

“The Owls are Not What They Seem: The Unintended Ecological Consequences of the Northwest Forest Plan”

Background and Motivation

Until the 1980s, the logging industry was king across the Northwestern forests. This changed when environmental groups started pushing back against the logging industry, in particular against the over-extraction of timber and against the potential threats to endangered species that came with it.

In 1990, the tide turned decisively against the logging industry when the northern spotted owl was listed as "threatened" under the Endangered Species Act, thus becoming the symbol of the environmental groups' fight against the loggers. In 1991, a federal judge placed an injunction on all timber sales in spotted owl habitat until forest managers could produce a plan to ensure preservation of the entire ecosystem. In 1993, the federal government got involved in the ensuing stalemate, and in 1994 it passed the Northwest Forest Plan (NWFP). [1]

The NWFP was touted as a compromise between environmental and economic considerations; protecting old-growth forests and the wildlife that lived in it, while also generating stable and sustainable timber sales and logging employment.

25 years on, many feel that the NWFP has failed on all ***three dimensions***:

First, the NWFP never delivered on the economic side of the plan, as annual logging harvests have been in secular decline since its inception. In 1990, California took out just under 5 billion board feet from its forests. In 2000, the annual harvest had dropped by sixty percent to around 2 billion board feet. By 2012, this number had fallen to 1.5 billion board feet. [2] The reason for this precipitous decline has been burdensome regulation associated with any logging. As Congressman McClintock of California's 4th District said in a speech in September 2020: "Draconian restrictions on logging, grazing, prescribed burns and herbicide use on public lands have made modern land management endlessly time consuming and ultimately cost prohibitive. A single tree thinning plan typically takes four years and more than 800 pages of analysis. The costs of this process exceed the value of timber." [3] Unsurprisingly, lower timber output has meant lower employment in the logging industry: [Eichman et al. \(2010\)](#) and [Frank \(2020\)](#) document about 25 percent decline in logging employment inside the NWFP-area in the 1990s, and the qualitative evidence suggests this decline has continued at the same pace into the 2000s.

Second, the spotted owl seems not to enjoy the protected old-growth forest as much as anticipated. While owls prefer dense tree stands for nesting, they have a hard time finding prey when the entire forest consists of dense tree stands. As a result, forty percent of the active spotted owl areas have migrated out of the NWFP-protected areas and into areas of the forest that is open to logging. Meanwhile, the spotted-owl population inside the NWFP-protected areas is tanking." [4] In California, spotted-owl counts are now apparently consistently larger on privately managed forest land than on federally managed forests.

Third, and most important, the NWRP appears to have been a failure when it comes to protecting the Northwest's old-growth forest, as this year's dramatic forest fires across the Pacific Northwest have demonstrated. The reason is essentially that less logging creates higher tree density. Tree density in the Sierra Nevada in California, for example, is currently around 300 per acre, whereas historically, a healthy forest in this region would only have had around 60 trees per acre. Denser forests are more susceptible to fire not only because there is more biomass to burn, but also because density makes each individual tree more susceptible to fire. This is because trees are (a) thinner in higher-density forests; and they are (b) drier because they are in more competition for scarce water sources. [5]

On the first of these three dimensions, there already exists pretty strong causal evidence, as cited above. On the other two dimensions, the evidence at this point is largely qualitative/anecdotal. Supposing for a minute that the hypothesized failings on these other two dimensions could indeed be shown to be true, then this would make the NWFP one of the most salient example of regulatory failure imaginable: If the policy's objective was to strike a balance between competing goals but it failed on all goals, then *any* welfare analysis of the regulation needs to come out negative regardless of how much importance one attaches to each individual goal over the others.

What is nice about the NWFP from a researcher's perspective is that it lends itself to a quantitative case study for the unintended consequences of regulation because we can measure its effects on all three dimensions, with the data described below.

Data:

For this proposal, we plan to use ***four datasets***:

First, a map of the 10 million hectares of national forest lands in Oregon, Washington and Northern California covered by the NWFP allows us to make sharp spatial comparisons between forest land inside and outside the NWFP-covered areas. This map is included below.

Second, remote-sensing based satellite imagery allows us to create a panel dataset of the 'fuel load' built up in forests inside and outside the border. A forest's 'fuel load' measures the potential severity of a fire breaking out in it; it can be constructed from land cover type (grass, shrub, timber, slash) and density using the fire behavior fuel models in [Anderson \(1981\)](#).

Three, a geo-located panel dataset of the location of spotted owls over time. This allows us to test if spotted owls actually migrated out of the NWFP-covered areas over time. Data on spotted owl "activity centers" (i.e. nesting grounds) can be obtained under the "wildlife" tab of the Bureau of Land Management's geo-spatial data.¹

¹ <https://www.blm.gov/services/geospatial/GISData/oregon>

Four, forest fire data is available from the Trends in Burn Severity (MTBS) program.² However, because forest fires are spatially dispersed, they are not ideal to the spatial comparison around the NWFP border. As a useful alternative that is spatially more sharply defined we can collect data on fire ignition points from [Short \(2017\)](#).

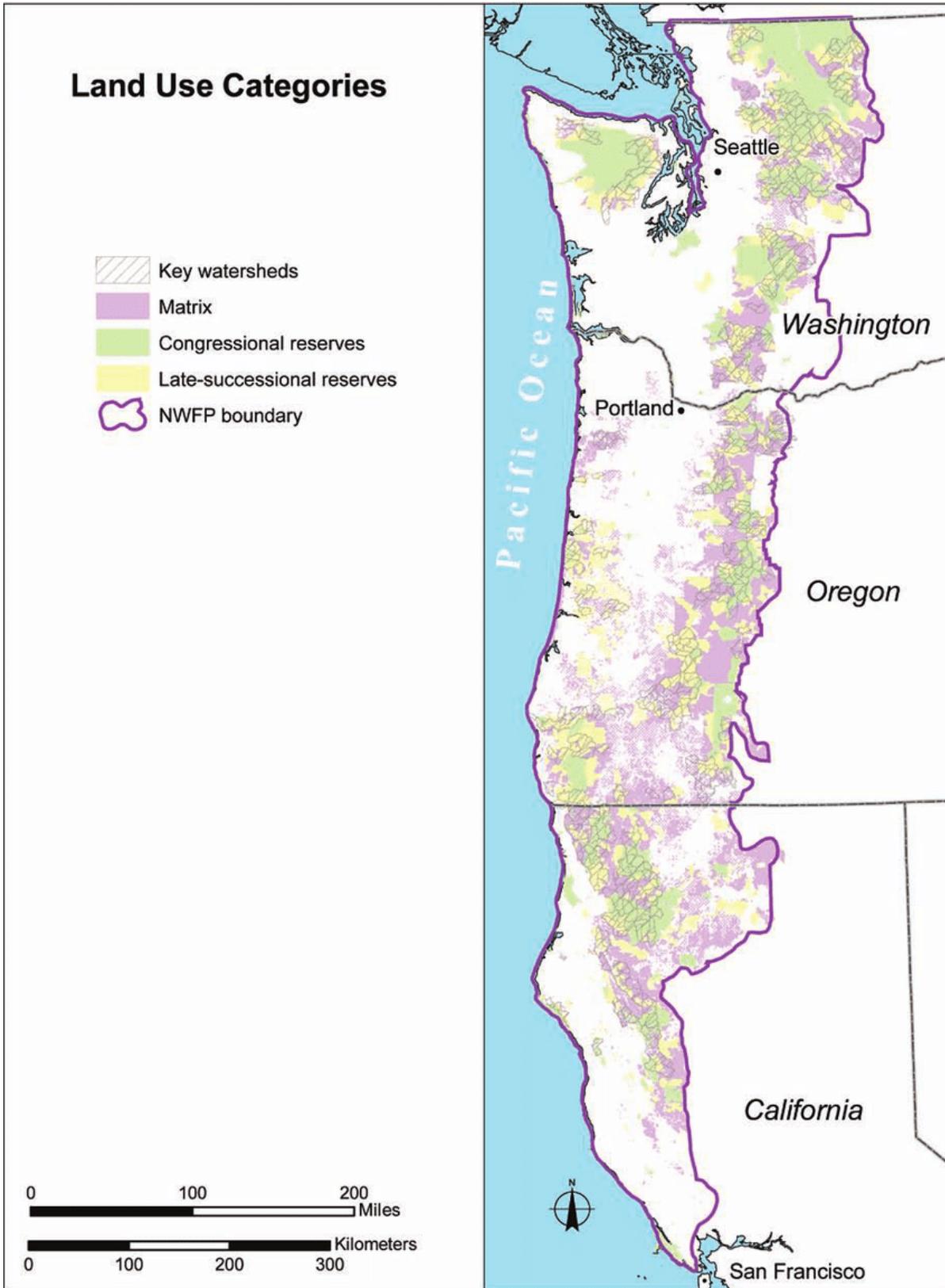
Empirical Methodology

With these data in hand we plan to undertake a spatial comparison between areas inside and outside of the NWFP boundary, stretching from the Canadian border down to San Francisco. We aim to document the extent to which fuel load has accumulated differentially inside relative to outside the NWFP boundary, from 1990 to today. We secondly plan to document how the spotted owl population developed over this same time period. Lastly, we plan to study whether the (hypothesized) differential fuel load built up inside the NWFP is associated with a higher incidence of wild-fires breaking out.

All comparisons above can be investigated through a number of empirical lenses: first, at fine-grained spatial units, the analysis lends itself naturally to a spatial regression discontinuity design; second, if we aggregate spatial areas into somewhat larger units (which we may need to for the owl data for instance) the analysis lends itself naturally to a synthetic control group analysis. Third, a simple difference in differences analysis can be performed.

In addition to the analysis above, we plan to undertake a narrative economic analysis, as suggested in [Shiller \(2017\)](#), of how advocacy for NWFP regulation has changed over time, from its origins of opposing corporate interests and excess logging during the timber wars, to the observation that NWRP does not appear to have prevented the decline of the spotted owl population to the creeping realization that over-regulation of any logging activity inside the NWRP areas may have actively contributed to increasing the frequency and severity of wildfires.

² <https://www.mtbs.gov/>



REFERENCES

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[2] https://www.fs.fed.us/pnw/pubs/pnw_gtr908.pdf

[3] <https://mcclintock.house.gov/newsroom/speeches/our-forests-tragedy>

[4] <https://www.hcn.org/issues/45.7/seeking-balance-in-oregons-timber-country/bigger-fires-and-evolving-threats-force-changes-in-the-northwest-forest-plan>

[5] <https://www.sciencemag.org/news/2017/04/save-forests-cut-some-trees-down-scientists-say>

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