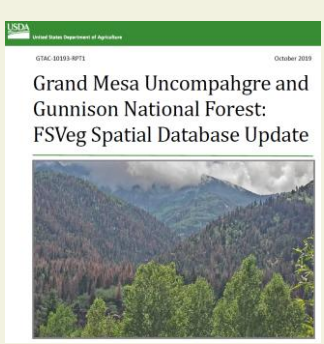
Change Detection and Lynx Habitat Update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Grand Mesa Uncompahgre and Gunnison National Forest: FSVeg Spatial Database Update

Grand Mesa, Uncompahgre and Gunnison National Forests

SBEADMR & Taylor Park EA Combined Annual Stakeholder Meeting

February 23, 2021

Matt Vasquez, Forest Biologist

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Change Detection and Lynx Habitat Update

Change Detection – what is it?

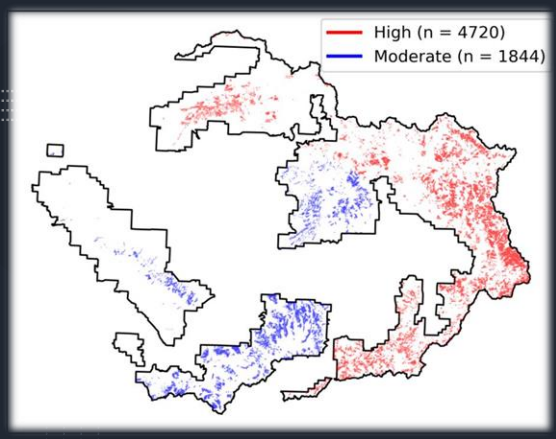
GMUG Lynx Habitat Re-mapping

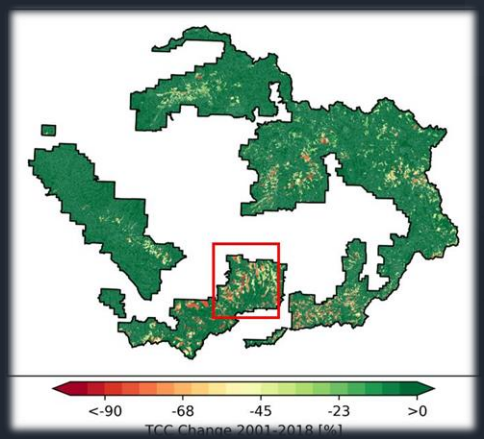
Management Implications

Where we're headed: what is change detection, how are we using it to update our Forest's lynx habitat mapping, and what are the management implications from changed conditions affecting lynx habitat suitability?

What's Change Detection?

- Method to update the GMUG's Field Sampled Vegetation (FSVeg) Spatial Database (Pan et al. 2019)
- Uses best available science to reflect current conditions





I will first start by saying I am not going to pretend I know everything about change detection. I will share what I've learned from those involved with it and provide an update on how we are using it to re-map lynx habitat to reflect habitat changes from tree mortality.

The Forest Service uses a vegetation database called FSVeg Spatial, which reflects vegetation conditions based on past photo-interpretation efforts. Due to intense tree mortality in recent years, this database no longer accurately reflects current vegetation conditions. The GMUG worked with the Forest Service Geospatial Technology and Applications Center (GTAC) to update FSVeg Spatial. GTAC acquired Landsat and Sentinel satellite imagery from 1989 to 2019 to detect change in canopy cover over the GMUG landscape. We narrowed the focus of the project to update polygons consisting of either an Engelmann Spruce mix, an Engelmann Spruce/Subalpine fir/Aspen Mix, or a Lodgepole Pine mix (priority strata referred to as clusters). Before updating the polygons, extensive common stand exam field data was collected within a sample of the polygons across the GMUG. Data collectors recorded tree species, diameter, and height for different size classes and status (live or dead) of individual trees, saplings, and seedlings found within each plot. GTAC then calculated mortality rates for each tree species and the different size classes using the

field data. GTAC used a modeling procedure to estimate tree canopy cover for the three cluster groups, producing a canopy cover map. Calculated mortality rates and the canopy cover map were used to update FSVeg Spatial. The updated FSVeg Spatial was then used to update our lynx habitat mapping.

Left figure: Updated polygon segments that existed in the high mortality (red) and moderate mortality (blue) regions; right figure: The spatial distribution of change in tree canopy cover (from Pan et al. 2019).

Reference:

Pan, C. G.; Bellante, G.; Goetz, W.; Swisher, L.; Megown, K. 2019. Grand Mesa Uncompahgre and Gunnison National Forest: FSVeg Spatial Database Update. GTAC-10193-RPT1. Salt Lake City, UT: U.S. Department of Agriculture, Forest Service, Geospatial Technology and Applications Center. 18 p.

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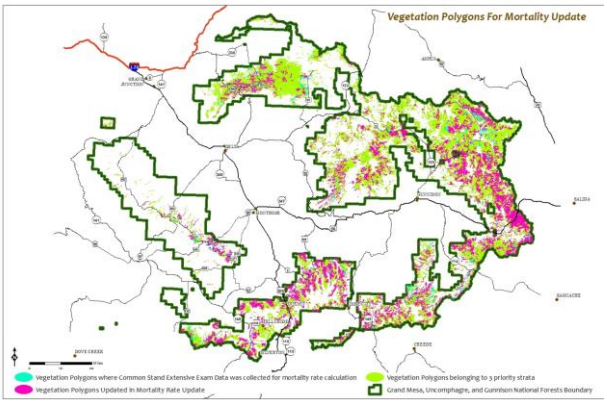

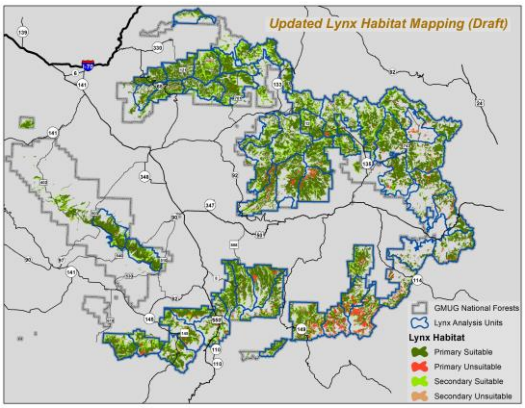

6,564 polygons were updated, approximately 10% of the polygons in the FSVeg Spatial database. After this update was applied to FSVeg Spatial, FSVeg Spatial was then used to update our lynx habitat mapping to reflect lynx habitat changes from tree mortality. Our new lynx habitat mapping is currently in draft form. The current lynx habitat mapping we use was last modeled in 2014. Since majority of lynx habitat is spruce-fir forests, and since spruce bark beetles killed a high percentage of overstory Engelmann spruce trees in large portions of the GMUG, we expected to see differences in amount of suitable lynx habitat now compared to 2014.

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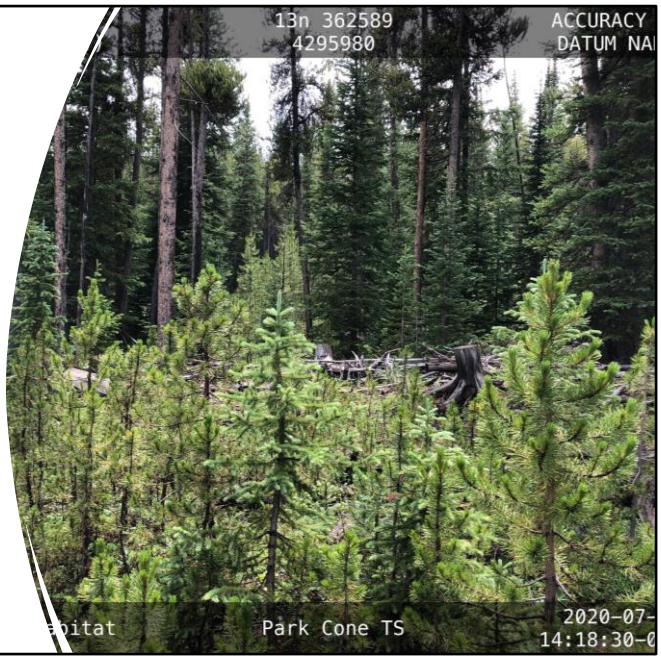
Management Implications

Southern Rockies Lynx Amendment - Standard VEG S1: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.



Why does this matter? We manage lynx habitat per the Southern Rockies Lynx Amendment (SRLA), and consistent with the Lynx Conservation Assessment and Strategy (2013). We need to ensure compliance with SRLA standards. This habitat mapping update is relevant because we need to understand how much lynx habitat changed to a stand initiation structural stage (unsuitable condition) due to the spruce bark beetle epidemic and identify LAUs that are approaching or exceeding the Veg S1 Standard. What does this mean for management?

Management Implications

Lynx Analysis Units approaching or exceeding the 30% threshold standard:

Lynx Analysis Unit	% unsuitable from beetle kill*	% unsuitable from beetle kill + vegetation management*
Cathedral	63	64
Cebolla	17	18
Cochetopa	23	24
Los Pinos Creek	28	31
Stewart Creek	64	65

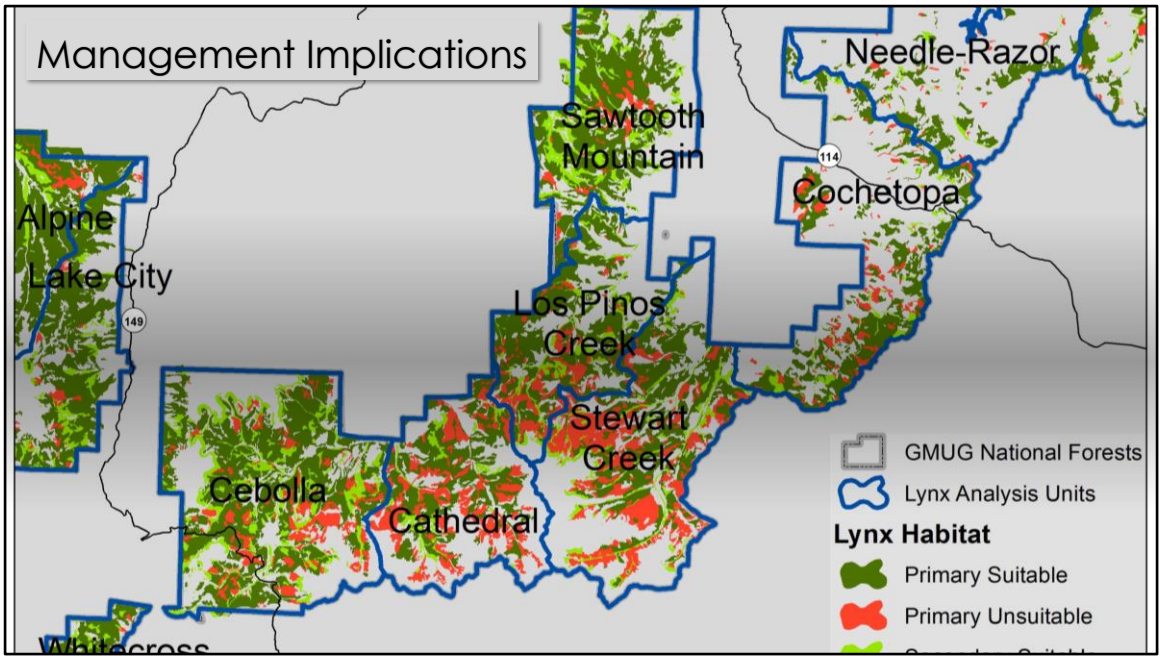
All on the Gunnison Ranger District, Gunnison Basin South Geographic Area

*Subject to change

For the Cathedral, Los Pinos Creek, and Stewart Creek LAUs, we will not implement additional vegetation management activities that would convert suitable habitat to unsuitable. If the Cebolla and Cochetopa LAUs reach 25% unsuitable, that is our trigger to review our activities and ensure no additional conversion to unsuitable occurs from vegetation management. All other LAUs on the GMUG not shown here range from 0 – 14% unsuitable from beetle kill + vegetation management.

Salvage harvest occurs primarily in areas converted to unsuitable due to beetle kill.

*Percentages subject to change. We are reviewing the calculations, and percentages may decrease a little. We think we overestimated by including acres that are not actually lynx habitat in our calculations. Regardless, the Cathedral, Stewart Creek, and possibly Los Pinos Creek LAUs exceed the 30% unsuitable threshold.



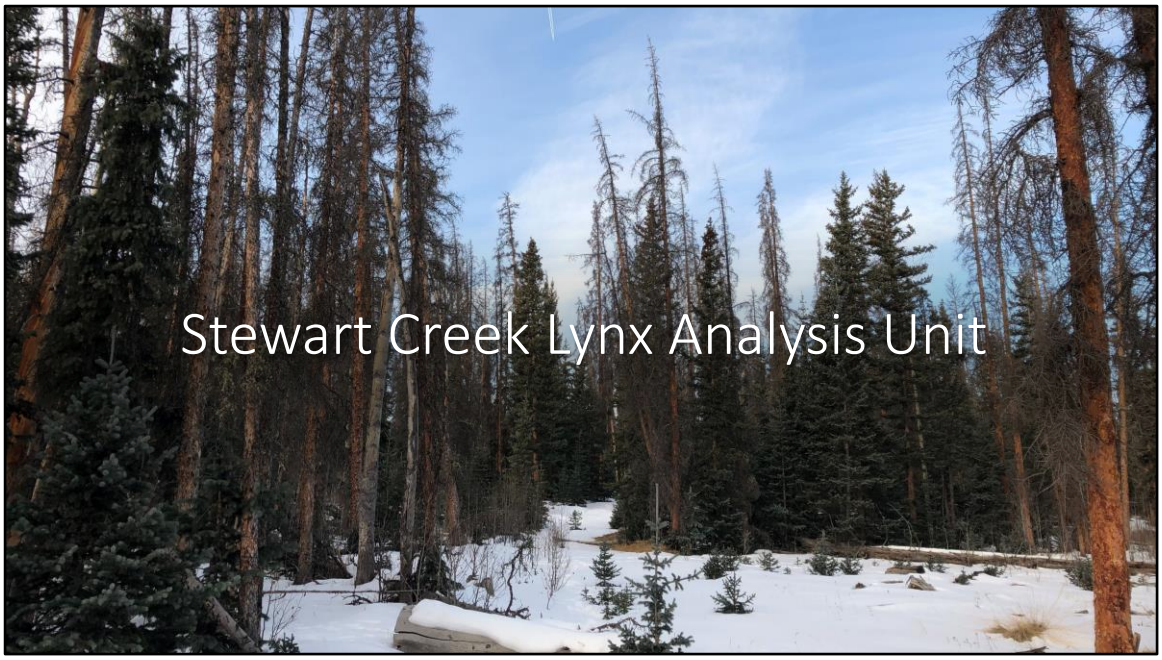
Here we zoom in to those 5 LAUs in the previous table, containing the highest percentage of unsuitable habitat on the GMUG.

Note: many areas with extensive dead overstory still provide lynx habitat. Areas mapped as unsuitable largely reflect single-storied overstory stands >90% dead. Multi-storied stands = resilient lynx habitat likely to remain suitable post-beetles.

Many areas with no mapped lynx habitat are still forested and potentially important for connectivity.

Single-storied stand with dead and dying overstory on the left side; and multi-storied stand with healthy, dense spruce regeneration on the right side. Photo taken in 2014.

Example of habitat converted to unsuitable due to overstory tree mortality in a predominantly single-storied stand.



Example of habitat conditions in the Stewart Creek Lynx Analysis Unit. There is fine-scale heterogeneity in dense horizontal cover. Lots of variability with clumps of live spruce understory mixed with areas having little to no live understory.

Next Steps

Finalize	Finalize updated lynx habitat mapping:
Review by	Review by all District biologists
Review	Review with U.S. Fish and Wildlife Service
Update	Update lynx habitat statistics to reflect current conditions

Review during late winter - Spring 2021 with District bios and with FWS; Clay Speas working on updating lynx habitat statistics.


Thank you!