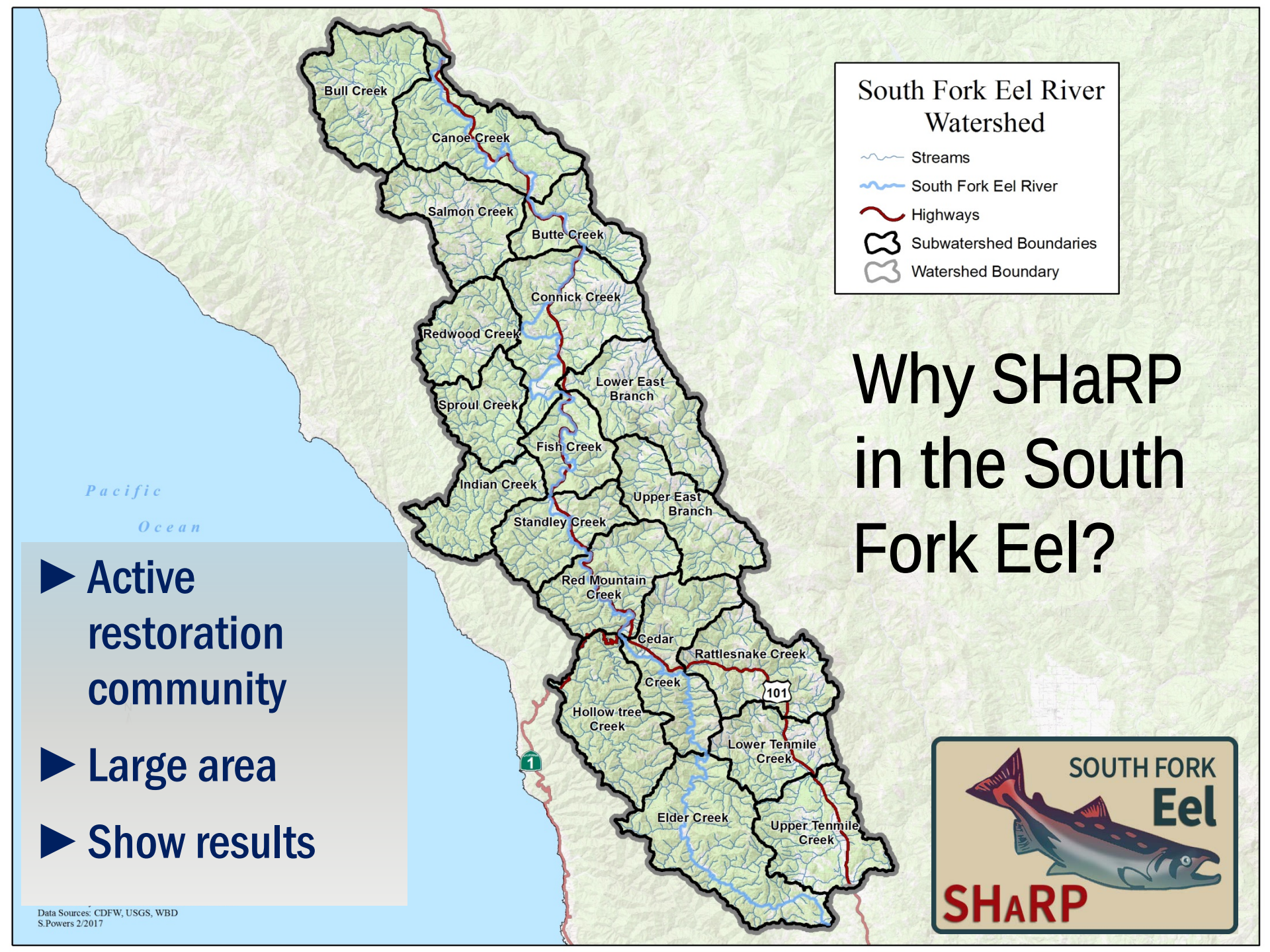
- A process to identify effective restoration within priority areas
- Opportunistic vs. focused site selection
- Focus limited resources on certain creeks within a watershed so resources will do the most good (e.g., where water temp, flow suitable)

Salmon Habitat Restoration Priorities

Why the South Fork Eel River?

- Highest numbers of salmon in Eel River
- Most intact





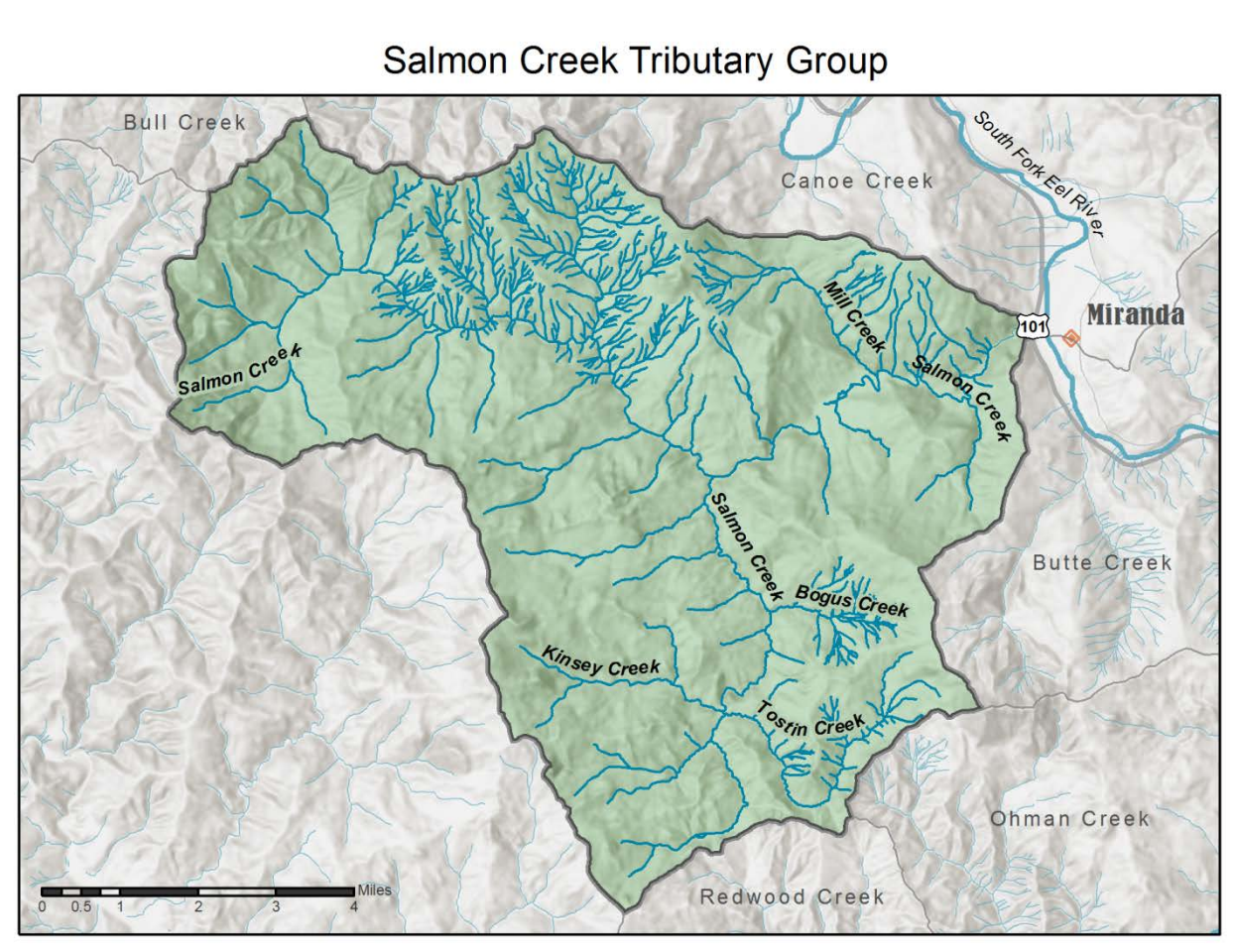
Why SHaRP in the South Fork Eel?

- Active restoration community
- Large area
- Show results

SOUTH FORK Eel
SHaRP

Salmon Creek

- We lost the coho salmon and are in danger of losing the Chinook
- Prevent this happening in other tributary groups

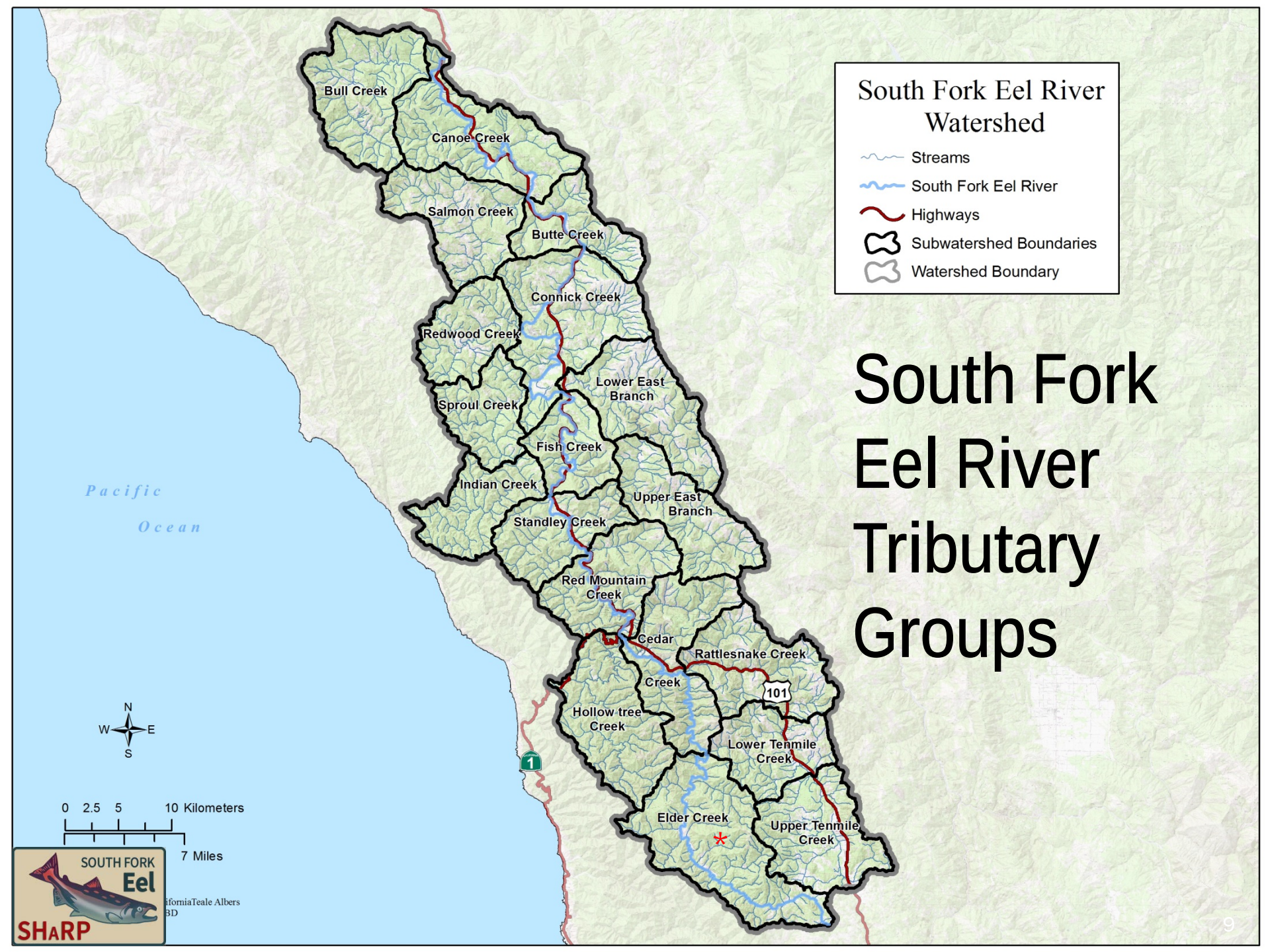


Don’t We Already Have Recovery Plans?

- Recovery Plans for the area were released in 2005, 2014 and 2016.
- Different scale –watershed scale vs. tributary level
- Both short- and long-term actions vs. actions that will benefit immediately
- Single-species focus vs. all three species
- This effort builds on existing recovery plans.

Framework used for assessment of tributary groups

- Bradbury 1995: Handbook for prioritizing watershed protection and restoration to aid recovery of native salmon
- Oregon state senator Bill Bradbury
- Developed by Oregon scientists and resource managers
- Used in Federal ESA recovery plans for salmonids – core selection
- Originally three categories of considerations – we added one (Habitat Conditions)



South Fork Eel River Tributary Groups

We considered four broad categories of data

- **Biological Importance**
  - Most recent assessments
- **Habitat Condition**
  - Most recent assessments
- **Optimism and Potential**
  - Optimism that ecosystems can be protected or restored.
  - Potential for restoration.
- **Integrity and Risk**
  - Degree of human-caused disturbance
  - Relative risk to biological and ecological resources

SOUTH FORK Eel SHARP

Information Considered
Biological Importance (x 2)

- Salmonid species distribution from observation data - BIOS

- Salmonid spawning abundance from redd density.

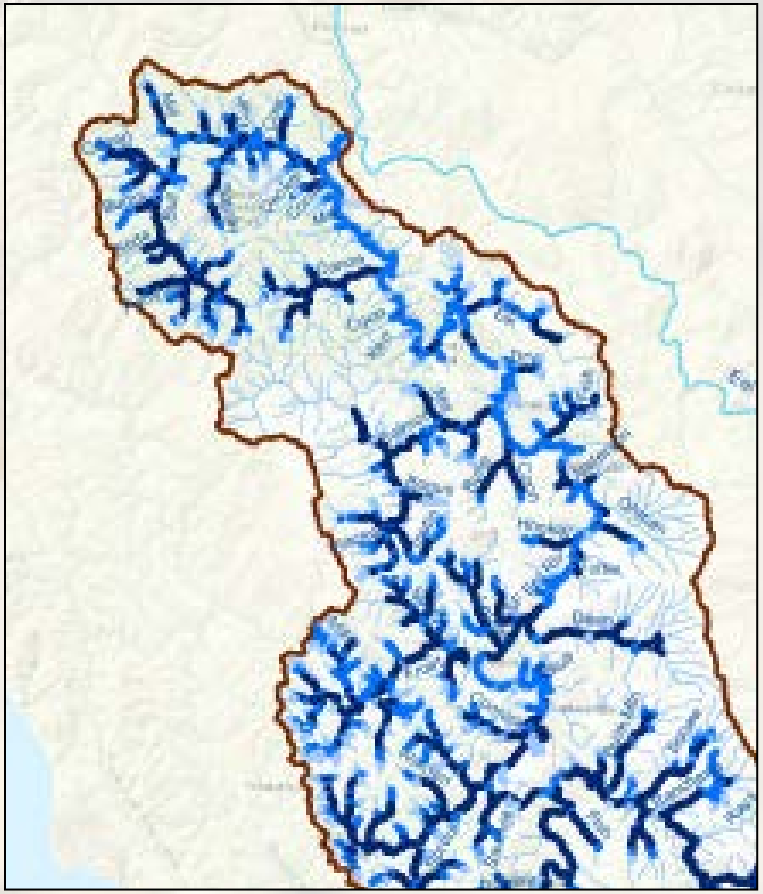
SOUTH FORK Eel SHARP

Information Considered
Habitat Condition

- CDFW Reach-scale habitat suitability index
  - Canopy
  - Pool Depth and Shelter
  - Embeddedness
- CDFW Large Wood Survey
- CDFW Refugia

Information Considered
Optimism and Potential

- Species-specific Intrinsic Potential
- Geology
- Land ownership
  - Public/Private
  - Average parcel size
- Previous landowner support for restoration



Information Considered
Integrity and Risk

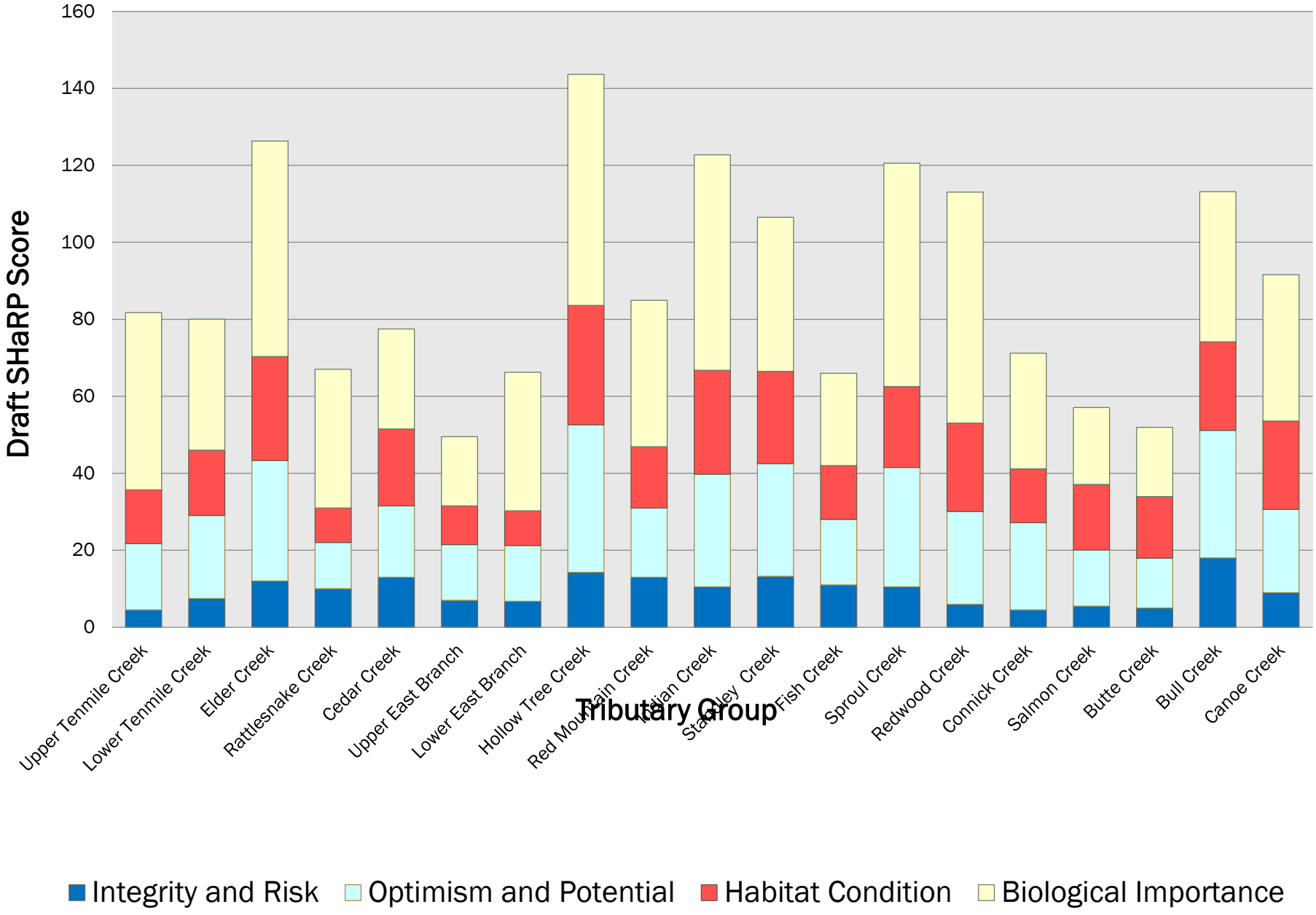
- **Water Temperature**
  - Eel River Recovery Project Temperature Compilation
  - NorWeST modeled mean August stream temps
- **Road Density**
- **Population Density**
- **Diversions**

SOUTH FORK Eel SHaRP

Analysis Approach

- MS Excel spreadsheet
- Value for each data source - 19 tributary groups
- Adjustment factor to account for aspects of category not otherwise captured
- Added up values within each of four categories (Biological Importance, etc.)
- Added up values across categories for total score

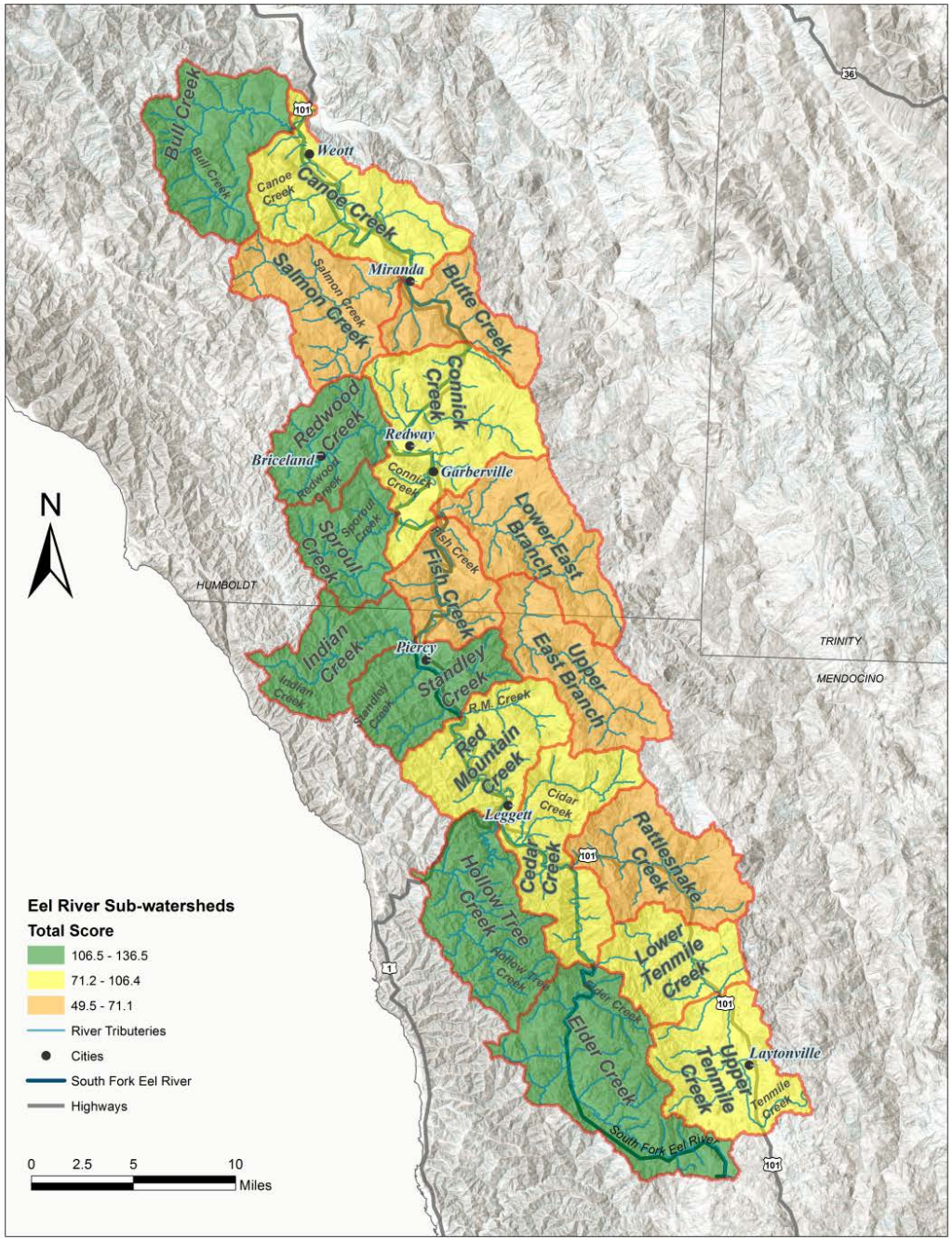
Draft Tributary Group Scores



Category	Tributary Group	Score
1	Hollow Tree Creek	136.5
	Elder Creek	126.3
	Indian Creek	122.8
	Sproul Creek	120.6
	Bull Creek	113.2
	Redwood Creek	113.1
	Standley Creek	106.5
2	Canoe Creek	91.6
	Red Mountain Creek	84.9
	Upper Tenmile Creek	81.7
	Lower Tenmile Creek	80.0
	Cedar Creek	77.5
	Connick Creek	71.2
3	Rattlesnake Creek	67.0
	Lower East Branch	66.3
	Fish Creek	66.0
	Salmon Creek	57.1
	Butte Creek	52.0
	Upper East Branch	49.5

- Once final, green tributary groups will move forward in the SHaRP process
- We will develop reach-level restoration plans for each of these seven tributary groups
- Recovery plan actions are encouraged everywhere

SOUTH FORK Eel SHaRP



SOUTH FORK Eel SHaRP

Next Steps

1. Gather input on draft tributary groups
    1. 45 day comment period
    2. Discuss scores for specific categories for particular creeks (contact us)
    3. If needed, smaller group meetings
2. Finalize tributary group scores
3. Identify types of restoration needed, actions, and locations
    - Landowners
    - Local restorationists familiar with

SOUTH FORK Eel SHARP

Finalizing Plan

4. Bring back to community for input (contact list)
5. Finalize SHaRP plan (reach level, site-specific action lists)
6. Seek funding to develop on-the-ground designs and implement actions

Future Task – Expand to Other Locations

- Learn from this pilot effort
- Consistent methodology, purpose; different data
- Use to describe needs of broader region (e.g., Eel River watershed) once other SHaRPs are completed.
- Business plan

Eel Russian River Commission

Agenda Summary

ITEM NO.: 7a

TO: Eel Russian River Commission

AGENDA TITLE:

Report On Sustainable Groundwater Management Plans, Regional Updates

MEETING DATE: November 17, 2017

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: N/A

ACTION:

MOTION: **2nd**

Eel Russian River Commission

Agenda Summary

ITEM NO.: 8

TO: Eel Russian River Commission

AGENDA TITLE:

Commissioner Reports

MEETING DATE: November 17, 2017

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: N/A

ACTION:

MOTION: **2nd**

Eel Russian River Commission

Agenda Summary

ITEM NO.: 9a

TO: Eel Russian River Commission

AGENDA TITLE:

ERRC Audit Discussion

MEETING DATE: November 17, 2017

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: N/A

ACTION:

MOTION: **2nd**

Eel Russian River Commission

Agenda Summary

ITEM NO.: 9b

TO: Eel Russian River Commission

AGENDA TITLE:

Lake County Alternate

MEETING DATE: November 17, 2017

ITEM TYPE: Regular Agenda **TIME ALLOCATED FOR ITEM**: N/A

ACTION:

MOTION: **2nd**

Eel Russian River Commission

Agenda Summary

ITEM NO.: 10

TO: Eel Russian River Commission

AGENDA TITLE:

Public Expression

MEETING DATE: November 17, 2017

ACTION: