CFLRP 5-Year Report

Project Name: Four Forest Restoration Initiative State: Arizona

Landscape-scale Desired Conditions for the life of the project as defined by the Collaborative (Based on 2,400,000 acre landscape)

Desired Conditions Target for Fire Regime Restoration: <u>47%</u> change (relative to the desired condition) occurs across <u>29%</u> of the landscape area by FY 2014.

1. *Risk of active crown fire has been reduced across 16% of the CFLR landscape.*
2. *Risk of crown fire initiation has been reduced across 29% of the CFLR landscape.*
3. *Risk of stand replacing fire has been reduced across 29% of the CFLR landscape.*

<u>Data processing</u>:

The boundaries for all restoration treatments were taken from the FACTS spatial database and displayed over an aerial photograph. The effect of each treatment was then visually categorized into groups based on canopy cover using a reference image where canopy was digitally calculated. The following assumptions were made based on well-established data derived from years of post-implementation monitoring, modeling, and practical breakpoints that describe broad trends: All treatments were assumed to have raised canopy base height (affects crown fire initiation). However, only those treatments that reduced canopy cover to below 40% were assumed to have reduced the risk of active crown fire. All prescribed fires and wildfires managed for resource benefit were assumed to have raised canopy base height and not to have significantly affected crown cover. All treatments were buffered by ¼ mile to capture the effect to areas immediately surrounding treatments. Where treatments or buffers overlapped, the overlap was subtracted to avoid double counting.

Restoration in Mountainaire

Then for DC Statement 1 and DC Statement 2, the sum of the footprint and buffer was represented as a function of the total landscape (2,400,000 acres).

$$\frac{(Treatment\ Footprint\ (stands < 40\%\ cover) + Buffer)}{2{,}400{,}000} = percent\ of\ the\ landscape\ DCS2$$

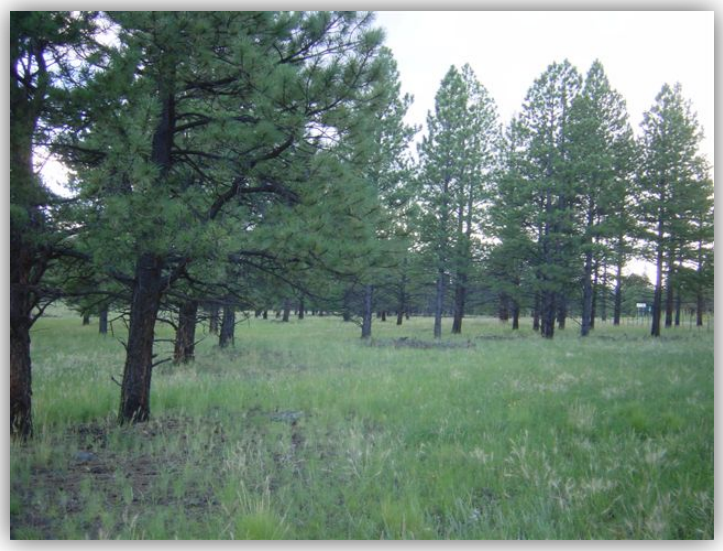
$$\frac{(Treatment\ Footprint\ (stands > 40\%\ cover) + Buffer)}{2{,}400{,}000} = percent\ of\ the\ landscape\ DCS1$$

To calculate DC Statement 3 and the Desired Condition Target, the total treatment footprint and buffers were summed and divided by 2,400,000 acres to derive the "percent of the landscape" value. Then we used the following process to calculate the "percent change." A raster layer with fuel model values was downloaded from LANDFIRE. Then a separate treatment raster layer was created with values associated with the post treatment canopy cover categories described above. To determine the effect of treatments on fuel models, the fuel models raster was overlaid with the treatment raster (including the associated buffers). A transition matrix for [fuel model x treatment] was created by our fuels specialist to describe how fuel models are likely to change in response to treatments. The fire behavior in areas adjacent to treatments is positively affected by the changes created through vegetation management, though not as strongly within the treatment boundary. So, a weighted change value was calculated to incorporate those areas directly treated and those areas adjacent to treatments. A more detailed explanation of the calculations is on file and available upon request.

Desired Conditions Target for Fish and Wildlife Habitat Condition: 58% change (relative to the desired condition) occurs across 25% of the landscape area by FY 2014.

1. *The quality and resilience of habitat is improved for open habitat species by 76% across 10% of the CFLR landscape.*
2. *The quality and resilience of habitat is improved for closed/mixed habitat species by 59% across 24% of the CFLR landscape.*

A similar process to the one described above was used to capture the effect of treatments on fish and wildlife. Species of interest (derived from TES species) were divided into functional groups based on their preference for either open canopy habitats or closed/mixed canopy habitats. The life history and home range of each species obviously differ significantly. For this reason, we selected 500 meters as a very conservative representation of the distance that an individual may range outside of a treated area (some species may regularly range across several miles) while still benefiting from the improved habitat condition. Based on the best available science, treatments that resulted in a canopy that was less than 40% were categorized as benefitting closed/mixed canopy species. Those that resulted in a canopy cover that was greater than 40% were categorized as benefitting open canopy species. Prescribed fires and wildfires managed for resource benefit were used to represent benefits to closed/mixed canopy species since these fires do not typically result in significant changes in canopy cover, but do improve the resiliency of the habitat.



Restored herbaceous cover improves habitat quality for herbivores and raptors alike

As before, the process required categorizing the treatment shapefile by canopy cover based on aerial photography. Where treatments or buffers overlapped, the overlap was subtracted. Prescribed fires and wildfires managed for resource benefit were not buffered. Again a weighted change value was calculated for treatment areas and adjacent areas that derive a lesser benefit from habitat management activities.

Desired Conditions Target for Watershed Condition: 10% change (relative to the desired condition) occurs across 100% of the landscape area by FY 2014.

1. *Watershed Classification and Assessment Tracking Tool (WCATT) scores across the entire CFLR landscape will improve or remain unchanged.*

The WCATT score is not a particularly sensitive metric when evaluating landscape scale changes, particularly with landscapes as large as that of 4FRI. Each forest is expected to develop one to two watershed restoration action plans (WRAP) per year. It is through the WRAP that a forest can take a close look at the condition in a HUC-6 watershed and identify the treatments required to change the WCATT score. The 4FRI has over 400 HUC-6 watersheds within the boundary and treatments have occurred in approximately 200 of them. A single treatment activity can affect a number of different components of the WCATT score. However, without a WRAP analysis, we cannot assess how the treated area will affect the WCATT score. For the purposes of this report, we will simply acknowledge that any treatment that improves the fire regime and wildlife habitat will have a positive effect on the condition of the watershed. Our desired condition statement is based on the prediction that all of our treatments will have either a neutral or positive effect on watershed condition. So the "percent change value" will be derived from the footprint of our treatments as a function of the total landscape area and the effect will be across 100% of the landscape (since there should be neutral or positive effects everywhere).

Desired Conditions Target for Landscape Scale Invasive Species Severity: <u>4%</u> of the CFLR landscape area was restored by reducing invasive species severity (preventing, controlling, or eradicating targeted invasive species) to meet desired conditions by FY 2014.

1. *The likelihood of invasive species establishment decreases because of resilience improvements across 4% of the CFLR landscape.*
2. *Targeted invasive species treatments create low severity conditions across 0.7% of the CFLR landscape.*

300-acre Dalmatian toadflax infestation

The first desired condition statement is based on the established relationship between increases in native understory cover and diversity and resilience of an area against invasive species establishment. To represent the effects of treatments that improve resilience, we took the vegetation treatments that resulted in canopy cover that is less than 40%. These are the treatments that are expected to result in a significant increase in understory cover.

The second desired condition statement is based on a FACTS report of invasive species treatment performance. This report is not necessarily accurate since the "percent change" values is compared to the current year's accomplishments, but may reflect changes that are the result of the previous year's treatments. Also, not every treatment is monitored, so those activities that report a value of "no change" do not necessarily represent reality. Nevertheless, when taken as a whole across all years, the average "percent change" value can be a useful surrogate for the effectiveness of treatments. To determine the number of restored acres, we took the total acres accomplished and multiplied it by the average percent change value (which excludes the null values of treatments that were not monitored).

Same area restored through bio-control agents

Current Landscape-Scale Evaluation

Scoring based on 5-year benchmarks (Good: > 75% of the target; Fair: 25% - 74% of the target; Poor: < 25% of the target)

Ecological Indicators	*Datasets and/or databases of records used*	*Good, Fair, Poor and (%) landscape across which progress is being made towards desired conditions*	*Are you achieving your CFLRP objectives? (Y/N)*	*If NO, briefly explain…*
Fire Regime Restoration	*FACTS; LANDFIRE*	*Good (23%)*	*YES*	
Fish and Wildlife Habitat Condition	*FACTS*	*Good (23%)*	*YES*	
Watershed Condition	*FACTS*	*Good (100%)*	*YES*	
Invasive Species	*FACTS; NRIS*	*Good (3.5%)*	*YES*	

Landscape-Scale Progress Narrative:

The Four Forest Restoration Initiative (4FRI) extends across 2.4 million acres of Ponderosa pine forest. It is the largest collaborative forest landscape restoration project (CFLRP) in Forest Service history and is at least a million acres larger than the next largest restoration project. Since its inception, 4FRI was envisioned as a 20-year restoration project despite the 10-year life span of CFLRA funding.

Progress

Over the last five years, progress has been made despite contractual setbacks and at least one exceptionally destructive wildfire. While wildfires highlight the need for accelerated restoration, they also represent a challenge from the standpoint of both planning and implementation. The 2011 Wallow Fire is a case in point. It burned over 500,000 acres of forest within the 4FRI project area, including over 50,000 acres with completed NEPA that were being prepared for implementation. These acres were part of the basis upon which our target outcomes were calculated. Their loss represented a significant setback in terms of restoration progress and had a devastating impact on the local industry required to support forest restoration. As a result, the pace of restoration has been slower than initially projected. In the absence of this landscape-scale disturbance, it is likely we would have exceeded our restoration targets for not only fire regime restoration, but also for wildlife habitat improvement.

Wallow Fire burned over a half-million acres and significantly set back restoration efforts

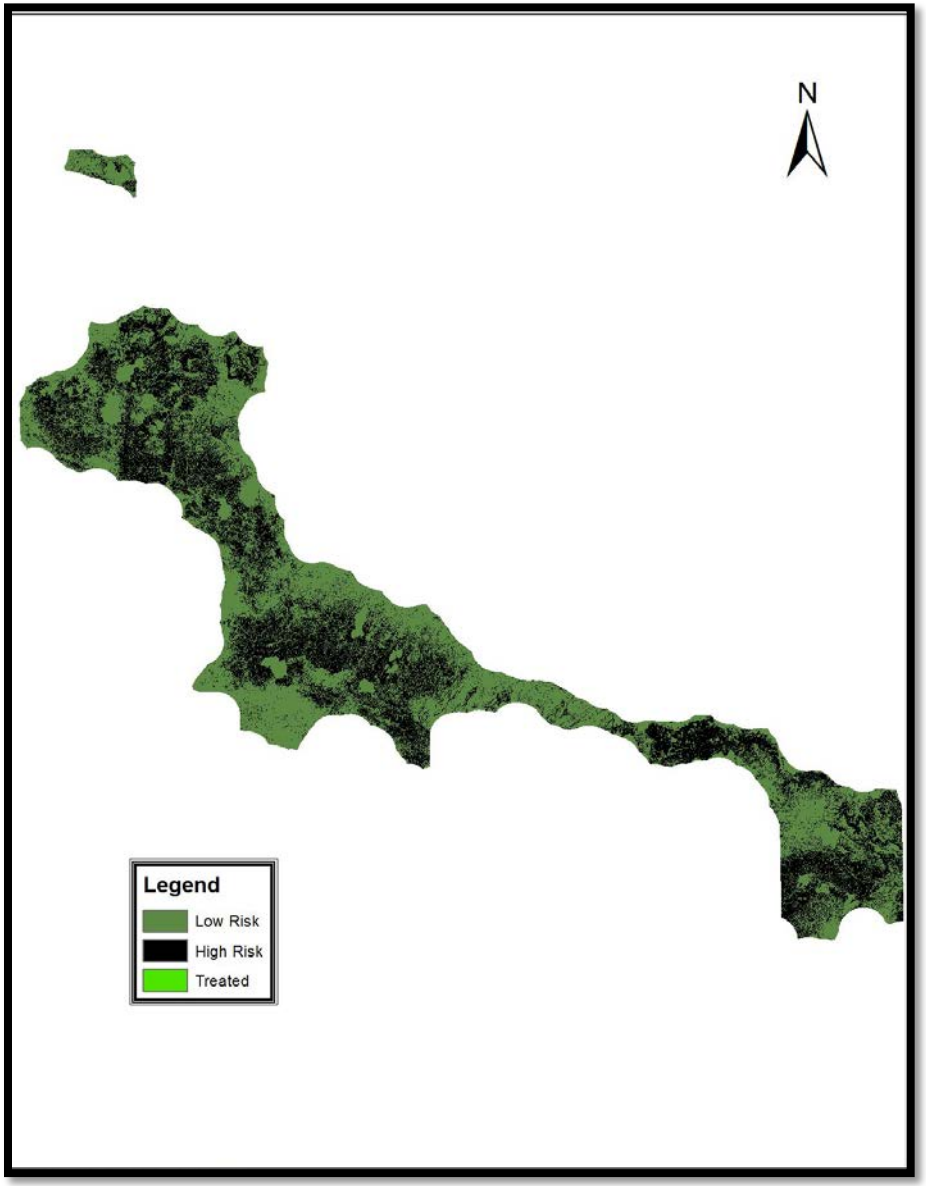
Despite the impacts of the Wallow Fire and several other wildfires that have burned since, restoration treatments have managed to progress at an unprecedented rate. In fact, the 4FRI has completed restoration treatments on more acres than some CFLR projects include in their entire project area.

Outcome Calculation

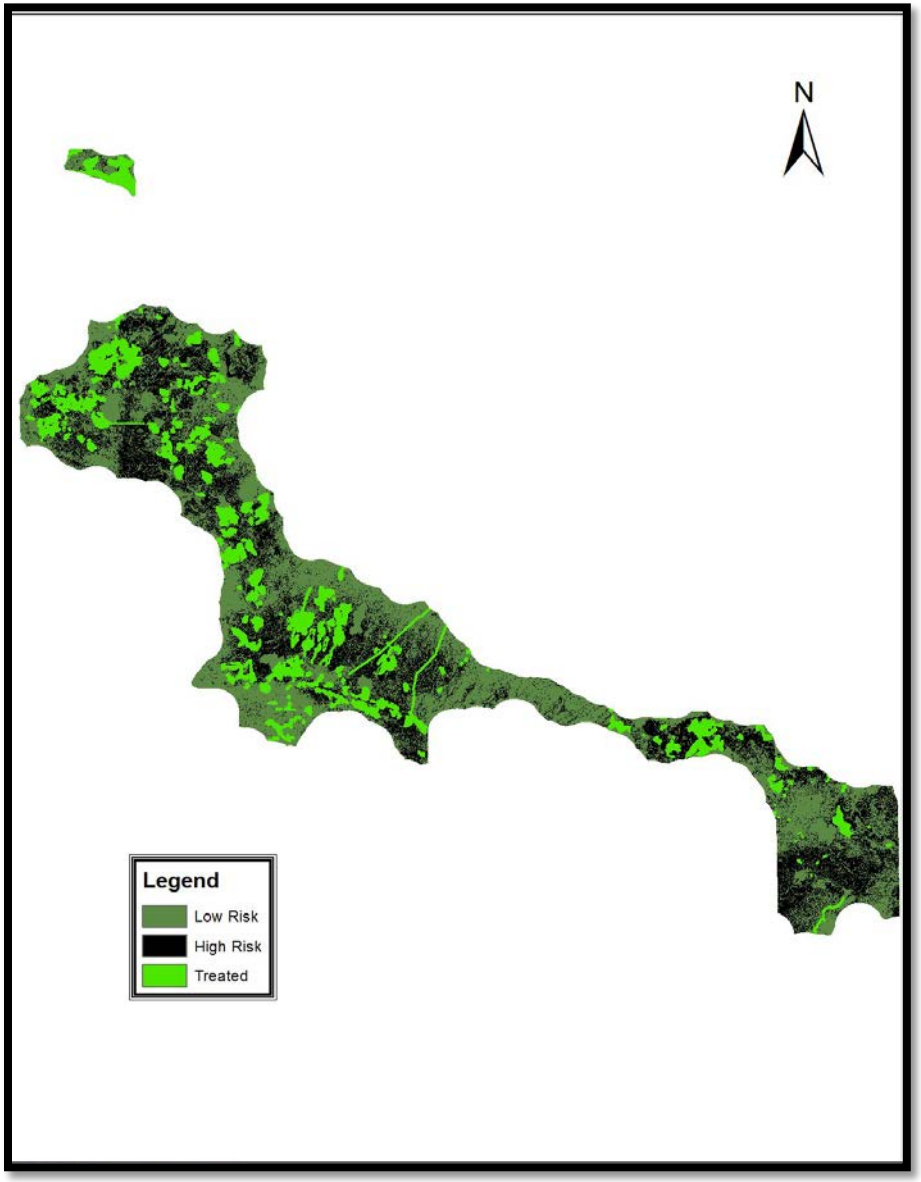
The effects of treatments extend beyond the treatment area boundaries. This is a critical concept to convey, yet it is one of the most challenging aspects associated with reporting outcomes as opposed to simply reporting output. Describing the magnitude and extent of treatment effects requires complex modeling. The resulting values can be either accurate for only a narrow set of conditions or can represent general trends for a much broader set of conditions. In order to succinctly describe landscape-scale effects we used the latter approach. This approach quantifies the critically valuable effects of restoration on the areas surrounding the footprint of individual 4FRI treatments. The specific methods and assumptions associated with calculating each ecological indicator are documented and filed for future reference rather than presented here. However, the implications are obvious. By sacrificing site-specific detail, we are able to capture the broader impact to the landscape and, in so doing, highlight one of the great values of landscape-scale restoration: strategically placed treatments can improve conditions across the entire landscape.

Road Decommissioning improves both habitat and watershed quality

For this report, the calculation of effects with respect to ecological indicators is focused on thinning treatments. While thinning represents the most visually noticeable type of restoration, it is only one of a full suite of restoration activities currently underway. The 4FRI also includes a number of other restoration treatments that directly affect wildlife habitat, watershed function, and invasive weed establishment. Maintenance and closure of hundreds of miles of roads, stream channel reconstruction, installation of protective enclosures and aquatic organism passages, and treatment of tens of thousands of acres of invasive species all contribute to improvements in ecosystem health and move the landscape's overall condition closer to a restored state. The effects of these restoration activities have not been incorporated into the ecological indicators, but they are nevertheless significant contributors to the success of the Four Forest Restoration Initiative.



Pre-Treatment landscape showing areas of high risk to stand replacing fires



Post-Treatment landscape showing treated areas at lower risk of stand replacing fires

Project-scale scoring

Current Project-scale Evaluation

Scoring based on 5-year benchmarks (Good: > 75% of the projects; Fair: 25% - 74% of the projects; Poor: < 25% of the projects)

Ecological Indicators	***Datasets and/or databases of records used***	***Project Level Good, Fair, Poor and (%) treatments resulting in measurable progress as defined above***	***Are you achieving your CFLRP objectives? (Y/N)***	***If NO, briefly explain…***
Fire Regime Restoration	***FACTS; Contract Record***	***Good (100%)***	***YES***	
Fish and Wildlife Habitat Condition	***FACTS; Contract Record***	***Good (100%)***	***YES***	
Watershed Condition	***FACTS; Contract Record***	***Good (100%)***	***YES***	
Invasive Species	***FACTS; NRIS***	***Good (100%)***	***YES***	

Project-Scale Progress Narrative:

By the time we are able to evaluate the effects of projects on ecological indicators, an extremely lengthy process has come to a close. This process begins during the planning phase when a set of high order desired conditions are developed based on forest plan direction and input from the public. The desired condition and design features inform the development of project objectives and these are carried forward into a prescription, treatment guide, and/or contract. During the implementation phase of the project, an administrator or inspector will oversee operations to ensure that the final outcome is aligned with the project objectives. It is through this carefully regulated process that we ensure that desired conditions are brought forward from the inception of the project all the way through to its completion.

If through some failure in this process, outcomes at the project level are not aligned with the broad desired conditions and project specific objectives, then it would become quickly clear to all. By design, a properly executed contract or treatment will achieve the desired conditions described in the project record. Therefore, unless there is a substantial failure during implementation, we expect to see measurable progress towards each desired condition.

Aquatic Passage Installation

To determine if a project was completed in full compliance with the contract language or treatment guide, we evaluated contract records or interviewed those individuals who were directly or indirectly involved in the inspection and approval of the completed project work. In this way, we were able to identify any occurrences where contract specification/treatment instructions were not followed and also evaluate whether those failures resulted in an inability to achieve the project objectives. Based on our review, all completed projects resulted in measurable progress towards the project-specific desired conditions.