Center for Sustainable Economy

November 13th, 2025

Kelly Lawrence, Supervisor
Olympic National Forest
1835 Black Lake Blvd SW
Olympia, WA 98512

RE: *Comments on the Canyon Forest Restoration Project Preliminary EA*

Dear Ms. Lawrence:

Please find below comments from the Center for Sustainable Economy (CSE) on the preliminary environmental assessment (PEA) for the Canyon Forest Restoration Project, hereafter ("Canyon timber sale"). CSE is a nonprofit environmental economics research and advocacy organization with members and partners in Washington who are concerned about the adverse environmental, social and economic impacts of the Forest Service's logging program.

Of particular concern with the Canyon timber sale is its effects on climate change and climate resiliency as well as the adverse economic impacts caused by loss and degradation of ecosystem services now worth tens of millions of dollars to the local economy each year. CSE's members frequently use and enjoy forest ecosystems in the Canyon timber sale area for recreation, gathering of non-timber forest products, fishing, wildlife watching and other pursuits. As currently planned, the timber sale will cause a significant loss or degradation of these uses and thus result in significant harm to our members.

Summary

At COP 26 in Glasgow, the United States and 140 other nations pledged to eliminate deforestation and forest degradation by 2030 as an essential strategy for avoiding the worst effects of climate change.[1] The State of Washington has also made commitments to slowing and reversing the pace of deforestation and forest degradation and scaling up

[1] A copy of the pledge and current signatories can be found online at: https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/.

climate smart alternatives to industrial-scale logging that can increase carbon sequestration, storage, and overall ecosystem integrity.[2]

Unfortunately, the Canyon timber sale runs counter to the goals and objectives of these historic agreement and commitments. This sale will deforest and degrade mature, naturally regenerated forests that are among the most carbon dense forests in the world, generate significant quantities of greenhouse gas (GHG) emissions, degrade carbon sequestration capacity, which is now approaching its maximum in the Canyon timber sale area, and make the land more susceptible to a wide range of climate stressors, such as water shortages, thermal pollution of coldwater fisheries, wildfires, heat waves, landslides, flooding, invasive species, and harmful algae blooms.

Consideration of climate impacts is recognized as an important component of National Environmental Policy Act review.[3] Two Superior Courts in western Washington[4] have ruled that excluding consideration of these climate impacts runs afoul of the State Environmental Policy Act (SEPA), which is a mirror image of the National Environmental Policy Act, by design. Despite this, climate impacts have been entirely excluded from the PEA. Nor has the Forest Service made any effort to identify mitigation measures that will reduce these climate impacts or consider alternatives that retain carbon storage and sequestration functions while implementing activities that are purely restorative.

In particular, while we are generally supportive of non-commercial, variable density thinning of dense young plantations (about half the stands included in the project) there is no need nor ecological benefit of thinning naturally regenerated mature stands, especially those that are already on the cusp of developing into late successional/old growth forests. As such, we request consideration of a climate smart alternative that includes the legitimate restoration aspects of this project while excluding commercial logging or road construction/reconstruction.

---

[2] For example, Washington's Climate Commitment Act, Natural Solutions Account seeks to increase forests' carbon pollution reduction capacity through "sequestration, storage, and overall system integrity" (RCW 70A.65.270). As another, the Board of Natural Resources Commissioner's Order on Carbon Sequestration and Storage (No. 202202) recognizes that forests, "as high-carbon ecosystems, play a vital role in climate change mitigation."

[3] 40 CFR 1500 et seq., the NEPA Bipartisan Permitting Reform Implementation Rule established procedures for incorporating climate change and climate impacts into NEPA analysis and consideration of alternatives that reduce such impacts. In addition, in 2023, CEQ issued more detailed guidance on incorporating climate change impacts under NEPA (Federal Register / Vol. 88, No. 5 / Monday, January 9, 2023, at 1196 to 1212. While these regulations have been rescinded by the Trump Administration, they nevertheless represent the gold standard for NEPA compliance under the Forest Service's own NEPA regulations.

[4] For details of both cases, see: https://www.sustainable-economy.org/court-slaps-dnr-again-for-climate-impacts-of-mature-forest-logging.

We are also concerned that the PEA does not contain any information about economic impacts. While the project will generate economic benefits measured by the value of timber sold, the PEA should provide an analysis of what economic benefits are being sacrificed to create that value. Left in their existing state, forests in the Canyon timber sale area provide a wide range of ecosystem services – like carbon capture, water filtration, recreation and non-timber forest products – that are worth tens of millions of dollars to the local economy each year. We ask that the final EA address these ecosystem service values.

Lastly, we note that with a planned volume of over 19 million board feet (19,299 thousand board feet (mbf))[5] this is by far the most extensive and damaging logging operation in the recent history of the Olympic National Forest. The amount of timber offered for sale across the entire forest is calculated for each year in 'cut and sold' reports prepared for each national forest at the end of each fiscal year.[6] The total volume sold in recent years is as follows:

Olympic, all sales (FY 2024): 17,534.90 mbf
Olympic, all sales (FY 2023): 19,744.66 mbf
Olympic, all sales (FY 2022): 8,323.61 mbf
Olympic, all sales (FY 2021): 6,275.04 mbf

Because of the controversial nature of the project as well as its size, we believe a full environmental impact statement is required. More detail on these issues and concerns is provided below.

A. The Canyon timber sale will have long-term harmful effects on climate change and climate resiliency.

With respect to climate impacts, there are three general categories that will be associated with the Canyon timber sale: (a) releases of both biogenic and fossil-fuel related greenhouse gas (GHG) emissions; (b) loss and degradation of carbon sequestration capacity and (c) increased vulnerability to climate stressors.

(i) GHG emissions

GHG emissions associated with Forest Service logging projects – including the Canyon timber sale – are easy to understand and quantifiable using published sources, yet no

[5] The PEA contains an error. The anticipated sale volume is 19,299 thousand board feet (mbf) not board feet. PEA at 6.
[6] USDA Forest Service. Forest Products Cut and Sold from the National Forests and Grasslands. Available online at: https://www.fs.usda.gov/forestmanagement/products/cut-sold/index.shtml.

mention of such emissions are included in the PEA.[7] Trees are half carbon by weight, and when they are cut down and turned into wood products most of the carbon contained in those trees is eventually returned to the atmosphere through the decay of slash, stumps, needles, and other debris left over after logging, mill waste, and end use products. Multiple investigations in Washington, in other states, and nationally indicate that on average roughly 80% of the original carbon stored in trees is released into the atmosphere and landfills over a 100-year period through these processes, with much of that released within one or two years of logging. This contrasts with older forests and soils that draw down and store carbon for centuries.

In addition, carbon dioxide, methane, and nitrous oxide are released from disturbed and eroded soils, and carbon dioxide is emitted from fossil fuels combusted by machinery during road building, logging, application of chemicals and fertilizers, slash burning, transportation of logs to mills, manufacturing at mills, and transportation of finished wood products.

Life cycle analysis (LCA) is the gold standard for quantifying all these logging related releases of greenhouse gases. Talberth and Carlson (2024) and Hudiburg et al. (2019) have provided one of the most comprehensive inventories of such GHG emissions associated with Washington's timber harvest activities, and concluded that annual GHG emissions attributable to timber harvest activities average 32 – 46 million metric tons CO_2 per year, making the logging and wood products sector the second greatest source of GHG emissions in the state, even after deducting the fossil fuel related emissions included in other sector inventories.[8] The variation between the studies is attributable to the inclusion of forgone and land use conversion activities in the former (Talberth and Carlson, 2024).

Dividing these emissions by the volume of statewide timber harvests during the periods analyzed in each study yields emissions factors of 10.27 and 16.74 tCO_2-e/mbf.[9] Applying these emissions factors to the volume removed by the Canyon timber sale (19,299 mbf) results in a preliminary GHG estimate of 198,200 – 323,065 tCO_2-e. This range is many times the threshold for facility GHG reporting at both the state and federal levels (25,000 tCO_2-e/yr) and the threshold for project-level reporting (10,000 tCO_2-e/yr) under

---

[7] See, e.g. Talberth, J. Carlson, E. 2024. Forest carbon tax and reward. regulating greenhouse gas emissions from industrial logging and deforestation in the US. Environment, Development and Sustainability Volume 27, pages 14913–14934; Law, B., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C., Harmon, M.E., 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. *PNAS* April 3, 2018 115 (14) 3663-3668; Hudiburg, T., Law, B.E., Moomaw, W.R., Harmon, M.E., Stenzel, J.E., 2019. Meeting GHG reduction targets requires accounting for all forest sector emissions. *Env. Res. Ltrs.* 14(2019): 095005.

[8] Talberth and Carlson (2024) and Hudiburg et al. (2019), note 7.

[9] Statewide timber harvest volume for each study was drawn from Bureau of Business and Economic Research, University of Montana, 2022. Washington Timber Harvest. Available online at: https://www.bber.umt.edu/FIR/HarvestWA.aspx.

Washington's draft GHG reporting rule for projects.[10] Because of the significance of these GHG emissions, a full EIS and not an EA is required.

(ii) Loss of carbon sequestration capacity

Every new logging unit and segment of logging road constructed on Olympic National Forest lands puts some of the most productive carbon capturing land in the world out of commission for decades, if not permanently. The proposed roadwork associated with the Canyon timber sale will add over 17 miles of temporary, reconditioned, or reconstructed roads, eliminating carbon sequestration capacity for many decades, or permanently if the roads are left open.

In addition, commercial logging activities will degrade over 1,900 acres, causing these lands to emit more carbon than they release for 10-15 years after logging. On these acres, the land becomes a carbon emissions source and not a sink. Net ecosystem productivity – the best measure of carbon sequestration – goes negative during this time.[11] These post-harvest releases as well as the carbon sequestration that is being sacrificed can be calculated with relative ease using methods and sources of information available to the Forest Service. By reducing carbon sequestration capacity, the Olympic National Forest logging program, including the Canyon timber sale, is helping to further increase GHG concentrations in the atmosphere and associated radiative forcing.

(iii) Loss of climate change resiliency

In addition to generating significant quantities of GHG emissions, the Canyon timber sale, by deforesting over 1,900 acres through commercial thinning, clearcuts, and other intensive practices, building or restoring over 17 miles of logging roads, and implementing harmful post-harvest regeneration activities (burning, spraying, etc.) will amplify the deleterious effects of climate change by making the land more susceptible to its effects. In particular, the Canyon timber sale in combination with similar logging projects on federal, state, and private lands in the region can be expected to amplify risks associated with:

---

[10] Washington Department of Ecology. 2021. Greenhouse Gas Assessment for Projects (GAP) Rule Washington Administrative Code (WAC) 173-445. Available online at: https://ecology.wa.gov/getattachment/36bdb605-225d-4a74-9edd-8bc600714977/WAC173_445_GAP_Rule_Framework_Informal_Review.pdf.

[11] See, e.g. Grant, R. F., Black, T. A., Humphreys, E. R., & Morgenstern, K. (2007). Changes in net ecosystem productivity with forest age following clearcutting of a coastal Douglas-fir forest: Testing a mathematical model with eddy covariance measurements along a forest chronosequence. Tree Physiology, 27, 115–131; Turner, D. P., Guzy, M., Lefsy, M. A., Ritts, W. D., Van Tuyl, S., & Law, B. E. (2004). Monitoring forest carbon sequestration with remote sensing and carbon cycle modeling. *Environmental Management,33*(4), 457–466. https://doi.org/10.1007/s00267-003-9103-8

- Depleted water supplies. Dry season stream flows are today dramatically depleted across the Pacific Northwest as a consequence of extensive logging and the rapid regrowth of water-hungry young vegetation after logging.[12] For example, long-term experiments in Coastal Oregon indicate that the conversion of mature and old growth conifer forests to homogenous plantations of Douglas fir produced a persistent summer streamflow deficit of 50 percent in plantations aged 25 to 45 years relative to intact, older forests.[13] Climate change will make matters worse by further reducing dry season flows thereby straining "the ability of existing infrastructure and operations to meet many and varied water needs."[14]

- Warming waters. As the climate warms and dries in the summer, Washington waterways will also warm. This thermal pollution is intensified by intensive logging. In Oregon, Department of Forestry modeling concludes that a typical logging operation compliant with the Oregon Forest Practices Act on average, boosts water temperatures by 2.6 degrees Fahrenheit on top of any background increase due to climate change.[15] According to multiple federal agencies, "the evidence is . . . overwhelming that forest practices contribute to widespread stream temperature problems."[16] Warmer water, in turn, will cause "harmful algal blooms to occur more often, in more waterbodies and to be more intense."[17]

- Increased wildfire risk. Timber plantations and other intensively managed forestlands burn hotter and faster than natural forests. This is because they lack the moisture content and structural complexity needed to keep wildfires in check. Decades of monitoring by firefighters and researchers show that fires burning in complex natural forests create a mosaic of intensely burned and relatively untouched areas. On the other hand, fires burning in homogenous tree plantations

---

[12] Perry, T. D., Jones, J.A., 2016. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. *Ecohydrology*. 1-13.

[13] Segura, C., Bladon, K., Hatten, J., Jones, J., Hale, C., Ice, G., 2020. Long-term effects of forest harvesting on summer low flow deficits in the Coast Range of Oregon, *Journal of Hydrology*, Volume 585, article id. 124749.

[14] Dalton, M.M., K.D. Dello, L. Hawkins, P.W. Mote, and D.E. Rupp, 2017 *The Third Oregon Climate Assessment Report*, Oregon Climate Change Research Institute, College of Earth, Ocean and Atmospheric Sciences, Oregon State University, Winston, OR, page 18.

[15] Oregon Department of Forestry (ODF), 2015. Detailed analysis: predicted temperature change results. Agenda Item 7, Attachment 3 to the meeting packet prepared for the Board of Forestry, June 3rd, 2015. Salem, OR: ODF.

[16] EPA-FWS-NMFS, 2/28/01 Stream Temperature Sufficiency Analysis Letter to ODF and ODEQ.

[17] US Environmental Protection Agency, "Climate change and harmful algae blooms," available online at: https://www.epa.gov/nutrientpollution/climate-change-and-harmful-algal-blooms.

are more likely to be uniformly severe.[18] New research that examined burn severity after Oregon's historic wildfires in 2020 concluded that "[e]arly-seral forests primarily concentrated on private lands, burned more severely than their older and taller counterparts, over the entire megafire event regardless of topography."[19] This should be a wakeup call to the Forest Service that the practice of replacing structurally complex, mature forests, such as those in the Canyon timber sale with monoculture plantations or heavily thinned stands is a practice that exposes nearby communities to increased wildfire risk. Two recent court decisions have flagged the connections between clearcut-style logging and increased fire hazard and further underscored the need for re-consideration of industrial logging practices in watersheds important for irrigation, drinking water, and fish.[20]

- Heat waves. Mature forests in the Canyon timber sale area now act as temperature refuges, helping to keep the land and waters within and adjacent to the sale area cool during both routine and extreme heat wave events. During heatwaves, which are becoming more frequent and extreme, surface temperatures in open clearcuts or heavily thinned units can exceed 130 degrees Fahrenheit while under the shaded forest canopy temperatures are often 40 to 50 degrees cooler.[21] A recent analysis by CSE and OSU researcher Christopher Still reviewed data from NEON tower sites in plantations and undisturbed old growth forests in southwest Washington and found that the degraded plantation site was hotter (+4.5 ºC), lost more water, was less efficient at photosynthesis, and experienced a more dramatic impact to carbon cycling, flipping from a sink to a source during the heat dome event.[22] All of these impacts can be expected as a result of the Canyon timber sale.

---

[18] *See, e.g.,* Stone, C., Hudak, A., Morgan, P., 2008. Forest harvest can increase subsequent forest fire severity. In Proceedings of the Second International Symposium on Fire Economics, Planning and Policy: A Global View. Armando González-Cabán**,** ed. Riverside, CA: USDA Forest Service, Pacific Southwest Research Station.

[19] Evers, C., Holz, A., Busby, S., Nielsen-Pincus, M., 2022. Burn severity in seasonal temperate rainforests under record fuel aridity. Fire 5(2), 41. https://doi.org/10.3390/fire5020041.

[20] Cascadia Wildlands; and Oregon Wild v. Bureau of Land Management; and Seneca Sawmill Company 6:19-cv-00247-MC. United States District Court of Oregon. 2019; and Bark; et al. v. United Stated Forest Service; and High Cascade Inc. No. 19-35665 D.C. No. 3:18-cv-01645-MO. United States Court of Appeals, Ninth Circuit. 2020.

[21] Hungerford, R.D., Babbitt, R.E. (1987). Overstory Removal and Residue Treatments Affect Soil Surface, Air, and Soil Temperature: Implications for Seedling Survival. Research Paper INT-377. Ogden, UT: USDA Forest Service Intermountain Research Station.

[22] Still, C., Talberth, J., 2022. Deforestation, forest degradation, heat waves and drought. Evidence from the Pacific Northwest heat dome of 2021. Port Townsend, WA: Center for Sustainable Economy. Available online at: https://www.sustainable-economy.org/deforestation-and-forest-degradation-are-making-heat-waves-and-drought-more-intense-evidence-from-the-pacific-northwest-heat-dome.

- Increased incidence and severity of landslides. The vast network of clearcuts and logging roads permeating industrial timber plantations and heavily logged Forest Service lands present a significant risk of landslides, especially during extreme precipitation events, such as the 1996 floods. Under almost all climate change scenarios for the Northwest, the frequency of these events will increase. Maintenance of strong root systems is an important factor in stabilizing soils during these events. Clearcutting (including areas within variable retention harvest units) reduces the strength of root systems dramatically, and thus is a major factor in increased landslide risk.[23] Logging roads channel water runoff and cause debris torrents that can travel many miles downstream, pick up momentum, and become heavily destructive.[24] Studies indicate that clearcuts exhibit landslide rates up to 20 times higher than background rates. Near logging roads, landslide rates are up to 300 times higher than in forested areas.[25]

- Increased risk of flooding. Research has demonstrated that heavily logged watersheds are at a much higher risk of flooding than those maintained in natural forest conditions. For example, Jones and Grant found that logging increased peak discharges by as much as 50% in small basins and 100% in large basins over a 50-year study period.[26] A 2008 Forest Service science synthesis confirmed the detrimental impacts of logging and logging roads on peak flows across western Oregon and Washington.[27]

- Enhanced habitat for invasive species and organisms that put public health at risk. Invasive species find few barriers in monoculture tree plantations and other heavily logged sites since key natural processes that keep such species in check have been removed. As succinctly stated by Norse, "in monocultures, without barriers to dispersal, insects and pathogens find unlimited resources in all directions."[28] As Washington's climate changes, a wide variety of non-native plants, insects, and disease-causing organisms, such as viruses, bacteria, prions, fungi, protozoans,

---

[23] Schmidt, K.M, J. J. Roering, J.D. Stock, W.E. Dietrich, D.R. Montgomery, Schaub, T. 2001. The variability of root cohesion as an influence on shallow landslide susceptibility in the Oregon Coast Range. *Can. Geotech. J* (38): 995-1024.

[24] Swanson, F. J., J. L. Clayton, W. F. Megahan, Bush, G., 1989. Erosional processes and long-term site productivity, pp. 67-81 in *Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems*. D. A. Perry, R. Meurisse, B. Thomas, R. Miller, J. Boyle, J. Means, C.R. Perry, R. F. Powers, eds. Portland, Oregon: Timber Press.

[25] Heiken, D., 2007. Landslides and Clearcuts: What Does the Science Really Say? Eugene, OR: Oregon Wild.

[26] Jones, J., Grant, G.E., 1996. Peak flow responses to clearcutting and roadbuilding in small and large basins, western Cascades, Oregon. Water Resources Research 32(4): 959 – 974.

[27] Grant, G.E., Lewis, S.L., Swanson, F.J., Cissel, J.H., McDonnell, J.J. 2008. Effect of Forest Practices on Peak Flows and Consequent Channel Response: A State-of-Science Report for Western Oregon and Washington. PNW-GTR-760. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

[28] Norse, E., 1990. Ancient Forests of the Pacific Northwest. Washington, DC: The Wilderness Society.

and internal (roundworms, tapeworms) and external (lice, ticks) parasites will spread, adversely affecting the health of humans, livestock, and pets in addition to fish and wildlife. A recent Forest Service assessment concluded "[e]vidence suggests that future climate change will further increase the likelihood of invasion of forests and rangelands by nonnative plant species that do not normally occur there (invasive plants), and that the consequences of those invasions may be magnified."[29]

- Elevated risk of harmful algae blooms. Harmful algal blooms (HAB) are an urgent concern statewide as climate change unfolds. Industrial forest practices greatly amplify this risk through three channels: (a) by warming waters; (b) by decreasing natural flow rates, and (c) by contaminating water supplies with glyphosate and urea, along with other chemicals and fertilizers that enhance HAB growth. With the presence of glyphosate and urea in streams, nontoxic algae growth is inhibited and HABs dominate without competition.[30] Modern drinking water treatment costs increase significantly when more rigorous treatment is needed to cleanse contaminated source water. Managing land to prevent source water contamination may be more cost-effective and may better protect human health than treating water after it has been contaminated. [31]

B. The PEA excludes consideration of a climate smart alternative.

An alternatives analysis is a central part of NEPA compliance, especially with respect to climate impacts. As the now rescinded CEQ NEPA guidance on climate impacts stated: "[c]onsidering the effects of climate change on a proposed action, and reasonable alternatives (as well as the no-action alternative), also helps to develop potential mitigation measures to reduce climate risks and promote resilience and adaptation."[32]

Since the Forest Service has adopted the CEQ NEPA rules in its own regulations, we believe this alternatives analysis is still required. With respect to climate impacts a truly 'climate smart' alternative would include the legitimate restoration components of the project and exclude those elements that decrease carbon storage, carbon sequestration, and climate resiliency. Project components that are likely to be beneficial and advance restoration objectives include road decommissioning, variable density thinning in young plantations, aquatic organism passages and planting under-represented herbaceous or woody species.

---

[29] Kerns, B., Guo, Q., 2012. Climate Change and Invasive Plants in Forests and Rangelands. U.S. Department of Agriculture, Forest Service, Climate Change Resource Center. Available online at: https://www.fs.usda.gov/ccrc/topics/climate-change-and-invasive-plants-forests-and-rangelands.

[30] Glibert, P. M., Harrison, J., Heil, C., & Seitzinger, S., 2006. Escalating worldwide use of urea–a global change contributing to coastal eutrophication. Biogeochemistry, 77(3): 441-463.

[31] Dissmeyer, George E., ed. 2000. Drinking water from forests and grasslands, a synthesis of the scientific literature. USDA Forest Service. Southern Research Station, General Technical Report SRS-39.

[32] Federal Register / Vol. 88, No. 5 / Monday, January 9, 2023 at 1206.

Project components that are likely to generate adverse climate impacts include all commercial logging sites and construction/reconstruction/reconditioning of roads.

C. The PEA fails to include an economic analysis.

NEPA and the Forest Service manual require use of "systematic, interdisciplinary approach to fully consider the impacts of Forest Service proposed actions on the physical, biological, social, and economic aspects of the human environment."[33] However, there is nothing in the PEA that addresses economic aspects. The timber sale will generate volume with known value but has and will continue to require expenditure of federal money for planning and post-harvest restoration and monitoring. In addition, the timber sale will also cause a loss of valuable ecosystem services that are provided by forests in the Canyon timber sale area if left to grow and mature.

According to FEMA's latest calculation, US forests provide important ecosystem service benefits in the form of aesthetic value, air quality regulation, climate regulation, erosion control, existence value, flood and storm hazard reduction, recreation and tourism, water filtration and water supply worth nearly $14,000 per acre per year.[34] This means that the 1,900 acres that will be affected by logging are now generating nearly $27 million in economic benefits each year, an amount that is far greater than the value of the timber planned for harvest. The PEA should be modified to recognize this economic contribution as one associated with the no action alternative and calculate the economic damage to these ecosystem service values that will result if the Canyon timber sales moves forward as planned.

Thank you for your time and consideration of the issues we've raised. We look forward to reviewing a full EIS for this project if it moves forward with full consideration of climate and economic impacts and reasonable alternatives.

Sincerely,

John Talberth
President and Senior Economist
Center for Sustainable Economy
1322 Washington Street Box 705
Port Townsend, WA 98368
jtalberth@sustainable-economy.org

---

[33] FSM 1950.2(2).

[34] Federal Emergency Management Agency (FEMA), 2022. FEMA Ecosystem Service Value Updates. Washington, DC: FEMA. Values updated to $2025.