



# What is the effect of treatments on the presence of forest pests and disease?



High density of insect caused mortality within a wet mixed conifer system in southern Colorado (photo: Collin McElroy)

## Intended monitoring:

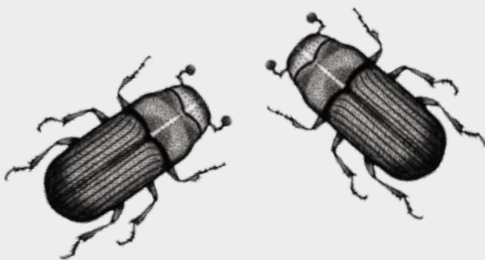
Use repeat CFRLP and Forest Inventory and Analysis (FIA) forest plots to measure tree mortality and infestation.

Calculate the number of acres of tree mortality by insect and disease agents within the CFLRP.

## Completed monitoring:

All snags (tree mortality) recorded within 0.1 acre CFRLP forest plots (2023 data) and snag data pulled from FIA report for CFLRP (2019 data). Insect and disease presence was not included in CFLRP forest plots.

Data pulled from the Forest Service Insect Disease and Detection Survey (IDS) database and analyzed across the CFLRP.



## 2-3-2 Cohesive Strategy Partnership Multiparty Monitoring Update

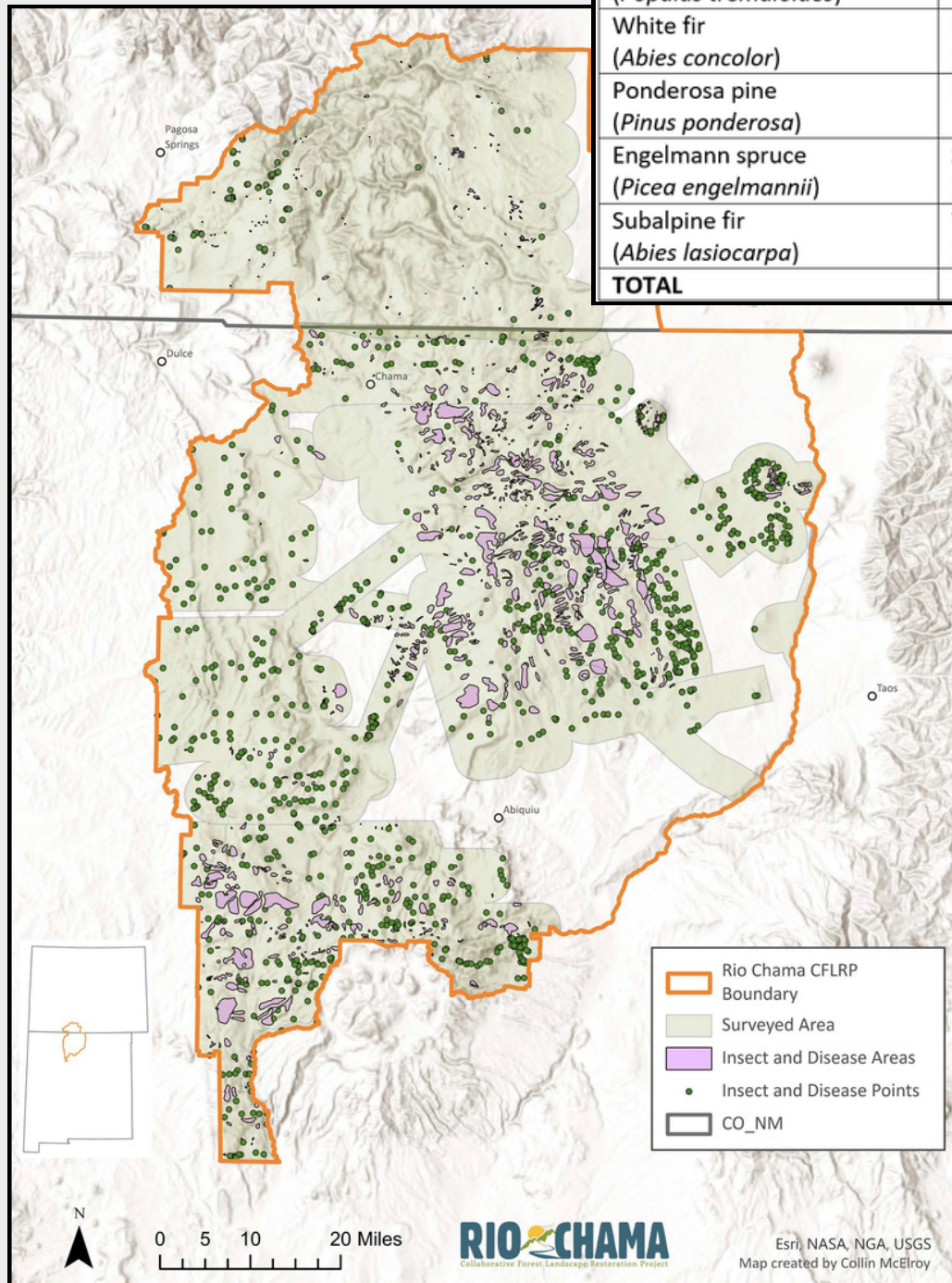
for the Rio Chama Collaborative Forest Landscape Restoration Program



# Overview of results:

## Current Insect and Disease data:

Host Species	Causal Agent	Sum (ac)
Pinyon species ( <i>Pinus spp.</i> )	Pinyon ips ( <i>Ips confusus</i> )	7615
Douglas fir ( <i>Pseudotsuga menziesii</i> )	Douglas fir beetle ( <i>Dendroctonus pseudotsugae</i> )	5244
Quaking aspen ( <i>Populus tremuloides</i> )	Unknown	2252
White fir ( <i>Abies concolor</i> )	Fir engraver ( <i>Scolytus ventralis</i> )	2025
Ponderosa pine ( <i>Pinus ponderosa</i> )	Unknown Bark Beetle	2017
Engelmann spruce ( <i>Picea engelmannii</i> )	Spruce beetle ( <i>Dendroctonus rufipennis</i> )	484
Subalpine fir ( <i>Abies lasiocarpa</i> )	Western balsam bark beetle ( <i>Dryocoetes confusus</i> )	20
<b>TOTAL</b>		<b>19657</b>



Above: Sum of 2022 acres with mortality by tree species and disease agent per USFS IDS.

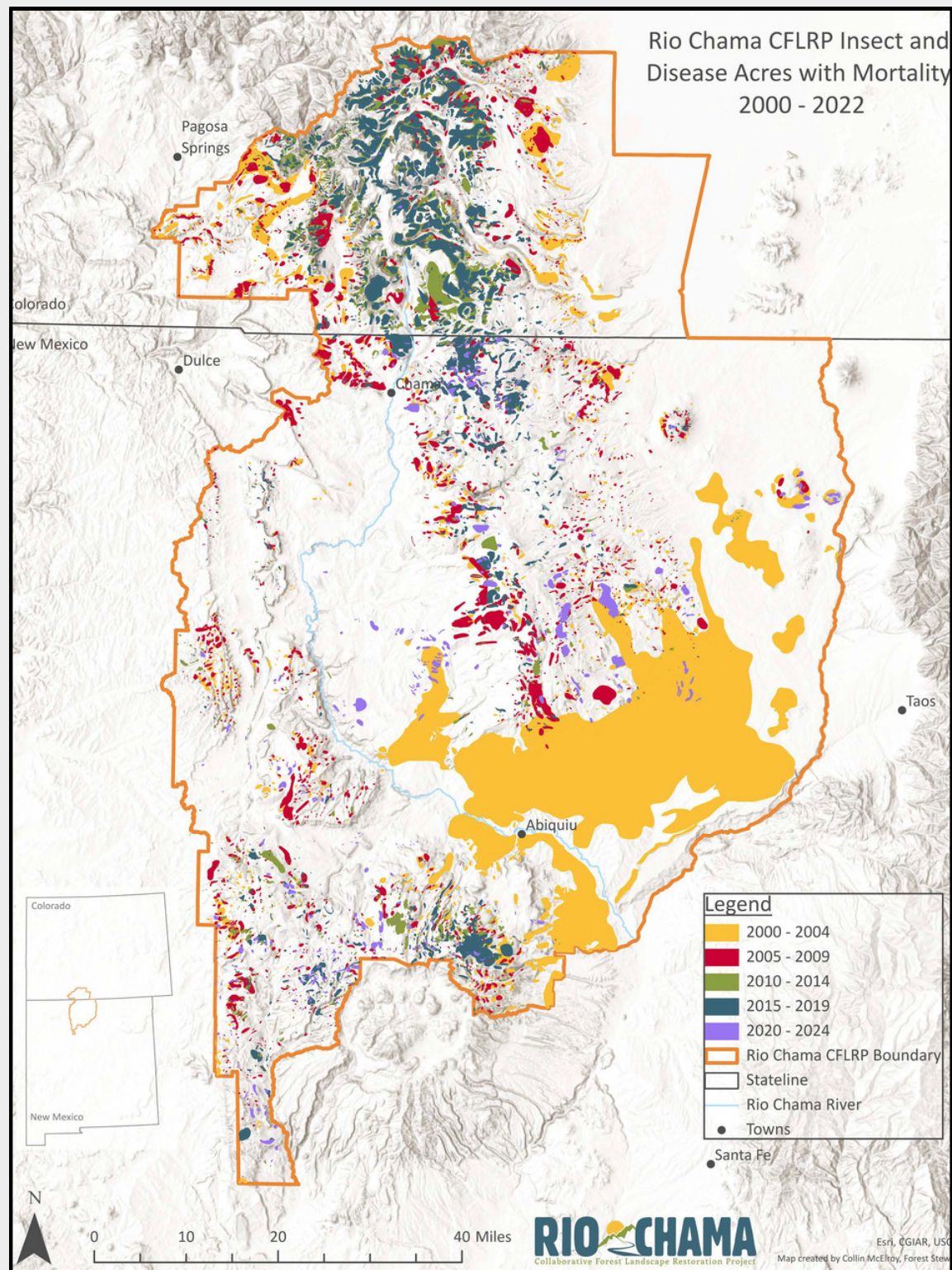
Left: Map of 2022 Insect Disease and Detection Survey data per USFS IDS.

Below: Average standing dead (snags) per acre estimated by 232 Forest Plots and FIA data. TPA stands for Trees Per Acre. (FIA data is from 2010-2019)

Forest Type	Forest Plots	FIA	Standing Dead TPA Forest Plots	Standing Dead TPA FIA Data
All Forest Types	All Forest Types	All Forest Types	20	17
Dry Mixed Conifer	Douglas-fir	Douglas-fir	6	16
Pinyon Juniper	Pinyon / Juniper	Pinyon / Juniper	1	6
Ponderosa Pine	Ponderosa Pine	Ponderosa Pine	3	3
Wet Mixed Conifer	Fir / Spruce / Hemlock	Fir / Spruce / Hemlock	47	41

## Spatial trends:

Right: 2000-2022 data from USFS IDS database and grouped into 5-year bins.



### Notes from the Field:

USFS Insect and Disease Detection Survey's (IDS) data is collected annually via aerial surveyor who identifies affected tree species and manually draws polygons. It is important to note that IDS polygons represent acres WITH mortality and defoliation rather than acres OF mortality and defoliation.

Within 0.1 acre forest plots, all snags were recorded. Plot-based standing dead estimates are highly dependent of recent disturbance and the limited number of forest plots likely skews the variability across the landscape. Protocol updates for 2024 will include recording the presence of select insect and disease agents. In addition, the use of drone imagery and Structure from Motion analysis to identify individual trees throughout a treatment area will expand in 2024.

What insect and disease agents can and should be monitored within forest plots?

Table summarizes adaptive management (AM) watch-outs as defined in Edition 1 of the 232 Partnership Multiparty Monitoring plan. AM watch-outs were determined by the 232 Partnership at the February 2023 meeting in Taos, NM. Yellow boxes indicate the watch-out was met, or not measured, and should be considered for collaborative discussion.

AM Watch-out	Commentary
Forest plots indicate higher presence of pest/disease impacted trees than FIA data.	Pest and disease trees were not explicitly recorded in 2023
Aerial survey results not ground truthed.	Extent of aerial detection survey ground truthing unknown.

### Monitoring Committee Recommendations and Takeaways

- Make sure we can answer monitoring questions with the data being gathered (invasives monitoring as an example).
- Utilize plots as data-rich sites for testing new scaling frameworks from plot to drone to satellite, leverage new data.
- Define "desired conditions" in AM watch-outs to provide metrics and goals for action.
- There is a lot of work to be done thinking about, and monitoring, large trees.
- Insect and disease monitoring needs to be incorporated into forest plot monitoring.
- Is it fair or useful to compare 232 data to FIA data?

Rio Chama CFLRP monitoring efforts and collaborative discussions are ongoing. Please direct comments and questions to [cody@forestguild.org](mailto:cody@forestguild.org)