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Nationwide Aerial Application of Fire Retardant on National Forest System Lands

Supplemental Information Report

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Contents

Introduction 1
Background 1
New Information/Changed Conditions 2
Changes in Species Considered 2
Changes in Retardant 3
Changes in Mapped Avoidance Areas 3
Assessment of Under-Reporting of Misapplications 4
Assumptions 4
Recommendations 5
Glossary 7
Literature Cited 7
Appendix A 8
Appendix B 11

Table 1: Species on Regional Threatened, Endangered, and Proposed species lists that were not included in the 2011 consultation, or in addendum consultations. 11
Table 2 : Species analyzed in 2011 that are no longer included on Regional threatened, endangered, and proposed species lists. 13
Table 3: Summary of fires with reported intrusions into threatened or endangered species avoidance areas that resulted in take 14
Table 4: Comparison of average numbers of fires, number of retardant drops, gallons of retardant used, and estimated acreage of impact between the periods of 2000-2010 and 2012-2018. 15
Table 5: Percentage of National Forest Service Lands, by Region, in mapped avoidance areas as reported in the Final Environmental Impact Statement and from 2019 avoidance area maps. 16
Table 6: Percentage of National Forest Service Lands, by Forest, in mapped avoidance areas as reported in the FEIS and from 2019 avoidance area maps. 17
Table 7: Percent, by Region, of Forests that completed the required 5% assessment monitoring (does not include Region 8 and 9 as their retardant use is a minor component of the total). 21
Table 8: Summary of aerial fire retardant drops in avoidance areas from 2012 through 2018 22

Introduction

This Supplemental Information Report documents results from review of the Nationwide Aerial Application of Fire Retardant on National Forest System Land, Final Environmental Impact Statement (United States Department of Agriculture Forest Service 2011b). The review was conducted to summarize any new information and/or changed conditions since the Final Environmental Impact Statement was completed in 2011 and focuses on changes in the species considered, amount of chemical used per year, approved chemicals, mapped avoidance areas, potential changes based on monitoring, and analysis assumptions.

Background

In October of 2011, the Forest Service signed the Record of Decision for the Nationwide Aerial Application of Fire Retardant on National Forest System Land (United States Department of Agriculture Forest Service 2011c), after completing the Environmental Impact Statement (United States Department of Agriculture Forest Service 2011b) and associated Endangered Species Act Section 7 Consultation (United States Department of Agriculture, Forest Service. 2011a) with the United States Department of Interior Fish and Wildlife Service and National Oceanic and Atmospheric Administration National Marine Fisheries Service, hereinafter referred to as the Services. The Record of Decision implemented an adaptive management approach to protect resources when using aerially applied fire retardant. A Five-Year Review was completed in 2017. The National Endangered Species Act Section 7 consultation documents (United States Department of Commerce, National Oceanic and Atmospheric Administration, 2011 and United States Department of Interior, Fish and Wildlife Service, 2011) with the Services have been amended as needed. All consultation documents expire on January 1, 2022.

The Record of Decision approved the use of aerially applied fire retardant and implemented an adaptive management approach that protects resources and continues to improve the documentation of retardant effects through reporting, monitoring and application coordination. Aerial retardant drops are not allowed in mapped avoidance areas or waterways. This direction is mandatory and implemented in all cases except where human life or public safety is threatened and retardant use within avoidance areas could be reasonably expected to alleviate that threat. Any misapplication will be reported, assessed for impacts, monitored and remediated as necessary. The Record of Decision also provided direction to better protect important heritage, cultural, and tribal resources and sacred sites; and approved aircraft operational guidance, avoidance area mapping requirements, annual coordination and reporting and monitoring requirements, and modifications resulting from Endangered Species Act Section 7 Consultation.

In order to assist in implementation of the Record of Decision, the Forest Service published the *Implementation Guide for Aerial Application of Fire Retardant* in 2012. The Implementation Guide has been updated as needed (United States Department of Agriculture Forest Service 2019). The document provides guidance for completing avoidance area mapping; requirements for pilots, fire operations, and resource specialists; reporting and monitoring instructions; and seasonal duties and annual training.

Avoidance areas maps were developed beginning with the 2012 fire season and included aquatic avoidance areas and terrestrial avoidance areas. For aquatic avoidance areas, waterways, including perennial streams, intermittent streams, lakes, ponds, identified springs, reservoirs and vernal pools are given a minimum 300-foot buffer. Terrestrial avoidance areas are used to avoid impacts on a) one or

more federally listed threatened, endangered or proposed plant or animal species or critical habitat where aerial application of fire retardant may affect habitat and/or populations; or b) any Forest Service terrestrial sensitive or candidate species where aerial application of fire retardant may result in a trend toward federal listing under the Endangered Species Act or a loss of viability on the planning unit (Forest). Depending on the species and protection requirements, there may be additional buffer widths for both aquatic and terrestrial mapped avoidance areas.

Each year the maps are reviewed, updated, and republished. The maps are available at different scales (Forest wide or by quadrangle) and from several data sources, both internal to the Forest Service and external. Avoidance maps can be updated or adjusted for threatened, endangered, or proposed species by Forest Supervisors in consultation with the Services as necessary. Mapping changes are allowed if they do not create additional adverse effects than what was analyzed in the Biological Assessments or change the analysis conducted or determinations made in the Biological Opinions.

The Record of Decision mandated that the Forest Service will annually report all misapplications of aerially applied fire retardant on National Forest System lands to the Services. The report includes a summary of yearly retardant use by Region and Forest; a summary of intrusion events and the percent of total events compared to number of retardant drops; and a listing of all reported misapplications and a summary of their effects. The Record of Decision also included a requirement for the Forest Service to annually assess five percent of all fires that are less than 300 acres in size and during which aerially delivered fire retardant had been used and aquatic or terrestrial avoidance areas exist. The intent of this requirement was to determine if underreporting of retardant misapplications was occurring. Results of the five percent assessment are included in the yearly monitoring report. A web database was developed in 2012 for the Record of Decision reporting requirements which also accommodates reporting by other federal agencies.

New Information/Changed Conditions

Changes in Species Considered

The original analysis considered species that were included on threatened, endangered and proposed species lists from the Services, and Forest Service Regional Forester designated sensitive species. Since 2011, there have been multiple types of changes to these lists including additions and removals of species, changes in species status (from sensitive to threatened/endangered or vice versa), changes in species ranges, or new designations of Critical Habitat. In order to maintain currency of Endangered Species Act Section 7 consultation, many of these changes were addressed in addendum consultations (Appendix A). Upon review of current species lists, there are 71 threatened, endangered or proposed species for which consultation has not been completed, which includes three mammals, six birds, six reptiles, two amphibians, ten snails, nine insects, four fish, four crustaceans, eleven mussels, and sixteen plants (Appendix B, Table 1). Consultation must be completed for these species. Table 2 in Appendix B lists 27 species that were included in the 2011 consultation that are no longer included on species lists for the Forests; therefore no longer require consultation. These include three mammals, three birds, one reptile, three fish, one crustacean, nine mussels, and seven plants.

In addition to species added to threatened, endangered or proposed lists, some species have expanded their ranges and are now considered as “may be present” in areas previously considered unoccupied.

Grizzly bear in the Northern Continental Divide Ecosystem is one example. Species ranges must be reviewed during future consultation to determine if additional effects are present.

Since 2011, Regional Forester Sensitive Species lists have been updated for Regions 2, 3, 4, 5, 6, 8, and 9. The newer lists include many more species, including species of insects, snails, clams, and worms that were not considered. The analyses of effects to new sensitive species have not been completed.

The Services issued Incidental Take Statements under the nationwide Biological Opinions. A review of the annual reporting to the Services indicates that from 2012 to 2018, 74 fires reported intrusions into the avoidance areas for threatened and endangered species. Of those fires, 12 resulted in take of threatened or endangered species or and/or critical habitat and eight of those required re-initiation of consultation (Appendix B Table 3). For other species, such as Quino checkerspot butterfly, the Forest Service is approaching the incidental take limits. Re-consultation is required for these species to update the Incidental Take Statements.

Changes in Retardant

Since 2011 there have been changes in both the retardant formulations approved for use, and the amount of retardant used each year. There are currently seven chemicals on the long-term retardant Qualified Products List (Wildland Fire Chemicals). These chemicals have the same general toxicity mechanism and effects as those considered in 2011, with aquatic toxicity LC_{50} ranging from a low of 2454 mg/L to a high of 225 mg/L. It is anticipated that future qualified products may have alternate toxicity pathways from the current list depending on their formulation. The 2011 Record of Decision did not include a clear process for completing Section 7 consultation and National Environmental Policy Act analysis for new retardant products.

For this review we compared the number of fires, gallons of retardant used, estimated number of retardant drops, and estimated acres impacted by retardant for the period 2000-2010 (before the Record of Decision) and the period 2012-2018 (after the Record of Decision). This information is displayed in Appendix B, Table 4. Overall, the total number of fires per year was less, but the amount of retardant used was greater. Possible reasons for the increased retardant use include longer fire seasons, larger fires, and larger and faster air tankers. Retardant use in Regions 8 and 9 has decreased, while retardant use in Regions 1, 2, 4, and 5 has increased. The determination of effects to species relies heavily on the amount of retardant applied annually at the Forest level. With the increase in amount of retardant applied since 2012, all determinations that are based on the amount of retardant, including forests that have increased retardant use, will need to be reviewed.

Changes in Mapped Avoidance Areas

The Record of Decision included direction for Aquatic Avoidance Areas (United States Department of Agriculture Forest Service 2011c, page 3), stating that waterways "will be avoided and are given a minimum of 300-foot buffer, including perennial streams, intermittent streams, lakes, ponds, identified springs, reservoirs, and vernal pools." Between 2012 and 2014, 30 to 43 percent of the reported misapplications were in dry intermittent streams with no anticipated effects to threatened, endangered, proposed or sensitive species (Appendix B, Table 8). Several Regions (3, 5, and 6), in consultation with the Services, remapped the aquatic avoidance areas to remove many of the intermittent streams that are dry during the fire season. Table 5 compares the percentage of each Region in avoidance areas in

2019 (Appendix B) with those reported in 2011 (United States Department of Agriculture Forest Service 2011b, Appendix P).

Table 6 displays this information by Forest. The FEIS reported a total of 30 percent of NFS lands in avoidance areas with 0.82 percent for Threatened, Endangered, Proposed and Sensitive species. In 2019, only 22 percent of NFS lands were in mapped avoidance areas; however 3.49 percent of that was for threatened, endangered, proposed and sensitive species. The changes are due to better information leading to a reduction in the number of intermittent streams included in avoidance areas and an increase in the number and size of threatened, endangered, proposed and sensitive species avoidance areas.

Assessment of Under-Reporting of Misapplications

The Record of Decision included specific direction, under Reporting and Monitoring, to help in determining whether under-reporting of fire retardant misapplication is occurring. The Forest Service is required to annually assess five percent of all fires that are less than 300 acres in size, where aerially delivered fire retardant was used, and avoidance areas are present. Compliance with this reporting requirement has dropped since 2012 as shown in Appendix B Table 7.

In total, from 2012 to 2018 there were 245 assessments completed. Each year, four to six misapplications were identified for a total of 35 instances reported (14.3 percent of assessments). In some cases, the misapplication was identified first, and that fire was used as the 5 percent reporting requirement by the forest. Of the 35 identified misapplications; 14 were into dry intermittent streams, 11 of these reports prior to some Regions removing intermittent streams from avoidance area maps; 4 were into the buffer only; 13 were into the buffer and the water (one from runoff after application); 2 were misapplications to aquatic threatened, endangered, proposed and sensitive species habitat; and 2 were to terrestrial threatened, endangered, proposed and sensitive species habitat. Of the 245 total assessments, 2 (0.8 percent of assessments) were identified as impacting Threatened and Endangered species.

Of the 35 misapplications reported by the five-percent assessment, 28 were documented in the Wildland Fire Chemical Misapplication Report system and included in yearly statistics of misapplication reports. Seven misapplications discovered during five-percent assessments were not included in Wildland Fire Chemical Misapplication Report system. If these fires are included in the total number of misapplication reports it increases the percent of total fires from 2012 to 2018 with misapplications from 0.48 percent to 0.49 percent. (Appendix B Table 8). These data indicate that under-reporting of retardant misapplications is a very small percentage of total fires.

Assumptions

There were many assumptions used during the 2011 Final Environmental Impact Statement (United States Department of Agriculture, Forest Service 2011b) analysis. This section summarizes those assumptions that are no longer valid or need to be reviewed.

- The 2000 to 2010 fire season statistics provide a reasonable representation of the risk of retardant applications in the next 10 to 15 years relative to the Forest Service land base even though past or future decades could have more fires (Geier-Hayes 2011).

- Known species occurrences and designated critical habitat areas would be protected from adverse effects by avoidance area designations that direct use of retardant away from these areas. Designated critical habitat where the use of aerial application of fire retardant does not affect or change primary constituent elements does not require protection or avoidance mapping.
- Based on 3 years of misapplication data in aquatic habitats there is a 0.42 percent chance of hitting water or the buffer. If a national forest/grassland has more than 1 retardant drop per year then the chance of misapplication is greater than 0.1 percent and does not meet the threshold for Not Likely to Adversely Affect determinations.
- Yearly pre-season coordination meetings will still occur and help in reducing impacts to species and habitats by discussing changes in Critical Habitat, new population information, and monitoring needs for species prior to season use.

Recommendations

1. Complete Endangered Species Act Section 7 Consultation with the Services, for the current list of species, prior to expiration of the current Biological Opinions on January 1, 2022. This will:
    a. Complete consultation for those species not currently covered.
    b. Update Incidental Take Statements for those species at or near current limits.
    c. Replace National Biological Opinions when they expire.
2. Undertake a Supplemental Environmental Impact Statement to:
    a. Analyze for the changed assumptions and conditions.
    b. Complete analysis of potential effects for Regional Forester Sensitive Species.
    c. Set procedures for analysis of new retardant formulations and chemicals.
3. Develop a new proposed action for the Supplemental Environmental Impact Statement to provide clarity of direction and remove unnecessary requirements. The proposed action would be based on the selected alternative in the Record of Decision with the following changes:
    a. Standardize use of the term “intrusion” and discontinue use of the term “misapplication”. Define “intrusion” as “any application of aerial retardant, accidental or allowed under the exception, into an avoidance area”.
    b. Remove five-percent assessment requirement for determining if under-reporting of intrusions is occurring.
    c. Include relevant recommendations from the Five-Year Compliance Review (United States Department of Agriculture Forest Service 2018).
    d. Clearly explain process to approve new chemical formulations consistent with Endangered Species Act and National Environmental Policy Act requirements.
    e. Clarify avoidance area language as follows:
        i. Aquatic Avoidance Areas:
            1. Mapped waterways (including but not limited to perennial streams, intermittent streams, lakes, ponds, identified springs, reservoirs, vernal pools, and riparian vegetation) where water is present at the time of retardant application.

ii. **Endangered Species Act Threatened, Endangered, Proposed, and Candidate Species, and Regional Forester Sensitive Species Avoidance Areas:**
    1. Where aerial application of fire retardant may affect one or more federally listed threatened, endangered, proposed or candidate plant or animal species or critical habitat, specify avoidance areas to minimize impacts.
    2. Where aerial application of fire retardant may impact certain Regional Forester Sensitive Species or their habitat, specify avoidance areas to minimize impacts.
    3. Waterways that are dry at the time of retardant application may be included in avoidance areas where there is a potential for downstream indirect effects to occur.

iii. **Avoidance areas may be adjusted for local conditions. Adjustments related to Endangered Species Act threatened, endangered, proposed and candidate species will be coordinated with the Services local offices.**

Glossary

Intrusion: any application of aerial retardant, accidental or allowed under the exception, into an avoidance area.

Services: refers collectively to the United States Department of Interior Fish and Wildlife Service and National Oceanic and Atmospheric Administration National Marine Fisheries Service.

Literature Cited

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United States Department of Interior, Fish and Wildlife Service. 2011. Biological Opinion – Effects to Listed Species from United States Forest Service Aerial Application of Fire Retardant on National Forest System Lands. December. 711 pages.

Appendix A

List of Addendum Consultations completed for Nationwide Aerial Application of Fire Retardant on National Forest System Land

Date Completed	Reference Number	Title	Species or Action
April 20, 2012	FWS/R2/ES-TE/051159	Fish and Wildlife Service letter concurring with changes to the waterway avoidance area mapping	Region 3 removed dry intermittent streams from avoidance areas
June 19, 2013	FWS/USFS-92220-11B0001-13TA0313	Revision of Aerial Fire Retardant Avoidance Area Maps - BDF 2013	Region 5, San Bernardino National Forest removed dry intermittent streams from avoidance areas
March 2014			Region 5 removed dry intermittent streams from avoidance areas
July 11, 2012 July 5, 2012	FWS\R1 \AES\DCN 052038 No # from NMFS	Request for a Common Understanding and Concurrence on Regional Revisions to Waterway A voidance Areas as Described in the National Endangered Species Act Consultation for the Aerial Application of Fire Retardant on National Forest System Lands across the United States	Region 6 removed dry intermittent streams from avoidance areas
April 9, 2015	FWS-01EWFW00-2015-I-0291	Aerial Application of Fire Retardant on National Forest System Lands - Taylor's Checkerspot Butterfly and Designated Critical Habitat	Taylor's checkerspot butterfly and critical habitat
May 15, 2015	FWS-01EOFW00-2015-I-0210	Forest Service Analysis for Reinitiation of Consultation on Aerial Application of Fire Retardant on National Forest System Lands Due to Revised Critical Habitat Designations for Northern Spotted Owl.	northern spotted owl revised critical habitat
June 4, 2015	FWS-01EWFW00-2015-I-0284	Informal Consultation for Fire Retardant and Woodland Caribous Critical Habitat	woodland caribou critical habitat

Date Completed	Reference Number	Title	Species or Action
May 17, 2016	WCR-2015-1976	Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Aerial Application of Fire Retardant in the Snake River Basin	Snake River spring/summer Chinook salmon, Snake River fall-run Chinook salmon, Snake River sockeye salmon, Snake River Basin steelhead, and critical habitats, southern resident killer whales and critical habitat
June 16, 2016	WCR-2015-1976	Administrative Correction, Incidental Take Statement: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Aerial Application of Fire Retardant in the Snake River Basin	Snake River spring/summer Chinook salmon, Snake River fall-run Chinook salmon, Snake River sockeye salmon, Snake River Basin steelhead, and critical habitats, southern resident killer whales and critical habitat
May 7, 2019	06E11000-2018-F-061	Supplemental Amendment for the Application of Fire Retardant, National Fire Retardant, Lolo National Forest	bull trout and critical habitat
April 9, 2018	AES/DER/BNC/067817	Informal Consultation and Conference Report on the U.S. Forest Service's Application of Aerial Fire Retardant	wolverine, Canada lynx, gray wolf, California condor, northern long-eared bat, Gunnison sage grouse
July 6, 2018	AES/DER/BNC/068469	2018 Reinitiated Biological Opinion for the Nationwide Aerial Application of Fire Retardants on National Forest System Lands	Sierra Nevada yellow-legged frog and critical habitat, mountain yellow-legged frog and critical habitat, Yosemite toad and critical habitat, western yellow-billed cuckoo
August 3, 2018	01EWFW00-2017-F-0653	Aerial Application of Fire Retardant on National Forest System Lands: Effects to Oregon Spotted Frog and Designated Critical Habitat	Oregon spotted frog and critical habitat

Date Completed	Reference Number	Title	Species or Action
August 31, 2018	AES/DER/BNC/068806	Amendment to the 2018 Reinitiated Biological Opinion for the Nationwide Aerial Application of Fire Retardants on National Forest System Lands	Clarifies the incidental take assessment and Incidental Take Statement for the western yellow-billed cuckoo
May 17, 2019	WCRO-2018-0288	Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion, Concurrence Letter, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response: Aerial Application of Fire Retardant on National Forest System Land within the Jurisdiction of the National Marine Fisheries Service West Coast Region; California, Oregon, Washington, and Idaho	**chinook salmon**: California Coastal; Central Valley Spring-run; Lower Columbia River; Puget Sound; Sacramento Winter-run; Snake River Fall-run; Snake River Spring/summer; Upper Columbia River Spring-run; and Upper Willamette River; and critical habitats. **steelhead:** Puget Sound; Central California Coast; Central Valley; Lower Columbia River; Mid-Columbia River; Northern California; Snake River Basin; South-Central California Coast; Southern California; Upper Columbia River; and Upper Willamette River; and critical habitats. **chum:** Hood River Canal Summer-run; Columbia River; and critical habitats. **coho salmon:** Lower Columbia River; Oregon Coast; and Southern Oregon/Northern California Coast; and critical habitats. **sockeye salmon:** Snake River and critical habitat. **southern resident killer whales and critical habitat** **North American green sturgeon and critical habitat** **Pacific eulachon and critical habitat**

Appendix B

All Tables referenced in the document

Table 1: Species on Regional Threatened, Endangered, and Proposed species lists that were not included in the 2011 consultation, or in addendum consultations.

Common Name	NatureServe Global Scientific Name	Status[1]	Subgroup	Regions
Shenandoah salamander	*Plethodon shenandoah*	E	amphibian	8
dusky gopher frog	*Rana sevosa*	E	amphibian	8
rufa red knot	*Calidris canutus rufa*	T	bird	9
ivory-billed woodpecker	*Campephilus principalis*	E	bird	8
greater sage grouse, bi-state population	*Centrocercus urophasianus*	PT	bird	4, 5
Yuma Ridgeway's rail	*Rallus obsoletus yumaensis*	E	bird	3
interior least tern	*Sterna antillarum athalassos*	E	bird	8
roseate tern	*Sterna dougallii*	E	bird	8
southern sandshell	*Hamiota australis*	T	bivalve	8
neosho mucket	*Lampsilis Rafinesque ana*	E	bivalve	8
speckled pocketbook	*Lampsilis streckeri*	E	bivalve	8
orangefoot pimpleback	*Plethobasus cooperianus*	E	bivalve	9
fuzzy pigtoe	*Pleuroblema strodeanum*	E	bivalve	8
slabside pearlymussel	*Pleuronaia dolabelloides*	E	bivalve	8
rayed kidneyshell	*Ptychobranchus foremanianus*	E	bivalve	8
southern kidneyshell	*Ptychobranchus jonesi*	E	bivalve	8
fluted kidneyshell	*Ptychobranchus subtenum*	E	bivalve	8
rabbitsfoot	*Quadrula cylindrical cylindrica*	T	bivalve	8, 9
Choctaw bean	*Villosa choctawensis*	E	bivalve	8
Madison Cave isopod	*Antrolana lira*	T	crustacean	8
San Diego fairy shrimp	*Branchinecta sandiegoensis*	E	crustacean	5
Big Sandy crayfish	*Cambarus callainus*	T	crustacean	8
Riverside fairy shrimp	*Streptocephalus woottoni*	E	crustacean	5
Zuni bluehead sucker	*Catostomus discobolus yarrowi*	E	fish	3
candy darter	*Etheostoma osburni*	E	fish	9
yellowcheek darter	*Etheostoma percnurum (moorei)*	E	fish	8
Kentucky arrow darter / Cumberland Plateau darter	*Etheostoma percnurum (spiloyum)*	T	fish	8
Morro shoulderband snail	*Helminthoglypta walkeriana*	E	gastropod	5
tumbling creek cavesnail	*Antrobi culveri*	E/CH	gastropod - aquatic	9
Anthony's riversnail	*Athearnia anthonyi*	E, XN	gastropod - aquatic	8
lacy elimia	*Elimia crenatella*	T	gastropod - aquatic	8

[1] E = Endangered, T = Threatened, P = Proposed, CH = Critical Habitat, XN = experimental population

Common Name	NatureServe Global Scientific Name	Status[1]	Subgroup	Regions
golden riffleshell	*Epioblasma florentina aureola*	E	gastropod - aquatic	8
round rocksnail	*Leptoxis ampla*	T	gastropod - aquatic	8
painted rocksnail	*Leptoxis taeniata*	T	gastropod - aquatic	8
flat pebblesnail	*Lepyrium showalteri*	E	gastropod - aquatic	8
cylindrical lioplax	*Lioplax cyclostomaformis*	E	gastropod - aquatic	8
tulatoma snail	*Tulotoma magnifica*	T	gastropod - aquatic	8
rusty patched bumble bee	*Bombus affinis*	E	insect	1, 8, 9
Franklin's bumblebee	*Bombus franklini*	PE	insect	5, 6
Dakota skipper	*Hesperia dacotae*	T	insect	1
Mount Charleston blue butterfly	*Icaricia Shasta charlestonensis*	E	insect	4
Hermes copper butterfly	*Lycaena hermes*	P/E	insect	5
American burying beetle	*Nicrophorus americanus*	E	insect	9
Hungerford's crawling water beetle	*Brychius hungerfordi*	E	insect - aquatic	9
meltwater lednian stonefly	*Lednia tumana*	P	insect – aquatic	1
western glacier stonefly	*Zapada glacier*	P	insect – aquatic	1
Humboldt marten	*Martes courina ssp. humboldtensis*	PT	mammal	5
fisher	*Pekania pennati*	T	mammal	5, 6
West Indian manatee	*Trichecus manatus*	E	mammal	8
Decurrent false aster	*Boltonia decurrens*	T	plant – vascular	9
San Fernando Valley spineflower	*Chorizanthe parryi* var *fenandina*	T	plant – vascular	5
Lee pincushion cactus	*Coryphantha sneedii* var *leei*	T	plant – vascular	3
Sneed pincushion cactus	*Coryphantha sneedii* var *sneedii*	E	plant – vascular	3
Neches River rose mallow	*Hisbiscus dasycalyx*	T	plant – vascular	8
mountain bluet	*Houstonia montana*	E	plant – vascular	8
Webber ivesia	*Ivesia webberi*	T	plant – vascular	4, 5
fleshy-fruit gladecress	*Leavenworthia crassa*	E	plant – vascular	8
prairie bush clover	*Lespedeza leoptostachya*	T	plant – vascular	9
California orcutt grass	*Orcuttia californica*	E	plant – vascular	5
Fickeisen plains cactus	*Pediocactus peeblesianus* var *fickeisenii*	E/CH	plant – vascular	3
Penland beardtongue	*Penstemon penlandii*	E	plant – vascular	2
North Park phacelia	*Phacelia formosula*	E	plant – vascular	2
white fringless orchid	*Platanthera integrilabia*	T	plant – vascular	8
Leedy's roseroot	*Rhodiola integrifolia* ssp *leedyi*	T	plant – vascular	2

Common Name	NatureServe Global Scientific Name	Status[1]	Subgroup	Regions
Michaux's sumac	*Rhus michauxii*	E	plant – vascular	8
yellow-blotched map turtle	*Graptemys flavimaculata*	T	reptile	8
black pine snake	*Pituophis melanoleucus lodingi*	T	reptile	8
Louisiana pinesnake	*Pituophis ruthveni*	PT	reptile	8
eastern massassauga	*Sistrurus catenatus*	T	reptile	9
northern Mexican gartersnake	*Thamnophis eques megalops*	T	reptile	3
narrow-headed gopher snake	*Thamnophis rufipunctatus*	T	reptile	3

Table 2 : Species analyzed in 2011 that are no longer included on Regional threatened, endangered, and proposed species lists.

Common Name	NatureServe Global Scientific Name	Subgroup	Regions
lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	mammal	3, 8
Kirtland's warbler	*Setophaga kirtlandii*	bird	9
black-capped vireo	*Vireo atricapilla*	bird	8
dwarf wedgemussel	*Alasmindonta heterodon*	bivalve	8
yellow blossom (pearlymusseil)	*Epioblasma florentina florentina*	bivalve	8
purple cat's paw pearlymussel	*Epioblasma obliquata obliquata*	bivalve	8
tubercled-blossom pearlymussel	*Epioblasma torulosa torulosa*	bivalve	8
turgid blossom	*Epioblasma turgidula*	bivalve	8
shinyrayed pocketbook	*Lampsilis subangulata*	bivalve	8
ring pink mussel	*Obovaria retusa*	bivalve	8
dark (pigtoe) clubshell	*Pleurobema furvum*	bivalve	8
heavy pigtoe	*Pleurobema taitanum*	bivalve	8
longhorn fairy shrimp	*Branchinecta longiantenna*	crustacean	5
Modoc sucker	*Catostomus microps*	fish	5, 6
Cape Fear shiner	*Notropis mekistocholas*	fish	8
Oregon chub	*Oregonichthys crameri*	fish	6
Virginia northern flying squirrel	*Glaucomys sabrinus fuscus*	mammal	8
eastern cougar	*Puma concolor couguar*	mammal	8

Common Name	NatureServe Global Scientific Name	Subgroup	Regions
Louisiana black bear	*Ursus americanus luteolus*	mammal	8
Apalachicola rosemary	*Conradina glabra*	plant	8
Cumberland rosemary	*Conradina verticillata*	plant	8
white bladderpod	*Lesquerella pallid*	plant	8
Michigan monkeyflower	*Mimulus glabratus var. michiganensis*	plant	9
Chapman's rhododendron	*Rhododendron minus var. champmanii*	plant	8
white-haired goldenrod	*Solidago albopilosa*	plant	8
slender-petaled mustard	*Thelypodium howellii* ssp. *spectabilis*	plant	6
American alligator	*Alligator mississippiensis*	reptile	8

Table 3: Summary of fires with reported intrusions into threatened or endangered species avoidance areas that resulted in take.

Year	Region	Forest	Fire	Species	Was consultation reinitiated?
2013	5	San Bernardino	Mountain	Quino checkerspot butterfly	no, take was within limits
2013	4	Sawtooth	Road 210	Snake River spring/summer chinook salmon, sockeye salmon, and steelhead trout	yes, at take limit
2014	4	Boise	Bull Creek	bull trout	no, take was within limits
2014	4	Sawtooth	Hell Roaring	Snake River spring/summer chinook salmon and steelhead trout	yes
2014	6	Okanagon-Wenatchee	Carlton Complex	Bull trout Upper Columbia River steelhead trout	no, take was within limits; yes, take was at limit
2016	4	Sawtooth	Dry Creek (2 events)	Snake River spring/summer chinook salmon and steelhead trout	yes, reinitiated with West Coast Region addendum
2016	5	Los Padres	Rey	arroyo toad	no
2017	1	Lolo	Lolo Peak	bull trout	yes, take exceeded
2017	1	Lolo	Sunrise Creek	bull trout	yes, take exceeded
2017	1	Lolo	Rice Ridge	bull trout	yes, take exceeded

Year	Region	Forest	Fire	Species	Was consultation reinitiated?
2018	5	Mendocino	Ranch	Southern Oregon Northern California Coast coho salmon and steelhead trout	Yes, reinitiated under West Coast Region addendum
2018	6	Rogue River-Siskiyou	Nachez	Southern Oregon Northern California Coast coho salmon	yes, reinitiated with West Coast Region addendum

Table 4: Comparison of average numbers of fires, number of retardant drops, gallons of retardant used, and estimated acreage of impact between the periods of 2000-2010 and 2012-2018.

FS Region	2000-2010 Average # fires per year	2012-2018 Average # fires per year	2000-2010 Average retardant drops per year[2]	2012-2018 Average retardant drops per year	2000-2010 Average gallons per year	2012-2018 Average gallons per year	2000-2010 estimated acres of impact per year from coverage levels of 8 gallons per 100 square feet to 4 gallons per 100 square feet (percent)	2012-2018 estimated acres of impact per year from coverage levels of 8 gallons per 100 square feet to 4 gallons per 100 square feet (percent)
R1	973	836	371	577	927,617	1,442,160	266 – 532 (0.0001-0.0021%)	414 - 828 (0.0016-00.0032%)
R2	599	525	100	214	250,320	534,613	72 – 144 (0.0003-0.0007%)	153 – 307 (0.0007-0.0014%)
R3	1,691	1,104	686	453	1,715,952	1,133,126	492 – 985 (0.0024-0.0047%)	325 – 650 (0.0016-0.0032%)
R4	930	651	382	778	953,969	1,945,612	274 – 548 (0.0009-0.0017%)	558 – 1,117 (0.0018-0.0035%)
R5	1,444	1,348	1.024	2,847	2,560,522	7,118,102	735 – 1,470 (0.0036-0.0073%)	2,043 – 4,085 (0.0101-0.0202%)
R6	1.349	1,249	560	579	1,401,032	1,447,413	402 – 804 (0.0016-0.0032%)	415 – 831 (0.0017-0.0033%)
R8	924	633	135	8	337,861	18,894	97 – 194 (0.0007-0.0015%)	5 – 11 (0.0-0.0001%)
R9	530	409	27	6	68,163	16,156	20 -39 (0.0002-0.0003%)	5 – 9 (0.0-0.0001%)
Total	**8,473**	**6,768**	**3,286**	**5,462**	**8,215,437**	**13,656,076**	**2,358 – 4,715 (0.0012-0.0024%)**	**3,919 – 7,838 (0.0020-0.0041%)**

[2] Number of retardant drops is estimated using an average of 2500 gallons of retardant per drop. Actual gallons of retardant per drop varies by type of aircraft and situation.

Table 5: Percentage of National Forest Service Lands, by Region, in mapped avoidance areas as reported in the Final Environmental Impact Statement and from 2019 avoidance area maps.

Region	Final Environmental Impact Statement percent of Region in waterway avoidance areas[3][4]	Final Environmental Impact Statement percent of Region in threatened, endangered, proposed, and sensitive species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in threatened, endangered, proposed, and sensitive avoidance areas
Northern Region (1)	-	0.56	23	22.8	1.54
Rocky Mountain Region (2)	-	0.56	37	36.4	1.51
Southwest Region(3)	-	0.22	4	3.4	1.46
Intermountain Region (4)	-	1.10	19	18.4	2.05
Pacific Southwest Region(5)	-	0.79	20	9.5	13.91
Pacific Northwest Region (6)	-	0.06	17	17.0	0.77
Southern Region (8)	-	0.81	34	29.0	6.82
Eastern Region (9)	-	4.87	27	25.2	2.92
TOTAL	30	0.82	22	19.7	3.49

[3]Percent of Region in waterway avoidance areas was not reported by Region in the Final Environmental Impact Statement.

Table 6: Percentage of National Forest Service Lands, by Forest, in mapped avoidance areas as reported in the FEIS and from 2019 avoidance area maps.

Forest	Final Environmental Impact Statement percent of Region in waterway avoidance areas	Final Environmental Impact Statement percent of Region in TEPS species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in TEPS avoidance areas
Beaverhead-Deerlodge	22	0.23	22	21.6	0.37
Bitterroot	23	0.22	23	23.0	0.49
Custer-Gallatin[1]	22	0.11	18	18.0	0.23
Dakota Prairie Grasslands	-	-	29	28.1	0.80
Flathead	24	1.32	25	23.3	12.99
Helena-Lewis and Clark	23	0.18	23	22.7	0.19
Idaho-Panhandle	27	0.10	25	25.1	0.09
Kootenai	23	0.72	22	22.0	0.54
Lolo	23	0.12	23	22.5	0.18
Nez-Perce Clearwater	26	1.74	25	24.9	0.45
Bighorn	29	<0.00	17	16.6	0.00
Black Hills	23	<0.00	15	13.7	1.16
Grand Mesa, Uncompahgre and Gunnison	36	0.53	36	35.3	2.27
Medicine Bow-Routt and Thunder Basin NG	33	0.13	49	48.7	0.42
Nebraska, Samuel R. McKelvie NFs and Oglala, Buffalo Gap and Fort Pierre NGs	31	0.05	4	3.9	0.02
Rio Grande	38	<0.00	37	37.1	0.01
Arapahoe-Roosevelt and Pawnee NG	33	-	36	35.2	1.50

Forest	Final Environmental Impact Statement percent of Region in waterway avoidance areas	Final Environmental Impact Statement percent of Region in TEPS species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in TEPS avoidance areas
Pike-San Isabel, Cimmaron Comanche NG	31	0.11	43	43.1	0.83
San Juan	43	0.33	43	42.6	1.66
Shoshone	45	<0.00	46	45.6	0.00
White River	38	4.73	41	37.0	6.98
Apache-Sitgreaves	26	0.16	5	4.3	2.52
Carson	25	0.01	4	4.1	0.14
Cibola	23	0.23	6	2.9	3.23
Coconino	21	0.77	3	3.3	0.57
Coronado	36	0.47	2	1.3	1.08
Gila	30	0.17	4	3.5	1.99
Kaibab	23	0.03	1	1.0	0.01
Lincoln	28	0.15	1	0.8	1.67
Prescott	29	0.04	2	0.2	0.40
Santa Fe	26	<0.00	5	4.6	0.16
Tonto	32	0.23	7	6.7	2.29
Ashley	25	<0.00	29	29.3	0.00
Boise	26	<0.00	26	25.9	6.80
Bridger-Teton	27	0.15	27	26.9	0.21
Caribou-Targhee	23	0.06	10	10.1	0.00
Dixie	26	6.39	30	25.0	9.95
Fishlake	24	2.58	29	24.4	6.21
Humboldt-Toiyabe	25	0.02	6	5.3	1.52
Manti-LaSal	24	6.10	31	24.4	9.20
Payette	23	0.13	23	22.8	0.11
Salmon-Challis	24	2.46	24	23.5	0.00
Sawtooth	25	0.06	21	20.9	0.06
Uinta-Wasatch-Cache	25	0.09	9	9.1	0.20
Angeles	26	1.00	6	3.5	3.79
Cleveland	22	1.55	11	5.7	7.43
Eldorado	58	0.04	15	14.1	2.28
Inyo	36	0.69	9	6.9	3.37
Klamath	31	0.02	48	1.2	47.56

Forest	Final Environmental Impact Statement percent of Region in waterway avoidance areas	Final Environmental Impact Statement percent of Region in TEPS species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in TEPS avoidance areas
Lassen	18	0.02	17	4.9	13.26
LTBMU	60	<0.00	17	16.6	2.90
Los Padres	33	2.61	15	3.0	14.79
Mendocino	61	<0.00	25	8.6	20.03
Modoc	22	0.16	6	3.2	3.34
Plumas	67	0.05	11	10.5	0.87
San Bernardino	25	4.18	9	2.9	7.41
Sequoia	13	3.22	18	11.6	7.92
Shasta-Trinity	45	<0.00	32	13.7	24.41
Sierra	74	0.01	22	18.7	5.39
Six Rivers	49	0.13	46	12.6	45.28
Stanislaus	77	0.19	14	12.9	2.06
Tahoe	59	0.13	16	14.9	1.81
Columbia River Gorge	18	0.60	22	17.9	4.53
Colville	23	0.02	13	13.0	0.77
Deschutes	10	0.02	9	7.7	3.68
Fremont-Winema	14	0.01	4	4.1	0.23
Gifford Pinchot	43	0.04	49	49.3	1.40
Malheur	14	0.02	11	11.1	0.04
Mt. Baker - Snoqualmie	45	<0.00	30	29.9	1.83
Mt. Hood	28	0.01	19	19.3	0.05
Ochoco	22	0.10	9	8.6	0.28
Okanagon-Wenatchee	17	0.21	12	11.6	0.32
Olympic	38	<0.00	26	24.3	2.51
Rogue River-Siskiyou	13	0.03	25	24.2	1.05
Siuslaw	52	0.00	32	31.6	0.11
Umatilla	28	0.12	13	12.4	0.07
Umpqua	23	0.05	18	18.2	0.12
Wallowa-Whitman	38	0.03	14	14.2	0.07
Willamette	39	0.01	20	19.1	0.63
NFs of Alabama	-	-	30	29.9	0.00
Daniel Boone	27	0.06	30	30.0	0.18

Forest	Final Environmental Impact Statement percent of Region in waterway avoidance areas	Final Environmental Impact Statement percent of Region in TEPS species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in TEPS avoidance areas
Chattahoochee-Oconee	-	-	24	23.8	0.19
Cherokee	40	0.15	37	37.1	0.38
NFs of Florida	59	2.90	12	12.4	0.00
Kisatchie	34	2.40	37	33.0	5.44
NFs of Mississppi	35	0.40	37	36.6	0.97
George Washington and Jefferson	29	<0.00	56	26.4	39.65
Ouachita	28	0.00	25	25.3	0.00
Ozark-St. Francis	26	0.33	26	25.8	1.13
NFs of North Carolina	31	2.98	47	40.7	9.07
Francis Marion and Sumter	36	0.34	40	37.4	4.01
NF&G of Texas	40	<0.00	30	29.7	0.06
Land Between the Lakes NRA	-	-	35	35.1	0.00
Allegheny	-	-	21	21.3	0.00
Chequamagon-Nicolet	-	-	13	12.2	0.44
Chippewa	30	<0.00	14	14.3	0.00
Green Mountain and Finger Lakes	-	-	27	27.0	0.00
Hiawatha	-	-	43	41.9	1.33
Hoosier	-	-	62	62.0	0.00
Huron-Manistee	27	23.67	47	21.7	32.98
Mark Twain	32	0.35	27	26.9	0.68
Midewin	-	-	23	22.7	0.00
Monongahela	-	-	22	21.6	0.00
Ottawa	-	-	45	44.4	0.30
Shawnee	-	-	30	29.9	0.00
Superior	26	0.02	21	21.0	0.02
Wayne	-	-	34	30.2	0.00

Forest	Final Environmental Impact Statement percent of Region in waterway avoidance areas	Final Environmental Impact Statement percent of Region in TEPS species avoidance areas	2019 percent of Region in avoidance areas	2019 percent of Region in waterway avoidance areas	2019 percent of Region in TEPS avoidance areas
White Mountain	-	-	21	21.2	0.00

Table 7: Percent, by Region, of Forests that completed the required 5% assessment monitoring (does not include Region 8 and 9 as their retardant use is a minor component of the total).

Region	2012	2013	2014	2015	2016	2017	2018	Total
1	100%	100%	100%	56%	71%	60%	33%	71%
2	90%	38%	67%	0%	56%	67%	29%	53%
3	100%	50%	50%	33%	40%	50%	38%	54%
4	100%	83%	89%	56%	60%	56%	50%	71%
5	94%	41%	29%	50%	18%	53%	40%	47%
6	88%	100%	27%	25%	33%	36%	30%	46%
TOTAL	95%	65%	53%	40%	42%	53%	38%	56%

Table 8: Summary of aerial fire retardant drops in avoidance areas from 2012 through 2018

	2012	2013	2014	2015	2016	2017	2018	7 year total	7 year average
Gallons of aerially delivered retardant on NFS lands	8,543,031	12,218,348	8,896,234	11,623,971	19,037,372	18,943,573	16,376,213	**95,638,742**	**13,662,677**
Total Number of Fires	7,725	7,588	6,910	6,835	5,772	6,869	5,739	**47,438**	**6,777**
Acres Burned	2,538,898	1,316,849	721,964	1,680,393	1,194,039	2,484,272	1,843,457	**14,526,097**	**2,075,157**
Total # of retardant drops[1]	4,746	6,788	4,942	6,458	10,576	10,524	9,039	**53,073**	**7,582**
# of intrusion reports	70	50	30	51	58	83	80	**422**	**60**
Intrusions % of total drops	1.47	0.74	0.61	0.79	0.55	.6	.7	-	**.7**
# fires with intrusions	39	35	27	27	31	35	35	**229**	**33**
Intrusions % of total fires	0.50	0.46	0.39	0.40	0.54	0.51	0.61	-	**0.48**
# reports directly into water	19	25	7	38	19	20	36	**164**	**23.5**
% of total drops	0.40	0.37	0.14	0.59	0.18	0.19	0.40	-	**0.31**
# reports into dry intermittent stream	30	18	9	8	8	8	13	**94**	**13**
% of total drops	0.63	0.27	0.18	0.12	0.08	0.07	0.14	-	**0.17**
# of reports in TEP species aquatic avoidance areas	11	11	8	8	25	20	34	**117**	**17**
% of total drops	0.23	0.16	0.16	0.12	0.24	0.19	0.38	-	**0.22**
# of reports in non TEP species aquatic avoidance areas	23	29	12	29	25	16	19	**153**	**22**
% of total drops	0.48	0.43	0.24	0.45	0.24	0.15	0.21	-	**0.29**
# reports into FS Sensitive avoidance areas	6	2	1	3	0	0	13	**25**	**4**
% total drops	0.13	0.03	0.02	0.05	0.00	0.00	0.14	-	**0.05**
# reports with Incidental Take	0	2	3	0	4	5	6	**20**	**3**
Take % of total drops	0.00	0.03	0.04	0.00	0.05	0.00	0.07	-	**0.039**
Take exceeded?	no	no	no	no	yes	yes	yes		

*Retardant drop values are estimated by dividing the 'total gallons applied on NSF lands' by an estimated airtanker volume. In the 2011 FEIS, gallons was estimated at 2,500 gallons per drop (assuming that an airtanker would deliver the entire tank load). It was determined over the past couple years that 1,800 gallons per drop was a better estimate. The drop numbers presented in this table present this lower (1,800 gallon) value. In previous correspondence with NOAA Fisheries, FWS and briefing papers provided to staffs and agencies, some discrepancy in retardant drop numbers are possible due to this adjustment.