



**Comments on Special Areas: Roadless Area “Conservation!” Proposed Rule (Rescissions)
36 CFR Part 294 RIN 0596-AD66 Submitted Via the eRulemaking portal
<https://www.regulations.gov/> (October 2, 2026)**

I submit these comments as a research scientist involved in roadless area science publications for decades. I also attended the historic signing ceremony of the landmark Roadless Conservation Rule (RCR) at the White House Rose Garden in January 2001. At the time, the RCR was essential in moving the Forest Service into more of a coordinated conservation strategy that provided a unified vision for the nation’s last intact forests and watersheds at least 2,000 acres each. When left to the discretion of local managers, under pressure from logging and development interests, roadless areas were bulldozed, clearcut, and damaged by a broad suite of development projects. In conducting this rescissions process, the Forest Service now shamelessly seeks to return to the failed actions of the past by cloaking logging and road building in “fuel reduction” jargon and putting economic interest groups that are degrading ecosystems— logging, mining, grazing, ORVs – above that of sustainable recreation use and conservation interests. It should be noted that the Forest Service already has some 380,000 miles of roads, enough to circumnavigate the planet some 16 times and having cumulative impacts to aquatic and terrestrial systems on every national forest. The agency’s own DEIS even admits it will worsen fire problems and degrade ecosystems by building even more roads for development yet it chose an alternative that defies science, community wildfire protection, and ecosystem integrity.

Notably, the DEIS does not include an appropriate range of alternatives and none of the alternatives are based on the best available science (BAS) given extensive degradation of ecosystem integrity will occur (DellaSala et al. 2025a, Lindenmayer et al. 2026¹) from proposed stepped up logging and road building.

We request that the agency analyze a new alternative that builds on the RCR and closes development loopholes within IRAs as follows:

- Add new areas left out of the RCR including unroaded areas >1,000 acres each.
- Tighten logging restrictions within IRAs and unroaded areas – there is no ecological reason for thinning in IRAs as they are the lowest priority for fire risk reduction; your own DEIS shows this to be the case.
- Restrict fuel reduction to a narrow zone of some 20-m nearest structures in the Wildland Urban Interface (WUI). Overwhelming evidence shows the most flammable landscapes are those that have been logged and roaded. Additionally, recent evidence shows 75-95% of agency treatments are >1-km from the nearest structures, which is useless to communities facing increasing wildfire spillover events from logged areas (see below).

¹ DellaSala, D.A. et al. 2025a. Measuring forest degradation via ecological-integrity indicators at multiple spatial scales. *Biol. Cons.* <https://doi.org/10.1016/j.biocon.2024.110939>. Lindenmayer, D.B., D.A. DellaSala et al. 2026. Ecological trade-offs of mechanical thinning in temperate forests. *Biological Conservation* <https://doi.org/10.1016/j.biocon.2026.111748>.

- Lower road densities at watershed scales via seasonal road closures for fire risk reduction and obliterate the road prism in failing and low-use roads where impacts are occurring.
- Prohibit mining and energy development projects.
- Prohibit livestock grazing in IRAs and unroaded areas by supporting lease buyouts and permanently closing/restricting these areas to livestock grazing given that livestock are one of the biggest risks to ecosystem integrity, wildfire severity increases, and polluted streams on public lands (Beschta et al. 2012²).

IRAs ARE NATURAL CLIMATE SOLUTIONS AND REFUGIA IN A MATRIX OF DEGRADED LANDS

Roadless areas are recognized globally for irreplaceable ecosystem benefits. International recognition has resulted in calls to cease road building within remaining roadless areas and to restore fragmented areas by lowering road densities (Ibisch et al. 2016, Hoffman et al. 2024³). Intactness is a fundamental component of ecosystem integrity and functional landscapes (DellaSala et al. 2025a, *ibid*), and this is lacking in the DEIS alternatives that are not based on best available science.

The following ecosystem integrity benefits have been documented as **uniquely provided by roadless areas** that would be degraded by the proposed actions and that need a hard NEPA look:

- Clean water (many IRAs are in headwater reaches), biodiversity, intact river and watersheds, traditional forest and cultural values, and climate regulation (DellaSala et al. 2011, Talty et al. 2020, Olden et al. 2026, Mildrexler et al. 2026⁴).
- Carbon stores, wildlife refugia, natural climate solutions, mature and old-growth forests (Talty et al. 2020, DellaSala et al. 2022a, Law et al. 2022, Law et al. 2023⁵).
- Strongholds for fish and wildlife, and essential habitat for vulnerable, threatened, endangered, and imperiled species (Strittholt and DellaSala 2002, Loucks et al. 2003, Dietz et al. 2021⁶).

²Beschta, R.L. et al. 2012. Adapting to climate change on western public lands: addressing the ecological effects of domestic, wild, and feral ungulates. *Environmental Management* <https://link.springer.com/article/10.1007/s00267-012-9964-9>.

³ Ibisch, P.L., et al. 2016. A global map of roadless areas and their conservation status. *Science* 354:1423-1427. Hoffman et al. 2024. Mapping roadless areas in regions with contrasting human footprint. *Scientific Reports* <https://www.nature.com/articles/s41598-024-55283-3>

⁴ DellaSala, D.A. et al. 2011. Roadless areas and clean water. *J. Soil & Water Conservation* <https://doi.org/10.2489/jswc.66.3.78A>. Talty, M.J. et al. 2020. Conservation value of national forest roadless areas. *Conservation Science & Practice* <https://doi.org/10.1111/csp2.288>. Olden, J.D. 2026. Assessing the value of the U.S. Roadless Rule for people and nature. *PLoS One Water* <https://doi.org/10.1371/journal.pwat.0000538>.

⁵ Talty, *Ibid*. DellaSala et al. 2022a. Mature and old-growth forests contribute to large-scale conservation targets in the conterminous United States. *Frontier in Forests and Global Change* <https://doi.org/10.3389/ffgc.2022.979528>. Law, B.E. et al. 2022. Creating strategic reserves to protect forest carbon and reduce biodiversity losses in the United States. *Land* <https://doi.org/10.3390/land11050721>. Law, B.E. et al. 2023. Southern Alaska's forest landscape integrity, habitat, and carbon are critical for meeting climate and conservation goals. *AGU Advances* <https://doi.org/10.1029/2023AV000965>.

⁶Strittholt, J.R., and D.A. DellaSala. 2002. Importance of roadless areas in biodiversity conservation in forested ecosystems: case study of the Klamath-Siskiyou ecoregion of the United States. *Conservation Biology* <https://doi.org/10.1046/j.1523-1739.2001.99577.x>. Loucks, C. et al. 2003. USDA Forest Service roadless areas: potential biodiversity conservation reserves. *Conservation Ecology* <http://www.consecol.org/vol7/iss2/art5>. Dietz, M.S. et al. 2021. The importance of U.S. national forest roadless areas for vulnerable wildlife species. *Global Ecology & Conservation* <https://doi.org/10.1016/j.gecco.2021.e01943>.

- Representation of habitat types and land forms in conservation areas needed to forestall large-scale biodiversity losses (DeVelice and Martin 2001 – not open access, abstract below; Crist et al. 2005⁷).
- Refugia for native plant populations compared to roaded areas that have high levels of weedy species (Gelbard and Harrison 2003⁸, not open access, see abstract below).
- Economic value from recreation activities estimated at \$500 million in one year alone with an estimated passive use benefit of \$8 billion (Hjerpe and Aldrich 2018⁹).
- Contributions to state and local economies (Izon et al. 2010¹⁰ – not open access, see abstract below).

From DeVelice and Martin 2001 – Abstract: We assessed the extent to which inventoried roadless areas (IRAs) on USDA Forest Service lands contain biophysical features that complement the conservation reserve network (e.g., national parks, designated wilderness areas, and wildlife refuges) in the United States. We compared the percentage of land area in IRAs and conservation reserves across three geographic divisions (Alaska, East, and West), 83 ecoregions, 10 elevation zones, and 11 land-cover classes. We also summarized variation in the size class distribution of IRAs. Of the 83 ecoregions evaluated in the United States, 28 have >12% of their total area in conservation reserves. If IRAs are considered with conservation reserves, the number of ecoregions exceeding the 12% threshold increases from 28 to 32. When only national forest land in the ecoregions is considered, the area of designated wilderness exceeds 12% in 18 of the 45 ecoregions summarized. If IRAs are considered along with designated wilderness, the number of ecoregions exceeding the 12% threshold increases from 18 to 32. On national forest land below 1500 m, 10% is designated wilderness and 18.5% is IRA. Above 1500 m, 20% is designated wilderness and 31.5% is IRA. If IRAs are considered along with designated wilderness, all land-cover classes (except water in the West) would exceed the 12% threshold in Alaska and the West. In the East, only the evergreen forest class would exceed the 12% threshold when IRAs are considered with designated wilderness. Of 462 polygons of designated wilderness in the national forests, 353 are <20250 ha, and 25 areas exceed 101 175 ha. If adjacent IRA land is considered along with national forest wilderness, the number of areas <20250 ha decreases to 295, and the number of areas >101 175 ha increases to 45. These results highlight the contribution that IRAs could make toward building a representative network of conservation reserves in the United States. Including these areas as reserves would expand ecoregional representation, increase the area of reserves at lower elevations, and increase the number of areas large enough to provide refugia for species needing large tracts relatively

⁷ DeVelice, R.L. and J.R. Martin. 2001. Assessing the extent to which roadless areas complement the conservation of biological diversity. *Ecological Applications* [https://doi.org/10.1890/1051-0761\(2001\)011\[1008:ATETWR\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2001)011[1008:ATETWR]2.0.CO;2) Digital Object Identifier (DOI). Crist, M.R. et al. 2005. Assessing the value of roadless areas in a conservation reserve strategy: biodiversity and landscape connectivity in the northern Rockies. *J. Applied Ecology* <https://doi.org/10.1111/j.1365-2664.2005.00996.x>.

⁸ Gelbard, J.L. and S. Harrison. 2002. Roadless habitats as refuges for native grasslands: interactions with soil, aspect, and grazing. *Ecological Applications* [https://doi.org/10.1890/1051-0761\(2003\)013\[0404:RHARFN\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2003)013[0404:RHARFN]2.0.CO;2).

⁹ Hjerpe, E., and G.A. Aldrich. 2018. Economic value and contributions of roadless areas. https://www.researchgate.net/profile/Evan-Hjerpe/publication/336444790_Economic_Values_and_Contributions_of_Roadless_Areas/links/5da0cde945851553ff88d679/Economic-Values-and-Contributions-of-Roadless-Areas.pdf.

¹⁰ Izon, G.M. et al. 2010. The economic value of protecting inventoried roadless areas: a spatial hedonic price study in New Mexico. *Contemporary Economic Policy* <https://doi.org/10.1111/j.1465-7287.2009.00190.x>.

undisturbed by people. Even with the addition of IRAs, many ecoregions in the United States would remain underrepresented in the reserve network, especially in the East.

From Izon et al. 2010 Abstract: The objective of this paper is to examine the off-site benefits, as capitalized into housing values, of protecting 1.6 million acres of Inventoried Roadless Areas (IRAs) in the state of New Mexico, United States. In light of petitions filed by various U.S. states to maintain the status of IRAs as roadless lands, spatial hedonic price models are estimated and used to calculate the implicit value of IRAs in New Mexico. Findings show that a two-stage least squares (2-SLS), robust spatial-lag model is the most appropriate econometric representation of the hedonic price function, and that IRA lands are a significant and positive determinant of house value. After controlling for the presence of Wilderness Areas (WAs) and other characteristics, results indicate that, on average, there is a 5.6% gain in the property value of a house from being located in, or adjacent to, a Census tract with IRAs. In the aggregate, this gain represents 3.5% of the value of all owner-occupied units in New Mexico (\$1.9 billion in capitalized value, or an annualized value in perpetuity of \$95 million, assuming a 5% interest rate). (JEL R22, H40, Q51, C21).

From Gelbard and Harrison 2003 – Abstract: The idea that roadless habitats act as refuges for native-plant diversity against exotic-plant invasion has seldom been tested. We examined the effect of distance from roads and its interactions with soil type, aspect, and livestock grazing on native- and exotic-plant diversity in a 130000-ha inland California (USA) foothill grassland landscape. During spring 2000 and 2001, we measured the numbers of and cover by native and exotic plant species in 92 sites stratified by distance from roads (10 m, 100 m, and >1000 m), soil type (nonserpentine and serpentine), and aspect (cool, warm, and neutral slopes). In nonserpentine grasslands, native cover was greatest in sites >1000 m from roads (23%) and least in sites 10 m from roads (9%), and the percentage of species that were native was significantly greatest in sites >1000 m from roads (44%) and least in those 10 m from roads (32%). In addition, the most distant sites had the largest number of native grass species and the fewest exotic forb species. In serpentine grasslands there was no significant effect of distance from roads on the numbers of and cover by native and exotic species. On both soils, two exotic species (*Centaurea solstitialis* and *Aegilops triuncialis*) were at their lowest frequencies, while a native bunchgrass, *Nassella pulchra*, was at its highest frequency, in sites >1000 m from roads. On nonserpentine soils only, the exotics, *Convolvulus arvensis* and *Polypogon monspeliensis*, were at their lowest frequency, while a native bunchgrass, *Poa secunda*, was at its highest frequency in the most distant sites. Native species were more abundant on serpentine than nonserpentine soils; on serpentine, natives were more abundant on slopes than flat sites, while on nonserpentine, natives were least abundant on warm, south-facing slopes. Grazing, soil type, and aspect all significantly interacted in their effects on native and exotic richness and cover. Grazing negatively affected the number of native grass species, but not the number of native forb species on nonserpentine, and positively affected the number of native forb species, but not the number of native grass species on serpentine. Roadless areas are significant refuges for native species. However, to protect these habitats from the continued threat of invasion, land managers should consider means of preventing construction of new roads, limiting off-highway vehicle access into grasslands with low road densities, identifying a regime of livestock grazing that favors the persistence of natives over the spread of exotics, and monitoring recreational trails and grazing allotments within roadless areas to detect and eradicate new infestations.

A SPECIAL CALL OUT FOR THE TONGASS NATIONAL FORESTS AS THE CROWN-JEWEL OF THE NATIONAL FOREST SYSTEM

The Tongass was included in the original RCR because it is the crown jewel of the national forest system providing myriad ecosystem benefits and refugia properties that scale beyond the

area itself. The Tongass contains an estimated 20% of the carbon stocks within the entire national forest system; ~5.3 million acres of ‘productive’ old-growth forests (POG), by far the most in the nation; and ~16% of the total IRAs (DellaSala et al. 2022b¹¹). It is one of the most important and relatively intact temperate rainforests in the world, aside from the very obvious clearcuts and roads, particularly on Prince of Wales Island where logging has been extensive. The area’s irreplaceable combination of IRAs and POG collectively holds about 95% of the forest carbon stores in forested areas on the Tongass with very little stored in young growth (DellaSala et al. 2022b). Historic logging released the equivalent emissions of ~15 million vehicles (69.5 Mt CO₂e) (DellaSala et al. 2022b). Much of that logging was concentrated on high volume, valley bottomlands, especially on Prince of Wales Island where according to the Global Nature Watch (forest monitoring system), some 29,000 ha of old-growth forests were lost from 2001 to 2025, which is equivalent to 12 Mt of CO₂e (Figure 1, red areas are clearcuts, roads are not shown at this scale). Figures 2-4 show views of clearcut logging and Figure 5 is a road layer zoom-in on a section of north Prince of Wales Island near Thorne Bay where logging and roads accumulate impacts to habitat of culturally important wildlife like deer and salmon.

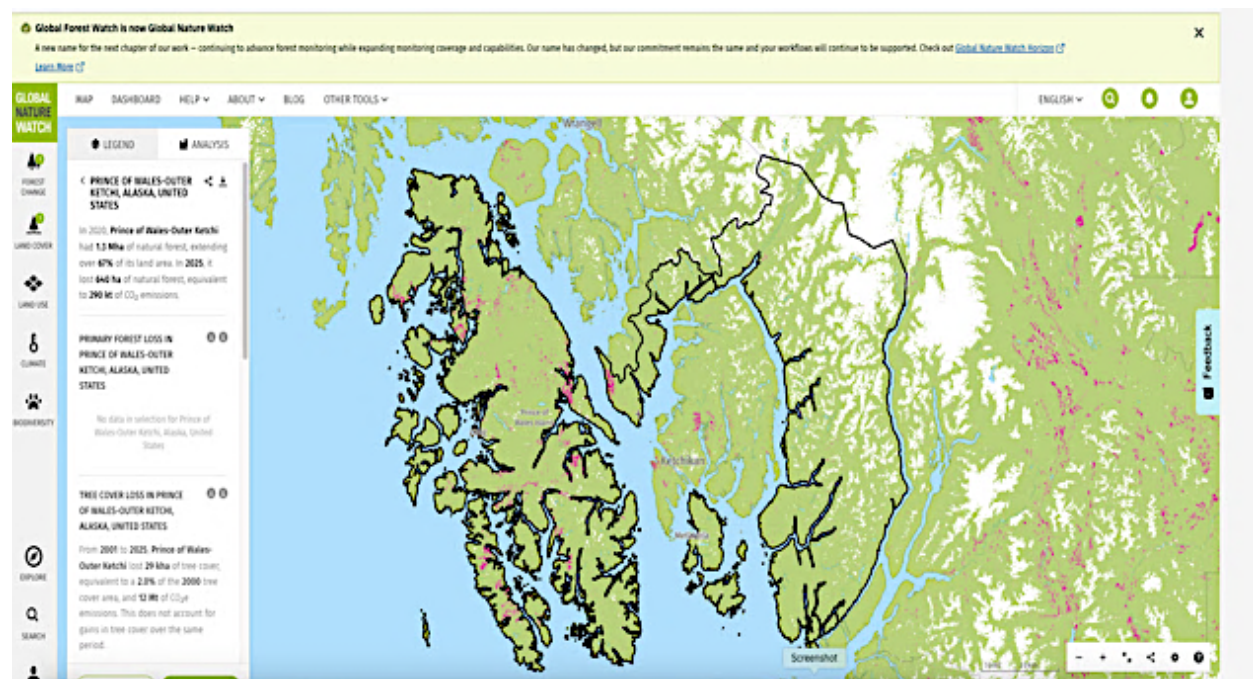


Figure 1. Prince of Wales Island logging 2001-2025. Losses (in red) are primarily from logging as there were no major fires during this time.

¹¹ DellaSala, D.A. et al. 2022b. The Tongass National Forest, southeast Alaska, USA: a natural climate solution of global significance. Land <https://doi.org/10.3390/land11050717>.



Figure 2. Google Earth zoom-in on Prince of Wales Island near Thorne Bay showing extensive forest fragmentation from recent clearcuts (light brown) and prior clearcuts (light green).



Figure 3. What it looks like on the ground – Thorne Bay area. Forest Service clearcuts leaving up to 50% of the forest biomass on the ground to emit carbon.



Figure 4. Flyover of Prince of Wales logging showing road and clearcut logging degradation. In addition, to Forest Service logging units, the northern part of the island has been extensively damaged by Native Corporation logging adding to cumulative impacts.

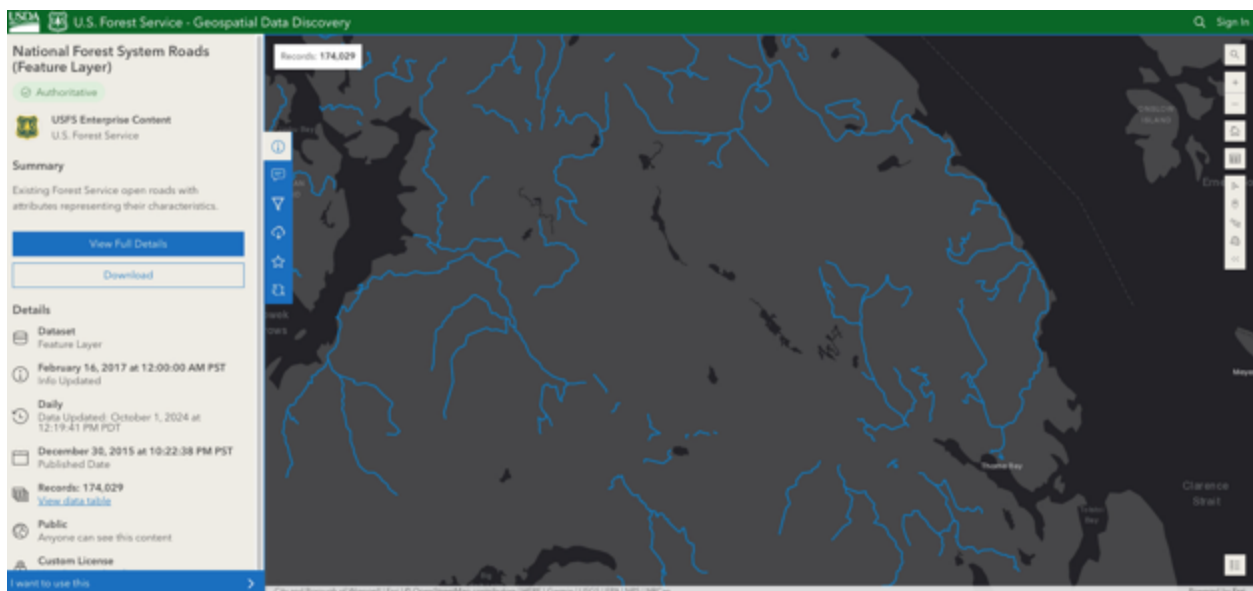


Figure 5. Example of extensive road network near Thorne Bay, Prince of Wales Island.

Before the Trump administration's climate denialism and anti-forest protection strategies, the Forest Service actually believed in climate change mitigation and was taking measures to

transition Tongass logging out of old-growth forests and into young growth on a much smaller and relatively less damaging logging footprint. The rescissions of Tongass IRAs would increase logging emissions, damage salmon strongholds, degrade culturally important wildlife habitat, and forgo prospects that the Tongass can function as a climate refugia (DellaSala et al. 2015¹², DellaSala et al. 2022b Ibid, Law et al. 2023 Ibid).

It also has been known for some time that the Tongass is a money-loser in below-cost timber sales due in part to high costs of building roads to access areas increasingly difficult to get into in steep terrain, as prior logging high-graded most of the valley bottom timber before the 1990s Tongass Timber Reform Act. Tongass timber sales do not generate much revenue in relation to costs and this is a drain on taxpayer dollars and an unconscionable waste of a natural climate solution. To sum up, in FY 2019 the Forest Service lost \$16.1 million on Tongass logging and from FY 1980 to FY 2020 the agency squandered some \$1.7 billion (\$44 million per year on average) on below cost timber sales (Taxpayers for Common Sense 2020¹³). The agency could lose another ~\$190 million in five years alone if IRAs are opened to logging (Taxpayers for Common Sense 2020).

In sum, rescinding the RCR on the Tongass will damage one of the world's last remaining intact temperate rainforests, degrade habitat for culturally and recreationally important fish and wildlife, especially salmon that are of substantial economic importance, and squander taxpayer dollars on below-cost timber sales costing hundreds of millions of dollars. The proposed action needs to be summarily rejected and roadless protections maintained. The Forest Service needs to take a hard look at an alternative that reduces overall and individual watershed road densities on Prince of Wales Island and other heavily roaded areas on the Tongass by decommissioning roads to increase overall intactness and reduce forest fragmentation. Northern Prince of Wales Island (e.g., north of the Honker divide) is an ideal area for a road decommissioning and a road-rip restoration focus.

ROADS ACCUMULATE IMPACTS TO AQUATIC AND TERRESTRIAL ECOSYSTEMS

To reiterate, the Forest Service has some 370,000 miles of roads (enough to circumnavigate the Earth 16 times, and more than 8 times the entire US Interstate Highway system) with a road maintenance backlog >\$10 billion (Congressional Research Service 2023¹⁴). Road densities vary across Forest Service regions but all regions have been cumulatively impacted at watershed scales outside IRAs and unroaded areas. And according to one published study, 20% of the total land area of the U.S. is within 127 m of a road with 83% within ~1 km of a road and thus the

¹²DellaSala, D.A. et al. 2015. Climate change may trigger broad shifts in North America's Pacific Coastal Rainforests. Reference Module in Earth Systems and Environmental Sciences <http://dx.doi.org/10.1016/B978-0-12-409548-9.09367-2>.

¹³Taxpayers for Common Sense. 2020. Cutting our losses after 40 years of money-losing timber sales in the Tongass. https://www.taxpayer.net/wp-content/uploads/2020/09/TCS-Cutting-Our-Losses-40-yrs.-of-Tongass-Timber-Sales_Sept.-2020.pdf.

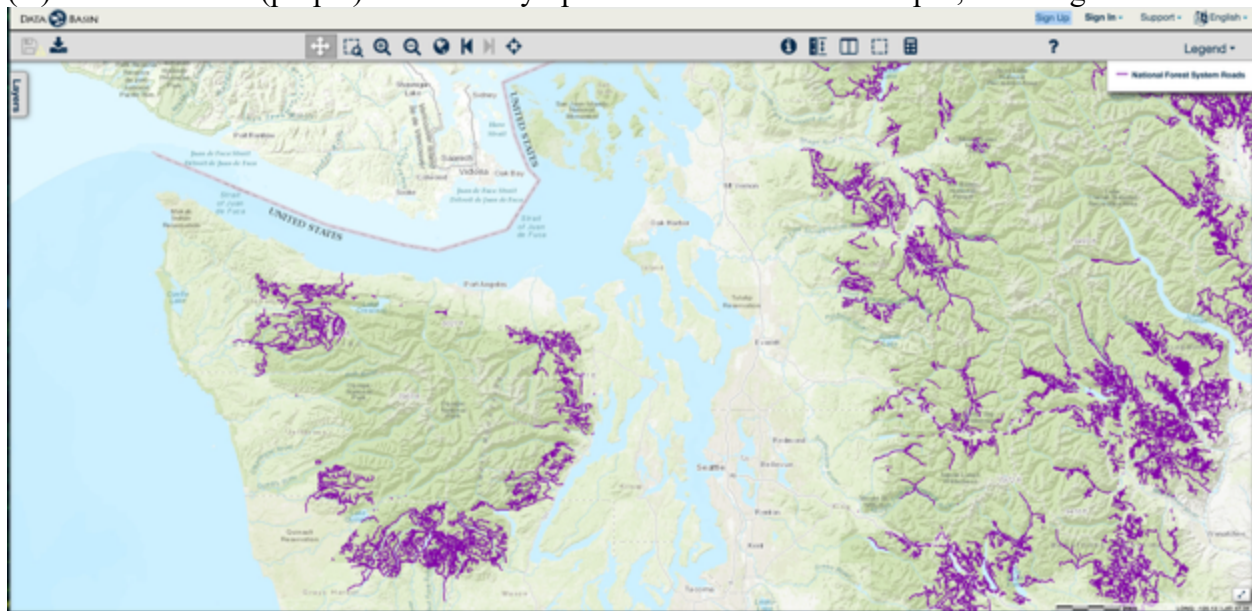
¹⁴Congressional Research Service. 2023. Deferred maintenance of federal land management agencies: FY2013-FY2022 estimates and issues. https://www.congress.gov/crs_external_products/R/PDF/R43997/R43997.15.pdf.

cumulative impacts are substantial and need to be properly analyzed (Ritters and Wickham 2003¹⁵ – abstract below).

Abstract: Ecological impacts from roads may be the rule rather than the exception in most of the conterminous United States. We measured the proportion of land area that was located within nine distances from the nearest road of any type, and mapped the results for 164 ecoregions and 2108 watersheds nationwide. Overall, 20% of the total land area was within 127 m of a road, and the proportion increased rapidly with distance, so that 83% was within 1061 m of a road, and only 3% was more than 5176 m away. For forest land area only, the proportions differed by less than 2% for all distances. Regions with more than 60% of their total land area within 382 m of a road may be at greatest risk of cumulative ecological impacts from roads. These regions include nearly all coastal zones, as well as substantial portions of the southeast US and the basins of the Ohio, Brazos, Colorado, Sacramento, and San Joaquin Rivers.

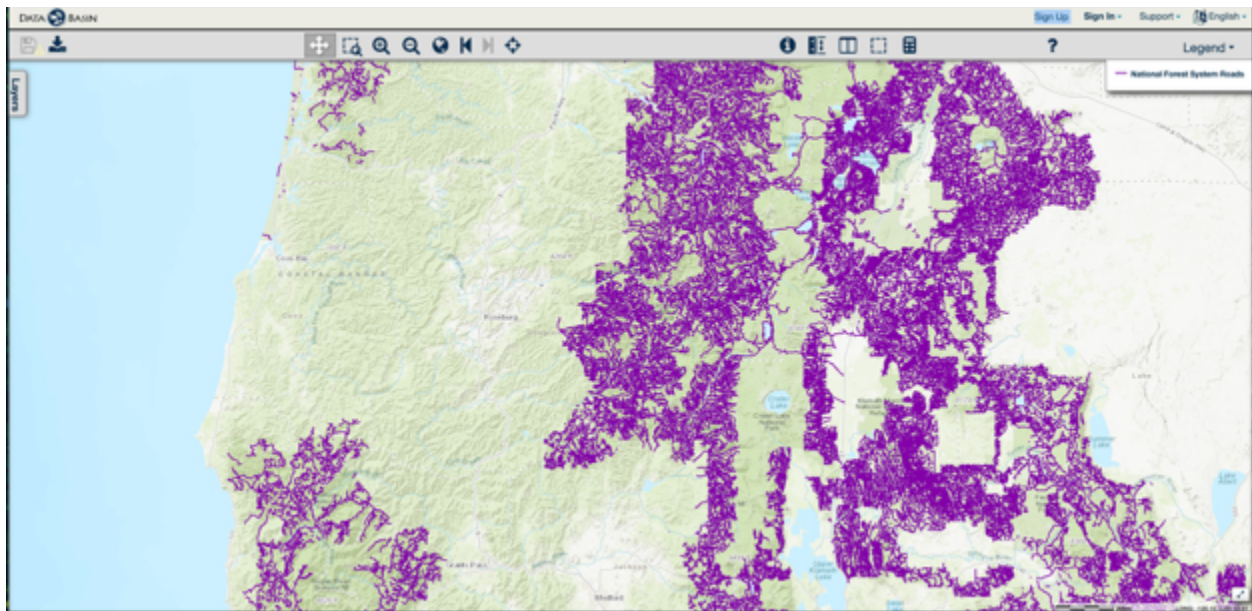
The following map layers in Figure 6 (A-F) show regional zoom-ins (in addition to the Prince of Wales example above) of extensive road systems under U.S. Forest Service management that are damaging to aquatic and terrestrial ecosystem integrity. In sum, every single national forest has extensive road related impacts that are cumulative and pervasive and need to be fully analyzed. By building more roads, the agency is downplaying impacts to remaining intact forests and watersheds, forgoing opportunities to restore heavily roaded areas, and failing to maintain its enormous road maintenance backlog.

(A) Road networks (purple) from the Olympics to western Cascade slopes, Washington.

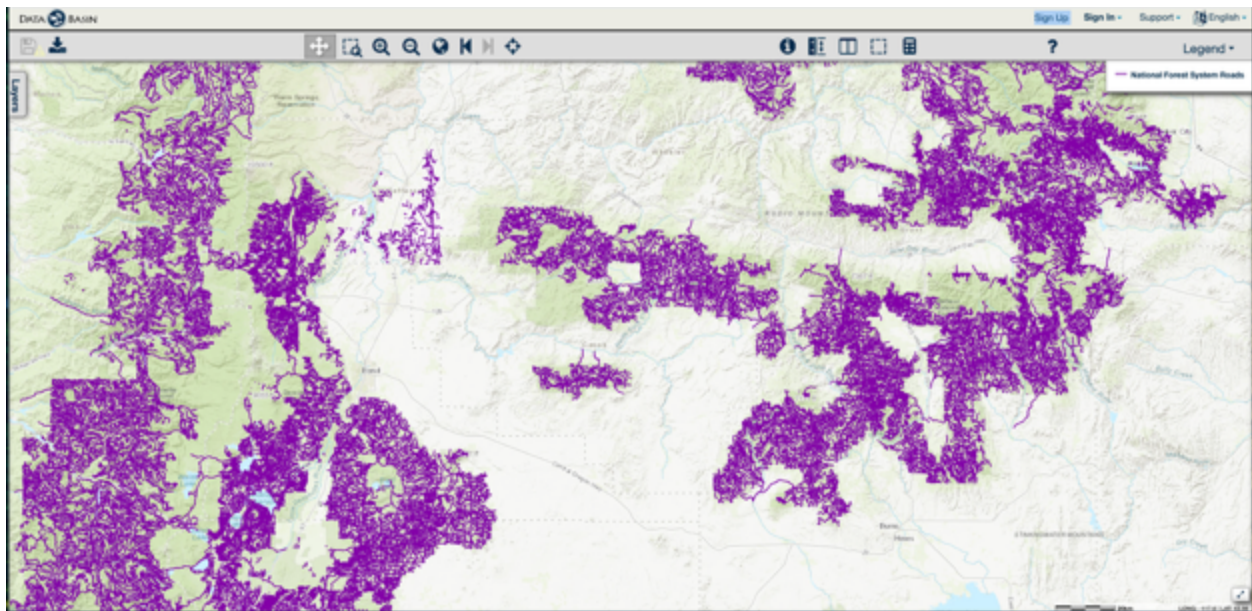


(B) Coast Range, CA to Eastern Cascades and basin areas, OR/CA

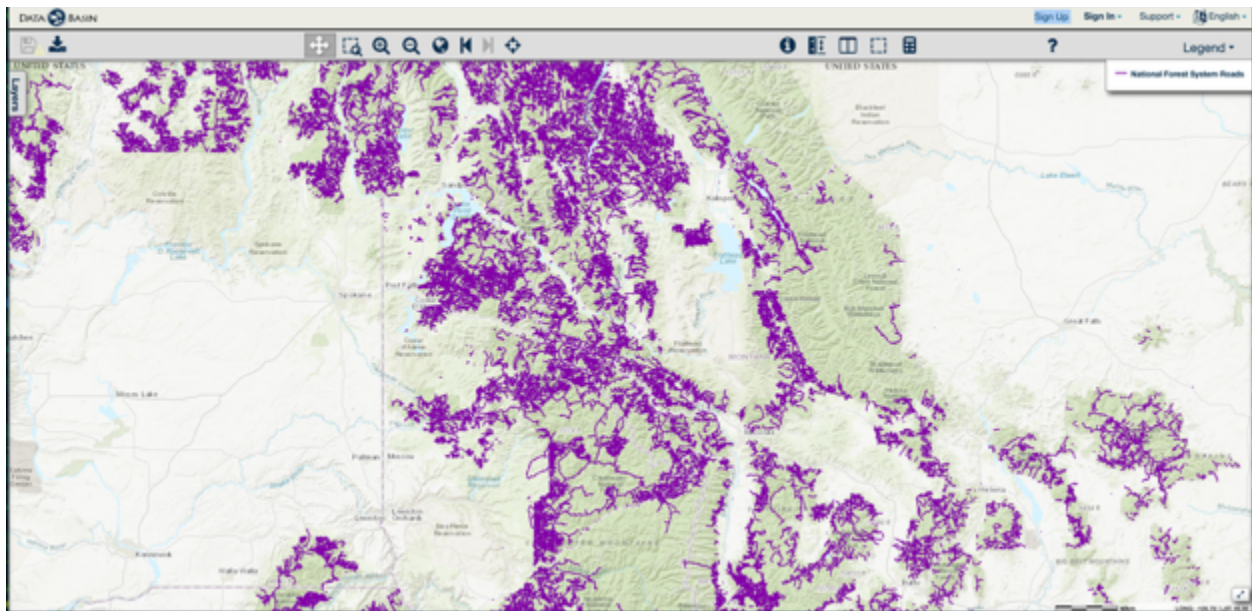
¹⁵Riitters, K.H., and J.D. Wickam. How far to the nearest road? *Frontiers in Ecology and the Environment* [https://doi.org/10.1890/1540-9295\(2003\)001\[0125:HFTTNR\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2003)001[0125:HFTTNR]2.0.CO;2).



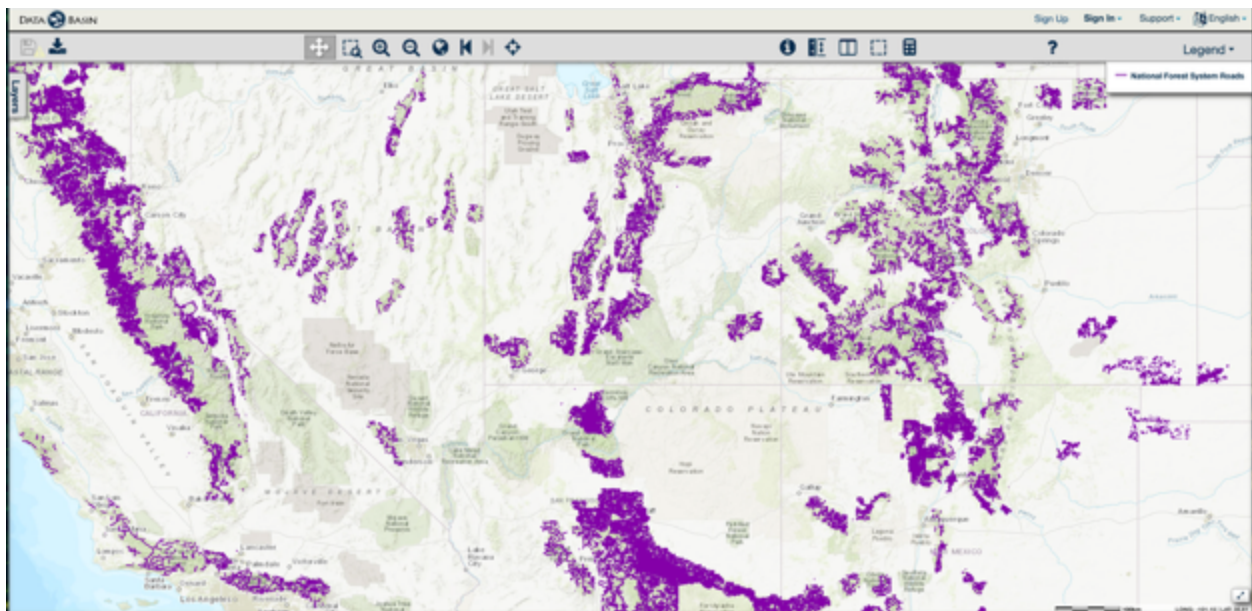
C - Willamette to Malheur National Forests, OR



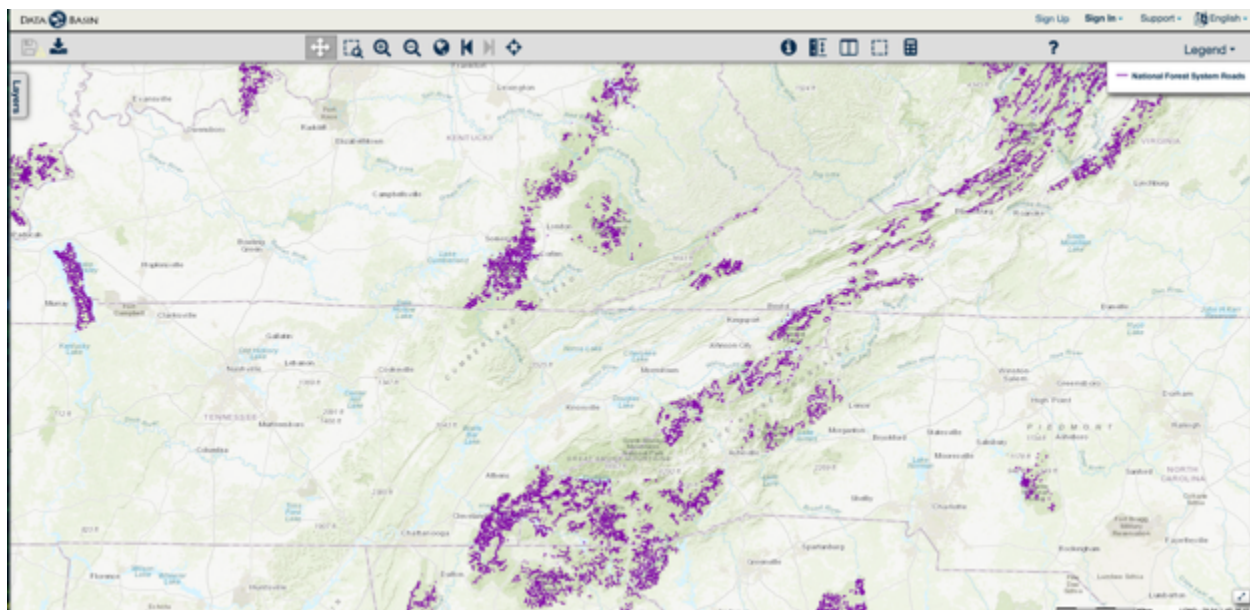
(D) Northern Rockies, Washington-Idaho



E – Southern Rockies – Sierras to Santa Fe, NM area



(F) – Appalachia region



Roads impact terrestrial and aquatic systems in many ways and those impacts can extend out to at least 1-km from the road prism (Ibisch et al. 2016 and Table S1-supplemental¹⁶). Impacts documented in Ibisch et al. and by others include:

- Reduction in abundance and richness of a broad range of taxa, including macroinvertebrates, butterflies, plants, birds, mammals, herpetofauna, and even animal genomes.
- Wildlife mortality sinks from poaching and vehicle collisions.
- Chemical and sediment pollution to streams.
- Modification of wildlife behavior and movement patterns.
- Promotion of invasive species – invasive plants, invertebrates, terrestrial animals, freshwater and marine organisms.
- Landscape patterns and fragmentation effects.
- Noise from traffic.
- Movement patterns of large carnivores (Basille et al. 2013, Grilo et al. 2015¹⁷ – summary below).

Summary -Carnivores are a diverse group of wildlife that occur in most environments around the world. Large, wide-ranging carnivores play key ecological roles in natural systems. They regulate population sizes of herbivores and other small- and medium-sized carnivores that in turn affect the growth, structure and composition of plant communities and habitats and the health of the small-animal populations that live in these habitats. Carnivores are particularly susceptible to the impacts of roads because many species require large areas to sustain their populations, have low reproductive output and occur in low densities.

- Carnivores with large home ranges, long dispersal distances or inability to tolerate human disturbance are particularly vulnerable to the effects of roads and traffic.

¹⁶Ibisch, P.L. et al. 2016. A global map of roadless areas and their conservation status. Science DOI: 10.1126/science.aaf7166.

¹⁷Basille, M. et al. 2013. Selecting habitat to survive: the impact of road density on survival in a large carnivore. PLoS One <https://doi.org/10.1371/journal.pone.0065493>. Grilo, C. et al. 2015. Carnivores struggling for survival in roaded landscapes <https://doi.org/10.1002/9781118568170.ch35>Digital Object Identifier (DOI).

- Threats from roads and traffic such as wildlife-vehicle collisions barriers to movement, habitat disturbance and road avoidance jeopardise the persistence of certain carnivore populations.
- Road and landscape-related features influence behavioural responses of carnivores to roads, mortality risk and barrier effects.
- Different types of crossing structures are needed to increase habitat connectivity for the wide diversity of carnivore species.
- Fencing, when paired with crossing structures, is critical to reducing the negative effects of roads on carnivores.

Grilo et al. 2015 - The effects of roads and traffic on carnivores are well understood and vary significantly because of the diversity in their body size, movement ecology, prey selection and habitat preferences. Consequently, carnivores require a diverse suite of mitigation options, many of which have been well studied. Further research is needed to evaluate effects of roads and mitigation success in maintaining genetic integrity that supports long-term viable populations of carnivores.

Notably, Trombulak and Frissell (2000)¹⁸ reviewed the ecological effects of roads on terrestrial and aquatic communities, which were many (abstract below).

Abstract: Roads are a widespread and increasing feature of most landscapes. We reviewed the scientific literature on the ecological effects of roads and found support for the general conclusion that they are associated with negative effects on biotic integrity in both terrestrial and aquatic ecosystems. Roads of all kinds have seven general effects: mortality from road construction, mortality from collision with vehicles, modification of animal behavior, alteration of the physical environment, alteration of the chemical environment, spread of exotics, and increased use of areas by humans. Road construction kills sessile and slow-moving organisms, injures organisms adjacent to a road, and alters physical conditions beneath a road. Vehicle collisions affect the demography of many species, both vertebrates and invertebrates; mitigation measures to reduce roadkill have been only partly successful. Roads alter animal behavior by causing changes in home ranges, movement, reproductive success, escape response, and physiological state. Roads change soil density, temperature, soil water content, light levels, dust, surface waters, patterns of runoff, and sedimentation, as well as adding heavy metals (especially lead), salts, organic molecules, ozone, and nutrients to roadside environments. Roads promote the dispersal of exotic species by altering habitats, stressing native species, and providing movement corridors. Roads also promote increased hunting, fishing, passive harassment of animals, and landscape modifications. Not all species and ecosystems are equally affected by roads, but overall the presence of roads is highly correlated with changes in species composition, population sizes, and hydrologic and geomorphic processes that shape aquatic and riparian systems. More experimental research is needed to complement post-hoc correlative studies. Our review underscores the importance to conservation of avoiding construction of new roads in roadless or sparsely roaded areas and of removal or restoration of existing roads to benefit both terrestrial and aquatic biota.

In sum, Trombulak and Frisell report the follow road-related impacts:

- Mortality from road construction and vehicle collisions
- Modification of animal behavior including large carnivores and ungulates
- Disruption of the physical environment
- Alteration of the chemical environment
- Spread of exotic species

¹⁸ Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. <https://conbio.onlinelibrary.wiley.com/doi/epdf/10.1046/j.1523-1739.2000.99084.x>.

- Changes in human use of land and water

According to one estimate, the impacts of road-effect zones (includes a buffer around the road prism itself) impact up to 15-20% of US areas (Forman and Alexander 1998¹⁹ – abstract below).

Abstract- A huge road network with vehicles ramifies across the land, representing a surprising frontier of ecology. Species-rich roadsides are conduits for few species. Roadkills are a premier mortality source, yet except for local spots, rates rarely limit population size. Road avoidance, especially due to traffic noise, has a greater ecological impact. The still-more-important barrier effect subdivides populations, with demographic and probably genetic consequences. Road networks crossing landscapes cause local hydrologic and erosion effects, whereas stream networks and distant valleys receive major peak-flow and sediment impacts. Chemical effects mainly occur near roads. Road networks interrupt horizontal ecological flows, alter landscape spatial pattern, and therefore inhibit important interior species. Thus, road density and network structure are informative landscape ecology assays. Australia has huge road-reserve networks of native vegetation, whereas the Dutch have tunnels and overpasses perforating road barriers to enhance ecological flows. Based on road-effect zones, an estimated 15–20% of the United States is ecologically impacted by roads.

Based on the impacts noted above and the extensive road network with major maintenance backlogs and financial costs, the Forest Service needs to analyze an alternative that seasonally closes roads (fire ignition reduction), lowers watershed scale road densities, and is fiscally responsible without building more costly and damaging roads. Transportation focus should also target road decommissioning due to ecosystem integrity benefits (Switalski et al. 2004²⁰ – abstract below).

Abstract: Road removal is being used to mitigate the physical and ecological impacts of roads and to restore both public and private lands. Although many federal and state agencies and private landowners have created protocols for road removal and priorities for restoration, research has not kept pace with the rate of removal. Some research has been conducted on hydrologic and geomorphic restoration following road removal, but no studies have directly addressed restoring wildlife habitat. Road removal creates a short-term disturbance which may temporarily increase sediment loss. However, long-term monitoring and initial research have shown that road removal reduces chronic erosion and the risk of landslides. We review the hydrologic, geomorphic, and ecological benefits and impacts of three methods of road removal, identify knowledge gaps, and propose questions for future research, which is urgently needed to quantify how effectively road removal restores terrestrial, riparian, and aquatic habitat and other ecosystem processes.

WILDFIRE & INSECT OUTBREAK RISKS ARE HIGHEST IN LOGGED AND ROADED AREAS (PUBLISHED AND ORIGINAL RESEARCH FINDINGS)

There have been numerous peer-reviewed studies demonstrating that roaded and logged areas burn more frequently and severely than IRAs and protected areas (DellaSala and Frost 2001, Odion et al. 2004, Bradley et al. 2016, Zald and Dunn 2018, DellaSala et al. 2024, 2025b, 2026,

¹⁹Formann, R.T.T., and L.E. Alexander. Roads and their major ecological effects. Annual Review Ecol., Evol. & Systematics <https://doi.org/10.1146/annurev.ecolsys.29.1.207>.

²⁰Switalski, T.A. et al. 2004. Benefit and impacts of road removal. Frontiers in Ecology & Enviro. [https://doi.org/10.1890/1540-9295\(2004\)002\[0021:BAIORR\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2004)002[0021:BAIORR]2.0.CO;2).

Aplet et al. 2026, Kilbride et al. 2026 Ibid²¹) and conserving IRAs does not increase wildfire activity (Johnston et al. 2021²²).

The following demonstrate the wildfire refugia properties of IRAs and protected areas and underscore the misguided allocation of “fuels reduction” treatments conducted far removed from the nearest structures, a strategy that will do nothing to protect communities from wildfire spillover events.

- Most wildfire spillover events have occurred on private lands where logging is greatest, not public lands (Downing et al. 2022²³).
- Extreme fire weather interacts with logged landscapes to produce large amounts of high severity fire (Zald and Dunn 2018 Ibid).
- In the Southern Rockies, Wilderness represented only ~11% of the total burn footprint from 1984-2022 and in Colorado that footprint was just 3.4% of the total burn area. IRAs overall had lower levels of fire within the overall fire footprint in Colorado and Wyoming (DellaSala et al. 2024 Ibid). Notably, nearly three-quarters of thousands of “fuel treatments” in this region occurred >1-km from the Wildland Urban Interface (WUI) despite claims that the agency was protecting communities from spill over events.
- In the Northern Rockies, nearly 83% of the total treatment footprint was >1-km from any WUI type and wildfires were more prevalent in logged areas (DellaSala et al. 2025b Ibid).
- In the Klamath-Siskiyou ecoregion, wildfires were more severe in plantations (Odion et al. 2004) and within managed areas within the Siskiyou Crest subregion (DellaSala et al. 2026 Ibid). Two of the region’s largest fires were more severe in “managed areas” and up to three-fourths of all “fuel treatments” were >1-km from structures. Likewise, the vast majority of treatments were >1-km from nearest structure.

²¹DellaSala, D.A., and E. Frost. 2001. An ecologically based strategy for fire and fuels management in national forest roadless areas. *Fire Management Today* Vol 61:12-23. Odion, D.C. et al. 2004. Patterns of fire severity and forest conditions in the western Klamath Mountains, California. *Conservation Biology* 18:927-936 https://www.researchgate.net/publication/238291617_Patterns_of_Fire_Severity_and_Forest_Conditions_in_the_Western_Klamath_Mountains. Bradley et al. 2016. Does increased forest protection correspond to higher fire severity in frequent fire forests of the western United States. <https://doi.org/10.1002/ecs2.1492>Digital Object Identifier (DOI). Zald, H.S.J. and C.J. Dunn. 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. *Ecol. Applic.* <https://doi.org/10.1002/eap.1710>Digital Object Identifier (DOI). DellaSala, D.A., et al. 2024. An ecoregional conservation assessment for the southern Rocky Mountain Ecoregion and Santa Fe subregion, Wyoming to New Mexico USA. *Land* <https://doi.org/10.3390/land13091432>. DellaSala, D.A. et al. 2025b. An ecoregional conservation assessment for the northern Rockies ecoregion and proposed climate refugium in the Yaak River watershed, USA. *Forests* <https://doi.org/10.3390/f16050822>. DellaSala, D.A. et al. 2026. An ecoregional conservation assessment for the Klamath-Siskiyou ecoregion and proposed Siskiyou Crest Climate Refuge, southwest Oregon and northern California, USA. *Diversity* <https://doi.org/10.3390/d18070415>. Aplet, G. et al. 2026. Three-decade record of contiguous-U.S. national forest wildfire indicates increased density of ignitions near roads. *Fire Ecology* <https://doi.org/10.1186/s42408-026-00450-2>.

²²Johnston, J.D. et al. 2021. Does conserving roadless wildland increase wildfire activity in western US national forests. *Environ. Res. Letter* <https://doi.org/10.1088/1748-9326/ac13ee>.

²³Downing, W.M. et al. 2022. Human ignitions on private lands drive USFS cross-boundary wildfire transmission and community impacts in the western US. *Scientific Reports* <https://www.nature.com/articles/s41598-022-06002-3>.

- In the Blue Mountains of Oregon, the largest amount of high severity fire occurred in the “managed areas” over a four-decade period (Table 1 below) and up to 95% of all “fuel treatments” were >1-km from structures (DellaSala in prep).
- Insect outbreaks are highest in logged and heavily roaded landscapes due to homogenization of tree species compensation, oversimplification of forest structures, and reduced habitat for insectivorous species (Black et al. 2011²⁴).
- A key false assumption of wildfire severity increases in the notion that large dead trees are a fire problem in IRAs. The Forest Service uses this as justification to conduct substantial postfire logging operations and road building with minimal environment safeguards. Yet, large dead trees are not a significant wildfire problem and the agency’s logging program is motivated by the economics of salvage logging (DellaSala et al. 2025c²⁵).

Table 1. High-severity MTBS fire area and percentage (1984–2024) within selected BPS forest settings in the Blue Mountains Ecoregion by elevation and land use group. Protected comprises GAP 1 and 2; Protected+ comprises GAP 1, 2, and 3a (IRAs); Managed comprises GAP 3b and 4. Protected is a subset of Protected+, so these two columns are not additive. Selected forest settings comprise the 11 LANDFIRE Biophysical Settings (BPS) systems assigned in supplementary Table S1 of DellaSala et al. (2026) to dry mixed-conifer forest and woodland, mesic mixed-conifer forest and woodland, dry Douglas-fir forest and woodland, and ponderosa pine forest, woodland and savanna. BPS represents potential vegetation settings, rather than current forest cover. High-severity hectares represent the area classified as maximum high severity within each elevation band and protection group. High-severity percentages divide that area by the included MTBS fire footprint in the same elevation band and protection group, within the selected forest settings. They do not use the entire area of the forest settings or protection group as the denominator. Group percentages are calculated from pooled hectares, rather than by averaging individual GAP percentages. The All elevations row pools the included footprint with valid elevation across elevation bands. Each 30 m location is represented once using its highest included MTBS severity class during 1984–2024. Unburned-to-low and unprocessed-only cells are included in footprint denominators; MTBS class 5 (increased greenness) is excluded. GAP 3a comprises assigned GAP 3 land within inventoried roadless areas, and GAP 3b comprises the remaining GAP 3 land. GAP 4 includes explicit GAP 4 and residual land without an assigned GAP code under the project’s reporting convention. Elevation is measured in meters using the supplied USGS 3DEP-derived elevation raster, aligned to the MTBS grid by nearest-neighbor resampling. Integer elevations are grouped into 0–500, 501–1000, 1001–1500, 1501–2000, 2001–2500, and >2500 m bands. Hectares are rounded to whole numbers and percentages to one decimal place; small positive areas are shown as <1 ha. NA indicates no included footprint from which to calculate a percentage. This table corresponds to supplementary Table S6 in DellaSala et al. (2026). The forest selection follows Table S1 exactly, but does not include the paper’s additional LANDFIRE Existing Vegetation Type adjustment for agricultural and developed areas. This analysis uses standard MTBS thematic severity classes for 1984–2024, rather than the paper’s RdNBR classification for 1985–2023. The elevation source also differs from the paper’s LANDFIRE elevation dataset.

²⁴ Black, S. et al. 2011. Insects and roadless forests: a scientific review of causes, consequences, and management alternatives https://xerces.org/sites/default/files/2018-05/10-004_02_XercesSoc_Insects%2BRoadless-Forests_web.pdf.

²⁵DellaSala, D.A. et al. 2025c. Removing dead trees will not save us from fast-moving wildfires. PNAS <https://www.pnas.org/doi/10.1073/pnas.2510922122>.

Elevation (m)	Protected high ha	Protected+ high ha	Managed high ha	Protected high %	Protected+ high %	Managed high %
0–500	1	1	0	1.8	1.4	0.0
501–1000	165	209	757	7.2	5.9	3.8
1001–1500	572	978	5,221	7.7	7.3	10.2
1501–2000	1,078	1,740	12,369	25.3	19.0	23.5
2001–2500	118	118	<1	81.0	81.0	26.3
All elevations	1,933	3,046	18,348	13.7	11.5	14.8

CONCLUSIONS

The RCR has, for the most part, maintained remaining intact areas on the national forest system for decades and, as it did in 2001 when adopted, maintains overwhelming public and scientific support. The DEIS is not based on best available science; recognizes many of the impacts noted herein, yet chose an alternative that will compromise roadless values for economic interest groups; and has been compromised by the Trump logging executive orders. The agency is already spending billions of dollars on wildfire prevention while at the same time wildfires are increasing (DellaSala et al. 2022c²⁶). This is mainly because the Forest Service is focused on the effects – more wildfires burning – rather than the root causes – logging, roads, livestock, and climate change that are contributing mostly to the increases (DellaSala et al. 2022b, Ibid).

An historic preoccupation with logging, mining, livestock, ORVs and other interests lead to local discretion ushering in projects that fragmented and degraded intact areas. The lack of a unified vision for IRAs at the time prompted calls for more oversight that has been provided for over two decades by the RCR. The Forest Service needs to take a hard look at its pervasive road impact and development footprint while analyzing a new alternative that builds on the RCR via new additions (areas >1,000 acres), tightens restrictions on logging given the relatively lower fire risks of IRAs, removes livestock and mining claims, and reduces road impacts on every national forest through road decommissioning, stepped up road maintenance of failing roads, and seasonal road closures to reduce unwanted fire ignitions. Fuel reduction treatments need to concentrate on structures and not backcountry (>1-km) logging that will only increase the risk of wildfire spillover events.

The agency is shamelessly captured by extraction interests that has returned forest policies to draconian times of ramped up logging and road building underscored by the administration's climate denialism and one-side economic interests.

²⁶DellaSala, D.A., et al. 2022c. Have western USA fire suppression and megafire active management approaches become a contemporary Sisypheus? Biol. Conservation <https://doi.org/10.1016/j.biocon.2022.109499>.