HIGHLIGHTS AND ACTION ITEMS | STAKEHOLDER SCIENCE COMMITTEE

LAKE TAHOE WEST RESTORATION PARTNERSHIP

Date/Time: August 27th, 2019 |10:00am – 12:00pm

Remote Webinar and California Tahoe Conservancy, 1061 3rd St, South Lake Tahoe, CA 96150

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Participants: Bri Tiffany, Brian Garrett, Stephanie Coppeto, Joe Harvey, Christine Aralia, Jennifer Quashnick, Kat McIntyre, Christina Restaino, Jonathan Long, Sue Britting, Bruce Springsteen, Zach Bradford

Action Items

- 1. Sarah will send out Draft 3 of the LRS tonight (8/27) or tomorrow (8/28).
 - a. **Stakeholders** will flag any items they have issues with in Draft 3 of the LRS by 9/3 at the latest.
- 2. Sarah will follow up with Sue about graphics featured on p.13.

Updated LANDIS Results

- Background on what was updated across treatment Scenarios:
 - Revised assumptions.
 - More climate variations.
- LANDIS Team incorporated additional updates in new runs for all 4 scenarios:
 - Revised treatment of managed wildfires/suppression.
 - Increased wildfire suppression effectiveness for all ignitions under Scenarios 1,
 2, 3 (Under Scenario 4, *lightning ignitions outside of WUI have less suppression*).
 - Made beetle outbreaks more responsive to climate (climatic water deficit and minimum winter temperature) rather than being periodic (the probability of outbreaks is tied to host and non-host density tree).
 - Restricted frequency retreatment intervals.
 - More dead biomass removed during harvests to better match design team intent.
 - Decreased the reductions in litter and duff due to thinning to better match monitoring results.
- Adjustments to Scenario 4 in LANDIS modeling:
 - 4v2: More prescribed fire in LTW (~3000 acres, meaning ~10,000 acres basin-wide rather than 3000 acres basin-wide).
 - Ignite prescribed fires throughout year based upon fire weather constraints.

- Area burned in a day expanded to about 180 acres/day (concentrated in the spring and fall, but some occurring throughout the year as weather permitted).
- 90 days of prescribed fire is close to overall average of annual "burn days" estimated by Randy Striplin (based upon air quality, fire weather, and resource availability).
- Climate projections:
 - 4 global circulation models: CanESM, CNRM, HadGEM, MIROC5.
 - Consistent with models used in California's 4th Climate Adaptation Plan.
 - 2 RCPs representative concentration pathways:
 - RCP 4.5 (low emissions): optimistic trajectory.
 - RCP 8.5 (high emissions): business-as-usual/current trajectory.
- Comparison of climate projections:
 - Temperature increase across all projections.
 - Precipitation varies by projection.
 - CanESM 8.5 has more summertime precipitation than others (which influences fires).
 - Microc5 4.5 and 8.5 have more extended droughts.
- Fire indicators:
 - Total wildfire.
 - \circ $\;$ Area burned at high severity.
 - Area burned in large high severity patches.
 - >40 acres.
 - >200 acres.
 - Total fire for two climate projections.
- LANDIS Results:
 - Total area burned by wildfire in LTW:
 - With moderate climate change metric:
 - MIROC5 projections result in much more area burned by wildfire, as it projects more multi-year droughts than the other GCMs, especially toward the end of the century.
 - With high climate change metric:
 - Patterns change somewhat under high emission pathway projections, although the net effects across the models are pretty similar to the 4.5 pathway results. Notably, CanESM_8.5 is associated with greater summer precipitation, which is associated with less area burned compared to the other projections.
 - High severity fire area in LTW:
 - With moderate climate change metric:
 - Scenario 3 and Scenario 4v2 are similar.
 - Scenario 4v2 does well compared to Scenarios 1 and 2.
 - With high climate change metric:
 - Again, the higher emissions pathway projections cause more spread in the projections, but the average outcomes are similar to under the projections with more modest climate change.

- Question from Stakeholders: Is the fire season changing?
 - Response from Science Team: The fire season has likely expanded under 8.5 climate projection.
- High severity fire area in LTW, average across projections within emissions pathway:
 - This chart shows the average across the 4 GCMs for each emissions pathway (RCP 4.5 and 8.5). There averages were not sensitive to climate emission pathway, but there are some effects on performance of scenario 1 versus 4 (there was less prescribed burning under scenario 4 with high climate change, which might in turn reduce its effects on high severity fire, while amount burned under high severity under scenario 1 is reduced slightly under high climate change.
- High severity fire area, >40-acre high severity patches in LTW (all climate change pathways):
 - Similar story to results from total area burned.
- High severity fire area, >200-acre high severity patches in LTW (all climate change pathways):
 - Scenario 4v2 performs best.
 - Question/Comments from Stakeholders:
 - It seems like no matter what treatment is done on the landscape, there is an increase in high severity fire.
 - Science Team response: This is pretty consistent with the fourth climate adaptation from California.
 - Most of the research suggests that we will see more fire on the landscape no matter what
 - Since these results are cumulative, even without climate change we would expect high severity fire area to increase correct?
 - Science Team response: Yes.
 - Over 100 years, 5000 acres of cumulative high severity fire doesn't actually seem that bad?
 - Science Team response: You would expect some amount of large high severity patches no matter what treatment was done on the landscape.
 - Cumulative fire area by severity and type in LTW, CanESM 4.5:
 - Results for all types of fire for the CanESM4.5 projection (same one used in Round 1 modeling).
 - Scenario 4v2 results in several times more prescribed fire and total fire. Prescribed fire is the biggest contributor to total area burned under both versions of Scenario 4.
 - Moderate severity fire is pretty similar across scenarios. Scenarios with more management (3 and 4) result in similar amounts of low and high intensity wildfire, while 4v2 results in more low severity wildfire than high severity

wildfire. Meanwhile, scenarios with less management (1 and 2) result in more high severity than low severity wildfire. Intuitive patterns

- Cumulative fire area by severity and type in LTW, MICROC5.85
 - For the MIROC5 8.5 scenario, amount burned increases under all scenarios except 4v2, which is similar overall (there was somewhat less prescribed fire). General patterns are similar to those reported in the previous slide.
- Total Carbon in LTW (megagrams/hectare):
 - Moderate climate change metric:
 - Compared to the old results, scenario 3 now "catches up" to scenario 4 in terms of carbon sequestration. The more extensive burning under scenario 4 v2 incurs a higher carbon penalty, especially in later decades.
 - High climate change metric:
 - Similar patterns as under RCP4.5, although the spread of the curves are a bit tighter, and declines in total carbon under Scenario4v2 are greater.
- Areas with trees >130 years old:
 - Moderate climate change metric:
 - The modeling results now suggest more declines in area with old trees, perhaps reflecting greater mortality from insects (which is now more responsive to climate).
 - High climate change metric:
 - Declines in old trees are somewhat greater with higher climate change.
- Areas with trees between 130 and 200 years old:
 - Moderate climate change metric:
 - Same results seen in trees >130 years old.
 - High climate change metric:
 - Same results seen in trees >130 years old.
- Areas with trees >200 years old:
 - Moderate climate change metric:
 - Trends for trees great than 200 years are more stable, although all projections forecast a large increase followed by a decline late in the century.
 - High climate change metric:
 - More projections forecast declines in areas with very old trees under the high emission pathway. The MIROC5 projection is an odd outlier.
 - Questions/comments from Stakeholders:
 - How do insects work in LANDIS?
 - Science Team response: Insect patterns changed from Round 1 to Round 2 of LANDIS. Round 1 was periodic outbreaks and based on species/age classes. Round 2 was based on climate change.

- What is the carbon response about? Is it because more small trees are growing or because there is a loss of big trees?
 - Science Team response: Interestingly, there isn't much of a difference in the loss of large trees over time but there is a significant difference in carbon storage over time. The interpretation is that the treatments seen in Scenario 3 and Scenario 4 are just overall reducing the biomass on the landscape.
- Summary of LANDIS results:
 - The IADT is of the mindset that these results don't change our strategy. Do Stakeholders agree?
 - Stakeholder #1: I thought the results were affirmative of the strategy.
 - There will eventually be a science report in the LRS that expands on the results. This will be an appendix to the LRS and not in the LRS itself. Any other questions?
- Any other questions/comments from Stakeholders?
 - The Stakeholders are interested in seeing seral stage patterns when the results are ready.
 - The Science Team is working on this.
- A huge thank you to Charles and Jonathan for their incredible work and dedication on LANDIS!

LRS Updates and Edits

- Main changes from Draft 2 to Draft 3 of the LRS:
 - Re-wrote the modeling section for clarity and brevity and addressed numerous comments from the Science Team regarding science consistency. Changed subsection titles for easier reference to the key results.
 - Improved consistency and balance in discussion of fire's ecological benefits versus risks of high severity fire wildfire.
 - Improved clarity, wording, and scientific accuracy regarding results of water quality modeling and effects of treatment on water quality.
 - Added an inset on best management practices and resource protection measures to clarify that managers use those tools in implementing all projects in order to protect water quality and other resource values.
 - Inserted more reference to lake clarity and how the Strategy supports lake clarity.
 - Changed "insects" to "insects and disease" including in the title of Goal 1.
 - In Goal 5, added language noting the importance of water infrastructure for fire suppression in communities.
 - In Goal 1 and the matrix, added language regarding the importance of genetic diversity of forests.
 - Provided more clarity regarding potential policy changes that will be analyzed in during the project planning phase.

- Improved wording, clarity, consistency, and comprehensiveness throughout the document.
- Process to finalize the LRS:
 - On Tuesday 9/3 the IADT will ask for Stakeholder's consensus to approve the LRS.
 - Stakeholders need to look over Draft 3 and flag anything they absolutely cannot live with in the document. These edits are needed by 9/3 at the latest but preferably sooner.
- The IADT and Stakeholders worked together on water quality wording in the LRS.
 - Main passages where water quality is addressed:
 - Exec summary (key modeling insight).
 - Modeling results water quality.
 - Goal 4.
 - The IADT and Stakeholders reviewed these passages. Main takeaways:
 - Words like *minimal* and *very small* are rather ambiguous. Try to avoid using these words and instead focus on comparisons to things like "natural background erosion".
 - Negligible is scientifically defensible but minimal is not. Slight is ok (important in context, i.e., that you are comparing effects of something to something else).
 - The IADT should acknowledge that there are uncertainties regarding reducing the risks from severe but very infrequent disturbances (i.e. a wildfire) by increasing the rate of modest disturbances (i.e. prescribed fire).
 - Sarah took note of all of the Stakeholder/IADT comments and will be incorporating these minor changes into Draft 3 of the LRS that will be released either 8/27 or 8/28.





UPDATED LANSCAPE MODELING RESULTS (Round 2)

Charts prepared by Charles Maxwell, NCSU With Editing by Jonathan Long, USDA FS PSW

8/27/2019

Background

- 1. What we updated across scenarios:
 - 1. Revised assumptions
 - 2. Many more climate variations
- 2. Two versions of scenario 4 (low and high burning)

LANDIS Team incorporated additional updates in new runs for all 4 scenarios

- Revised treatment of managed wildfire/suppression
 - Increased wildfire suppression effectiveness for all ignitions under Scenarios 1, 2, 3 (Under Scenario 4, *lightning ignitions outside of WUI have less suppression*)
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Adjustments to Scenario 4 in LANDIS modeling

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LANDIS Round 1



EMDS

Updated Assumptions:

- 1) More treatment using prescribed fire in Scenario 4b (similar amount to R1 Scenario 3) (also accounts for fire weather in allowing prescribed fire)
- 2) Increasing suppression outside of WUI for scenarios 1-3
- 3) Bark beetles more responsive to climate (rather than periodic)
- 4) Adjusting retreatment interval, removal of dead biomass (wood) to better match IADT intentions and removal of surface fuels based upon literature
- 5) 8 climate projections (4 climate change models X two emissions pathways) rather than 1
- Amount and type of fire including large high severity patches
- Areas with old trees
- Seral stages
- **Economics**
- Water quality

Climate Projections

• 4 global circulation models: CanESM, CNRM, HadGEM, MIROC5

- Consistent with models used in California's 4th Climate Adaptation Plan
- 2 RCPs representative concentration pathways
 - RCP 4.5 (low emissions): optimistic trajectory
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Comparison of Climate Projections

- Temperatures increase across all projections
- Precipitation varies by projection
- CanESM 8.5 has more summertime precipitation than others (which influences fires)
- MIROC5 4.5 and 8.5 have more extended droughts



Fire Indicators

- 1. Total wildfire
- 2. Area burned at high severity
- 3. Area burned in large high severity patches
 - 1. >40 acres (16 hectares)
 - 2. >200 acres (80 hectares)
- 4. Total fire for two climate projections



















Carbon





Areas with Old Trees

>130 years

130-200 years

>200 years



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Supplemental Slides







