3RD ANNUAL REPORT

submitted to
The United States Fish and Wildlife Service
&
The California Department of Fish and Wildlife

by
Green Diamond Resource Company

in fulfillment of requirements specified in condition G. of permit # TE43702D-0, incidental take permit for northern spotted owls, under section 10(a)(1)(B) of the Endangered Species Act and the state consistency determination

01 March 2023

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I. Introduction

On June 13, 2019, the United States Fish and Wildlife Service (the 'Service') accepted Green Diamond Resource Company's Forest Habitat Conservation Plan (FHCP) for the Covered Species, Northern spotted owl, fisher, red and Sonoma tree voles, and issued Green Diamond a section 10(a)(1)(B) incidental take permit under the Endangered Species Act (ESA). The signing of the permit by the Service allowed Green Diamond to harvest habitat that could result in the incidental take of the Northern spotted owl and would authorize take of fisher and tree voles should they become listed under the ESA in the future. Incidental take of Northern spotted owl over the 50-year permit term is anticipated to result primarily from modification of owl habitat that could displace owls, i.e., causing them to move to new areas and impairing their essential behavioral patterns. On July 31, 2019, Green Diamond requested a Consistency Determination (CD) from the California Department of Fish and Wildlife (CDFW) pursuant to Fish and Game Code Section 2080.1 that CDFW determine that the Biological Opinion (BO) issued by the Service, including its Incidental Take Statement (ITS) and incidental Take Permit (ITP), is consistent with the California Endangered Species Act (CESA). On August 30, 2019, the CDFW determined that the BO, ITS, and the FHCP are consistent with CESA and issued a CD to Green Diamond.

The key elements of the FHCP include:

- Promoting habitat heterogeneity across the Green Diamond landscape including the adoption of the Aquatic Habitat Conservation Plan riparian and geological management measures
- Protecting the 44 most productive Northern spotted owl sites through the Dynamic Core Area (DCA) strategy where sites are managed on a 'no-take' basis and harvest is prohibited within the core area for the site.
- Retaining and recruiting habitat elements important to the Covered Species by implementing the Terrestrial Retention of Ecosystem Elements (TREE) guidelines within harvest units
- Providing protection for the Covered Species
- A 7,741-acre special management area ("Peripheral Area") where the Northern spotted owl would be managed on a "no-take" basis
- Research and monitoring commitments for the Covered Species
- Compliance monitoring and adaptive management

The following report documents the fourth year of implementing the FHCP and includes details specified to comply with the FHCP. Included are sections about Covered Species surveys, habitat retention in timber harvest plans, levels of take, amount of habitat for the Covered Species, studies for the Covered Species, conservation areas, and other information required for annual reports as described in the Implementation Commitments Section 5.3.7 of the FHCP.

The reporting period of this report is from Sept. 1, 2021 to Sept. 1, 2022.

II. Northern Spotted Owl Surveys

As noted in the FHCP, all stands of trees scheduled for timber harvest or areas of potential habitat that may be modified by Covered Activities, must be surveyed for spotted owls prior to operations. The following describes the survey procedures and the results of the surveys.

A. Methods

To protect nesting owls and their young from direct harm due to Covered Activities during the breeding season and to identify owl activity centers, all stands scheduled to be harvested or modified by Covered Activities in 2022 were surveyed for spotted owls during the breeding season, March 1 - August 31, 2022. All timber harvest plans (THPs) initiated between Sept. 1, 2021, and February 21, 2022, were surveyed in 2021 and those initiated after February 21, 2022, were surveyed in 2022, prior to start of operations. Second year surveys were conducted for THPs that had been surveyed the previous year.

1. FHCP protocol surveys

Spotted owl surveys were conducted by Green Diamond wildlife biologists, and, in some cases, by other employees meeting the following qualifications recommended for spotted owl surveyors by the U.S. Fish and Wildlife Service (Protocol for surveying proposed management activities that may impact northern spotted owls, revised January 9, 2012):

> Normal hearing abilities are requisite. An owl caller must be able to hear the owl(s) if they were calling AND
>
> • Have training in spotted owl survey techniques OR
>
> • Have 1 year/season of spotted owl survey experience

Green Diamond's THPs were often comprised of multiple units. The number of units surveyed was typically referenced regarding owl surveys because owl surveys were conducted on a unit-by-unit basis, and not all units surveyed were eventually incorporated into THPs.

The surveys provided coverage of each THP unit and at least a 0.5-mile buffer around the unit, with some calling points established at least 1000 feet from the plan boundary. The calling points were strategically placed to ensure complete coverage of the survey area. Each calling point was called for a minimum of 10 minutes unless an owl responded sooner. If an owl site was known to be occupied in any portion of the survey area, a maximum 0.5-mile radius around the owl site was not called to avoid harassing the owls. Daytime site visits of such sites were conducted to establish activity centers.

A statistical analysis of THP detections was conducted in 2012. The purpose of the analysis was to determine the number of THP surveys necessary to achieve a 95% detection probability of territorial spotted owls within approximately 0.5 miles of a harvest unit. This analysis utilized ownership specific THP survey data and site occupancy data. THP detection data collected from 1994-2011 were analyzed in conjunction with spotted owl site occupancy of each corresponding year. Results from the analysis indicated 4 to 6 surveys of each THP unit were necessary to achieve a 95% detection probability of a territorial owl. More surveys (up to 6) were needed in the earlier part of the breeding season to achieve 95% probability because the probability of detection increases throughout the season. Four surveys were needed later in the season to reach the same probability. To capture the variation in probability throughout the season, a calculator was formulated from the analysis. The calculator assigns a detection probability to each Julian date and was used to determine the number of surveys required to achieve a 95% probability of detection. Surveys were conducted until the cumulative probability of the surveys was greater than or equal to 0.95. In 2022, surveys were conducted for each unit until an owl was located or until the surveys required to achieve a 95% detection probability were completed.

Each survey for an individual THP unit was spaced at least one week apart. In areas where no owls were detected, at least one survey was conducted after April 1. In areas where resident owls were found, at least one follow-up visit was conducted after May 1 to determine that the owls were not nesting.

Historic spotted owl sites within the influence of barred owls received one stand search on or after June 1 to increase the probability of locating evidence of roost sites or elicit the begging calls of juvenile spotted owls.

Each survey response was followed up with a daytime visit by Green Diamond biologists to locate the owl and determine its pair status, activity center, or nest site. If three complete follow-up visits were conducted and an owl was not located, it was concluded that the initial response was from an owl that did not have an activity center in the THP area. If follow-up visits were successful in locating spotted owls early in the nesting season (March to early April), at least one follow-up visit was conducted after May 1 (if a nest site was not located). A 0.25-mile buffer was maintained around the owl pair's activity center until its nesting status was determined. If the pair was still not nesting by May 1, after a minimum of 3 visits, then the radius of protection was no longer maintained and the whole plan became available for timber falling.

If a nest was found, the nest tree was marked, and the THP was immediately available for harvest providing that no timber falling or yarding was allowed within a 0.25-mile radius of the nest tree until it was determined that the owlets had fledged or that the nest had failed. After the owlets fledged, the radius of protection was 500 feet from the owlets and connectivity to continuous habitat was maintained. When owlets dispersed or were capable of dispersing, or it was determined that the nest had failed, falling and yarding was allowed within the 500-foot radius buffer that was being maintained for the owlets.

To protect nesting owls from potential impacts of spring slash burns, Green Diamond biologists reviewed a list of THP units to be burned after March 1. If it was determined that the fire or smoke generated from a burn would likely disturb a nesting pair, then appropriate measures were taken to prevent the disturbance (canceling or postponing the burn).

Barred Owls

Because barred owls reduce the probability of detecting spotted owls, and as a result of increased barred owl presence within the Green Diamond study area, survey effort at spotted owl territories invaded by barred owls included measures to increase the likelihood that resident spotted owls were detected. If a site was influenced by barred owls, surveys were conducted until a spotted owl was detected or the surveys required to achieve a 95% detection probability (determined by Green Diamond's site visit detection probability calculator) were completed with at least one survey occurring on or after June 1st.

2. Additional spot calling and second year surveys

Sites identified in surveys conducted from March 1 - August 31 in 2021 were considered valid until February 21, 2022, and surveys conducted during the same period in 2022 were considered valid until February 21, 2023. However, timber harvest in some plans spanned two owl survey years. For example, several 2022 THP units were surveyed during the 2021 breeding season and were found to be free of owls. The plans were initiated before February 21, 2022, but harvest had not been completed by February 21, 2022. Although the likelihood of owls establishing a territory in such plans is considered low, it is possible. Depending on the status of the THP, it may have required additional calling. In addition, due to the scheduling of contractors, continuous timber falling within a THP unit often does not occur. Contractors temporarily stop falling in a unit and return later, or different contractors move in to the THP area and resume falling. As a result, small portions of a plan area can be felled, and a THP unit can remain virtually unharvested for an extended period until harvest resumes. Because this could occur near the owl-breeding season, a greater likelihood of owls moving into the area would exist than if continuous timber operations occurred in the THP unit. Finally, in many cases, low priority THP areas that are surveyed in one year are not harvested until the next year. If a given area was surveyed with the 95% detection probability protocol in 2021 and no timber was harvested before February 21, 2022 of the following year, a possibility existed that owls may have moved into the area. However, because the area was previously surveyed, the probability of new owls moving into the area was considered low.

To detect the possibility that owls moved into a THP unit under the circumstances described above, Green Diamond implemented the following spot calling procedures on February 21 of each year and second year protocol procedures on March 1 of each year:

- If more than 10 acres of contiguous timber remained in the unit and falling was not continuous, then timber harvest was temporarily deferred until a second year or detection probability survey was conducted. This second-year protocol consisted

of a minimum of four nighttime surveys spaced at least five days apart, with at least one survey on or after April 1.

- If more than 10 acres of contiguous timber remained in the unit, and falling was continuous from on or before February 21, timber harvest continued with spot calling. The spot calls were concurrent with operations and occurred once a week until less than 10 acres of contiguous timber remained, or for a maximum of five weeks.

- If less than 10 acres of contiguous timber remained in the unit, then harvest continued with no special provisions.

- If less than 10 acres of contiguous timber remained in the unit, and harvest was deferred until the following breeding season, a possibility existed that owls may have moved into the area. Therefore, before resuming cutting activity after March 1, a biologist conducted two nighttime surveys at least five days apart. If no owls were detected, operations commenced.

For spot calling, qualified employees called the remaining timber in the plan from one or several locations to ensure adequate coverage of the area. The calling was done, weather permitting, at least once a week until less than 10 acres of contiguous standing timber remained, or for a maximum of five weeks. The spot calling was concurrent with timber operations, i.e., conducted before or after actual falling activity on a given survey day.

If an owl was detected during one of the surveys, operations were stopped until Green Diamond biologists determined if an owl activity center existed. If an owl was found, timber falling was suspended within 0.25 mile of its activity center until it was determined that the owl was not nesting.

B. Survey Results

1. FHCP protocol surveys

One-hundred thirty-seven THPs comprised of 525 units (Appendix I) were surveyed for spotted owls in 2022. Of these THP units, 273 had been surveyed in the previous year. Spotted owl responses were heard during surveys of 29 THPs, and 20 plans required follow-up surveys. Forty-six THPs surveyed during the reporting period had owl activity centers located within 0.5 mile. Seventy-three unique owl sites were associated with these THPs. Two new activity centers were found within 0.5 mile of a THP unit that was previously surveyed. One was associated with a possible site, and one was associated with a newly colonized site. Additionally, one perennial activity center moved within 0.5 mile of a THP that was previously surveyed.

A total of 221 THP units were initiated through timber falling or road construction during the reporting period. Timber operations were delayed on zero THP units due to nesting pairs in 2022. In compliance with the FHCP protocol, if a pair was found to be nesting, operations were not conducted within 0.25 miles of the nest until it was determined that the owlets had fledged or the nest had failed. Once the owlet(s) fledged, no operations would be conducted within 500 feet of the owlet(s) until the owlet(s) dispersed or were capable of dispersing. Five unoccupied spotted owl sites influenced by barred owls and located within 0.5 mile of a harvest unit where falling had been initiated between March 1 and August 31 of the current reporting period received a stand search on or after June 1. These five spotted owl sites were associated with five THPs and five unique harvest units. No slash burns were delayed due to the proximity of nesting spotted owls.

2. Additional spot calling and second year surveys

Forty-two THP units initiated before February 21, 2022 and having more than 10 contiguous acres remaining at that date were spot called for owls. There were two spotted owl detections during these surveys. A single owl was detected in association with THP 85-2001 (State ID: 1-21-00004DEL) Unit A, which resulted in the cessation of operations. The detection was associated with a known site. Operations did not resume until after protocol surveys were completed and determined that nesting had not occurred. A single owl was detected in association with THP 09-2001 (1-21-00011HUM) Unit E, which resulted in the cessation of operations. The detection was associated with a known site, and nesting was confirmed. Operations resumed outside of the 0.25-mile disturbance buffer associated with the nest location.

C. Discussion

There were no instances where unknown spotted owl sites were found near initiated THPs that were protocol surveyed. The FHCP survey protocol appears to be effective in locating owl sites prior to harvest operations and ensuring that owl sites are not unknowingly harvested below displacement thresholds. Furthermore, about 52% of THP units were resurveyed during 2022. All known spotted owl sites influenced by barred owls and with planned harvest operations received additional survey effort to account for the lower detection rates for spotted owls when barred owls are present. Additional survey effort was provided through spot calling, which increases the probability that owls within the THPs will be detected prior to THP initiation. Resurveys, spot calling, and surveys in response to barred owl occupancy provide an increased level of survey effort prior to timber operations.

III. THP Conservation Measures

A. Methods

The Terrestrial Retention of Ecosystem Elements (TREE) guidelines described in the FHCP govern the spatial distribution, type, and amount of retained structures across the Plan Area. The TREE is focused on habitat areas and habitat elements that are essential to specific behaviors of the Covered Species as well as other vertebrate species that reside in the Plan Area. The TREE provides primary consideration for live trees, snags, and coarse woody debris that currently provide or are most likely to become critical habitat elements on the landscape. The concept of 'critical habitat element' refers to something that is relatively rare on a managed landscape, takes a long time to develop (greater than a single rotation), and is linked to some behavior (reproduction, foraging) of a vertebrate species in such a way that the loss of the habitat element would likely result in a substantial population reduction of the species on the landscape. The FHCP also includes Riparian Management Zone (RMZ) prescriptions and protection of geologically unstable areas beneficial to the Covered Species as a landscape management commitment to promote retention and development of late seral habitat in a dendritic network across the Plan Area. Although initially created through Green Diamond's Aquatic Habitat Conservation Plan (AHCP), these prescriptions are also incorporated as enforceable commitments of the FHCP. Prescriptions for RMZs and geologically unstable areas provide a substantial benefit to the Covered Species and encumber over 25% of the Plan Area through extremely limited or no timber harvest. The following summarizes site-specific habitat retention measures identified before and after timber harvest for each THP with completions during the reporting period.

1. Pre-harvest habitat retention planning

The major habitat management measures quantified were:

- habitat retention areas (HRAs) planned (number),
- habitat retained as a result of AHCP Riparian Management Zones (RMZ) and geologically unstable areas,
- retention of all non-merchantable downed coarse woody debris (CWD),
- retention of green wildlife trees outside of RMZs, (planned number of trees to be retained per acre individually, in HRAs, or in clumps),
- retention of Wildlife Scorecard Trees,
- snag retention (estimated number per acre present before and after harvest)

General guidelines for green wildlife tree retention are outlined below.

General Candidate Tree Selection:

- Retain defective or poorly formed trees (i.e., animal damaged, forked top, broken top, etc.).
- Retain a mix of conifers and hardwoods (approximately 50/50 mix where possible).
- Species preference: Douglas-fir, hemlock, white fir, cedar, spruce, redwood, tanoak, madrone, California laurel, chinquapin.
- Consider protection from wind throw and site preparation burning when designating HRA and tree clump locations.
- Retain trees with the average diameter equal to or greater than average diameter of trees in the THP unit.
- Green wildlife tree retention is in addition to snag, geological, and RMZ retention.

Tree Retention Guidelines

Conifer Dominated Harvest Areas with RMZ or Geological Retention:

- Retain all scorecard trees ≥ 7.
- Retain other evergreen hardwoods at a rate of two trees per clearcut acre where they exist

Conifer Dominated Harvest Areas without RMZ or Geological retention:

- Retain all scorecard trees ≥ 7.
- Retain other conifer at a minimum rate of one tree per clearcut acre.
- Retain other evergreen hardwoods at a rate of two trees per clearcut acre where they exist
- If unit lacks hardwoods (< 2 per acre) and is located within a tract considered impaired for wildlife (i.e., a tract requiring retention of at least two trees per clearcut acre “Two Trees Per Acre Tract”), then retain additional conifers to achieve total retention of two trees per acre.
- If the unit lacks hardwoods (< 2 per acre) and is not located within a tract considered impaired for wildlife (i.e., a tract requiring retention of at least one tree per clearcut acre “One Tree Per Acre Tract”), then no additional conifer retention is required above the minimum one conifer per clearcut acre

Hardwood Dominated Harvest Areas with RMZ or Geological Retention:

- Retain all scorecard trees ≥ 7.
- Retain evergreen hardwoods at a rate of two trees per clearcut acre.

Hardwood Dominated Harvest Areas without RMZ or Geological Retention:

- Retain all scorecard trees ≥ 7.
- Retain a minimum 0.5-acre HRA or clumps totaling 0.5 acres and additional scattered evergreen hardwood trees at a rate of two trees per clearcut acre.

2. Post-harvest habitat retention

Post-harvest completion data were collected for harvested units that received company harvest plan completions during the reporting period or for plans in which logging activity had terminated. For plan completions, the number of green wildlife trees retained was estimated as the number of remaining trees > 12" dbh per acre. If the THP was to be burned for site preparation, the completion data was also collected after the plan was burned. It was noted for each completion whether site preparation, burning, windthrow or some other form of forest management damaged the retained habitat features.

3. Commercial Thinning

Commercial thinning involves removing selected trees that may contain commercial value in order to create additional growing space for crop trees. Commercial thinning on Green Diamond's forest lands is typically an intermediate treatment applied to younger stands that allows for the release of the selected crop trees by providing more light, and in some cases, more nutrients and soil moisture when they are limiting factors. The log size of these younger thinned stands is inherently smaller than those of an older stand ready for the final harvest stage of even-aged management (i.e., clearcut harvest). The protection measures and mitigations included in a final clearcut harvest, such as TREE, also apply to these intermediate thinning harvests. Given the goal of thinning harvests and the amount of post-harvest habitat retention associated with this type of silviculture, habitat for the Covered Species is at a minimum maintained, but this type of harvest should advance the development of habitat. Therefore, these units meet or exceed post-harvest habitat retention standards of the FHCP and are excluded from the pre-harvest and post-harvest retention summaries in the annual report.

B. Results

Fifty-one THPs comprised of 122 clearcut harvest units (2764.04 total clearcut acres) and 13 commercially thinned harvest units (522.63 total acres) approved after June 13, 2019, received company completions during the reporting period. The completed units ranged in size from 1.03 acres to 33.48 acres with an average of 22.66 acres. As described above, the 13 commercially thinned units were not included in the pre-harvest or post-harvest retention summaries (for clearcut harvest unit retention details see Appendix II and Tables 1, 2, 3, 4, 5, and 6).

1. Pre-harvest conservation measures

Among the 122 clearcut harvest units, 117 were conifer dominated and 104 of these had retention in RMZs or geologically unstable areas requiring no additional green tree retention beyond two hardwoods per clearcut acre where they existed. The average green trees per acre prescribed for the 104 conifer dominated units with RMZ or

geological retention was 2.21 per clearcut acre (Table 1). Ten units without RMZ or geological retention were in 'two trees per acre (TPA) tracts' and prescribed an average of 2.16 green trees per clearcut acre. The remaining three conifer dominated units without RMZ or geological retention were located within one TPA tracts and prescribed an average of 3.0 green trees per clearcut acre. The four units that were hardwood dominated and had RMZ or geological retention prescribed an average of 2.04 green trees per clearcut acre. The single hardwood dominated unit without RMZ or geological retention prescribed 2.10 green trees per clearcut acre. Twenty-six of the 122 units prescribed a total of 32 HRAs. The average number of snags prior to harvest was estimated to be 0.51 per clearcut acre. The average number of wildlife scorecard trees (scorecard trees) was 0.49 per clearcut acre (Table 2).

Table 1. Summary of planned pre-harvest THP green tree retention for completed THP units (n=122 Units).

	Conifer Dominated			Hardwood Dominated	
	GT/acre* with RMZ/GEO	GT/acre without RMZ/GEO (2 TPA tract)	GT/acre without RMZ/GEO (1 TPA tract)	GT/acre with RMZ/GEO	GT/acre without RMZ/GEO
Minimum	0.33	2.00	2.0	2.0	2.10
Maximum	10.20	2.80	4.0	2.17	2.10
Average	2.21	2.16	3.0	2.04	2.10

*all acres are clearcut acres
GT = green tree
RMZ = riparian management zone
GEO = geologically unstable area
TPA = tree per acre

Table 2. Summary of planned pre-harvest THP conservation measures for completed THP units (n = 122 Units)

	Snags/acre*	HRAs (#)	Scorecard Trees (#)	Scorecard Trees/acre
Minimum	0.00	0	0.00	0.00
Maximum	2.00	2	73	2.84
Average	0.51	0.26	11.09	0.49

*All acres are clearcut acres
HRA = habitat retention area
THP = timber harvest plan

2. Post-harvest habitat retention

The 104 conifer dominated units with RMZ or geological retention retained an average of 2.27 green trees per clearcut acre (Table 3). Among the 13 conifer dominated units without RMZ or geological retention, all units met the minimum green tree retention requirements. The ten conifer dominated units without RMZ or geographic retention that were located within two TPA tracts retained at least two green trees per clearcut acre with an average of 2.26 per clearcut acre. The three conifer dominated units without RMZ or geological retention located in one TPA tracts retained at least one green tree per clearcut acre with an average of 3.00 per clearcut acre. All hardwood dominated units met or exceeded the minimum retention requirements. The four hardwood dominated units with RMZ or geological retention retained an average of 2.04 green trees per clearcut acre, and the single hardwood dominated unit without RMZ or geological retention retained 2.1 green trees per clearcut acre. Among the total 122 units, an average of 0.50 wildlife scorecard trees per clearcut acre was retained. Twenty-six units retained a total of 32 HRAs. An average of 0.49 snags per acre and an average of 0.98 pieces of coarse woody debris per clearcut acre were retained post-harvest (Table 4).

Within the 122 units, 880.41 acres (31.85%) were retained in RMZs or geologically unstable areas with an average of 7.22 acres per unit. Harvest within class I and II RMZs during the reporting period represented the first and only entry allowed during the life of the Aquatic Habitat Conservation Plan and FHCP. None of the THPs were burned during the current reporting period.

Table 3. Summary of post-harvest THP green tree retention for completed THP units (n=122 Units).

	Conifer Dominated			Hardwood Dominated	
	GT/acre* with RMZ/GEO	GT/acre without RMZ/GEO (2 TPA tract)	GT/acre without RMZ/GEO (1 TPA tract)	GT/acre with RMZ/GEO	GT/acre without RMZ/GEO
Minimum	0.33	2.00	2.00	2.00	2.10
Maximum	10.20	3.00	4.00	2.17	2.10
Average	2.27	2.26	3.00	2.04	2.10

*All acres are clearcut acres
GT = green tree
RMZ = riparian management zone
GEO = geologically unstable area
TPA = tree per acre

Table 4. Summary of post-harvest THP conservation measures for completed THP units (n=122 Units)

	Snags/acre*	HRAs (#)	Scorecard Trees (#)	Scorecard Trees/acre	LWD/acre
Minimum	0.00	0.00	0.00	0.00	0.00
Maximum	2.00	2.00	73.00	2.84	5.00
Avgerage	0.49	0.26	11.39	0.50	0.98

*all acres are clearcut acres
HRA = habitat retention area
LWD = Large woody debris
THP = timber harvest plan

3. Comparison of pre- and post-harvest wildlife retention measures

The prescribed pre-harvest and post-harvest data were compared for the 122 THP units that were completed during the reporting period (Table 5 and Table 6). In some cases, additional tree clumps were retained to comply with the Forest Stewardship Council (FSC) standards. This additional retention was not counted towards green tree or HRA tallies unless it satisfied green tree or HRA criteria.

Average post-harvest retention of green trees was equal to or greater than pre-harvest prescriptions during the reporting period. At times, trees were left for unanticipated reasons and as long as they satisfied the criteria for a green tree, they were counted as additional trees in the post-harvest evaluation which can result in an increase in green trees post-harvest. Additional marking of trees prior to operations may also occur. These trees are counted post-harvest because they were marked, however, they were not reported on during pre-harvest because they had not been marked or recorded on the pre-harvest form. In 2022, seven units reported a loss of wildlife scorecard trees due to a combination of operational and safety constraints and windthrow. However, the overall average post-harvest retention of wildlife scorecard trees was greater than pre-harvest prescriptions. The post-harvest estimate of retained snags was slightly lower than the pre-harvest estimate. Discrepancies between estimates of pre- and post-harvest snags are common. Since snags are not marked and tallied individually, inaccurate ocular estimates are often made on the number per acre, particularly during the pre-harvest phase when they are less obvious in the unharvested stand. Total post-harvest number and acreage of HRAs did not change from pre-harvest prescriptions.

Table 5. Comparisons of pre- and post-harvest green tree retention for THP units (n=122 Units).

	Conifer Dominated						Hardwood Dominated	
	Pre GT/acre* with RMZ/ GEO	Post GT/acre with RMZ/ GEO	Pre GT/acre without RMZ/ GEO (2 TPA)	Post GT/acre without RMZ/ GEO (2 TPA)	Pre GT/acre without RMZ/ GEO (1 TPA)	Post GT/acre without RMZ/ GEO (1 TPA)	Pre GT/acre with RMZ/GEO	Post GT/acre without RMZ/GEO
Average	2.21	2.27	2.16	2.26	3.00	3.00	2.04	2.04
Average change/unit	0.06		0.10		0.00		0.00	

*All acres are clearcut acres
THP = timber harvest plan
GT = green tree
GEO = geologically unstable area
RMZ = riparian management zone

Table 6. Comparisons of pre- and post-harvest conservation measures for THP units (n = 122 Units).

	Pre Snag/ acre*	Post Snag/ acre	Pre HRA (#)	Post HRA (#)	Pre Scorecard Trees (#)	Post Scorecard Trees (#)	Pre Scorecard Trees/acre	Post Scorecard Trees/acre
Average	0.51	0.49	0.26	0.26	11.09	11.39	0.49	0.50
Average change/unit	-0.02		0.00		0.30		0.01	

*All acres are clearcut acres
THP = timber harvest plan
HRA = habitat retention area

C. Discussion

FHCP retention measures were implemented in compliance with the FHCP, and all required habitat retention features were successfully retained. Areas of habitat retained compared to the planned level of retention were equal to or greater in acreage for all but seven units that experienced a loss in wildlife scorecard trees due to a combination of operational and safety constraints and windthrow. Prior to becoming FSC certified, Green Diamond worked to minimize tree loss from wind throw by planning the retention of fewer wildlife tree groups or clusters and instead designated more HRAs and larger RMZs. Subsequent retention efforts have placed more emphasis on scattered and clumped tree retention throughout the units. However, planned individual tree or clump retention is placed in a topographic location that will minimize wind throw where possible while still meeting FSC standards. Individual wind firm trees from the original stand can often be more successfully retained than second growth. RPFs noted the additional incidental retention of scattered and clumped sub merchantable trees. These habitat features are not quantified in this report. In many instances, this incidental structure is likely to add another element of structural diversity to future forest stands.

The greatest amount of habitat retention in THPs occurred in RMZs and geologically unstable areas. Because Class I or II watercourses are given canopy retention that exceeds the standard Forest Practice Rules, this represents a significant amount of retention for future wildlife habitat. Because owls and fishers often occupy areas near streams lower on the slope, these areas are anticipated to provide excellent future core habitat for owls and fishers.

IV. Habitat for the Covered Species

A major premise of the FHCP is that habitat suitable for the Covered Species would increase throughout the life of the plan. Prior to model development and validation, habitat will be quantified by categorizing Green Diamond's land base into age classes according to their value to the Covered Species. The distribution of acres in each of the age classes changes through time as stands age and enter older age classes and as stands are harvested and enter the younger age classes. Another factor that could affect this distribution is land acquisition and disposal.

It should be noted that land exchanges, harvest, and growth of stands are not the only factors that affect age-class distribution. Other factors, such as improved cruise data, can also cause changes. However, given the extent of the ownership, the acreage involved should be insignificant.

A. Methods

1. Overall habitat

For tree voles, suitable habitat was defined in terms of suitable nesting habitat defined as stands 20 years or older with at least 20% basal area of Douglas-fir. The acreage of the following age classes, categorized according to their value to spotted owls and fishers, was also quantified.

Age in years	Importance to spotted owls and fishers
0-7	Recently regenerated stands, no direct value to owls or fishers
8-30	Potential foraging and woodrat habitat
31-45	Foraging, roosting/resting, and occasional nesting/denning habitat
46+	Prime nesting/denning and roosting/resting habitat and also foraging habitat
NF	Non-forested land, no direct value to owls or fishers

These acreages were estimated using GIS and falling initiation dates to determine the change in total habitat, i.e., change in acreage of stands greater than 30 years old for spotted owls and fishers. If falling was initiated, then it was assumed that the entire harvest unit was felled even if portions of the unit were harvested during a different reporting period or portions of the unit were retained. Therefore, utilizing falling initiation dates overestimates the acres harvested but allows for a more accurate assessment of the

potential for displacement of an owl or fisher. Additionally, the change in habitat composition between January 1, 2022 and January 1, 2023 was reported to provide an objective measure for comparison. Although this does not coincide with the dates of the reporting period, it more accurately reflects habitat changes from one year to the next.

For tree voles, acreages were estimated using harvest depletion data to determine the change in the proportion of nesting habitat, i.e., change in the proportion of stands 20 years or older with at least 20% basal area of Douglas-fir. Harvest depletion data are derived from post-harvest aerial imagery that accounts for retention acres in addition to acres removed. The depletion data allows for a more accurate measure of the changes in the proportion of vole habitat from one year to the next (growth and harvest) and follows the methods described in Chapter V for this Covered Species. The harvest depletion data is available at the end of each calendar year, and analyses are conducted over several months. Therefore, the change in proportion of habitat between January 1, 2021 and January 1, 2022 was reported. Although this does not coincide with the dates of the reporting period or the dates utilized for owls and fishers, it more accurately reflects changes in the proportion of nesting habitat for tree voles from one year to the next.

2. Land acquisition and disposal

Land transactions were summarized based on the type of transaction and the total number of acres acquired or disposed January 1, 2022 – January 1, 2023. Since land transactions may affect age-class distributions important to the Covered Species, the change in total habitat (stands greater than 30 years old for spotted owls and fishers and stands 20 years or older with at least 20% basal area of Douglas-fir for tree voles) as a result of land transactions was also quantified.

3. Proportion of Northern Spotted Owl habitat harvested

The total change in spotted owl habitat due to timber harvest was also quantified around owl sites. Each THP initiated (trees harvested) during the reporting period was evaluated to determine if it was located within 500 feet or 0.5 mile of an owl's activity center. If so, a GIS exercise was conducted to determine the amount of habitat harvested around the owl sites. Circles with radii of 500 feet (18 acres) and 0.5 mile (502 acres) were centered on owl sites affected by timber harvest. The amount of habitat within each of these circles was determined for both before and after harvest. In most cases, the amount of habitat harvested was based on the total acreage of THPs that had been initiated during the reporting period, whether or not harvest of the plans had been completed. However, multi-unit THPs were an exception to this. For these plans, certain individual units may have been deferred from harvest to avoid a potential owl displacement or for other operational reasons. Thus, for determining decrease in owl habitat, it was appropriate to evaluate harvest of THPs on a unit-by-unit basis to better document the timing of habitat loss.

To produce a standard for comparison, the percentage of owl habitat (stands > 30 years) originally present is reported for each area of interest. The percent change reflects the change in owl habitat through timber harvest relative to the total amount of owl habitat present prior to harvest. The results of the stand age distribution for the owl circles determined by the GIS were verified by examining aerial imagery and light detection and ranging (LiDAR) imagery. If stand ages were not quantified in the GIS, then stand age typing was based on aerial and LiDAR imagery interpretation. Imagery typing was done primarily for owl site circles that encompassed land outside of Green Diamond's ownership. In some cases, the exact age of the stand could not be discerned by examining the imagery so that habitat was classified into "habitat" (suitable roosting and nesting) and "non-habitat" categories.

B. Results

1. Overall habitat

Table 7 summarizes the change in age class distribution for owls and fishers between January 1, 2022 and January 1, 2023. A total of 236,502 acres of potential spotted owl and fisher habitat was estimated to occur within the Plan Area. The total amount of habitat (≥31 years) within the Plan Area increased by approximately 123 acres after accounting for land exchanges, harvest, growth, or reclassification of forest into different age classes (Figure 1). The amount of 31-45 age class decreased by 2,300 acres, and the amount of 46+ age class increased by 2,423 acres.

Table 8 summarizes the change in the proportion of vole nesting habitat between January 1, 2021 and January 1, 2022. The proportion of vole nesting habitat within the Plan Area as of January 1, 2021 was 53.9%, and the overall change in vole nesting habitat during the current reporting period was -0.8%.

2. Land acquisition and disposal

Nine-hundred and one acres of potential owl and fisher habitat and 290 acres of potential vole nesting habitat were acquired in the permit area between January 1, 2022 and January 1, 2023. A total of zero acres of potential owl and fisher habitat was removed from the permit area for a net increase of 901 acres of spotted owl and fisher habitat. A total of zero acres of potential vole nesting habitat was removed from the permit area for a net increase of 290 acres of vole nesting habitat.

No land transactions occurred within the Peripheral Area during the reporting period.

3. Proportion of Northern Spotted Owl habitat harvested

The percentage of habitat decrease due to timber harvest within 500-foot and 0.5-mile radius circles centered on 29 owl sites are presented in Table 9. Of the 29 sites evaluated, five sites were the subject of a report of potential owl displacement resulting from timber harvest in this or previous reporting periods.

Potential displacement sites had an average of 0.0% and 16.7% of habitat harvested within 500-foot and 0.5-mile circles, respectively. Non-displacement sites had an average of 0.0% and 6.6% of habitat harvested within 500-foot and 0.5-mile circles, respectively.

Table 7. Acreage of Green Diamond timberlands within the Plan Area by age or habitat class for owls and fishers at beginning and end of the FHCP reporting period based on acreage as of Jan. 1, 2022 and Jan. 1, 2023 after accounting for land transactions, harvest, growth, and reclassification of forest into other age classes.

Age or Habitat Class	Acres as of Jan. 1, 2022	Acres as of Jan. 1, 2023	Change in Acreage
Non-forest	5,276	5,267	-8
0-7 yrs	34,497	35,191	694
8-30 yrs	79,687	78,934	-753
31-45 yrs	78,121	75,821	-2,300
46+ yrs	158,258	160,681	2,423
Total	355,838	355,894	55

Table 8. The change in the proportion of vole nesting habitat within the Plan Area between January 1, 2021 and January 1, 2022.

Proportion of Nesting Habitat as of Jan. 1, 2021	Proportion of Nesting habitat as of Jan. 1, 2022	Change in proportion of Nesting habitat
53.9%	53.2%	-0.8%

Figure 1. Change in spotted owl and fisher habitat (stands > 30 years old) on Green Diamond Resource Company lands since approval of the FHCP.

Table 9. Percent of owl habitat (stands greater than 30 years old) within 500-ft. and 0.5-mile radius circles centered on owl sites, and percent of the total area changed (i.e., habitat removed) by timber harvest. Bold indicates sites potentially displaced (both direct and indirect) by timber harvest in the current reporting period. Site names followed by an asterisk (*) are potential direct displacement sites. "DCA" or "AMDCA" indicate the site was associated with a Dynamic Core Area or Adaptive Management Core Area, respectively. "Previous" indicates a potential displacement was triggered in a previous reporting period.

	500 feet		0.5 mile	
Site	% Habitat	% Change	% Habitat	% Change
4800	74.2	0.0	62.9	9.5
4851 (DCA)	100.0	0.0	93.5	26.3
Bear Creek	88.0	0.0	83.7	12.8
Cal Barrel	94.7	0.0	62.9	11.1
Fern Prairie	43.3	0.0	93.1	2.7
Henderson Gulch	100.0	0.0	78.6	1.3
HRC 47	46.3	0.0	60.0	0.1
Hulla Crup Turwar	100.0	0.0	90.6	12.5
Hunter 500 (DCA)	100.0	0.0	99.2	0.1
Jacoby Creek #2	100.0	0.0	76.7	9.0
Jiggs Creek	100.0	0.0	86.2	1.3
Korbel Mill	91.3	0.0	83.8	0.0
Maple Creek #1	100.0	0.0	93.4	5.9
Middle Stevens Creek	72.0	0.0	35.6	17.5
Mule Creek	100.0	0.0	61.5	0.1
Mynot School	84.9	0.0	78.0	15.3
Old 299 #1 (DCA)	100.0	0.0	59.7	10.5
Panther Bridge (DCA)	100.0	0.0	92.3	0.1
Poverty Creek	100.0	0.0	87.4	2.2
Quarry Creek (AMDCA)	100.0	0.0	72.2	6.8
Salmon Creek #4	68.1	0.0	24.2	7.4
Stevens Creek East	61.8	0.0	43.8	22.7

	500 feet		0.5 mile	
Site	% Habitat	% Change	% Habitat	% Change
Stone Lagoon	98.4	0.0	84.5	9.5
Upper Mynot Creek	100	0.0	95.7	3.7
Upper Stevens Creek	74.2	0.0	35.2	18.2
Wiggins Cabin	94.1	0.0	77.3	8.3
Wiggins Pond	81.2	0.0	60.7	0.5
Windy Point (previous)	52.0	0.0	38.4	17.7
Wiregrass Ridge	100.0	0.0	69.5	8.3

C. Discussion

The results of the habitat analysis for this annual report showed a slight overall increase in the total amount of habitat for spotted owls and fishers, indicating that growth of timber stands into owl and fisher habitat or habitat gained through land acquisitions exceeded timber harvest or habitat lost through land disposals. Typically, land exchanges are relatively small acreages. No disposals occurred during the current reporting period. The change in the proportion of vole nesting habitat within the Plan Area for this annual report did not exceed the projected average.

V. Take

The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct (16 U.S.C. section 1532(19)). Harm in the definition of take means an act which actually kills or injures wildlife. This may include significant habitat modification or degradation that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Although Green Diamond's incidental take permit covers all take of the Covered Species incidental to timber harvest operations, the primary form of incidental take anticipated in the FHCP is the displacement of the Covered Species due to habitat modification. However, it was recognized that such displacement could impair essential behavioral patterns and result in actual death or injury.

A. Northern spotted owl

1. Methods

a. Displacement (take) evaluation

An assessment of potential displacement (take) was conducted for sites when timber harvest or other Covered Activities resulted in one or more of the following conditions:

- Suitable nesting, roosting or foraging habitat was removed or destroyed within a 500-foot radius of a spotted owl site center (direct displacement)
- Less than 89 acres of stands 46 years and older remained post-harvest within a 0.5-mile radius of a spotted owl site (indirect displacement)
- Less than 233 acres of stands 31 years and older remained post-harvest within a 0.5-mile radius of a spotted owl site center (indirect displacement)
- Timber harvest within a 0.5-mile radius of a spotted owl site that was already below thresholds or that reduced habitat below thresholds (<89 acres of stands 46 years and older or < 233 acres of stands 31 years and older) post-harvest (indirect displacement)

If any of the above conditions occurred, a potential displacement occurred, and monitoring was triggered. A confirmed displacement was based on the post-harvest demographic performance of spotted owls within the home range where harvest (or other Covered Activities) triggered the assessment of potential displacement. The performance criteria are described below under 'Displacement monitoring and accounting'. Displacement associated with a particular owl site in a home range occurred only once, unless the site was designated as vacant and later recolonized. Additionally, individual owls could be displaced (taken) more than once if they occupied

successive owl sites in different home ranges where harvesting triggered a report of potential displacement.

Each THP initiated within the reporting period that had an owl site within 0.5 miles of the plan was evaluated for displacement using the process described in section IV.A.3. This involved estimating the amount of habitat within the 0.5-mile radius circle around each owl site using Green Diamond's GIS and remote sensing data. If the entire 502-acre circle was not on Green Diamond land, aerial photographs or other remote sensing data were used to determine the age class or habitat category of areas outside of the ownership, because Green Diamond's inventory does not include data from other ownerships.

b. Displacement monitoring and accounting

The displacement accounting period was based on the date of approval for the FHCP (June 13, 2019). Therefore, the displacement accounting period started on June 13 of the previous reporting year and ended on June 12 of the current reporting year. The number of potential displacements allocated for a given accounting period was based on the total number of active spotted owl sites at the end of the previous breeding season. Unused potential displacements were held in reserve and may be used in subsequent years so long as the total number of potential displacements is no more than twice the number of allocated potential displacements for the accounting period for which the potential displacement(s) was triggered. For example, if the number of allocated potential displacements in year X was 3, then a maximum of 6 potential displacements could be triggered in year X even if the number in reserve was greater.

Displacement (take) was designated based on the post-harvest demographic performance of spotted owls within the home range where harvest (or other Covered Activities) triggered the potential displacement assessment. The performance criteria were based upon occupancy and/or reproduction of any spotted owls at a site. The final displacement determination could occur beginning at the third and ending at the fifth breeding season following the last harvest that triggered the assessment. The following criteria were used for concluding that displacement (take) did not occur:

- in third breeding season following trigger of potential displacement:
  - owls nested (whether successful or not) in at least 2 years **or**
  - owls nested in 1 year with 2 years occupancy (at least 1 year of pair occupancy for sites with pair occupancy prior to timber harvest or a single owl at sites without pairs)

- in fourth breeding season following trigger of potential displacement:
  - owls nested in at least 2 years or
  - owl(s) occupied the site for four years (at least two years of pair occupancy for sites with pair occupancy prior to timber harvest or a single owl at sites without pairs)

- in fifth breeding season following trigger of potential displacement:
  - owl(s) occupied the site four out of five years (at least two years of pair occupancy for sites with pair occupancy prior to timber harvest or a single owl at sites without pairs)

The status of owls at sites being monitored for potential displacement was assessed by noting the 2022 location and behavior of the owls. All owl sites for which a report of potential displacement was triggered during this reporting period will be monitored in future breeding seasons to determine if displacement (take) has occurred. If the above criteria cannot be met, the site was considered to have been taken (owl or owls displaced) and recorded for the initial year in which the timber harvest triggered the potential displacement.

c. Projected potential displacement

The displacement accounting period was based on the approval date of the FHCP and was based on the number of active spotted owl sites in the previous breeding season. The initial displacement accounting period was June 13, 2019 through June 12, 2020 and the amount of allocated potential displacements (number of potential takes available) was based on the number of active spotted owl sites at the end of the 2018 breeding season. Likewise, the 2022-2023 displacement accounting period was based on the number of active spotted owl sites at the end of the 2021 breeding season.

1) Outcome of 2021-2022 projected potential displacements

The number and type (direct or indirect) of potential displacement projected in the last reporting period were compared to the actual numbers in this reporting period.

2) Projected 2022-2023 potential displacements

The results of the owl surveys (section II.B.1.) in conjunction with planned THP locations were used to estimate the type and location of potential displacements for the next reporting period.

2. Results

a. Displacement evaluation

Twenty-nine sites that had potential for direct or indirect displacement were evaluated during the reporting period (Table 10). Harvest initiated in the reporting period resulted in reports of zero potential direct displacements and four potential indirect displacements (Table 10).

Table 10. Acres of age and habitat classes within 0.5-mile radius circles (502 acres) centered on owl sites potentially impacted by timber harvest. Bold indicates potential displacement sites for the current reporting period. “DCA” or “AMDCA” indicate site was associated with a Dynamic Core Area or Adaptive Management Core Area, respectively. Asterisks indicate potential direct displacement sites and “previous” indicates a potential displacement was triggered in a previous reporting period and often at a different activity center.

Site	Owl site year	0-7 yrs. (acres)	8-30 yrs. (acres)	31-45 yrs. (acres)	46+ yrs. (acres)	Total acres owl habitat (31+)
4800	2022	71.0	121.0	145.7	140.6	286.28
4851 (DCA)	2022	2.9	67.5	34.4	312.2	346.6
Bear Creek	2021	65.8	42.8	0.00	367.3	367.3
Cal Barrel	2021	88.6	97.9	51.0	230.0	281.0
Fern Prairie	2022	34.8	0.00	122.9	332.6	455.5
Henderson Gulch	2022	25.6	81.0	218.0	172.8	390.8
HRC 47	2021	14.8	186.6	39.8	261.4	301.2
Hulla Crup Turwar	2021	38.0	9.3	228.5	170.2	398.7
Hunter 500 (DCA)	2021	4.1	0.00	269.9	228.3	498.3
Jacoby Creek #2	2022	71.1	46.0	103.5	247.4	350.9
Jiggs Creek	2021	65.2	4.4	22.6	404.8	427.3
Korbel Mill	2021	57.0	24.6	287.9	133.1	420.9
Maple Creek #1	2021	38.4	0.00	54.3	387.7	442.0
Middle Stevens Creek	2021	90.7	262.2	12.0	137.2	149.2

Table 10. Acres of age and habitat classes within 0.5-mile radius circles (502 acres) centered on owl sites potentially impacted by timber harvest. Bold indicates potential displacement sites for the current reporting period. “DCA” or “AMDCA” indicate site was associated with a Dynamic Core Area or Adaptive Management Core Area, respectively. Asterisks indicate potential direct displacement sites and “previous” indicates a potential displacement was triggered in a previous reporting period and often at a different activity center.

Site	Owl site year	0-7 yrs. (acres)	8-30 yrs. (acres)	31-45 yrs. (acres)	46+ yrs. (acres)	Total acres owl habitat (31+)
Mule Creek	2021	14.7	179.0	9.2	299.5	308.7
Mynot School	2021	38.4	58.7	161.0	184.7	345.7
Old 299 #1 (DCA)	2022	28.7	173.5	0.00	268.9	268.9
Panther Bridge (DCA)	2022	38.7	0.00	240.8	222.9	463.7
Poverty Creek	2021	27.4	35.9	92.8	336.9	429.7
Quarry Creek (AMDCA)	2022	47.4	89.6	160.7	180.6	341.2
Salmon Creek #4	2021	73.3	20.4	2.7	110.0	112.7
Stevens Creek East	2020	52.2	228.6	9.2	162.8	172.1
Stone Lagoon	2022	22.9	55.0	58.2	326.2	384.4
Upper Mynot Creek	2021	19.1	2.3	294.2	169.0	463.2
Upper Stevens Creek	2020	158.5	185.2	43.9	100.8	144.7
Wiggins Cabin	2022	79.3	34.8	0.00	356.3	356.3
Wiggins Pond	2022	192.9	4.7	15.5	288.0	303.5
Windy Point (previous)	2020	60.5	249.0	0.00	159.0	159.0

Table 10. Acres of age and habitat classes within 0.5-mile radius circles (502 acres) centered on owl sites potentially impacted by timber harvest. Bold indicates potential displacement sites for the current reporting period. “DCA” or “AMDCA” indicate site was associated with a Dynamic Core Area or Adaptive Management Core Area, respectively. Asterisks indicate potential direct displacement sites and “previous” indicates a potential displacement was triggered in a previous reporting period and often at a different activity center.

Site	Owl site year	0-7 yrs. (acres)	8-30 yrs. (acres)	31-45 yrs. (acres)	46+ yrs. (acres)	Total acres owl habitat (31+)
Wiregrass Ridge	2021	63.6	89.4	27.2	293.4	320.6

1) Activity at owl sites where harvest initiated a potential displacement

Middle Stevens Creek

This site was associated with Green Diamond THP #09-1501 (State ID #1-15-068HUM) Unit D. The following is a summary of the birds' known activity within the reporting period.

Date	Activity/Response
11/21/2021	Falling initiated causing potential indirect displacement.
3/9/2022	THP survey, unknown sex SPOW detection
3/22/2022	THP survey, no detection
3/29/2022	Site visit and THP survey, SPOW nest located
4/7/2022	Site visit and THP survey, pair detection
4/14/2022	THP survey, no detection
4/22/2022	THP survey, no detection
5/27/2022	Site visit survey, no detection
6/3/2022	Site visit survey, no detection
6/10/2022	Site visit survey, no detection
7/7/2022	Site visit survey, male SPOW detection, failed reproduction
7/14/2022	Site visit survey, no detection
8/12/2022	Site visit survey, no detection
8/29/2022	Site visit survey, no detection

Salmon Creek #4

This site was associated with Green Diamond THP #14-2001 (State ID #1-20-00124HUM) Unit C. The following is a summary of the birds' known activity within the reporting period.

Date	Activity/Response
12/02/2021	Falling initiated causing potential indirect displacement.
4/10/2022	Site visit survey, no detection
5/4/2022	THP survey, no detection
5/13/2022	THP survey, no detection
5/20/2022	Site visit and night call survey, no detection
5/31/2022	THP survey, no detection
6/14/2022	THP and site visit survey, SPOW pair detection, not reproductive
6/17/2022	Site visit survey, SPOW pair detection, not reproductive
7/29/2022	Site visit survey, SPOW pair detection, not reproductive

Stevens Creek East

This site was associated with Green Diamond THP #09-2001 (State ID #1-21-00011HUM) Unit F. The following is a summary of the birds' known activity within the reporting period.

Date	Activity/Response
12/08/2021	Falling initiated causing potential indirect displacement.
3/8/2022	Site visit survey, no detection
3/9/2022	THP survey, no detection
3/22/2022	THP survey, no detection
3/29/2022	THP survey, no detection
4/7/2022	THP survey, no detection
4/14/2022	Site visit and THP survey, no detection
4/22/2022	Site visit and THP survey, no detection
5/10/2022	Site visit and night call survey, no detection

Upper Stevens Creek

This site was associated with Green Diamond THP #09-2001 (State ID #1-21-00011HUM) Unit C. The following is a summary of the birds' known activity within the reporting period.

Date	Activity/Response
11/24/2021	Falling initiated causing potential indirect displacement.
3/9/2022	THP Survey, female SPOW detection
3/22/2022	THP Survey, SPOW pair detection
3/29/2022	THP survey, no detection
4/1/2022	Site visit survey, pair detection
4/7/2022	THP survey, no detection
4/14/2022	Site visit and THP survey, no detection
4/22/2022	Site visit and THP survey, SPOW nest located
5/27/2022	Site visit survey, single brooding SPOW
6/10/2022	Site visit survey, no detection
6/17/2022	Site visit survey, female SPOW detection, failed reproduction
6/30/2022	Site visit survey, SPOW pair detection, failed reproduction
8/12/2022	Site visit survey, male SPOW detection, failed reproduction

b. Displacement monitoring and accounting

During the 2021-2022 displacement accounting period, four potential displacements were allocated, six potential displacements were triggered, and zero were reserved. During the

2022-2023 accounting period, four potential displacements were allocated. Through the end of the current reporting period, none of the four allocated potential displacements were triggered; therefore, all four were reserved. Table 11 summarizes the allocated and reserved potential displacements for each accounting period. No sites were available to evaluate for confirmed displacements because at least five breeding seasons had not passed subsequent to harvest triggering potential displacement. Table 12 summarizes potential and confirmed displacements since implementation of the FHCP. Table 13 summarizes the occupancy and nesting status of potential displacement sites in breeding seasons subsequent to those in which the report of potential displacement was triggered. Since no sites were available to evaluate for confirmed displacements, no sites were added to the confirmed displacement total during the 2022 reporting period.

Table 11. Summary of allocated and reserved potential displacements by accounting period since implementation of the FHCP.

Accounting Period	Total # of Active Sites in Previous Breeding Season	Allocated Potential Displacements	Triggered Potential Displacements	Reserved Potential Displacements	Total Available Potential Displacements
2019-2020	152	5	2	3	3
2020-2021	136	4	4	0	3
2021-2022	134	4	6	0	1
2022-2023*	133	4	0	4	5

*Displacement accounting information reported through the end of the annual reporting period (June 13, 2022 – September 1, 2022)

Table 12. Summary of spotted owl sites potentially displaced since implementation of the FHCP, including potential displacements reported for the current reporting period (2021-2022). Bold indicates potential direct displacement and underline indicates a designation of displacement (confirmed displacement).

Year			
2019	2020	2021	2022
Windy Point	**Pollnow Peak**	Upper Maple B.L.	Middle Stevens Creek
	McCloud Creek	Guptil Gulch	Salmon Creek #4
	HRC 372	PL3	Stevens Creek East
	Clear Creek		Upper Stevens Creek
Potential Displacements			
1	4	3	4
Cumulative Potential Displacements			
1	5	8	12
Displacements			
0	0	0	0
Cumulative Displacements			
0	0	0	0
Cumulative Net Potential Displacements			
1	5	8	12
Cumulative Net Displacements			
0	0	0	0

Table 13. Spotted owl habitat (≥31 years of age), occupancy, and reproductive status at potentially displaced sites. Bold indicates potential direct displacement and shading indicates a confirmed displacement.

Site	displ. year	Habitat within ½ mile	Status prior to displ.	Status 1 year after	Status 2 years after	Status 3 years after	Status 4 years after	Status 5 years after	Status 6 years after	Status 7 years after	Status 8 years after
Windy Point	2019	169.9	Single, unk.	Non-nesting male	UO	UO					
Pollnow Peak	2020	185.9	UO	Vacant	Vacant	Vacant					
McCloud Creek	2020	214.5	Non-nesting pair	Female, unk.	Single Male						
HRC 372	2020	225.5	UO	UO	UO						
Clear Creek	2020	202.3	UO	UO	UO						
Upper Maple B.L.	2021	150	Single, unk.	UO							
Guptil Gulch	2021	212.3	UO	UO							
PL3	2021	194.3	UO	UO							
Middle Stevens Creek	2021		Non-nesting pair	Nesting Pair							
Salmon Creek #4	2021		Single, unk.	Pair, unk.							
Stevens Creek East	2021		UO	UO							
Upper Stevens Creek	2021		Pair, unk.	Nesting Pair							

Explanation of abbreviations: displ. = displacement; unk. = reproductive status unknown or unconfirmed; UO = unoccupied

1) Summary of potential displacement monitoring and accounting by year.

Potential displacement based on year 2019

Windy Point (indirect)
Harvest in September of 2019 initiated a potential indirect displacement. A single spotted owl of unknown gender and unknown paired status occupied this site in 2019 prior to potential displacement. This site was occupied by a single male in 2020 and unoccupied in 2021 and 2022. Additional harvest in 2022 triggered continued potential displacement, and this site does not yet qualify to be evaluated for final displacement determination.

Potential displacement based on year 2020

Pollnow Peak (direct)
Harvest in January of 2020 initiated a potential direct displacement. This site was unoccupied prior to potential displacement and remained unoccupied through 2022. This site is now considered to be vacant and does not yet qualify to be evaluated for final displacement determination.

McCloud Creek (indirect)
Harvest in June of 2020 initiated a potential indirect displacement. This site was occupied by a non-nesting pair in 2019 prior to the potential displacement. The site was occupied by a non-nesting pair in 2020,a female with unknown paired status in 2021, and a single male in 2022. This site does not yet qualify to be evaluated for final displacement determination.

HRC 372 (indirect)
Harvest in July of 2020 initiated a potential indirect displacement. This site was unoccupied in 2020 prior to potential displacement. This site was unoccupied in 2021 and 2022 and does not yet qualify to be evaluated for final displacement determination.

Clear Creek (direct)
Harvest in September of 2020 initiated a potential direct displacement. This site was unoccupied in 2020 prior to potential displacement. This site was unoccupied in 2021, and additional harvest in 2021 triggered continued potential displacement. This site remained unoccupied in 2022 and does not yet qualify to be evaluated for final displacement determination.

Potential displacement based on year 2021

Upper Maple B.L. (indirect)
Harvest in June of 2021 initiated a potential indirect displacement. This site was occupied by a single spotted owl with unknown paired or reproductive status prior to potential

displacement. This site was unoccupied in 2022 and does not yet qualify to be evaluated for final displacement determination.

Guptil Gulch (indirect)

Harvest in July of 2021 initiated a potential indirect displacement. This site was unoccupied prior to potential displacement. This site remained unoccupied in 2022 and does not yet qualify to be evaluated for final displacement determination.

PL3 (indirect)

Harvest in July of 2021 initiated a potential indirect displacement. This site was unoccupied prior to potential displacement. This site remained unoccupied in 2022 and does not yet qualify to be evaluated for final displacement determination.

c. Projected potential displacement

1) Outcome of 2021-2022 projected potential displacements

In the 2021 report, it was estimated that four owl sites would be potentially displaced in the current reporting period. Four potential displacements were triggered during this reporting period (Table 14).

2) 2022-2023 Projected potential displacements.

Green Diamond is projecting two potential displacements during the next reporting period (Table 15).

d. Direct harm

No direct harm or injury to spotted owls inadvertently occurred within the purview of Green Diamond's 10(a)(1)(B) permit.

Table 14. Potential displacement status of owl sites in 2022 projected in 2021 to be triggered from Sept. 1, 2021 - Sept. 1, 2022, and type of potential displacement projected.

Owl site	Projected type of potential displacement	Actual potential displacement status
Middle Stevens Creek	Indirect	Indirect
Salmon Creek #4	Indirect	Indirect
Stevens Creek East	Indirect	Indirect
Upper Stevens Creek	Indirect	Indirect

Table 15. Owl sites projected to be potentially displaced from Sept. 1, 2022 - Sept. 1, 2023 and type of potential displacement anticipated.

Owl site	Type of potential displacement	Site Status
Lower McCloud Creek	Direct	Unoccupied
Mather #1	Indirect	Unoccupied

3. Discussion

Since implementation of the FHCP, potential displacements have occurred at twelve spotted owl sites. Seven of these sites (Windy Point, Guptil Gulch, and Upper Maple BL, Middle Stevens Creek, Salmon Creek #4, Stevens Creek East, and Upper Stevens Creek), were considered displaced under the previous 1992 Northern Spotted Owl HCP. Only three of the 12 sites were occupied by spotted owl pairs prior to the potential displacement. All three paired sites remained occupied after the harvest that triggered the potential displacement, and two of the three sites were occupied by nesting pairs post-harvest. The remaining nine sites were occupied by single spotted owls (n=3) or unoccupied by spotted owls (n=6) prior to the potential displacement. Although the majority of potential displacement sites have experienced low occupancy and poor reproduction prior to the potential displacement, two sites (Salmon Creek #4 and Upper Stevens Creek) have been occupied by spotted owls that nested within 3 years preceeding the potential displacement. These two sites were considered displaced under the previous 1992 NSO HCP resulting in owls occupying core areas with remnant nesting habitat but habitat at the site level (0.5-mile circular buffer) below displacement thresholds (<233 overall acres). However, harvesting that triggered the potential displacements under

the FHCP occurred at the outer edge of the 0.5-mile buffer such that the nesting core remained intact.

Previous analyses examining displacements that occurred during the 1992 Northern Spotted Owl HCP permit term have suggested that site occupancy subsequent to potential displacement was strongly correlated with the type of potential displacement. For example, if potential displacement reporting was triggered as a result of timber harvest within 500 feet of an activity center (potential direct displacement) but an adequate amount of habitat remained within the territory, the owls were more likely to persist in the area. During the current reporting period, no direct displacements occurred. Future monitoring is needed to understand the potential impacts of harvesting and type of displacement on site persistence and biological performance. However, the potential displacements that have occurred during FHCP implementation were associated with sites demonstrating low occupancy and a lack of reproduction. These sites were unlikely to provide biological support for the local population within the Plan Area.

B. Fisher

1. Methods

Similar to spotted owls, the primary source of potential harm to fishers is habitat modification through timber harvesting that results in displacement of fishers. Displacement likely decreases survival and fecundity as fishers attempt to find suitable habitat not already occupied by a resident fisher. Through previous studies conducted on the Green Diamond ownership, the estimated population density of fishers across the Plan Area is 335 fishers. Because timber harvest averages approximately 2.0% of the ownership per year, annual timber harvest has the potential to harm an average of 6.7 fisher (2.0% of 335 = 6.7). Therefore, take is estimated to be 6.7 fisher annually. The percent of harvest within the Plan Area was estimated using harvest depletion data. Harvest depletion data are derived from post-harvest aerial imagery that depicts actual acres removed through Covered Activities and accounts for retention acres. The harvest depletion data is available at the end of each calendar year, and analyses are conducted over several months. Therefore, the percent of harvest within the Plan Area between January 1, 2021 and January 1, 2022 was reported.

Green Diamond has also documented fisher deaths at abandoned or unmaintained water tanks. Fishers may enter an unrestricted opening resulting in drowning or entrapment. All water tanks are inspected annually to ensure that openings are secured against potential entry by fishers. The details of these inspections are further described in Chapter VIII.

2. Results

A total of 350,848 acres were estimated to occur within the Plan Area, and 4,750 acres were harvested resulting in harvest of 1.4% of the Plan Area between January 1, 2021 and January 1, 2022.

3. Discussion

The annual level of take was projected to average 2.0% of the Plan Area fisher population as measured by the total acres harvested. During the current reporting period, the percent of harvest within the Plan Area did not exceed the projected average. Additionally, no fisher carcasses were observed during inspections of water tanks and covers over openings were intact indicating exclusion efforts continue to be successful.

C. Tree vole

1. Methods

Direct harm or displacement of tree voles may occur as a result of timber harvest. The approximate level of take is equal to the proportion of suitable nesting habitat harvested each year, which is projected to average 2.0% annually. Acreages were estimated using harvest depletion data to determine the change in the proportion of stands 20 years or older with at least 20% basal area of Douglas-fir (nesting habitat). Harvest depletion data are derived from post-harvest aerial imagery that accounts for retention acres in addition to acres removed. The depletion data allows for a more accurate measure of the changes in the proportion of vole habitat from one year to the next (growth and harvest). The harvest depletion data is available at the end of each calendar year, and analyses are conducted over serval months. Therefore, the change in proportion of habitat between January 1, 2021 and January 1, 2022 was reported. Although this does not coincide with the dates of the reporting period, it more accurately reflects changes in the proportion of nesting habitat for tree vole from one year to the next. Additionally, Green Diamond's forestry staff avoided felling trees with tree vole nests located within the Riparian Management Zones (RMZs) and geological areas.

2. Results

The proportion of vole nesting habitat within the Plan Area as of January 1, 2021 was 53.9%, and the overall change in vole nesting habitat during the current reporting period was -0.8% (Table 8, Chapter IV).

No trees with known tree vole nests were felled within the RMZs or geological areas during the current reporting period.

3. Discussion

The annual level of take was projected to average 2.0% of the Plan Area vole population as measured by the change in the proportion of vole nesting habitat. The change in the proportion of vole nesting habitat within the Plan Area for this annual report did not exceed the projected average. Additionally, no trees containing tree vole nests were felled within the RMZs or geological areas.

VI. Conservation Areas

The fundamental premise of the FHCP is that a mosaic of high-quality habitat would be maintained for the Covered Species within the term of the permit through retention of habitat elements and regrowth of other habitat components temporarily lost due to timber harvest. This central conservation strategy is augmented by specific landscape commitments. The primary mitigation strategy for the Northern spotted owl under the FHCP is the establishment of Dynamic Core Areas (DCAs) as the highest priority and level of protection for the most productive spotted owl sites distributed throughout the Plan Area. DCAs are intended to be dynamic and adaptive, which contrasts with the static reserve concept of the set-asides established under the 1992 Northern Spotted Owl HCP. Upon FHCP approval, set-aside areas established under the 1992 Northern Spotted Owl HCP that were not included as DCAs were available for timber harvest. However, harvesting was scheduled in a manner to delay take of spotted owl sites as long as possible within the constraints of the Forest Practice Rules (FPRs) and adjacency requirements. In addition to the DCAs, the FHCP established a Peripheral Area of approximately 2% of the Green Diamond ownership where spotted owls were specially managed for no take. This section of the annual report describes harvesting within former set-asides; designation, monitoring, and replacement of DCAs; and Peripheral Area management.

A. Methods

Green Diamond established 44 DCAs in the Plan Area, totaling 3777.4 acres. Each DCA was designed to provide a core nesting area for a single pair of spotted owls with a minimum no-harvest core area of 89 acres of nesting/roosting habitat where available. These initial DCAs were selected by first evaluating all sites within the Plan Area during the course of study (1990-2015). The criteria included selecting the most functional sites in terms of high occupancy and fecundity while considering extenuating factors related to maintaining good spatial distribution and considering barred owl influences on spotted owl site occupancy. In order to maintain spatial distribution for existing DCAs and future replacement DCAs, the Plan area was divided into 11 Owl Management Units (OMUs) ranging in size from approximately 22,000 acres to approximately 55,000 acres. OMUs were also used to evaluate spotted owl sites within geographical areas of somewhat similar habitat composition and management history. Using the same criteria, twelve additional DCAs were established as potential replacement or “Adaptive Management DCAs” (AMDCA) to provide for augmentation of the spotted owl population, as options for replacing spotted owl sites designated in the initial set of 44 DCAs, and for additions if Adaptive Management was triggered.

1. Transition from 1992 Northern Spotted Owl HCP set-asides

All set-aside areas defined in the 1992 Northern Spotted Owl HCP that were not designated as a DCA were available for timber harvest. However, Green Diamond implemented harvesting of these former set-asides within the Plan Area to maximize the persistence of any existing spotted owl sites by using a pattern of harvest unit layouts that avoided the core nesting area until the final harvest unit(s) within that set-aside.

2. DCA monitoring

The 44 DCAs and 12 AMDCAs were surveyed for spotted owls and barred owls, including a combination of site visits (daytime stand searches) and nighttime broadcast surveys at known spotted owl sites. A DCA/AMDCA was considered occupied if the associated spotted owl site was occupied, including occupancy at activity centers located outside of the DCA/AMDCA boundary. Annual occupancy and mean fecundity were calculated for all associated spotted owl sites in order to monitor the success of the biological functionality of the DCA (i.e., mean annual occupancy ≥0.75 and mean fecundity ≥0.25 averaged over the last four years). All owl activity centers were classified according to the definitions in section 6.2.4.4 of the FHCP. Since demographic surveys were not conducted for barred owls, information on barred owl site activity centers was limited. However, a combination of daytime and nighttime barred owl detections was used to determine if a spotted owl site associated with a DCA/AMDCA was influenced by barred owls. The spotted owl site was considered barred owl influenced if one of the following conditions were met:

- a pair of barred owls were detected within the site,
- a single barred owl was detected within the site more than once during the breeding season and detections were separated by at least two weeks, or
- a single barred owl was detected within the site over multiple consecutive breeding seasons.

3. DCA replacement or additions

The DCA conservation strategy was designed to maintain a well-distributed array of protected nesting core areas with high occupancy and good fecundity. Since these sites occur on a changing managed landscape, the locations of DCAs must remain dynamic through time to maintain their biological functionality while also providing flexibility in timber harvesting. Therefore, a DCA replacement occurred if the site declined below or failed to meet the biological thresholds for a DCA (i.e., mean annual occupancy ≥0.75 and mean fecundity ≥0.25 averaged over the last four years). DCA replacement may also occur for economic reasons so long as the replacement DCA met the biological and spatial requirements defined in the FHCP (Section 5.3.1.4.4). However, DCAs were not replaced during the first 5 years of FHCP implementation in order to allow time for the Conservation Program to be effective, especially barred owl removal efforts. As described above, 12 AMDCA sites may be used for replacing spotted owl sites designated in the initial set of 44

DCAs and for additions if Adaptive Management was triggered. One additional DCA was designated for each incremental net increase in the Plan Area of 8,000 acres, and the additional DCA was located within the scope of the added lands.

4. Peripheral Area management

The Peripheral Area consisted of timberlands that Green Diamond does not intend to own and manage as part of its long-term business plan and conservation plan for the Covered Species. Additionally, the Peripheral Area consisted of any other Green Diamond Ownership in Del Norte or Humboldt Counties, California that were outside the Eligible Plan Area described in the FHCP. The Peripheral Area was managed solely for the prevention of spotted owl take by timber harvest through implementation of pre-harvest survey protocols. If a spotted owl site was known to exist or was detected through surveys, it was protected by no take seasonal harvest restrictions and by maximum habitat modification limitations within no take spatial buffers around the spotted owl site (FHCP Section 6.2.4).

B. Results

1. Transition from 1992 Northern Spotted Owl HCP set-asides

Four timber harvest plans consisting of 198.9 acres were initiated within four of the former set-asides during the current reporting period (Table 16). Although 3 active spotted owl sites were within the boundaries of these set asides, the owl sites and harvest operations were not impacted due to habitat levels above thresholds (Section 5.1) and protection measures for nesting owls (Section 2.1).

Table 16. Schedule of set-asides and spotted owl site occupancy 2022.

Set-aside name	Original acres	Acres harvested in current reporting period	Cumulative acres harvested	Acres remaining	Site name	Site status	Harvest within site core
4076	297.1	0.0	0.0	297.1	4076[1]	Unoccupied	None
					4128	Nesting pair	None
					4300	Nesting pair	None
4230	77.0	0.0	0.0	77.0	4230#1[1]	Non reproductive pair	None
4850	875.9	94.8	94.8	781.1	4850	Vacant	None
					4851[1]	Male, pair status unknown	None
					6600[1]	Unoccupied	None
					Maple Creek #1	Male, pair status unknown	None
5700	76.2	0.0	0.0	76.2	5700[1]	Non reproductive pair	None
6007	193.8	0.0	0.0	193.8	6007[1]	Nesting pair	None
Bald Mt. Creek	61.2	0.0	0.0	61.2	None	Not applicable	None
Black Dog Creek	167.7	0.0	43.4	124.3	Lower Dry Creek	Nesting pair	None
Blue Creek Cabin	498.8	1.1	1.1	497.7	None	Not applicable	None
Boulder Creek	1987.8	0.0	208.5	1779.3	Boulder Creek #1	Unoccupied	None
					Boulder Creek #2[1]	Unoccupied	None
					Boulder Creek #3[1]	Unoccupied	None
					Boulder Creek #4	Nesting pair	None
					Boulder Creek #5[1]	Vacant	None
					Camp Gate	Unoccupied	None

Set-aside name	Original acres	Acres harvested in current reporting period	Cumulative acres harvested	Acres remaining	Site name	Site status	Harvest within site core
					Camp Gate North[1]	Unoccupied	None
Bug Creek	371.5	0.0	0.0	371.5	None	Not applicable	None
Cal Barrel	192.5	0.0	32.0	160.5	Cal Barrel	Non reproductive pair	None
Camp Bauer	241.1	0.0	0.0	241.1	Camp Bauer[1]	Nesting pair	None
Canyon Creek	188.3	0.0	0.0	188.3	Canyon Creek #1[1]	Nesting pair	None
Devil's Creek	113.3	0.0	0.0	113.3	Mad River Overlook	Nesting pair	None
Dolly Varden	374.2	37.4	64.3	309.9	Dolly Varden[1]	Vacant	None
EBF	111.6	0.0	0.0	111.6	EBF[1]	Unoccupied	None
Fawn Prairie	242.3	0.0	73.8	168.5	None	Not applicable	None
H131	166.9	0.0	0.0	166.9	None	Not applicable	None
Humbug Creek	162.6	0.0	0.0	162.6	Humbug Creek	Male, pair status unknown	None
Johnson Creek	125.2	0.0	0.0	125.2	None	Not applicable	None
Little Deer Creek	680.8	0.0	0.0	680.8	Deer Creek	Unknown[2]	None
					Little Deer Creek	Unknown[2]	None
Lower Tully Creek	376.1	0.0	0.0	376.1	None	Not applicable	None
Lupton Creek	249.0	0.0	0.0	249.0	Lupton Creek #1[1]	Unoccupied	None
					Lupton Creek #2	Unoccupied	None
					Lupton Creek #3	Male, pair status unknown	None
McCloud Creek	174.9	0.0	0.0	174.9	None	Not applicable	None

Set-aside name	Original acres	Acres harvested in current reporting period	Cumulative acres harvested	Acres remaining	Site name	Site status	Harvest within site core
Mettah Creek	176.3	0.0	0.0	176.3	None	Not applicable	None
Morek Creek	1002.7	0.0	0.0	1002.7	None	Not applicable	None
Mule Creek	853.1	0.0	99.8	753.3	Denman Creek	Non reproductive pair	None
					Mule Creek	Female, pair status unknown	None
No Name Creek	735.2	0.0	0.0	735.2	7000	Unoccupied	None
					Noname Creek[1]	Vacant	None
					Upper Noname Creek	Unoccupied	None
					Noname North	Female, pair status unknown	
Old 299	172.1	0.0	0.0	172.1	Old 299 #1[1]	Nesting pair	None
Poverty Creek	363.9	66.5	84.4	279.5	Poverty Creek	Single unknown[3]	None
Puter Creek	127.8	0.0	0.0	127.8	Quarry Creek[1]	Single male, not reproductive	None
Redwood Creek	181.1	0.0	0.0	181.1	None	Not applicable	None
Roddiscraft/Powerline	312.3	0.0	0.0	312.3	Powerline North	Pair, nesting status unknown	None
Salmon Creek	218.0	0.0	0.0	218.0	Salmon Creek #3[1]	Pair, nesting status unknown	None

Set-aside name	Original acres	Acres harvested in current reporting period	Cumulative acres harvested	Acres remaining	Site name	Site status	Harvest within site core
					Sampson	Vacant	None
SF Bald Mt.	130.0	0.0	0.0	130.0	None	Not applicable	None
T300	71.8	0.0	0.0	71.8	None	Not applicable	None
Upper Tully Creek	239.5	0.0	0.0	239.5	Upper Tulley Creek	Vacant	None
Walsh	148.2	0.0	0.0	148.2	Middle Salmon Creek	Unoccupied	None
					Walsh	Non reproductive pair	None
Williams Ridge	261.8	0.0	0.0	261.8	None	Not applicable	None
Wiregrass	229.0	0.0	0.0	229.0	None	Not applicable	None

[1] Denotes a spotted owl site that is also associated with a DCA or AMDCA.

[2]Unknown site status indicates that protocol surveys were not conducted. During the current reporting period, sites with an 'unknown' status were located outside of the demographic study area and where no timber harvesting was proposed.

[3]Single unknown denotes a spotted owl whose sex, pair status and reproductive status are unknown

2. DCA monitoring

The 44 originally designated DCAs were located in seven of the 11 OMUs, and the 12 AMDCAs were located in four of the OMUs (Table 17). Thirteen DCAs (Table 18) and nine AMDCAs (Table 19) were occupied by spotted owls in 2022. Ten DCA sites were occupied by pairs and three were occupied by owls with unknown social status. Five DCA-associated pairs attempted nesting and two pairs successfully fledged two owlets. Four AMDCAs were occupied by pairs, one was occupied by a single owl, and four were occupied by an owl with unknown social status. Two AMDCA-associated pairs attempted nesting and one pair successfully fledged one owlet. Compared to the previous reporting period, DCA occupancy and DCA/AMDCA paired occupancy decreased in 2022. Meanwhile, AMDCA occupancy increased in 2022.

Thirty-two of the 44 DCAs were considered to be influenced by barred owls in a previous year, 20 continued to be barred owl influenced in 2022, and one DCA was influenced by barred owls for the first time in 2022. Five of the 12 AMDCAs were considered to be influenced by barred owls in a previous year, one continued to be barred owl influenced in 2022, and zero AMDCAs were newly barred owl influenced during the current reporting period.

Of the 44 originally designated DCAs, six met the criteria for mean fecundity and mean occupancy, eight met the criteria for either mean fecundity or mean occupancy, and 30 failed to meet either criterion. Of the 12 AMDCAs, five met the criteria for mean fecundity and mean occupancy, six met the criteria for either mean fecundity or mean occupancy, and one failed to meet either criterion.

Table 17. Owl Management Units (OMUs) and their current associated DCA/AMDCAs. AMDCAs are differentiated with an asterisk.

OMU#	OMU Name	DCA	AMDCA
1	Smith River	None	Winchuck River
2	Wilson, Hunter, Terwer Creeks	East Fork Hunter, Hunter 500, T-Line, W100, W302	None
3	McGarvey, Ah Pah, Surpur Creeks	None	None
4	Tectah, Mettah, Roach, Tully Creeks	Ambrose, Hancorne Ranch, Lower Roach, Morek Creek, Notchkoo, WM200, WM400	None
5	Maple Creek	None	None
6	Redwood Creek	Dolly Varden, Fernwood, Garrett Creek, Lupton Creek #1, Noisy Creek, Panther Bridge	None
7	Little River	None	None
8	North Fork Mad River	Cal Barrel Washout, Camp Bauer, Jurin, Lower Dolf Creek, Old 299 #1, SF Bald Mt. Creek	Tip Top Ridge
9	Lower Mad River, Jacoby Creek	4076, 4230 #1, 4851, 6007, 6600, Canyon Creek #1, Devil's Creek, Dry Creek, Noname Creek	4107, 5700, Blue Blossom, Mad River Overlook, Mad River STS, Noname North, Quarry Creek, Sullivan Gulch
10	Upper Mad River, Upper Redwood Creek	Boulder Creek #2, Boulder Creek #3, Boulder Creek #5, Camp Gate North, Camp Gate South, Graham Creek, Mt. Andy, N. Goodman Prairie, Pardee South	None
11	Humboldt Bay, Eel River	EBF, Salmon Creek #3	C2300, Salmon Creek #2

Table 18. Dynamic Core Area (DCA) characteristics based on the current reporting period. 'Previous' indicates barred owl influence in a previous year.

DCA #	DCA site name	Acres	Starting year of occupancy	Year last occupied	Barred owl influence	Current year		Last 4 years (2019-2022)			
						Site Status	Number of fledglings	Mean fecundity	Number of fledglings	Years occupied	Mean Occupancy[1]
1	Hunter 500	78.2	2006	2022	No (previous)	Non nesting pair	0	0.33	2	3	0.75
2	W302	87.4	1992	2015	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
3	W100	76.9	1992	2020	Yes (previous)	Unoccupied	0	0.00	0	1	0.25
4	East Fork Hunter	56	2004	2021	No	Unoccupied	0	0.50	2	2	0.50
5	T-Line	98.1	1992	2019	No	Vacant	0	0.00	0	1	0.25
6	Ambrose	80.8	1993	2010	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
7	Notchkoo	72.3	1992	2022	Yes (previous)	Single Unknown[2]	0	0.00	0	3	0.75
8	Lower Roach	98.6	1992	2022	Yes (previous)	Single Unknown[2]	0	0.00	0	2	0.50
9	Morek Creek	107.7	1992	2016	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
10	Hancorne Ranch	90.4	2001	2012	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
11	WM400	105.5	1992	2016	No (previous)	Unoccupied	0	0.00	0	0	0.00
12	WM200	79.6	1992	2016	Yes (previous)	Vacant	0	0.00	0	0	0.00
13	Panther Bridge	81.1	1992	2020	Yes (previous)	Unoccupied	0	0.00	0	1	0.25
14	Garrett Creek	76.5	1992	2012	No (previous)	Unoccupied	0	0.00	0	0	0.00

DCA #	DCA site name	Acres	Starting year of occupancy	Year last occupied	Barred owl influence	Current year		Last 4 years (2019-2022)			
						Site Status	Number of fledglings	Mean fecundity	Number of fledglings	Years occupied	Mean Occupancy[1]
15	Dolly Varden	118.2	1992	2006	No (previous)	Vacant	0	0.00	0	0	0.00
16	Lower Dolf Creek	67.9	1999	2013	No (previous)	Vacant	0	0.00	0	0	0.00
17	Jurin	91.2	1993	2016	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
18	Old 299 #1	81.3	1992	2022	No (previous)	Nesting pair	0	0.17	1	3	0.75
19	Lupton Creek #1	92.7	1992	2015	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
20	Cal Barrel WO	81.7	1992	2022	No	Nesting pair	1	0.25	2	4	1.00
21	SF Bald Mt. Creek	69.4	1992	2022	No (previous)	Non nesting pair	0	0.00	0	2	0.50
22	Camp Bauer	103.8	1992	2022	No (previous)	Nesting pair	0	0.00	0	3	0.75
23	Fernwood	93.4	1992	2021	No	Unoccupied	0	0.00	0	2	0.50
24	Noisy Creek	129.7	1992	2011	Yes (previous)	Vacant	0	0.00	0	0	0.00
25	4230 #1	76	1992	2022	No (previous)	Non nesting pair	0	0.375	3	4	1.00
26	Canyon Creek #1	73.5	1992	2022	No	Nesting pair	1	0.33	2	4	1.00
27	4076	84.7	1992	2018	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
28	6007	78.5	1997	2022	No	Nesting pair	0	0.25	2	4	1.00
29	Devil's Creek	97	1999	2021	Yes (previous)	Unoccupied	0	0.00	0	2	0.50

DCA #	DCA site name	Acres	Starting year of occupancy	Year last occupied	Barred owl influence	Current year		Last 4 years (2019-2022)			
						Site Status	Number of fledglings	Mean fecundity	Number of fledglings	Years occupied	Mean Occupancy[1]
30	Dry Creek	68	1992	2022	No	Non nesting pair	0	0.00	0	4	1.00
31	4851	65.9	1992	2022	Yes (previous)	Male, pair status unknown	0	0.00	0	3	0.75
32	6600	70.7	1992	2014	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
33	Noname Creek	77.6	1992	2012	No	Vacant	0	0.00	0	0	0.00
34	Pardee South	71.5	2004	2018	No (previous)	Unoccupied	0	0.00	0	0	0.00
35	Boulder Creek #3	104.1	1992	2017	No (previous)	Unoccupied	0	0.00	0	0	0.00
36	Boulder Creek #2	78.9	1992	2018	Yes (previous)	Unoccupied	0	0.00	0	0	0.00
37	Camp Gate North	76.6	1992	2021	Yes (previous)	Unoccupied	0	0.00	0	1	0.25
38	Boulder Creek #5	96.9	1997	2018	No	Vacant	0	0.00	0	0	0.00
39	Camp Gate South	72.4	1992	2020	No (previous)	Unoccupied	0	0.25	1	2	0.5
40	Mt. Andy	95.7	1994	2015	No	Vacant	0	0.00	0	0	0.00
41	North Goodman Prairie	130.3	1992	2021	No (previous)	Unoccupied	0	0.00	0	2	0.5
42	Graham Creek	89.3	1992	2016	No	Vacant	0	0.00	0	0	0.00
43	EBF	74.3	1992	2021	Yes	Unoccupied	0	0.17	1	3	0.75

DCA #	DCA site name	Acres	Starting year of occupancy	Year last occupied	Barred owl influence	Current year		Last 4 years (2019-2022)			
						Site Status	Number of fledglings	Mean fecundity	Number of fledglings	Years occupied	Mean Occupancy[1]
44	Salmon Creek #3	77.1	1992	2022	Yes (previous)	Pair, nesting status unknown	0	0.5	2	4	1.00

[1] Mean Occupancy is reported as naïve occupancy (i.e., not modeled occupancy).

2 Single unknown denotes an NSO whose sex, pair status and reproductive status are unknown

Table 19. Characteristics of Potential Replacement or Adaptive Management Dynamic Core Areas (AMDCAs) established during the first five years of plan implementation. 'Previous' indicates barred owl influence in a previous year.

AMDCA #	DCA site name	Acres	Starting year of occupancy	Year last occupied	Barred owl influence	Current year		Last 4 years (2019-2022)			
						Site status	Number of fledglings	Mean fecundity	Number of fledglings	Years occupied	Mean occupancy[1]
45	Winchuck River	93.6	2011	2022	No (previous)	Single Unknown[2]	0	0.25	1	4	1.00
46	Tip Top Ridge	94.9	2016	2019	No (previous)	Unoccupied	0	1	2	1	0.25
47	Sullivan Gulch	89.7	2010	2022	No	Female, pair status unknown	0	0	0	4	1.00
48	Quarry Creek	92.4	1992	2022	No	Single male, not reproductive	0	0	0	4	1.00
49	Mad River STS	97.5	2012	2022	No	Male, pair status unknown	0	0.5	3	4	1.00
50	4107	92.4	1992	2020	No	Unoccupied	0	0	0	2	0.5
51	Blue Blossom	97.1	2010	2022	No (previous)	Non reproductive pair	0	0	0	3	0.75
52	5700	90.3	1992	2022	No	Non nesting pair	0	0.25	2	4	1.00
53	Mad River Overlook	90.1	2015	2022	No (previous)	Nesting pair	0	0	0	3	0.75
54	Noname North	93.1	2013	2022	Yes (previous)	Female, pair status unknown	0	0	0	3	0.75
55	Salmon Creek #2	93.5	1992	2021	No	Unoccupied	0	0.33	2	3	0.75
56	C2300	90	1992	2022	No	Nesting pair	1	0.67	4	4	1.00

[1]Mean Occupancy is reported as naïve occupancy (i.e., not modeled occupancy).

2 Single unknown denotes an NSO whose sex, pair status and reproductive status are unknown

Table 20. Comparison of occupancy and reproductive success for DCA and AMDCA sites from 2020 through 2022.

Year	# Occupied	# Pairs	# Pairs nesting	# Pairs successful	# Fledged owlets
2020	25	14	8	6	7
2021	26	18	12	8	12
2022	22	14	7	3	3

3. DCA replacement and additions

No DCAs were replaced during the current reporting year. No DCAs were added to the Plan Area as a result of land acquisitions.

4. Peripheral Area management

No THPs were harvested or proposed for harvest within the Peripheral Area during the reporting period. Therefore, no pre-harvest surveys were conducted. Additionally, no land transactions occurred within the Peripheral Area during the reporting period.

C. Discussion

Although harvest occurred within four of the historic set-asides, active spotted owl sites were not impacted due to the location of harvest in relation to the current activity center and the amount of habitat post-harvest.

In 2022, 38% of the successful spotted owl nest sites within the Plan Area were located within a DCA (n = 2) or an AMDCA (n = 1). Of the five successful nest sites not associated with a DCA or an AMDCA, four were located within an OMU containing the successful DCA or AMDCA sites. Of the eight successful nests, 88% were not influenced by barred owls (no detections within 0.5 mile of the activity center) in 2022. Additionally, all three of the DCA/AMDCA associated pairs that successfully fledged young were not influenced by barred owls in 2022. Although formal analyses have not been completed, the increase in overall mean fecundity and mean occupancy at DCA/AMDCA sites in 2021 was likely a result of ongoing barred owl removal efforts. The decrease in mean occupancy and mean fecundity in 2022 was likely due to heavy rainfall during April and early May, the critical incubation and brooding period for spotted owls. Additionally, pairs that nest in one year may be less likely to nest the following year due to high reproductive demands and energetic costs, thus creating an even-odd-year effect. The potential for an even-odd-year effect may have also contributed to the decrease in mean occupancy and number of successful nests in 2022. As outlined in the FHCP, DCAs will not be replaced for the first five years of FHCP implementation in order to allow time for the Conservation Program to be effective, especially barred owl removal efforts. In the absence of barred owls, spotted owls may select sites based strictly on habitat quality, and spotted owl performance at currently designated DCA/AMDCA sites may improve once the competitive pressures are alleviated.

VII. Spotted Owl Studies

Green Diamond's spotted owl studies from 1989 through 2019, which included a two-year graduate study of the owls' habitat and implementation of Green Diamond's 1992 HCP for Northern Spotted Owls, provided a firm biological basis for the conservation strategy of the FHCP. The demographic portion of these studies, which were continued in 2021, addressed population density, reproductive success, site occupancy, population turnover rates, and other demographic information pertaining to the owls.

The objectives of Green Diamond's continuing owl studies are to monitor the efficacy of the FHCP through:

- Estimating distribution and population density of northern spotted owls through direct counts of banded birds in large tracts of managed young-growth forests in northern California.

- Estimating demographic parameters (reproductive success, survival rates, site occupancy, and turnover rates) to determine viability of this population.

- Assessing the long-term dynamic relationship between owl distribution, habitat loss through timber harvest, and habitat gain through forest growth.

- Assess the potential impact on spotted owl viability from barred owls, West Nile Virus or other new threats

A. Methods

1. Site occupancy/status

Surveys were conducted at owl sites located in 2021 for occupancy in 2022. A site was considered occupied in 2022 if owls were detected at the same roost and/or nest site from previous years. A site was considered unoccupied in 2022 if it previously was a confirmed site, but not occupied in 2022. If a site was occupied early in the 2022 season, but apparently unoccupied later in the season, it was considered occupied in 2022. Such a site will not be considered unoccupied unless it is still unoccupied in 2023.

New sites were categorized in 2022 according to their survey history. A site was designated as a "newly discovered" site if it had been found in 2022 in an area that had not been surveyed or had inadequate survey coverage prior to 2021. A site was classified as a "newly colonized" site if it had been found in 2022 in an area that had been adequately surveyed prior to 2022, but no owls had been previously detected in the area. A site was classified as recolonized if it had been occupied in one or more previous years, unoccupied for three or more years prior to 2022 and then occupied again in 2022. A site

was classified as 'possible' if first responses of spotted owls occurred late in the breeding season and for which the required number of surveys/follow-up visits could not be completed before the end of the breeding season. 'Possible' sites designated in one breeding season are surveyed in the subsequent breeding season to determine if a perennial owl site exists.

2. Reproductive success

Pair status was designated by observing a male and female in close proximity (less than 1/4 mile) in any of the following contexts: roosting, vocalizing, nesting, delivering prey, or tending young. An owl was judged to be single if the same owl was observed on two or more occasions in the same general area without detecting an owl of the opposite gender.

Nesting was designated for pairs if the female was observed incubating eggs or brooding young between April 1 and May 31. In some instances, incubation was determined in late-March, but a second visit was generally conducted prior to May 31 to confirm nesting. We determined reproductive success of nesting owl pairs that were monitored to protocol from June 1- August 31. Pairs were considered to have successfully nested if at least one owlet was observed to have fledged. In special circumstances, the location and stage of development of an owlet found dead were evaluated to determine whether the owlet had fledged.

3. Spotted owl banding

When unbanded owls or owls banded with cohort auxiliary leg bands (owls banded as juveniles with a color band identifying the year in which they were banded) were located during follow-up visits, bait mice or artificial lures were used to attract the owls within range of capture. All age classes of spotted owls were primarily captured using a snare pole. Once an owl was captured, a USFWS band was placed on one of its legs and an auxiliary colored leg band on the other. The following measurements were usually taken in earlier years of the study: wing cord, body mass, length of tarsus, length of footpad, and tail length. If conditions permitted, toe, claw, bill length and bill depth also were measured. The age class of the owl was recorded. Subadults (one- or two-year-old owls) were distinguished from adults (greater than two years old) by having pointed retrices. One-year-old (S1) and two-year-old (S2) subadults were distinguished using the methods of Moen et al. (1991). Owls were also checked for molt, previous or current injuries, parasites, and presence of brood patches for females. Owls were released immediately after they were banded and measured.

4. Juvenile dispersal

Owls banded as juveniles were assigned to the appropriate age class when they were recaptured. We used locations of spotted owls banded as juveniles (both within and outside the Green Diamond study area) and recaptured as adults or subadults to measure

juvenile dispersal distances. Distances were determined for juveniles: 1) dispersing within Green Diamond's study area and 2) dispersing from Green Diamond's study area to another area or dispersing from another area to Green Diamond. Other study areas included the Willow Creek Study Area, Hoopa Reservation, Humboldt Redwood Company, Redwood National Park and regional studies in Oregon.

5. Turnover

Adult and subadult owls banded or resighted in one year were used to determine turnover rates in the subsequent year. Owls were considered to be "missing" if they were banded or resighted at least once during one season, but not resighted the next year. If an owl disappeared in the same season in which it was earlier banded or resighted, it was reported as missing the next season if its whereabouts were still unknown. Owls that were present at a site but could not be positively resighted were excluded from the analysis. New recruits were defined as owls that became territorial for the first time.

6. Owl density

Large areas (typically greater than 50,000 acres) completely surveyed for spotted owls and owl locations were mapped on a GIS database. GIS programs determined the acreage of thoroughly surveyed areas that included a northern and a southern study area. Once the owl sites were plotted, the number of sites in the surveyed areas was determined. The sites were classified into those occupied by paired or single owls. It was assumed that a single owl occupied the site 1) if it was confirmed that a single bird was at the site, or 2) if the pair status of the site was unknown. The total number of territorial owls associated with the sites in completely surveyed areas was used to calculate overall owl density and density of owls in the northern and southern areas. The density study area on and adjacent to Green Diamond ownership is shown in Figure 2. *The **density study area** is a defined subset of the demographic study area (see definition below in section 7) in which the entire area is surveyed each year in an attempt to locate all occupied northern spotted owl sites, which can be used to calculate an annual estimate of spotted owl density.*

7. Demography

Green Diamond Resource Company has been conducting a demography study on Northern Spotted Owls since 1990 to monitor trends in the owl's population within Green Diamond's ownership. *The **demographic study area** is the portion of Green Diamond's ownership and selected adjacent areas in which all known northern spotted owl sites are monitored annually to estimate occupancy, fecundity and survival following accepted scientific protocols. The number of demographic sites may change over time as a result of land acquisitions and disposals, newly colonized sites, or significant activity center shifts at historic sites.* The Green Diamond demographic study area is one of 11 long-term, ongoing studies that contribute to a periodic, region-wide meta-

analysis of the status of the northern spotted owl. In January 2020, Green Diamond biologists attended a workshop convened in Corvallis, Oregon to analyze demographic data on Northern Spotted Owls. The workshop was attended by biologists from 11 study areas throughout Washington, Oregon and California along with a large contingent of biometricians and statisticians from several academic and research institutions across North America. Most of the study areas were on federal lands or a mix of federal, state and private lands, with only one entirely on private lands and one on Indian Reservation lands.

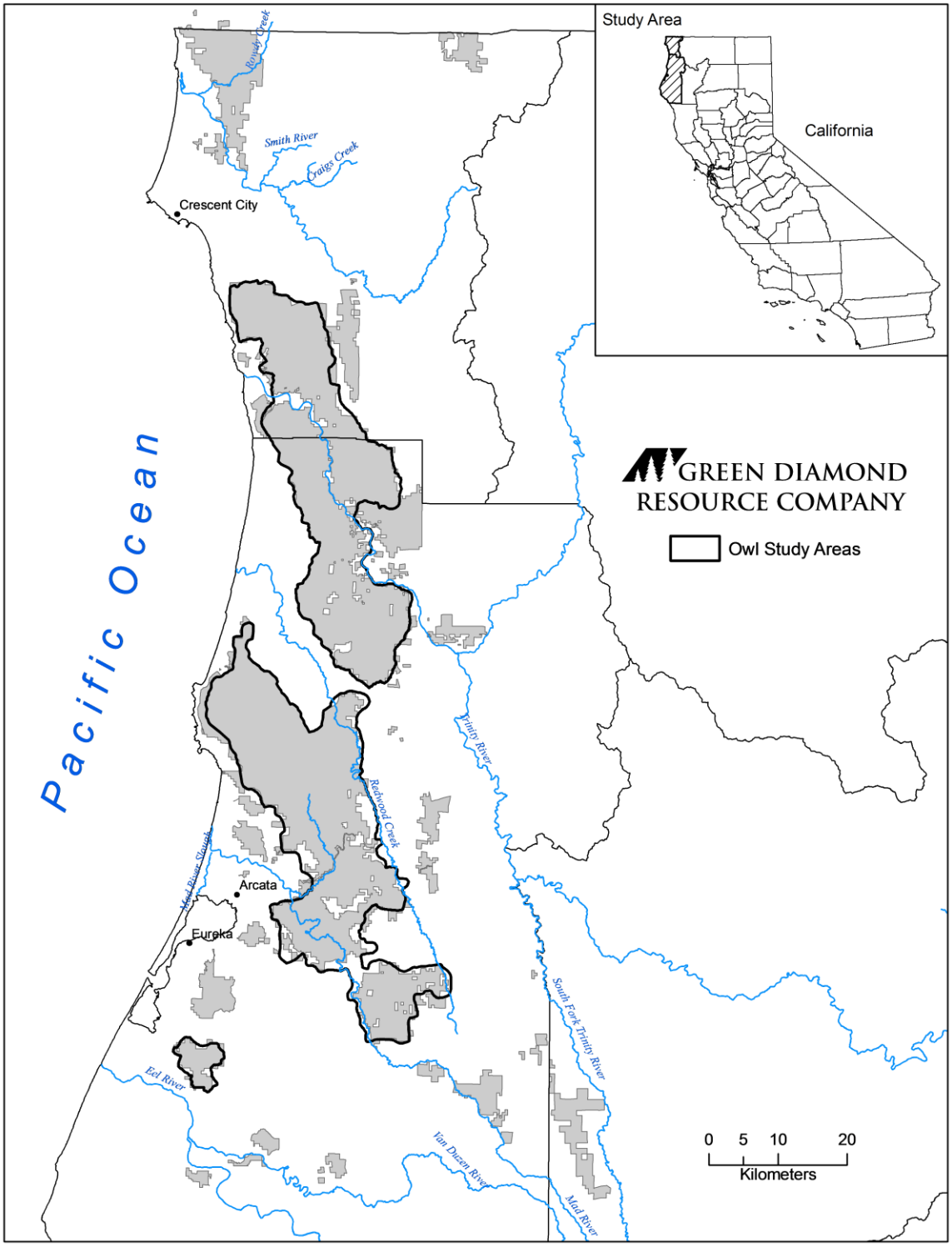


Figure 2. Location of Green Diamond density study area for northern spotted owls in northern California.

8. Barred owls

Since 1989, Green Diamond biologists have noted the incidental detection of barred owls on or adjacent to the ownership while conducting surveys for spotted owls. We recorded all barred owl detections from daytime and nighttime owl surveys since 1989. We defined a barred owl site as an area having a history of detections from a single bird on multiple occasions within the same year or in multiple years. Single detections of pairs or evidence of young were also included as sites. The assessment for number of sites was limited to the density study area since this area has consistent and adequate annual survey coverage. We did not conduct site visit level surveys for barred owls to determine paired or reproductive status.

Upon approval of the amendment to the 1992 Northern Spotted Owl HCP in December 2007, Green Diamond committed to further research on the interactions between spotted owls and barred owls. In 2009, Green Diamond began conducting barred owl surveys in select areas within the spotted owl density study area. Surveys were conducted using electronic solid state callers (Wildlife Technologies) with a variety of barred owl vocalizations. Coincident with the specific surveys for barred owls, Green Diamond launched a pilot study (Phase I) in participation with the California Academy of Sciences. The removal of barred owls was conducted in the context of before-after-control-impact (BACI) design that divided the study area into paired areas of similar size where one portion of the study area was treated (barred owls lethally removed, Diller et al. 2014) and the other area considered a “control” was untreated by allowing unfettered expansion of barred owls. The spotted owl response variables in both treatment and control areas were occupancy, fecundity and survival. A secondary objective of the study was to observe more “case studies” of how spotted owls respond to the removal of territorial barred owls. The highest priority was given to removing barred owls from nest sites or activity centers that were formerly occupied by spotted owls. Following removal, we documented the specifics of the site relative to potential recolonization by either species of owl. These case studies provided insight into how spotted owls respond, when they have been displaced by barred owls. For example, if the original spotted owl territory holders rapidly recolonize a site (i.e., several weeks to a month) following the removal of an invading pair of barred owls, this would suggest the spotted owls remained in or near their original territory after being displaced. However, if a site that has been “freed” of barred owls takes a long time (i.e., a year or more) to be recolonized and/or the spotted owls are new individuals at the site, this would suggest that displaced spotted owls abandon their territories after being displaced. The initial Phase I experiment was completed in 2014 and results of the study are available in Diller et al. 2016.

In 2020, based on the results of the Phase I experiment, Green Diamond initiated Phase II of the barred owl removal experiment which expands the removal effort across all of the Plan Area, where feasible. Phase II also utilizes a BACI (before-after-control-impact) design with paired treated (i.e., the Plan Area where barred owls will be removed) and

untreated control areas (i.e., the Willow Creek Demographic Study Area). Phase II objectives include those of Phase I (spotted owl demographic response to barred owl removal), determining the feasibility of a large-scale removal experiment, and estimating the recovery of spotted owl populations that have been suppressed by barred owls for a decade or more. Phase II has an expected duration of approximately 10 years or until objectives of the study have clearly been achieved. Following completion and evaluation of the results of Phase II, Phase III implementation will include an approved invasion and co-existence experiment. During the invasion portion of Phase III, barred owls will be allowed to recolonize selected areas from which they had previously been removed for 10 years or more. The objectives of the second portion of Phase III will be to fine tune suppression of barred owl numbers to achieve a stable equilibrium in which the FHCP spotted owl objectives are achieved while minimizing the need for continued lethal removal of barred owls.

Removal efforts in 2020 focused on spotted owl sites associated with Dynamic Core Areas (DCAs), sites with recent (within the last three years) spotted owl occupancy, and Owl Management Units (OMUs) with designated DCAs. Removal efforts in 2021 and 2022 continued to focus on these same areas but also expanded to include the majority of the Plan Area. For more information on DCAs and OMUs, see Chapter VI of this report. Since initiation of the Phase II barred owl removal experiments in 2020, barred owl surveys have been conducted year-round.

In 2010, we conducted occupancy surveys for barred owls within the spotted owl Density Study Area. We established 68 survey points from which we conducted the occupancy surveys. Occupancy surveys were conducted during the early breeding season and in the late fall/winter. We used a variety of barred owl vocalizations broadcast from digital wildlife callers (Wildlife Technologies, MA-15). Each survey point was called for a minimum of sixteen minutes. The goal is to conduct occupancy surveys on an annual basis to assess occupancy over the long-term in relation to potential management actions.

From 2011 through 2022, the barred owl occupancy survey effort was expanded to include the spotted owl Demographic Study Area. We modified our survey protocols to include nine minutes of spotted owl vocalizations followed by nine minutes of barred owl vocalizations broadcast from digital wildlife callers (Wildlife Technologies model MA-15). In order to cover the study area more completely, we increased the number of survey points from 68 to 500 or approximately one station/800 acres within the demographic study area. Each survey point was called for a minimum of eighteen minutes at least twice during the spotted owl breeding season (March 1 through August 31).

9. Model validation

a. Habitat fitness

Green Diamond developed a habitat fitness model for spotted owls using research and monitoring data collected over two decades. Habitat fitness projections indicate an increasing trend in the habitat with greatest fitness values suggesting the spotted owl population is capable of increasing in the Plan Area in the future. After approximately ten years of FHCP implementation, Green Diamond will attempt to validate the habitat fitness model by determining if the trend in estimated occupied spotted owl sites are statistically shown to be stable or increasing as predicted by the increasing trend in habitat quality. If validated, then direct monitoring of the entire spotted owl population across the Plan Area will be replaced by monitoring habitat conditions projected by a multi-state occupancy model.

b. Site occupancy

Since the habitat fitness model was not developed to predict how site-specific management actions might influence habitat quality for a specific spotted owl site, Green Diamond will develop and validate a multi-state occupancy model that includes management covariates that are more easily calculated and interpreted. A first draft of this site occupancy model will be developed within three years of signing the FHCP. If validated, the site occupancy model will be used to estimate take (displacement), estimate population change for the Plan Area spotted owl population and assess triggers for adaptive management. The triggers for adaptive management under the occupancy model will be the same as triggers used for rate of population change where there is evidence of a statistically significant decline in the Plan Area spotted owl population.

If both models are validated, the intensive Plan Area demographic spotted owl surveys will be replaced by occupancy surveys. However, Green Diamond will continue spotted owl surveys to protect individual nesting spotted owls, monitor DCAs, and monitor spotted owl fecundity in the Plan Area.

B. Results

1. Site occupancy

In 2022, a total of 85 owl sites were located in the Green Diamond demographic study area (Table 21). Of these sites, 81 were confirmed as occupied and four were confirmed as possible sites. Fifty-three sites were occupied by pairs, five were occupied by a single owl and 27 were occupied by owls with unknown social status. Thus, a minimum of 138 territorial owls were on the study area in 2022. The annual variation in confirmed and possible owl sites is shown in Table 22.

Of the sites occupied in 2021, 58 were occupied in 2022. Twelve sites occupied by pairs in 2021 were occupied by single birds or birds with unknown social status in 2022. Similarly, seven sites occupied by single birds or birds of unknown social status in 2021 were occupied by pairs in 2022. Owl sites occupied in 2022 that were not accounted for in 2021 included four possible sites, 18 perennial sites, three recolonized sites, and two newly colonized sites (Table 23 and Appendix III). Since 1994, there were 77 sites considered newly colonized in the density study area, and 99 sites considered newly colonized in the demographic study area. Since the adoption of the FHCP in 2019, there were six sites considered newly colonized in the demographic study area. No sites were newly discovered in 2022. A complete list of spotted owl sites located within the demographic study area and/or on the Green Diamond ownership along with matching state master owl numbers and the status of each site during the current reporting period is located in Appendix IV.

2. Reproductive success

Twenty-four pairs at 48 sites (50%) monitored (paired sites with protocol reproductive surveys) during the nesting season attempted nesting (Table 24). The reproductive success for one pair that attempted nesting was unknown. Thirteen nesting pairs successfully fledged a minimum of 17 owlets, for a reproductive success rate of 0.35 owlets fledged per monitored site. To date, eight pairs have made 13 nesting attempts in nest boxes. Eight attempts were successful, and ten owlets were fledged.

The trend in the number of owlets fledged per monitored pair from 1992-2022 is shown in Figure 3. The equation of the straight line relating owlets fledged per monitored pair versus year was estimated as: owlets fledged/monitored pair = 13.432-0.006*year. The slope of the regression line is -0.0064 with a standard error of 0.004. Due to this relatively high annual variation, the significance test that the slope is zero resulted in a t-value of -1.54 with $P = 0.13$.

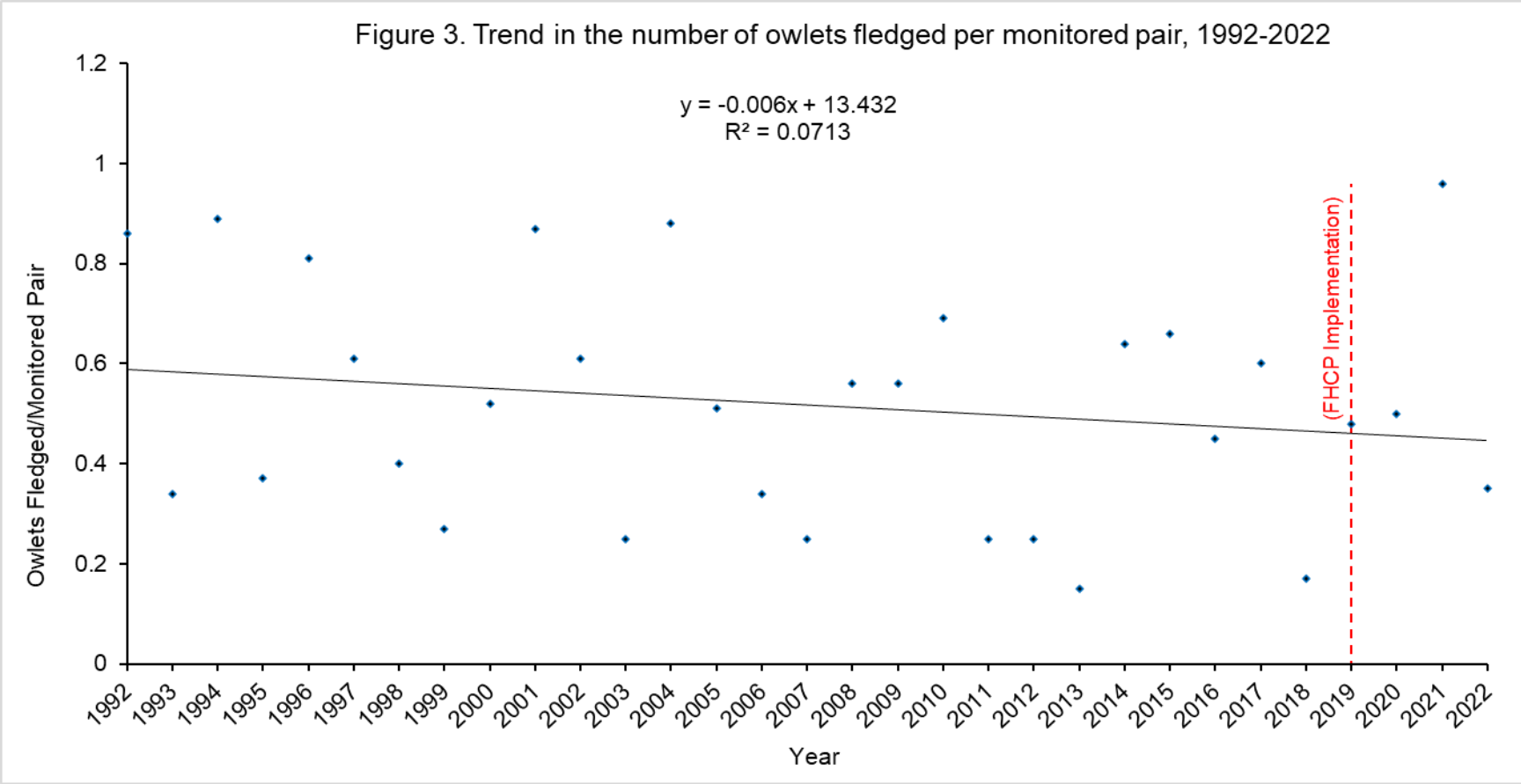


Figure 3. Trend in the number of owlets fledged per monitored pair, 1992-2022
y = -0.006x + 13.432
R² = 0.0713
Owlets Fledged/Monitored Pair
1.2
1
0.8
0.6
0.4
0.2
0
(FHCP Implementation)
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

Table 21. Status of northern spotted owls, Green Diamond demographic study area, 2022.

Nesting pairs (n)	Non-nesting pairs (n)	Nesting Status unknown pairs (n)	Singles (n)	Social status unknown (n)	Total sites (n)	Fledged owlets (n)
24	12	17	5	27	85	17

Table 22. Annual variation in northern spotted owl sites, Green Diamond demographic study area 1990-2022.

	Sites		
Year	Confirmed	Possible	Total
1990	86	1	87
1991	142	2	144
1992	171	18	189
1993	185	15	200
1994	183	5	188
1995	163	3	166
1996	155	0	155
1997	167	3	170
1998	186	3	189
1999	168	0	168
2000	163	0	163
2001	161	1	162
2002	156	1	157
2003	146	0	146
2004	141	0	141
2005	123	0	123
2006	128	0	128
2007	107	0	107
2008	99	0	99
2009	116	4	120
2010	117	2	119
2011	125	1	126
2012	125	2	127
2013	126	6	132
2014	122	3	125
2015	131	2	133
2016	119	8	127
2017	98	3	101
2018	95	6	101
	< FHCP Implementation >		
2019	88	2	90
2020	86	9	95
2021	82	4	86
2022	81	4	85

Table 23. Site occupancy of northern spotted owls, Green Diamond demographic study area, 2022.

		Sites Located in 2022			
Pair Status	Sites occupied in 2021	Sites occupied in 2021 and 2022	Sites Newly Colonized	Sites Recolonized	Sites Newly Discovered
Total	85	58	2	3	0

Table 24. Reproductive success of northern spotted owl pairs monitored from 1990-2022, Green Diamond demographic study area.

Year	# Sites monitored	# Pairs not nesting or reproductive	# Pairs nesting	# Pairs successful	# Fledged owlets	# Owlets fledged/ monitored site
1990	56	18	38	29	46	0.82
1991	101	45	56	47	70	0.69
1992	126	39	87	73	109	0.86
1993	92	56	36	20	31	0.34
1994	131	46	85	76	117	0.89
1995	106	59	47	30	39	0.37
1996	117	40	77	62	95	0.81
1997	94	54	40	35	57	0.61
1998	100	49	51	29	40	0.40
1999	111	86	25	20	30	0.27
2000	120	60	60	40	62	0.52
2001	114	40	74	58	99	0.87
2002	112	53	59	43	68	0.61
2003	91	71	20	16	23	0.25
2004	94	34	60	51	83	0.88
2005	98	37	61	32	50	0.51
2006	71	44	27	18	24	0.34
2007	67	55	12	10	17	0.25
2008	77	44	33	26	43	0.56
2009	66	29	37	23	37	0.56
2010	65	26	39	28	45	0.69
2011	75	58	17	12	19	0.25
2012	63	48	15	10	16	0.25
2013	80	67	13	10	12	0.15
2014	84	48	36	31	54	0.64
2015	74	42	32	29	49	0.66
2016	58	39	21	15	26	0.45
2017	52	28	24	19	31	0.60
2018	58	46	12	7	10	0.17
			<FHCP Implementation>			
2019	48	26	22	14	23	0.48
2020	40	19	21	15	20	0.50
2021	49	15	36	28	47	0.96
2022	48	29	24	13	17	0.54
Overall Mean						0.54

3. Spotted owl banding

Seven adults, five subadults and two juvenile spotted owls were captured and banded on the Green Diamond study area in 2022 (Table 25). The age of one non-juvenile banded in 2022 was unknown. Combined with 1990-2021 banding totals, 877 (46.4%) adults and subadults, and 1014 (53.6%) juveniles, for a total of 1891 owls have been banded. Of all non-juvenile owls that were banded on the Green Diamond study area through 2022, 32.2% were subadults, 67.8% were adults, and the age of two non-juveniles were unknown. Since FHCP implementation, 50 (73.5%) adults and subadults, and 18 (26.5%) juveniles, for a total of 68 owls have been banded (Table 26).

From 1990-2022, 70 owls recaptured on the Green Diamond study area were originally banded on other study areas such as the Willow Creek Study Area, Redwood National Park, Hoopa Reservation, and Humboldt Redwood Company lands (Table 27). These 70 owls included with the 1875 owls reported above combine for a grand total of 1945 individual owls captured on the Green Diamond study area. Since FHCP implementation, three owls recaptured on the Green Diamond study area were originally banded on other study areas (Table 28). Four birds previously banded as a juvenile were recaptured in 2022, for a total of 263 juveniles banded on the Green Diamond study area that were later recaptured within the Green Diamond study area (Table 29). More detailed information on the individual spotted owls banded, recaptured or resighted in 2022 can be found in Appendix V.

4. Juvenile dispersal

Three-hundred eighty-eight juveniles were known to have dispersed within, to, or from the Green Diamond study area between 1990 and 2022. Dispersal distance information for 386 of these owls ranged from 0.5 to 93 miles, with a mean of 9.2 miles. Dispersal distances for two males were unknown. Dispersal distances of 186 males ranged from 0.5 to 93 miles, with a mean of 7.8 miles. One-hundred ninety-four females dispersed an average of 10.3 miles, with a range of 0.75 to 87.4 miles. The gender of six owls was unknown. Owls dispersing within the Green Diamond study area (n=261) dispersed an average of 6.77 miles while those dispersing to or from the study area averaged 14.4 miles (n=125).

Table 25. Age and gender of northern spotted owls banded on the Green Diamond study area, 1990-2022.

		Age				
Years	Gender	Adults	Subadults	Juveniles	Unknown	Total
1990-2022	males	314	133	-	1	448
	females	279	148	-	-	427
	unknown	0	1	1014	1	1016
Total		593	282	1014	2	1891

Table 26. Age and gender of northern spotted owls banded on the Green Diamond study area since FHCP implementation (2019 – 2022).

		Age				
Years	Gender	Adults	Subadults	Juveniles	Unknown	Total
2019 - 2021	males	15	3	-	-	18
	females	15	3	-	-	18
	unknown	0	0	16	1	17
Subtotal		30	6	16	1	53
2022	males	3	2	-	1	6
	females	4	3	-	-	7
	unknown	0	0	2	0	2
Subtotal		7	5	2	1	15
Total		37	11	18	2	68

Table 27. Age and gender of northern spotted owls banded as juveniles by Willow Creek Study Area, Humboldt Redwood Company, Hoopa Indian Reservation studies, Oregon Bureau of Land Management, U.S. Forest Service or Redwood National Park and recaptured as territorial owls on the Green Diamond study area 1990-2022.

	Age			
Gender	Adults	1st year Subadults	2nd year Subadults	Total
Males	17	4	10	31
Females	13	14	12	39
Total	30	18	22	70

Table 28. Age and gender of northern spotted owls banded as juveniles by Willow Creek Study Area, Humboldt Redwood Company, Hoopa Indian Reservation studies, Oregon Bureau of Land Management, U.S. Forest Service or Redwood National Park and recaptured as territorial owls on the Green Diamond study area since FHCP implementation (2019-2022).

	Age			
Gender	Adults	1st year Subadults	2nd year Subadults	Total
Males	1	1	0	2
Females	0	0	1	1
Total	1	1	1	3

Table 29. Recaptures of juveniles banded on the Green Diamond study area 1991-2022. Parentheses indicate number of recaptures of juveniles banded by Green Diamond and captured on other study sites. Shaded years indicated pre-FHCP implementation.

Year of recapture with the number of recaptures in the column below

Cohort	# banded	1991 - 2000	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22	Total	% recapture
1990 - 2000	601	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204	33.9
2001	82			6	9	7	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	27	32.9
2002	53				3	7	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	34.0
2003	19					1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	21.1
2004	67						7	3	4	1	3	1	0	0	0	3	0	0	0	0	0	0	0	0	22	32.8
2005	45							1	1	3	3	1	0	1	0	1	1	0	0	0	0	0	0	0	12	26.7
2006	17								0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	11.8
2007	14									1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	21.4
2008	30										3	2	2	0	1	0	0	0	0	0	0	0	0	0	8	26.7
2009	24											0	3	1	1	0	0	0	0	0	0	0	0	0	5	20.8
2010	16												1	1	0	0	0	0	0	0	0	0	0	0	2	12.5
2011	9													1	1	1	0	0	0	1	0	0	0	0	4	44.4
2012	10														0	2	0	0	0	0	0	0	0	0	2	20.0
2013	3															1	0	1	0	0	0	0	0	0	2	66.7
2014	25																0	1	2	0	0	1	1	1	6	24.0
2015	21																	1	0	0	0	0	1	0	2	9.5
2016	1																		0	0	0	0	0	0	0	0.0
2017	3																			0	0	0	2	0	2	66.7
2018	0																				0	0	0	0	0	0.0
2019	0																					0	0	0	0	0.0
2020	4																						0	0	0	0.0
2021	12																							2	2	16.7
Total	1056	171 (34)	19 (7)	10 (2)	15 (1)	17 (6)	18 (2)	8 (1)	6 (1)	6	9	5	7 (1)	5	5 (2)	10 (1)	1	3	2	1	0	1	4	4	327 (58)	30.9

5. Turnover

a. Missing owls

In 2022, fourteen non-juvenile territorial owls (eight males and six females) were found at sites different from those that they occupied in 2021 (Table 30). An additional 35 banded non-juvenile territorial owls present in 2021 were not resighted in 2022 (Table 30).

b. New recruits

The cumulative total since 1991 of new recruits of known age class was 449 subadults (41%) and 635 adults (58%) (Table 31). Seven of the new recruits into the territorial population in 2022 were subadults and nine were adults (Table 32). Five of the adults were females and four were males. The cumulative total since FHCP implementation (2019-2022) of new recruits of known age class was 15 subadults (24%) and 45 adults (73%) (Table 32).

6. Owl density

An estimated 368,406 acres (97.9%) of Green Diamond Resource Company timberlands have been surveyed to date. This acreage includes numerous blocks of land that are typically surveyed for owls but are too small and isolated to use in our density estimates. Green Diamond's California timberlands ownership increased in 2019 through 2022 with the acquisition of 9,878 acres in southern Humboldt County. Of the newly acquired lands, 9,489 acres were surveyed for owls but are not enrolled in the FHCP and not included in the density study for the reporting year. For estimating density, we used 3 large contiguous blocks of land; one in the northern area and 2 in the southern area. The northern study area had eight owl sites occupied by 11 owls within 123,753 acres, or 0.0.9 territorial owls/1000 acres. The southern study area had 64 owl sites occupied by at least 104 owls within 165,650 acres, or 0.64 territorial owls/1000 acres. Thus, a total of 75 owl sites occupied by a minimum of 115 owls were within 288,908 acres, for an overall density of 0.40 territorial owls/1000 acres. The total number of spotted owl sites on the density study area is shown in Figure 4. In 1998, Green Diamond acquired approximately 70,000 acres of timberland in Humboldt County. This area was included in the density study area as a one-time expansion. The increase in the number of sites in 1998 as shown in Figure 4 reflects this expansion. Similarly, from 2010 through 2017 Green Diamond disposed of approximately 27,600 acres of timberlands within the density study area. However, this decrease in the number of occupied sites was offset each year by the number of newly colonized and recolonized sites within the remaining density study area.

Table 30. Turnover rates of individual northern spotted owls, Green Diamond study area, 2022.

Gender	Banded or Resighted in Previous Year and Resighted in Current Year n (%)	Banded or Resighted in Previous Year Not Resighted in Current Year n (%)	Resighted at Site Different from that of Previous Year n
males	37	14	8
females	33	21	6
Total	70 (65)	35 (35)	14

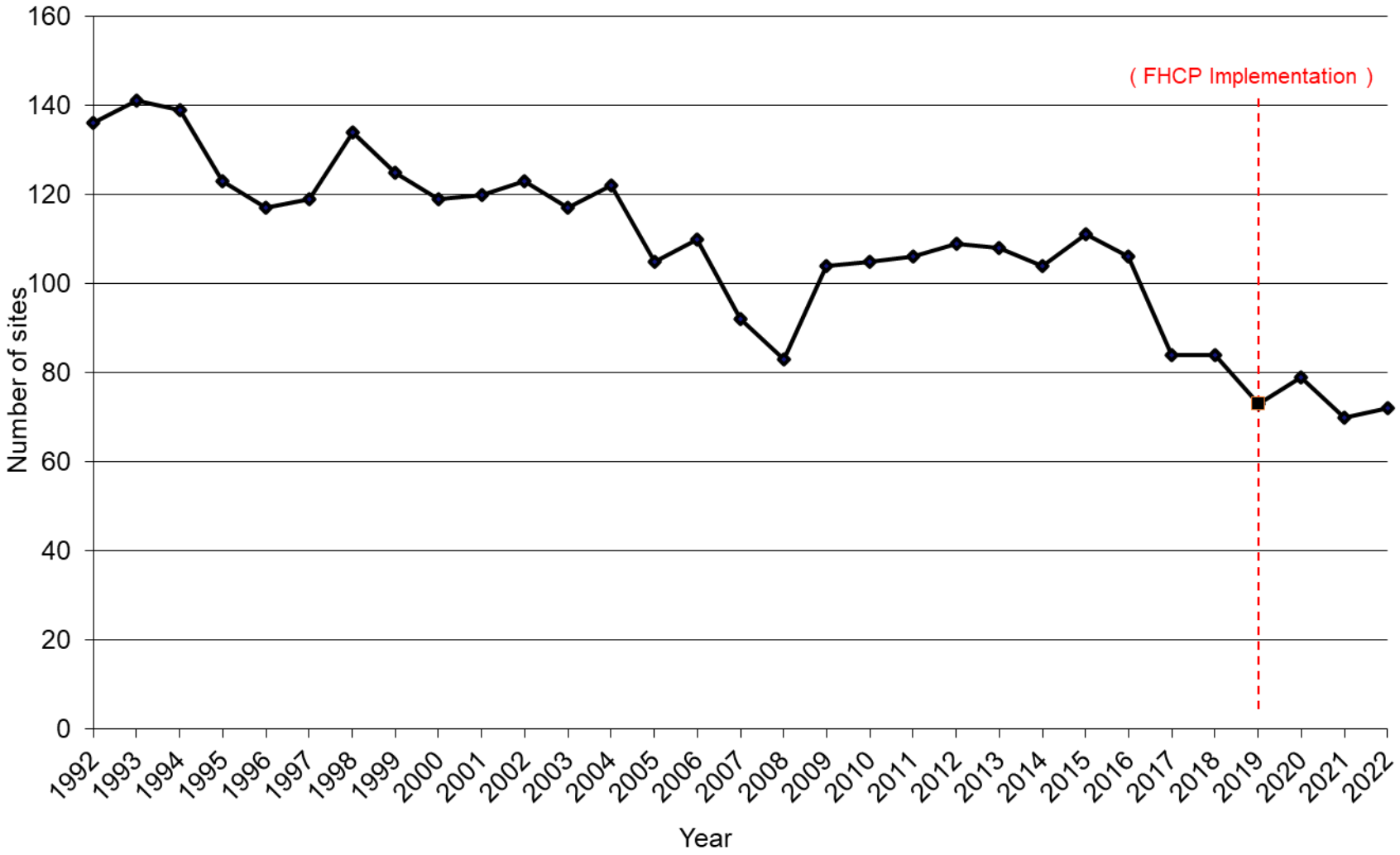
Table 31. Gender and age class of northern spotted owl new recruits, Green Diamond study area 1991-2022.

Year	Gender	Age			Total (n)
		Subadults n (%)	Adults n (%)	Unknown n(%)	
Cumulative total 1991-2022	Males	205	345	1	550
	females	242	289	-	531
	unknown	2	1	1	4
Total		449 (41)	635 (58)	2 (0)	1086

Table 32. Gender and age class of northern spotted owl new recruits, Green Diamond study area since FHCP implementation (2019-2022).

Year	Gender	Age			Total (n)
		Subadults n (%)	Adults n (%)	Unknown n(%)	
2019-2021	Males	4	19	-	23
	females	4	17	-	21
	unknown	0	0	1	1
	subtotal	8 (18)	36 (80)	1(2)	45
2022	males	4	4	1	9
	females	3	5	-	8
	unknown	0	0	0	0
	subtotal	7 (41)	9 (53)	1 (6)	17
Total		15 (24)	45 (73)	2 (3)	62

Figure 4. Total number of occupied and possible spotted owl sites on Green Diamond density study area, 1992-2022



7. Demography

Green Diamond initiated mark-recapture studies throughout its ownership in 1990 to estimate key demographic parameters and trends in the population. Along with other range-wide demographic studies of the northern spotted owl, Green Diamond participated in five meta-analyses in 1998, 2004, 2009, 2014, and 2020. The most recent published meta-analysis (Franklin et al. 2021) analyzed Green Diamond data from 1990-2018. As a result of the Phase I barred owl removal study 2009 - 2014 (see Diller et al. 2016), data from areas where barred owls were removed were censored from the analysis beginning in the year of first removal and including all subsequent years regardless of whether removals were later discontinued.

Fecundity was estimated for adult northern spotted owls (≥3 years) for 11 study areas from 1993-2018 using reproductive survey data. The best model included the additive fixed effects of ecological region (state and major forest type), quadratic relationship of time, annual estimates of barred owl occupancy within a spotted owl territory, and the oscillating even-odd year time effect. Estimates indicated that years with higher reproductive output tend to be followed by years with low reproductive output, and fecundity decreased with increased proportion of spotted owl territories where barred owls were detected.

Apparent survival, recruitment rates, and rates of population change were estimated from mark-recapture data. Apparent survival estimates for all 11 study areas indicated a period of gradual decline since 1993 that was followed by a notable steep decline after 2011 and a strong negative effect of barred owl occupancy on apparent spotted owl survival. Recruitment rates declined across all study areas as the proportion of spotted owl territories occupied by barred owls increased.

The annual finite rate of northern spotted owl population change (lambda) was estimated using data from 1993-2018 for all study areas except Hoopa, which only included data through 2012 when barred owl removals began over the entire study area. Annual rate of population change estimates for all study areas indicated a declining population with annual population declines of 2-9%.

The trend in estimates of the realized population change for all study areas (1995-2017) indicated that the population of northern spotted owls in 2017 was smaller than in 1995. Estimated population sizes in 2017 had declined by >80% in Washington, almost 75% in Oregon, and ≥30% in California. For the California study areas, Northwestern California declined by about 50%, Hoopa declined by about 30%, and Green Diamond's population had declined by >60%.

Franklin et al. 2021 also investigated the co-occurrence dynamics of northern spotted owls and barred owls using two-species occupancy models to estimate occupancy, local extinction rates, and colonization rates of northern spotted owl territories based on

detection/non-detection data for northern spotted owls and barred owls (all study areas 1993-2018, excluding territories where barred owl removals occurred). Results indicated that northern spotted owl territory occupancy declined in all study areas coincident with increasing barred owl occupancy. The results also indicated a strong positive association between the presence of barred owls and northern spotted owl territory extinction rates and a strong negative association between barred owl presence and northern spotted owl colonization.

Since the previous meta-analysis, northern spotted owls continued to experience significant declines range wide in areas without barred owl management. Since 1995, it was estimated that northern spotted owls on the Green Diamond study area declined by greater than 60%. However, these estimates were derived using less than half of the monitored spotted owl territories due to data being censored for areas with prior barred owl removals. Study area specific analyses are needed to understand current population trends on the Green Diamond study area subsequent to the Phase I experiment and after initiation of the Phase II barred owl removal experiment. The Phase II barred owl removal experiment was initiated in 2020, and once additional years of data are collected, in-depth study area specific analyses will be conducted and presented in future annual reports.

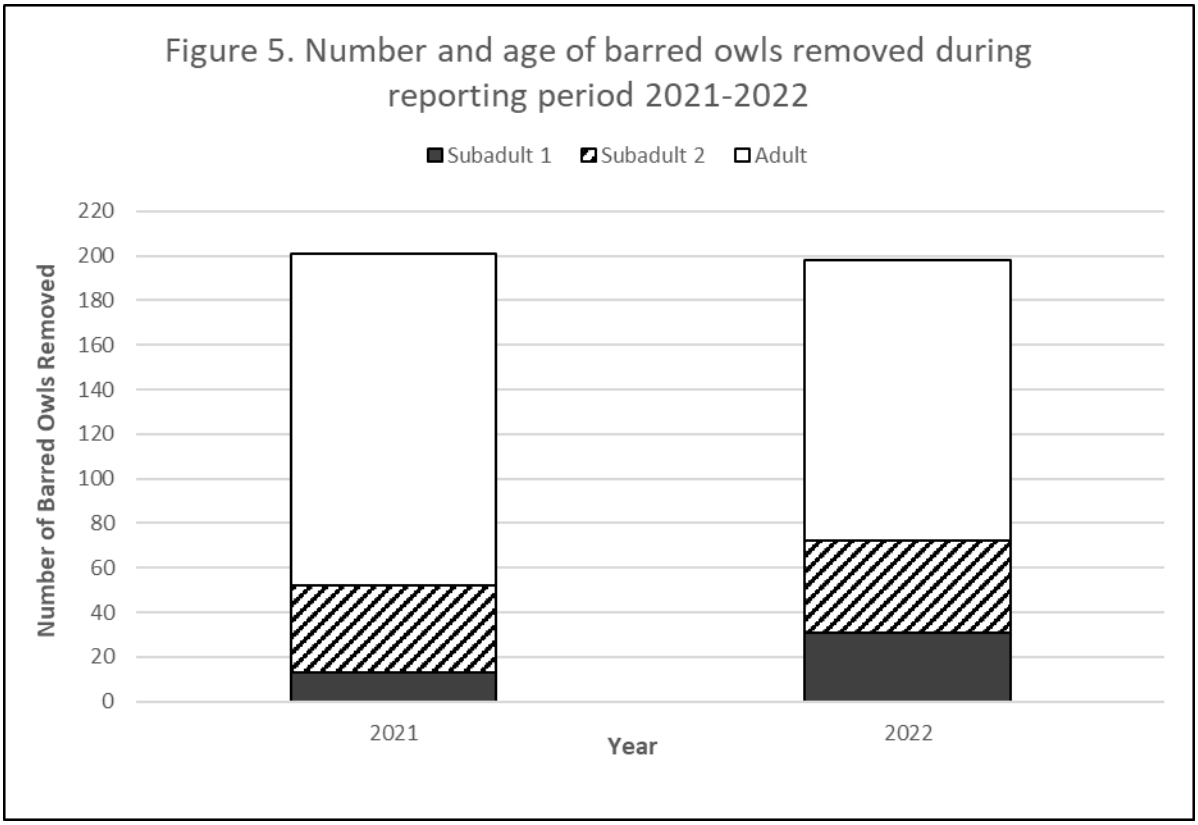
8. Barred owls

During the reporting period (September 1, 2020 - August 31, 2021), barred owls were detected during 653 surveys. Single barred owls were detected during 472 surveys and pairs were detected during 181 surveys. From March 1 through August 31 of 2022 barred owls were detected during 463 surveys. Single barred owls were detected during 351 surveys, and pairs were detected during 117 surveys. Since each site (survey station, spotted owl territory, or barred owl territory) is surveyed multiple times throughout the season and individual barred owls are not marked, it is difficult to estimate a minimum number of barred owls detected during a given season. The number of detections at the same site or area ranged from one to 17 (mean = 2,41). From these detections, we estimated a minimum of 140 barred owl territories within the density study area and a minimum of 193 barred owl territories within the demographic study area.

Since initiation of Phase II, 497 barred owls have been removed from 175 sites. During the reporting period, 165 barred owls were removed from 78 currently or previously occupied spotted owl sites and 33 barred owls were removed from sites without previous spotted owl occupancy. Pairs were successfully removed from sites on 33 occasions. During the 2021 reporting period 149 (74.1%) of removed barred owls were adults and 52 (25.9%) were sub adults (Figure 5). During the 2022 reporting period, 126 (63.6%) adult and 72 (36.4%) subadult barred owls were removed (Figure 5). During the 2021 reporting period, 123 (61.2%) female and 78 (38.8 %) male barred owls were removed (Figure 6). During the 2022 reporting period 96 (48.5%) female barred owls, 91 (46%) male barred owls were

removed, and 11 (5.5%) barred owls of unknown sex were removed. Two barred-spotted owl hybrids have been removed since the initiation of Phase II.

Forty-six barred owls were removed from 17 unique Dynamic Core Area sites (DCAs; Chapter VI) during the reporting period. The number of barred owls removed from an individual Owl Management Unit (OMU) during the reporting period ranged from zero to 37 (Table 33).



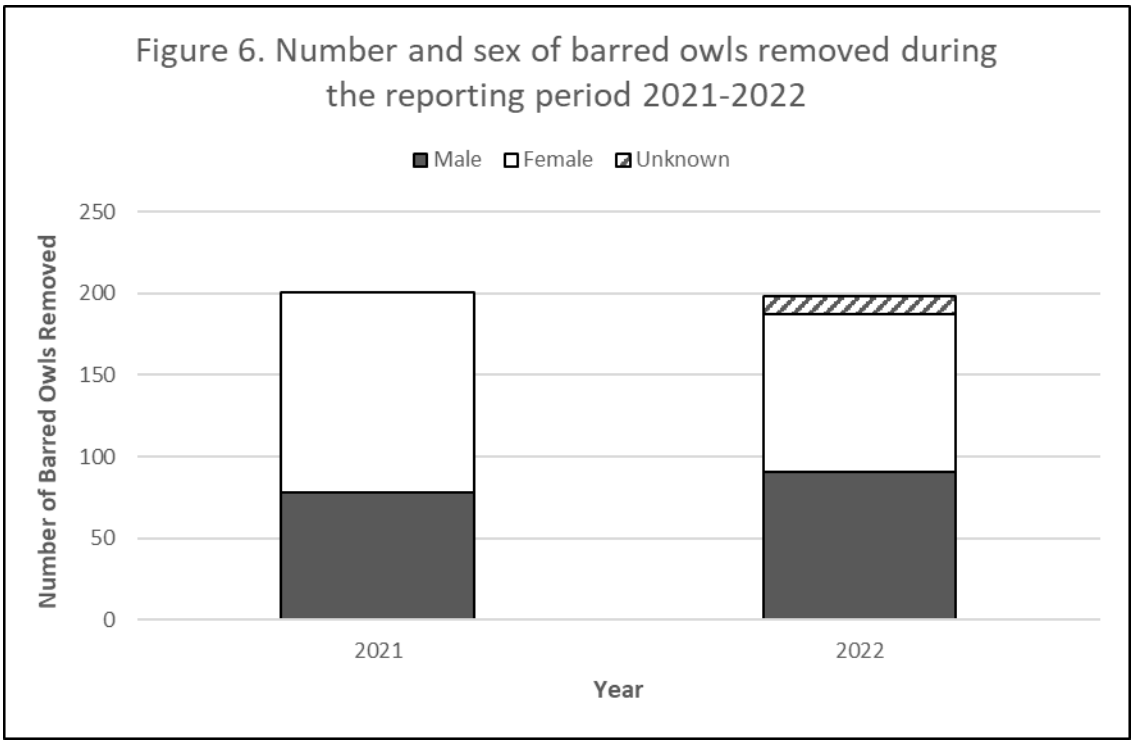


Table 33. Number of barred owls removed within the Owl Management Units (OMUs) during the reporting period by year.

Owl Management Unit	2020	2021	2022	Total
Smith	0	16	17	33
Wilson, Hunter, Terwer Creeks	0	36	37	73
McGarvey, Ah Pah, Surpur Creeks	0	11	15	26
Tectah, Mettah, Roach, Tully Creeks	0	41	23	64
Maple Creek	0	4	3	7
Redwood Creek	14	25	25	64
Little River	0	3	5	8
North Fork Mad River	16	12	10	38
Lower Mad River, Jacoby Creek	9	28	25	62
Upper Mad River, Upper Redwood Creek	6	20	19	45
Humboldt Bay, Eel River	0	5	19	24
Total	45	201	198	444

The number of spotted owl sites located on the Green Diamond demographic study area that were considered to be influenced by barred owls (barred owl detections within 0.5-mile) increased from 2011 through 2020 but has decreased since the implementation of Phase II (Figure 7). Since initiation of Phase Two, several case studies have been observed which potentially represent the positive effect barred owl removal has for spotted owls. Since Phase II began several spotted owl territories previously occupied by barred owls have had spotted owls reoccupy the site. (Table 34).

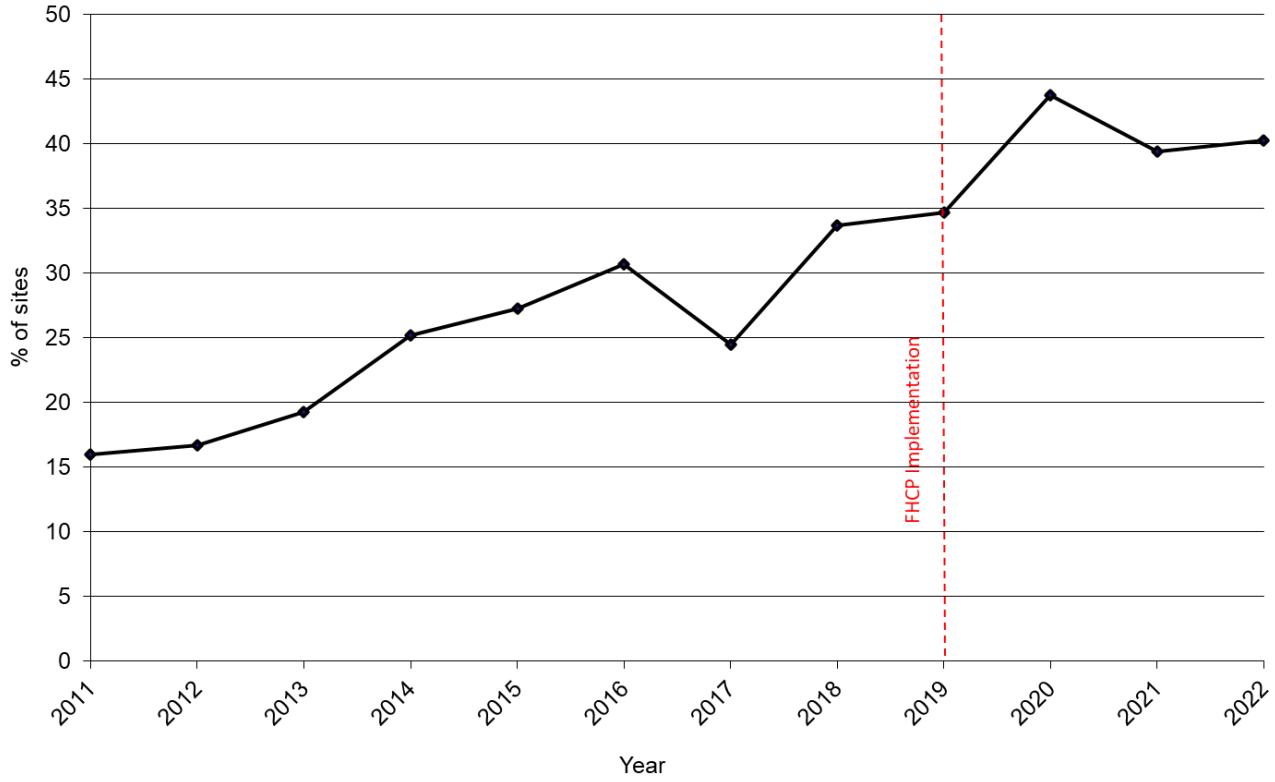
Table 34. Spotted owl site status before and after barred owl removals.

Site	Site status prior to removal	Removal date	Spotted owl detection date post-removal
Old 299 #1	Vacant	3/18/2020	5/19/2020
North Goodman Prairie	Unoccupied	3/26/2020	4/02/2020
4851	Unoccupied	3/24/2020	7/13/2020
4128	Unoccupied	9/03/2020	4/09/2021
Lower Roach	Vacant	3/22/2021	5/06/2021
Lord Ellis Creek	Unoccupied	4/28/2021	7/28/2021
Lord Ellis North	Unoccupied	10/07/2020	4/09/2021
Devils Creek	Unoccupied	3/29/2020	4/29/2021
SF Bald Mountain Creek	Unoccupied	1/25/2021	3/26/2021
Tree Farm	Unoccupied	9/1/2021	8/24/2022
Camp Gate North	Unoccupied	3/25/2020	6/9/2021
Denman Creek	Unoccupied	3/10/2021	4/19/2022

In addition to spotted owls reoccupying sites where barred owls have been removed, spotted owl pairs that established activity centers on the edge of their territory after being displaced by barred owls were observed reoccupying and producing young within their historic nesting core areas after barred owls were removed. These observations are anecdotal and future analyses are pending.

From 2010 through 2022, Green Diamond continued to collect information on the impacts of barred owls on spotted owl apparent survival, fecundity and occupancy. Results from the detailed analysis comparing the spotted owl vital rates between the treatment and control study areas from 2010 through 2014 are published and available in Diller et al. 2016. Results from the Phase II will be available in future annual reports.

Figure 7. Percentage of spotted owl sites influenced by barred owls on Green Diamond demography study area, 2011-2022



9. Habitat and occupancy modeling

Results for spotted owl habitat and occupancy modeling will be made available in future annual reports.

C. Discussion

The trend in the total number of owl sites (occupied and possible) in the density study area provided the most accurate estimate of the real trend in total owl sites for the entire ownership, because peripheral areas tended to have less consistent survey effort. The apparent initial increase from 1990-1993 was the result of a "learning curve" associated with field crews becoming familiar with the study area and documenting all perennial owl sites. The peak in total owl sites occurred in 1993-1994 followed by a decline until 1998, a relatively stable period through 2004, and a further decline from 2004 through 2008. This was followed by an increase of sites from 2009 through 2015 and a decline since 2015. In 1998, the apparent increase in sites was a result of an expansion in the size of the density study area after a land acquisition and a resultant increase in sites. The increase in sites from 2009 to 2015 did not result from any changes in the study area, but the average number of recolonized, newly colonized, and newly discovered sites in those years (average = 9.1) was greater than the average from 1996 through 2008 (average = 4.2). The removal of barred owls within portions of the study area was the most likely factor influencing the increase in the number of recolonized spotted owl sites. The decrease in the number of spotted owl sites since 2015 is likely associated with an increasing number of barred owl sites within the density study area. Although the total number of occupied sites within the density study area declined in 2021 and 2022, a higher number of sites occupied by pairs were observed compared to the 2019 and 2020 reporting periods. The decrease in overall occupied sites in 2022 is likely the result of heavy rainfall during April and early May, the critical incubation and brooding period for spotted owls.

The negative trend in number of owlets fledged per monitored pair (fecundity), although not statistically significant, is one of several potential factors that could have contributed to the overall decline in spotted owl sites during the study period. The decline is also partially due to the net displacements that occurred during this time period under the incidental take permit for the 1992 Northern Spotted Owl HCP and potential displacements that occurred under the FHCP. However, the number of owl sites has declined similarly in areas with and without significant timber harvest indicating other factors were involved. Additional analyses using mark-recapture data with covariates such as weather, habitat elements, barred owls and timber harvest are necessary to assess the factors responsible for the trend in owl sites. The direct competitive interactions with the barred owl and recent disease factors such as West Nile virus may further contribute to declining trends in the spotted owl population that are not easily identified. The results from the 2020 meta-analysis support the hypothesis that reduced fecundity is likely the result of increased competition with barred owls, but other factors such as habitat and climactic variables have also been shown to influence spotted owl fecundity (Franklin et al. 2021). Although additional years of data are needed, the increase in naïve paired occupancy and fecundity since 2020 may be the result of property-wide barred owl removals initiated in 2020.

The fundamental premise of the spotted owl FHCP is that owl sites lost through timber harvest will be replaced in other areas as stands mature and become suitable for

occupancy by owls. However, simply tracking stands transitioning from one age class to another may not adequately predict suitable owl habitat on the landscape, if a high proportion of stands have recently matured into age classes defined as suitable owl habitat. Habitat used by spotted owls (whether foraging, roosting or nesting) develops gradually through time and a simplistic accounting of the proportion of the landscape in different age classes of forest may not accurately reflect the amount of habitat available to spotted owls. The use of spatially explicit models incorporating foraging and nesting site selection along with demographic parameters will provide insight into the matrix of habitat ages, types and components necessary to support owls on the landscape and further refine our definitions of owl habitat. Continued monitoring of the population and analyses of how timber harvest has affected the owl population will lend insight to future management of the forests within Green Diamond's ownership.

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VIII. Fisher Studies

The fundamental premise in the FHCP for fisher conservation is ample foraging habitat and potential resting and denning habitat will increase through time as the riparian management zones and geologic protection zones age and continue to develop older forest characteristics. Green Diamond will develop an occupancy model that will be used to estimate the probability that a fisher will occupy (i.e., foraging or moving through) a specific point in the Plan Area. Validation or initial refinement of this fisher occupancy model will be completed within five years of FHCP approval and will rely on data collected using non-invasive remote camera survey techniques.

A. Methods

1. Occupancy Surveys

Green Diamond established a randomly located sampling frame for remote camera stations across the Plan Area. The sampling frame consisted of baited remote camera stations centered at a 4-km grid spacing. Each camera station (sampling unit) consisted of one or two cameras located within 200 meters of the grid center point resulting in 91 sampling units (Figure 8).

The sampling period was October through March for each year the surveys occurred. In order to estimate fisher occupancy, all sampling units were surveyed in each of the first two sampling periods (October 2018 - March 2019 and October 2019 - March 2020). After the first two complete sampling periods, Green Diamond will continue to monitor fisher occupancy by conducting non-invasive surveys on at least one-half of the Plan Area every five years such that a complete survey would occur by year ten. This will permit either a validation or refinement of the fisher occupancy model at 10-year intervals. The survey grid was divided into five sampling blocks to sample all stations with a logistically feasible approach while accounting for spatial issues and comparisons among the various watersheds. Sampling blocks were randomly selected to determine sampling order. Sampling order in year one remained the sampling order in subsequent survey years to allow for comparisons and account for seasonal variation in detection rates. All sample units within a sampling block were surveyed simultaneously.

Green Diamond deployed high-end Reconyx brand cameras (Reconyx Inc., Holmen WI, USA) at each sampling station. Models included first generation Hyperfire HC500, HC600, PC800, PC900, and second generation Hyperfire HP2X. Camera stations were baited with two raw chicken drumsticks and commercial trapping lure (Caven's Gusto Lure, Minnesota Trapline Products, Pennock MN) secured to a tree within 5 – 15 feet of the camera. Cameras were deployed for a minimum of 21 days and were checked and rebaited weekly.

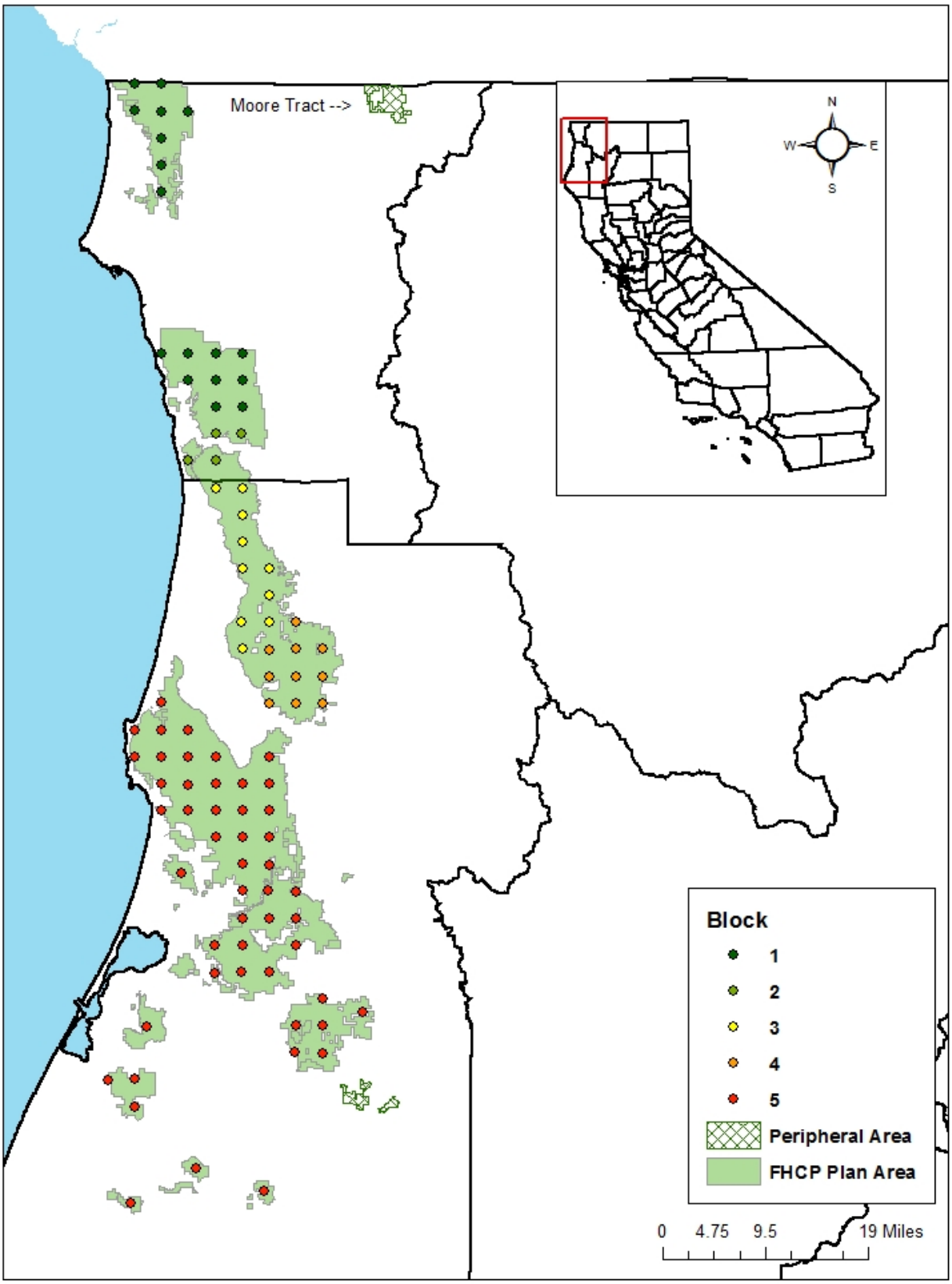

Figure 8. Location of remote camera stations by block within the Plan Area and Peripheral Area (2018/2019 and 2019/2020 sampling periods).

2. Occupancy Modeling

Initial refinement of the occupancy model occurred after completing two sessions of occupancy surveys (i.e., session one = October 2018 – March 2019 and session two = October 2019 – March 2020). Occupancy modeling was conducted using a multi-season single-species site occupancy model that accounted for imperfect detection and environmental covariate effects (MacKenzie et al. 2002). Fisher detections were modeled at each camera station during each session by dividing 21-day primary sampling periods into seven 3-day secondary sampling periods. The site occupancy model assumed 1) geographic closure during the primary sampling period around a single station within a trapping session (MacKenzie et al. 2017), 2) detections across secondary periods were derived from a binomial process, and 3) detections within the secondary periods were independent or correctly modeled with covariates. Additionally, the model assumed that occupancy was independent between sites or correctly modeled with covariates, and no false detections occurred. The eight stations with dual cameras were also evaluated for similarities in fisher detections, but the data obtained from the dual stations did not improve model estimation significantly enough to warrant inclusion. Therefore, one camera at each dual station was randomly selected for use in the analysis.

Biotic and abiotic covariates were generated at each site including covariates potentially affected by forest management (Table 35). Covariates associated with fisher occupancy and probability of detection were selected and measured at two scales (2 and 4 km circular buffers), but only one scale for each covariate was allowed in the same model. The circular buffers were based on approximate fisher home range size within the Plan Area (Thompson 2008). Pearson's correlation was calculated between all pairs of continuous covariates, and for pairs with a correlation >0.6, one covariate within a pair was dropped or only one covariate within a pair was allowed in the same model. Quadratics were considered for a subset of the covariates, but the quadratic terms had to be accompanied by their linear versions within the models.

Table 35. Variable name and description for all covariates considered during the initial phase of model development. The Use category indicates if a covariate was included in the official model selection or discarded due to a pairwise Pearson correlation or other reasons. The quadratic category indicates if the quadratic form of the covariate was included in model selection. Lastly, the Pearson r. Group shows the pairwise correlation (collinearity) groupings that required separation during model development.

Variable Name (Psi: Occupancy)	Variable Description	Use	Quadratic	Pearson r. Group
MeanMax2km	Mean of the maximum LiDAR return height for each 5-meter raster cell within a 2-km circular area.	1	0	
MeanMax4km	Mean of the maximum LiDAR return height for each 5-meter raster cell within a 4-km circular area.	1	0	
Maxge40m_PerArea2km	Percent of a 2-km circular area with maximum LiDAR return height ≥ 40 meters.	0	0	
Maxge40m_PerArea4km	Percent of a 4-km circular area with maximum LiDAR return height ≥ 40 meters.	0	0	
HydrEdge_Density_2km_Circle	Stream density in km/km2 within a 2-km circular area.	0	0	
HydrEdge_Density_4km_Circle	Stream density in km/km2 within a 4-km circular area.	0	0	
Hydro_BuffR_2km_PerArea	Percent of a 2-km circular area with Riparian Management Zone (RMZ).	1	0	
Hydro_BuffR_4km_PerArea	Percent of a 4-km circular area with Riparian Management Zone (RMZ).	1	0	
StandAge_0_5_PerArea2km	Percent of a 2-km circular area where stand age is from 0-5 years old.	0	0	
StandAge_0_5_PerArea4km	Percent of a 4-km circular area where stand age is from 0-5 years old.	0	0	
StandAge_0_15_PerArea2km	Percent of a 2-km circular area where stand age is from 0-15 years old.	1	0	
StandAge_0_15_PerArea4km	Percent of a 4-km circular area where stand age is from 0-15 years old.	1	0	
PD_2km_circle_TAO_GE40m	Density in ac/ac2 of Individual Trees (TAO) with height ≥ 40 meters within a 2-km circular area.	1	0	
PD_4km_circle_TAO_GE40m	Density in ac/ac2 of Individual Trees (TAO) with height ≥ 40 meters within a 4-km circular area.	1	0	
DFBA_2km_PerArea	Percent of total* basal area in Douglas fir within a 2-km circular area.	0	0	
DFBA_4km_PerArea	Percent of total basal area in Douglas fir within a 4-km circular area.	0	0	
RWBA_2km_PerArea	Percent of total basal area in redwood within a 2-km circular area.	1	1	1, 4
RWBA_4km_PerArea	Percent of total basal area in redwood within a 4-km circular area.	1	1	2, 5
HWBA_2km_PerArea	Percent of total basal area in hardwood within a 2-km circular area.	1	1	1, 5, 7
HWBA_4km_PerArea	Percent of total basal area in hardwood within a 4-km circular area.	1	1	2, 4, 6
NonForestStands_2km_PerArea	Percent of a 2-km circular area where stand age is from 0-5 years old, or non-forest (grassland, river bars, etc.).	1	0	
NonForestStands_4km_PerArea	Percent of a 4-km circular area where stand age is from 0-5 years old, or non-forest (grassland, river bars, etc.).	1	0	
RoadEdge_Density_2km_Circle	Road density in km/km2 within a 2-km circular area.	1	0	1, 6
RoadEdge_Density_4km_Circle	Road density in km/km2 within a 4-km circular area.	1	0	2, 7
Latitude_5m	Latitude measured in decimal degrees	1	1	3
Spatial Block	Five roughly north/south rectangular partitions of the study area with each representing a 3-week subsampling period within a trapping session.	1	0	3
Trapping Session (18/19, 19/20)	Two sampling periods comprised of October through March 2018/2019 and 2019/2020.	1	0	
Variable Name (Lambda: Detection Probability)	**Variable Description**	**Use**	**Quadratic**	**Pearson r. Group**
Mean_TAO_Height_50m_Radius	Mean tree height with a 100 m circular area	1	0	8
Mean_TAO_Height_100m_Radius	Mean tree height with a 200 m circular area	0	0	8
Spatial Block	Five roughly north/south rectangular partitions of the study area with each representing a 3-week subsampling period within a trapping session.	1	0	
Trapping Session (18/19, 19/20)	Two sampling periods comprised of October through March 2018/2019 and 2019/2020.	1	0	

* Total basal area is the sum of all tree species basal area measured (diameter at breast height) during field inventory collection.

Detections of fisher were modeled at site i $(n = 91)$ during session *j* (2018-2019, 2019-2020) with occupancy status z_{ij}, which was occupied with probability ψ_{ij}:

$$z_{ij} \sim \text{Bernouli}(\psi_{ij}).$$

When a site was occupied during session *j* and fisher were detected within a 3-day period, the probability of detection, $y_{ij,}$ was:

$$y_{ij}|z_{ij}L_{ij,} \sim \text{Bernouli}(z_{ij}\lambda_{ij}\, L_{ij}/3),$$

where λ_{ij} was the probability of detection and L_{ij} was the number of days (out of 3) the camera station was operational. Thus, L_{ij} was the measure of effort relative to the entire 3-day secondary sampling period.

The logistic function was used to model the probability of occupancy as:

$$\text{logit}(\psi_{ij}) = \beta_0 + I_j + \beta_1 x_{ij1} + \beta_2 x_{ij2} + \cdots + \beta_{ijp} x_{ijp} + site_i ,$$

where occupancy was estimated for each trapping session *I* with intercept β_0, coefficients β_1 through β_p, and covariates x_1 through x_p measured at site *i* during session *j*. Additionally, a random site effect ($site_i$) was included to account for lack of independence between trapping sessions at a site. The logistic function was also used to model probability of detection λ_{ij}. Since trapping session *I* was included, occupancy rates were estimated for each session, and immigration and emigration dynamics were "implied but not specifically accounted for" (MacKenzie et al. 2017, page 342).

Model selection was performed for occupancy and probability of detection using the Watanabe-Akaike information criterion (WAIC; Vehtari et al. 2017), and the best model included the lowest WAIC. All possible probability of detection models containing a maximum of four covariates were included in the model selection process while holding the model for occupancy constant. Once the best model for probability of detection was selected based on the lowest WAIC value, all possible occupancy models containing a maximum of four covariates were included. The quadratic and linear forms of a covariate were counted as a single covariate. After fitting the best model for occupancy, the model for detection probability was revisited using the new model for occupancy.

All models were fit in a Bayesian hierarchical framework using Markov chain Monte Carlo (MCMC) methods and R package jagsUI (Kellner 2021). All covariates were standardized prior to modeling to improve convergence. Bayesian 95% credible intervals (CI) were calculated for all coefficients and estimates were not considered statistically significant if the 95% CI included zero. Uniform priors (0,1) were used for mean occupancy and detection parameters. Uniform (-10, 10) priors for model covariates were used for occupancy, the probability of detection, and the random effects of each trapping session. Inference was drawn from three chains of 20,000 iterations following a burn-in of 5,000 iterations. The MCMC process did not including thinning or reduction in the number of

iterations since posterior distributions are better approximated without thinning (Hobbs and Hooten 2015, Richardson and Spiegelhalter 1998).

Model convergence was evaluated using the Gelman-Rubin diagnostic (Rhat: Gelman and Rubin 1992), trace plots, and plots of posterior distributions function (Sinharay 2003). Convergence was obtained when all Rhat values were <1.05 with adequate mixing among chains. Model fit was evaluated using posterior predictive checks and the area under the receiver operating characteristic curve (AUC; Hosmer et al. 2013). First, posterior predictive checks determined model fit if the Bayesian p-value (Hobbs and Hooten 2015, Conn et al. 2018) was >0.05 and <0.95. Bayesian p-values were calculated for differences in simulated data from the model compared to the actual observations. The Freeman-Tukey fit statistic (Conn et al. 2018) and SD counts were used for the differences in the residuals. Both Bayesian p-values provided evidence of whether the underlying distribution of the detections at a site was Binomial (a series of independent Bernoulli trials) or if the data were overdispersed relative to a Binomial distribution. Additionally, the AUC was estimated for each model. Values near 1 indicated near perfect discrimination of occupied sites compared to sites not occupied, and values near 0.5 indicated that the model provided little insight for occupancy compared to random assignment.

Marginal plots of the changes in estimated occupancy were created based on the range of covariates in each model while holding other covariates constant at their median values. Prediction plots were also created by calculating the estimates of occupancy at each sampled site based on a model and plotting those predictions against the observed values for the covariate in the model. Marginal and prediction plots demonstrated how occupancy estimates were related to changing covariate values based on hypothetical and observed sites on the landscape, respectively. Finally, the model-averaged occupancy at each sample site was mapped by making predictions from a subset of competing models and taking a weighted average of the predictions at each site based on the WAIC weight of each model. WAIC weights were calculated for each model using the method described by Burnham and Anderson (2002) for other information-theoretic approaches.

Validation or further refinement of this model will rely on additional non-invasive remote camera surveys. Validation of the fisher occupancy model will be based on demonstrating high fisher occupancy (Ψ>0.6) in areas that are predicted to have high probability of occupancy. In other words, determining whether or not fisher are found at specific areas where the model predicts occupancy to be high. Green Diamond will estimate occupancy rates for at least half of the Plan Area at five-year intervals so that the entire Plan Area is surveyed every 10 years. If statistically significant ($p \leq 0.05$) declines in fisher occupancy rates are observed for five years or more in all or a major portion of the Plan Area, Green Diamond will collaborate with the Service to assess the cause of the decline and propose corrective actions as necessary following the procedures described under Adaptive Management.

3. Water Tank Surveys

Water tanks within the Plan Area were inspected annually and measures were taken to prevent marten from becoming entrapped. Annual inspections determined if openings greater than two inches existed, and if the openings were secure and effective in excluding wildlife. Tanks are composed of either plastic or steel material. Modern plastic tanks generally have round, threaded openings for use in PVC plumbing. These types of tanks use modern, standard fittings which can be used interchangeably. Plastic tanks usually require little to no exclusion efforts. Steel tanks generally date from the early 1900's to the 1960's. These tanks use widely varying types of fittings and can have openings created from cutting torches. Exclusion techniques vary and require specialized tools. A powder fastener is often utilized to drive nails into the steel surfaces of the tank to fasten mesh around openings. The primary issue with using steel mesh is oxidation which can be mitigated by applying a coat of spray paint. Since 2012, this technique has been monitored and proven to be a long-lasting repair method.

4. Incidental observations

Company employees that frequently conduct field work throughout the Plan Area received training on species identification and reporting of incidental observations of listed or sensitive wildlife species, including fishers. All incidental observations of fisher were vetted by Green Diamond's biological staff and records maintained in a spatial database.

5. Prevention of rodenticide use

Anticoagulant rodenticide poisoning has been identified as a threat to the Covered Species, including fisher. Anticoagulant rodenticides are used to eradicate or suppress rodent pest populations in illegal marijuana cultivation sites to minimize economic losses. Exposure to anticoagulant rodenticides can cause direct mortality and potentially increase the risk of predation or other diseases. During the current reporting period, measures were taken to discourage unauthorized marijuana cultivation and associated rodenticide use in the Plan Area. In addition to maintaining a system of controlled access for the Plan Area, security patrols were conducted to detect cultivation sites, and if detected, eradication efforts were conducted in coordination with the Sheriff's Department.

6. Den Sites

If an active den was located, the den structure received a 0.25-mile radius no-harvest buffer to protect reproducing female fisher and their young from disturbance. The disturbance buffer remained in place until a determination was made that the den had been abandoned or fisher kits had been moved to another den more than 0.25 miles from the harvest area. Any confirmed den trees were retained even after they were no longer active.

B. Results

1. Occupancy Surveys

Occupancy surveys were not conducted during the current reporting period.

2. Occupancy Modeling

Field Sampling

Fishers were detected at 49 stations during session one, and 37 of the 49 stations detected fishers in more than one 3-day secondary sampling period. Fishers were detected at 62 stations during session two, and 44 of the 62 stations detected fishers in more than one 3-day period. The number of fishers per camera operating day was scattered across the seven 3-day periods indicating fishers were not trap-happy or trap-averse during the 21-day primary period (Figure 9). The average number of operating days within a 3-day period was 2.7739 (SD = 0.4921) during trapping session one, and 2.8885 (SD = 0.4491) during session two. The average number of fisher detections per day within 3-day periods was 0.0824 in session one (SD = 0.0231) and 0.0978 in session two (SD = 0.017).

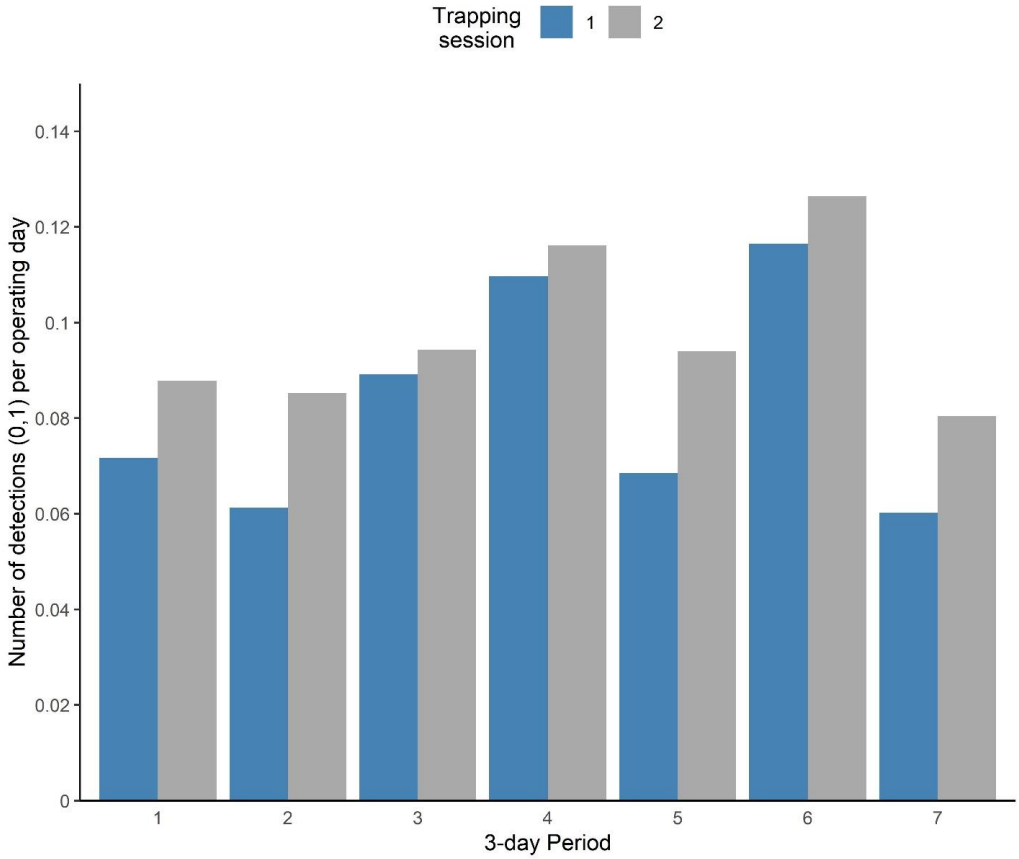

Figure 9. The number of detections per operating day for each 3-day sampling period during a trapping session. Not all traps were in operation during each 3-day period. Sessions 1 and 2 were conducted from October through March in 2018-2019 and 2019-2020. A trend in the number of detections per operating day could suggest trap happiness or aversion.

Occupancy and Detection Probability Modeling

Six models were fit for probability of detection while using trapping session as the only covariate for the probability of occupancy. The best-fitting model for the probability of detection was the intercept-only (Table 36) representing a constant probability of detection.

Table 36. Model ranks based on Watanabe-Akaike information criterion (WAIC) for each probability of detection model considered. Delta-WAIC is the difference in WAIC compared to the top model. The indicator variable for trapping session 2 is denoted by I(trapping session = 2).

Model rank	Probability of detection model	Δ WAIC
1	Intercept only	0.00
2	Mean_TAO_Height_50m_Radius	1.46
3	I(trapping session = 2)	2.10
4	I(trapping session = 2) + Spatial block	2.18
5	Spatial block	2.44
6	I(trapping session = 2) + Mean_TAO_Height_50m_Radius	3.68
7	Mean_TAO_Height_50m_Radius + Spatial block	3.70

Using the best model for probability of detection, 203 models were fit for the probability of occupancy. The model with the lowest WAIC value included the covariates for trapping session, latitude (linear and quadratic), and percent of hardwood basal area within a 4km circular buffer (linear and quadratic) (Table 37). All covariates in the top model had significant coefficients ($\alpha = 0.05$) based on 95% Bayesian credible intervals excluding zero. All of the top 21 models for occupancy included covariates for trapping session and Latitude (linear and quadratic), both with significant coefficients, and the top 21 models also had the highest AUC values. Other than trapping session and latitude (in all of the top 21 models), percent of hardwood basal area within a 4km circular buffer in the top model, and percent of redwood basal area within a 4km circular buffer, no other covariates with significant coefficients were included in the top 21 models.

Table 37. Model ranks based on Watanabe-Akaike information criterion (WAIC) for the top 21 site occupancy models considered, along with delta-WAIC and the area under the curve (AUC). Delta-WAIC is the difference in WAIC compared to the top model. The indicator variable for trapping session 2 is denoted by I(trapping session = 2). Covariates ending with '_2' indicate quadratics. A positive coefficient is represented by a '+' before the covariate, and a negative coefficient is represented by '–'. Covariates with significant coefficients (α = 0.05) based on 95% Bayesian credible intervals excluding 0 are noted by '*'.

Model rank	Probability of occupancy model	ΔWAIC	AUC
1	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – HWBA_4km_PerArea + HWBA_4km_PerArea_2*	0.0000	0.8182
2	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + HWBA_4km_PerArea	0.6502	0.8147
3	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + HWBA_2km_PerArea	0.7576	0.8154
4	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – RWBA_2km_PerArea	1.1122	0.8108
5	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2*	1.1255	0.8093
6	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – RWBA_4km_PerArea	1.1817	0.8099
7	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + PD_4km_circle_TAO_GE40m	1.2255	0.8099
8	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + PD_2km_circle_TAO_GE40m	1.4480	0.8088
9	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + HWBA_2km_PerArea + HWBA_2km_PerArea_2	1.8448	0.8147
10	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – NonForestStands_PerArea4km	1.9089	0.8054
11	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – RoadEdge_Density_4km_Circle	1.9188	0.8079
12	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – Hydro_BuffR_4km_PerArea	1.9213	0.8037
13	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – Hydro_BuffR_2km_PerArea	1.9697	0.8068
14	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + StandAge_0_15_PerArea4km	1.9762	0.8088
15	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – RoadEdge_Density_2km_Circle	2.0494	0.8078
16	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + StandAge_0_15_PerArea2km	2.1088	0.8078
17	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + MeanMax4km	2.2288	0.8141
18	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + MeanMax2km	2.3101	0.8097
19	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – RWBA_2km_PerArea + RWBA_2km_PerArea_2	2.3262	0.8140
20	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* – NonForestStands_PerArea2km	2.3930	0.8069
21	I(trapping session = 2)* + Latitude_5m* – Latitude_5m_2* + RWBA_4km_PerArea + RWBA_4km_PerArea_2*	2.8246	0.8191

*Ninety-five percent Bayesian credible interval does not contain 0.

Estimates of site occupancy for each trapping session were similar across the 203 models (Figure 10), and the average of fisher site occupancy was 0.5685 in trapping session one (range = 0.5657 to 0.5749) and 0.7147 during trapping session two (range = 0.7111to 0.7199). The average estimated probability of detection if a camera was operational all 3 days was 0.5346 (range = 0.5345 to 0.5348) during any single 3-day period. The probability of detection a fisher across a 21-day trapping session was 0.99527 (range = 0.995269 to 0.995277). Model averaged occupancy was mapped at each sampled site (Figure 11).

Rhat values for all parameters in all models were <1.01, and trace and posterior density plots showed no evidence of a lack of convergence for the final model. The posterior predictive checks did not indicate a lack of fit or lack of independence in the 3-day detections (p-values were close to 0.5).

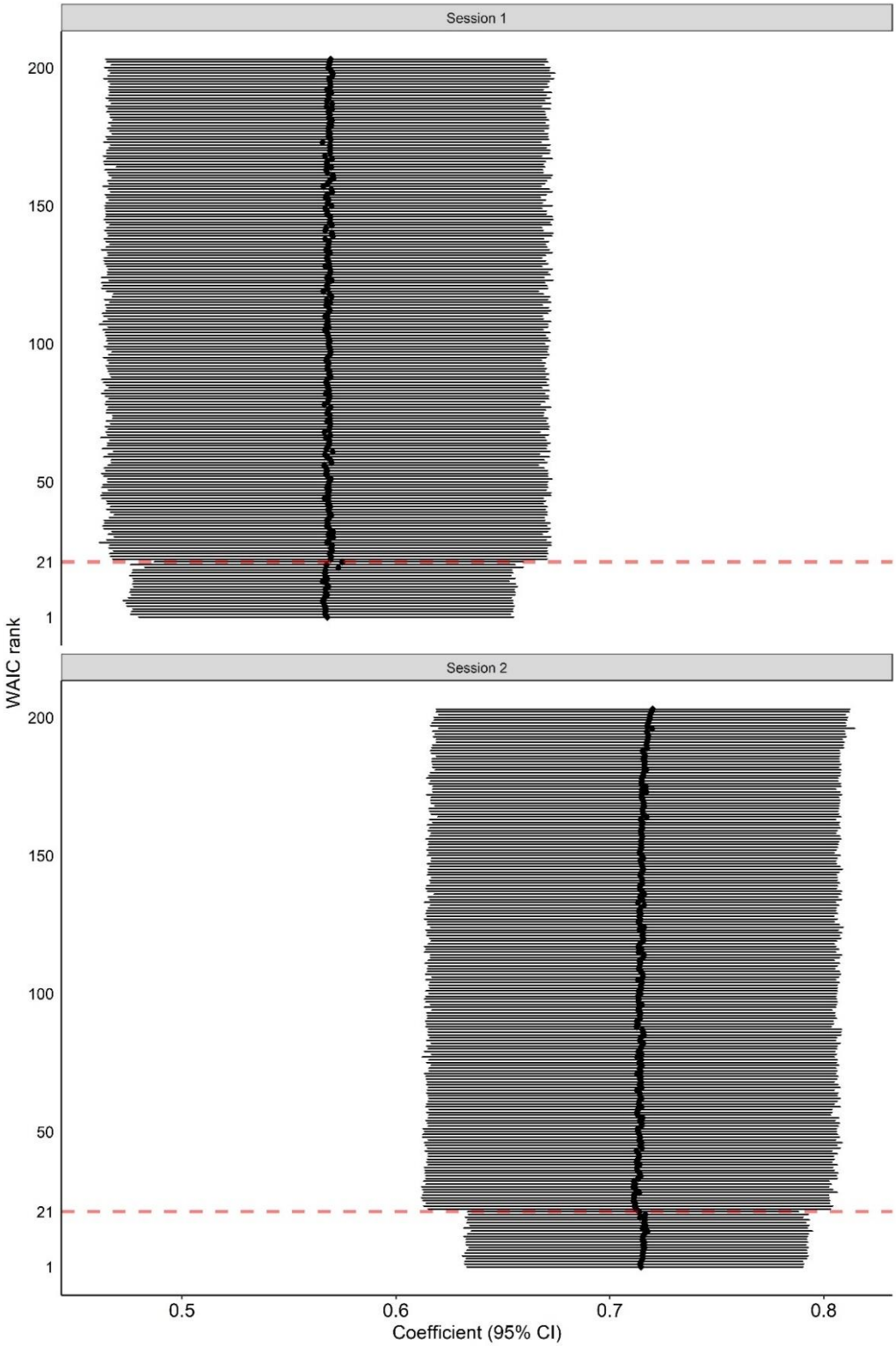

Figure 10. Estimates of occupancy during each trapping session, with 95% Bayesian credible interval (CI), for each of the 203 models based on WAIC rankings. Red horizontal dashed lines show where the precision of estimates becomes lower (larger CIs) after the top 21 models based on WAIC.

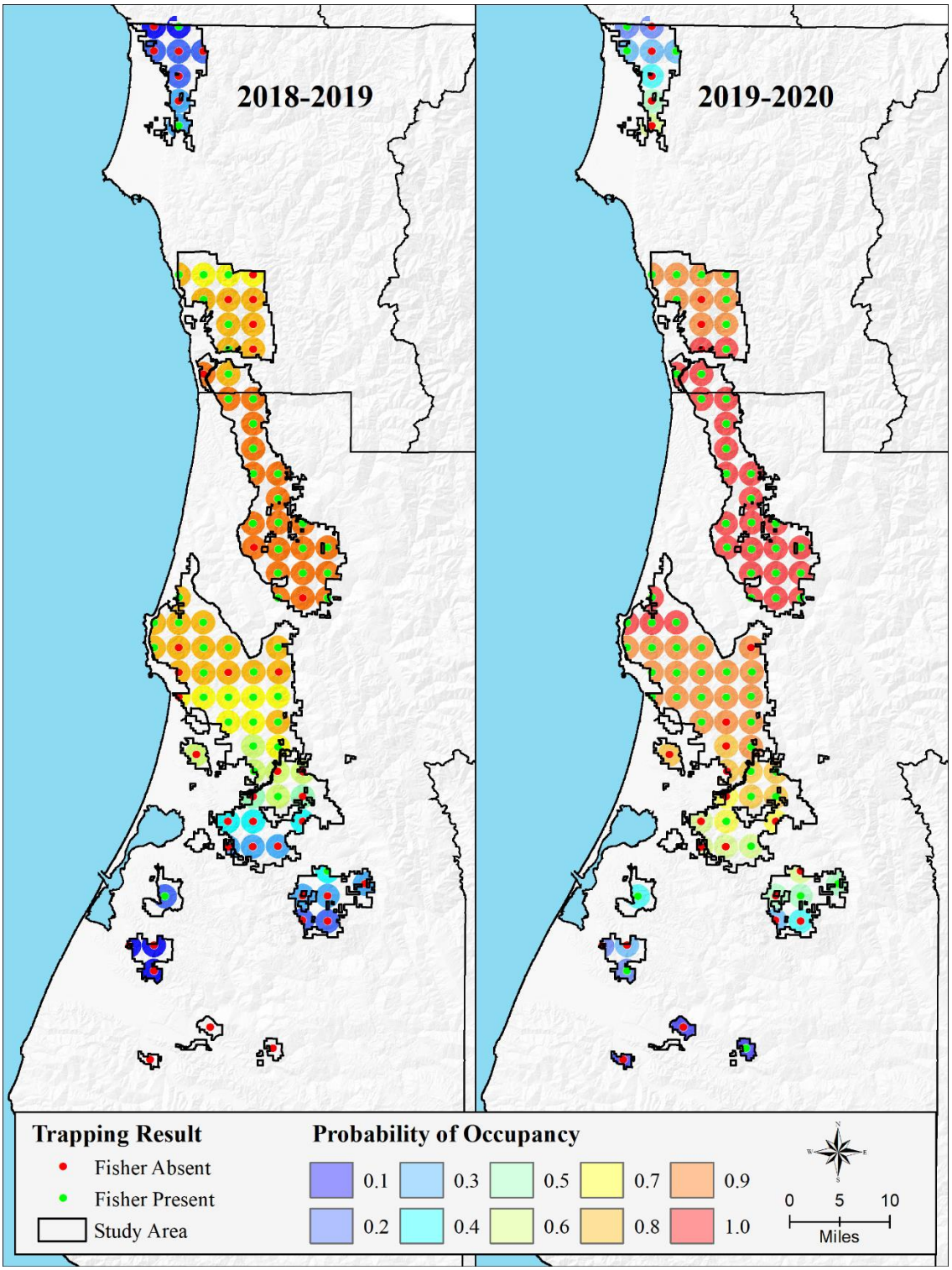

Figure 11. Trapping stations on a 4-km grid across the study areas. Green 'dot' indicates a fisher was present and detected at least once. The values for probability of occupancy were calculated using the final multi-season site occupancy model.

3. Water Tank Surveys

Eighty-nine water tanks were located within the Plan Area across 72 sites in 2022 (Figure 12, Appendix VI). At sites with multiple tanks, each individual tank was assigned its own ID number. In previous years, these tanks were all given the same ID number. The unique ID assigned to each tank resulted in an increase in the number of tanks reported in 2022. All 89 tanks were inspected for damage or openings, and barriers were assessed for continued reliability. Forty-six of the 89 tanks had openings repaired in previous years, and 44 were still reliable at preventing entry by fishers. Two tanks were found to have new openings or damage to previous patches, and both were repaired. Forty-two of the 89 tanks did not require exclusion installations. One tank (4100) is known to be a historic Vaux's swift nesting structure has an opening on the side of the tank near the top that was not repaired. A board was placed in the opening that would allow any trapped animals to escape. No fisher, marten, or other remains were identified in or around the 89 tanks.

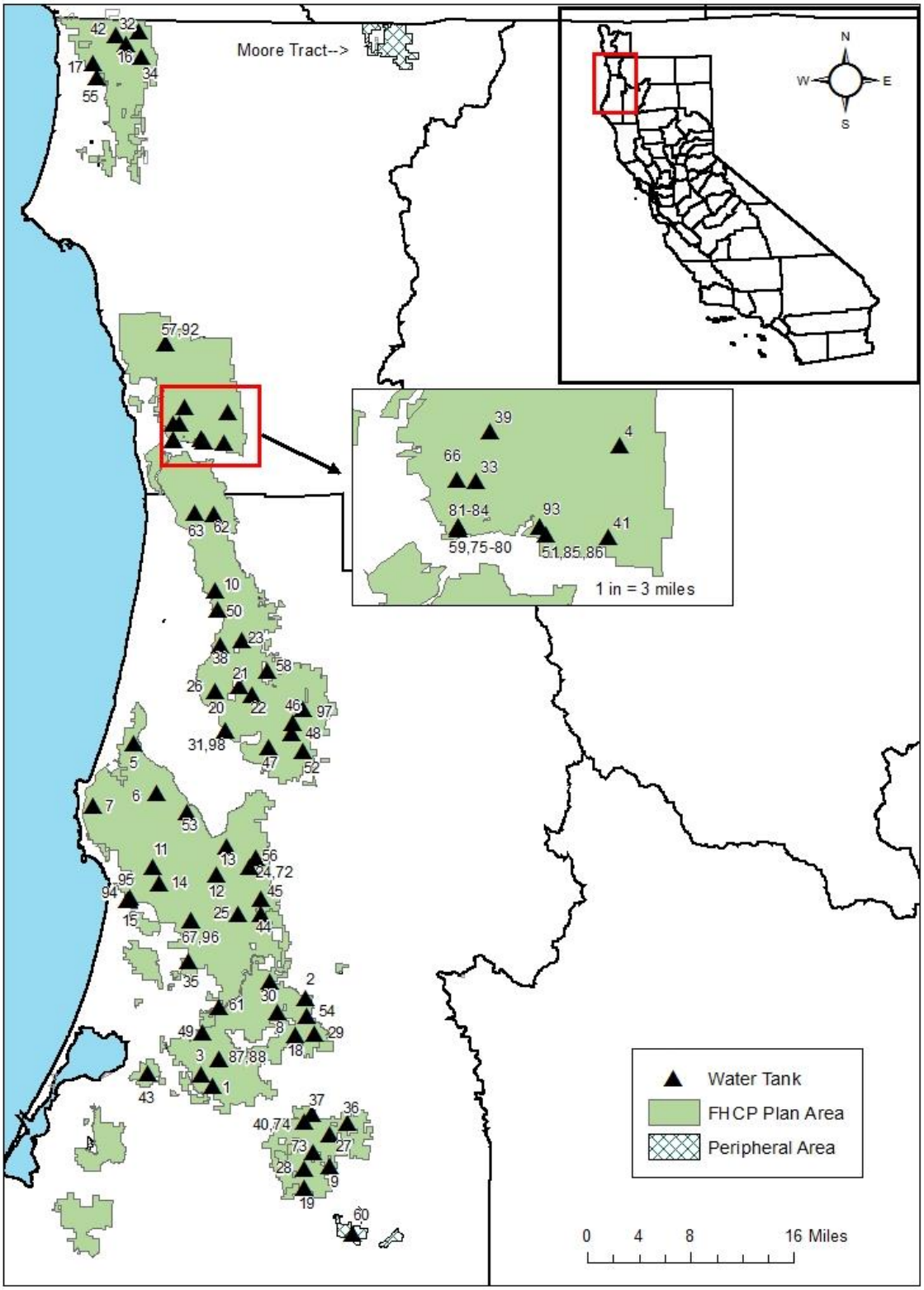

Figure 12. Water tank locations within the Plan Area and Peripheral Area.

4. Incidental observations

Five incidental fisher observations occurred during the current reporting period (Figure 13).

5. Prevention of rodenticide use

No trespass cultivation sites were identified within the Plan Area during the current reporting period. In 2022, Green Diamond began collaborating with the Humboldt County Sheriff's Department to clean up historic (pre-FHCP) sites

6. Den Sites

No active den sites were located during the current reporting period.

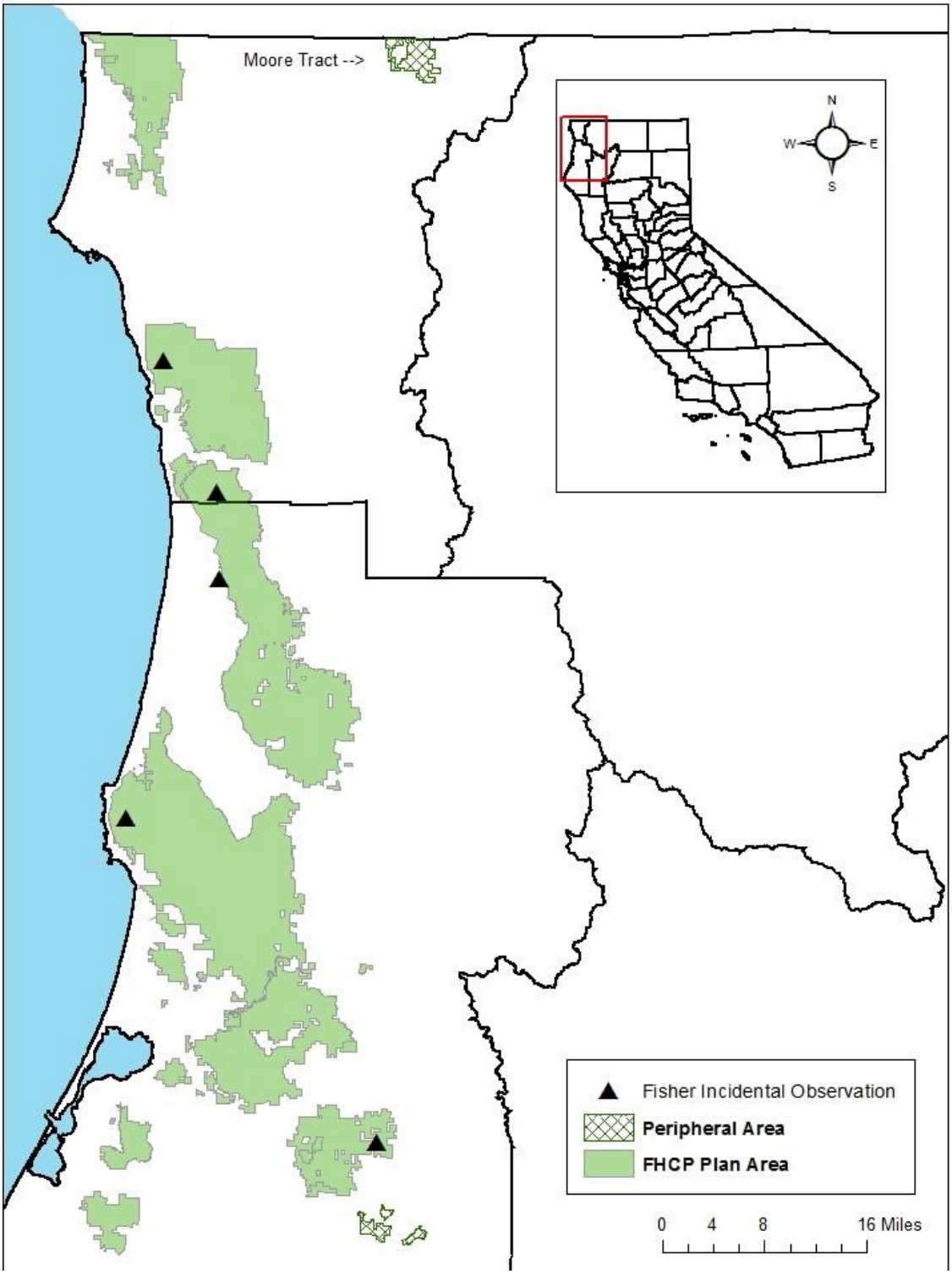

Figure 13. Incidental observations of fisher within the Plan Area during the current reporting period.

C. Discussion

Based on the initial occupancy modeling, detection probability did not vary across sites. The top 21 models for occupancy included covariates for trapping session and latitude. Trapping session, latitude, hardwood basal area, and redwood basal area (at the 4km scale) were statistically significant covariates, but all of the top 21 models had similar values for Area Under the Curve. Fisher occupancy remained high across the Plan Area and appears to be increasing based on area-wide surveys conducted in 1991-1995 and 2004-2005 when compared to this study. Although additional surveys will continue to improve the model predictions, retention of hardwoods, retention of rest and den trees, and the development of later seral habitat to help promote habitat heterogeneity will continue to maintain or increase habitat for fisher across the Plan Area.

All active and historic water tanks were inspected during the current reporting period, and exclusion methods appear to be successful at preventing entrapment and drowning of fisher and other species. Water tank inspections will continue in subsequent years to ensure exclusion methods continue to be effective.

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IX. Tree Vole Studies

Direct survey methods for tree voles were not incorporated in the FHCP due to the high cost associated with stand searches and climbing trees to confirm vole nests and estimate occupancy. Therefore, the primary approach to monitoring property-wide trends in tree vole populations will be through evaluating presence of tree voles in spotted owl pellets collected during demographic monitoring. An occupancy model was developed to detect changes in tree voles in spotted owl pellets. Green Diamond will also continue to investigate alternative approaches to monitoring tree voles and supplementing spotted owl pellet collections. In addition to more rigorous monitoring methods, Green Diamond also maintains an incidental observations database for several listed or sensitive wildlife species, including tree voles. The following sections summarize the occupancy surveys and incidental observations for tree voles.

A. Methods

1. Occupancy surveys

Pellets were collected during demographic surveys at known, occupied spotted owl sites throughout the Plan Area during the spotted owl breeding season for the current reporting period. Visual searches were conducted around known nest trees and roost trees and any other areas within the stand where whitewash was present. Since pellets tend to break apart upon falling to or hitting the ground, intact pellets and portions of pellets were collected. All pellets and portions of pellets collected during a single visit to a spotted owl site were collected in the same small plastic bag, labeled with the date and associated spotted owl site name, and frozen. Pellets were dissected to determine if the contents contained tree vole bones (genus *Arborimus*). Historic pellet samples were utilized to develop initial occupancy modeling methods, and owl pellets collected from 2019 through the current reporting period will be utilized in future occupancy modeling. The statistical methods are described in the following section (Section A.2).

2. Occupancy analysis

Tree vole occupancy was estimated using a hierarchical model that contained two occupancy and two detection probabilities: one for pellet samples (not all pellets present within an occupied spotted owl site were detected) and one for vole detections (not all bones present within a pellet sample were successfully identified). A pellet sample was defined as one or more pellets collected at a spotted owl site during a single daytime stand search. An occupied spotted owl site was included in the analysis in a given year if the site had at least one daytime visit for that site-year combination. All occupied owl sites with ≥ two average annual daytime stand searches/visits (i.e., the average number of daytime visits for a site during years the site was occupied) and years containing ≥ 30 sites

meeting this daytime visit criteria were included in the analysis. Years were excluded from the analysis if fewer than 30 pellet samples were collected that year.

Pellet detections were modeled at owl site *i* during visit *j* as $z_p(i) \sim Bernoulli(\psi_p)$, where $z_p(i)$ = 1 if pellets were collected at the owl site and $z_p(i)$ = 0 if no pellets were collected at the owl site. Since pellets were not detected with certainty if present at an owl site, the probability p_p of pellets being collected during a single visit was defined as $y_p(i) \sim Binomial\left(z_p(i)p_p, m(i)\right)$, where *m*(*i*) was the number of visits to site *i* during the year and $y_p(i)$ was the number of visits where pellets were collected. Therefore, the probability of collecting pellets was zero when no pellets were present at a site to collect.

Tree vole detections in pellet samples were modeled as $z_v(i) \sim Bernoulli(\psi_v)$, where $z_v(i)$ = 1 if a site *i* had *Arborimus spp*. remains in pellets collected during the year. Since tree vole bones were not always successfully identified when present within a pellet sample, the probability p_v of finding tree vole bones when present within a pellet sample was defined as $y_v(i) \sim Binomial\left(z_p(i)z_v(i)p_v, y_p(i)\right)$, where $y_v(i)$ was the number of visits to site *i* with tree vole bones. Therefore, the probability of finding tree vole bones within a pellet sample at site *i* was zero if there were no pellets collected at a site ($z_p(i)$ = 0) or the collected pellets did not contain tree vole bones ($z_v(i)$= 0).

To estimate the probability that an owl site was occupied by pellets and occupied by tree voles, ψ_p was multiplied by ψ_v where the value $\psi = \psi_p\psi_v$ represented the unconditional (for pellet collection) probability of tree voles occupying owl sites.

The Bayesian hierarchical occupancy model described above was estimated using Markov chain Monte Carlo (MCMC) methods and the R package 'RJAGS' (http:mcmc-jags.sourceforge.net). All prior distributions were uninformative (flat) for parameters ψ_p, ψ_v, p_p, and p_v. A burn-in of 25,000 iterations on 3 chains was completed followed by 75,000 sampling iterations thinned to every 30 iterations. This resulted in 2,500 samples per chain and 7,500 total observations per parameter. Convergence and stability were diagnosed by using the Gelman-Rubin statistic (with values < 1.05 indicating convergence). Summary credible intervals were reported for each parameter as 90% Highest Density Intervals (HDI).

Trends in tree vole occupancy (ψ) were estimated using weighted linear regression where weights were the inverses of each parameter's 90% credible interval width. Regular linear regression was used because the shape of all occupancy posterior distributions were close to normal and ranges were far enough from 0 and 1 to ensure valid predicted values (i.e., >0 and <1). Three weighted trend models were fit: 1) $\psi = \beta_0 + \beta_1(Period)$, where *Period* indicated the early (1990-1997) or late (2005-2012) periods of the study; (2) $\psi = \beta_0 + \beta_1(Year)$, where *Year* was year of the study; and (3) $\psi = \beta_0 + \beta_1(Period) + \beta_2(Year) +$

$\beta_3(Period \times Year)$. Trend estimates (slope), predicted values, and 90% confidence intervals around predicted values were reported for the model with the lowest AIC statistic.

3. Incidental observations

Company employees that frequently conduct field work throughout the Plan Area received training on species identification and reporting of incidental observations of listed or sensitive wildlife species including tree voles. All incidental observations of tree voles or tree vole nests were vetted by Green Diamond's biological staff and records maintained in a spatial database.

B. Results

1. Occupancy surveys

In 2022, 96 pellet samples from 45 different spotted owl sites were collected and dissected. Twenty-four of these samples from 18 different sites contained bones from at least 46 individuals within the Arvicolinae subfamily. Of these 46 individuals, 39 were identified as *Arborimus* sp., three were identified as *Microtus*, and the genera of four could not be identified. The 39 *Arborimus* individuals were associated with 17 unique spotted owl sites primarily located in the Lower Mad River – Fickle Hill Owl Management Unit (Table 38). One of the 96 total samples was collected from one site that was not occupied by spotted owls during the reporting period. Therefore, these pellets could have been produced by other owls or by foraging or roosting spotted owls from adjacent territories. However, this sample did not contain tree vole bones. For some samples, poor skull and mandible condition prevented taxonomic classification to genus (*Arborimus* versus other sympatric voles) utilizing basic skull/teeth morphology resulting in the possibility that there were more tree voles in our samples than reported. Further classification of the *Arborimus* genus (*A. pomo* and *A. longicaudus* vs. *A. albipes*) has proven difficult in the absence of genetic confirmation in the past, so we did not differentiate between the three *Arborimus* species in this report. Further results on tree vole occupancy will be presented in a future report.

Table 38. Number of individuals classified as Arvicolinae and *Arborimus* sp. in pellet samples collected from Owl Management Units within the Green Diamond study area in 2022.

Owl Management Unit Name	# of Samples	# of Arvicolinae individuals	# of *Arborimus* sp.
Humboldt Bay – Eel River	7	12	10
Little River	1	2	2
Lower Mad River – Fickle Hill	10	20	16
Maple Creek	0	0	0
McGarvey, Tarup, Ah Pah and Surpur Creeks	0	0	0
North Fork Mad River	4	9	8
Redwood Creek	0	0	0
Smith River	1	1	1
Tectah, Mettah, Roach, and Tully Creeks	0	0	0
Upper Mad River, Upper Redwood Creek	1	2	2
Wilson, Hunter, and Turwar Creeks	0	0	0

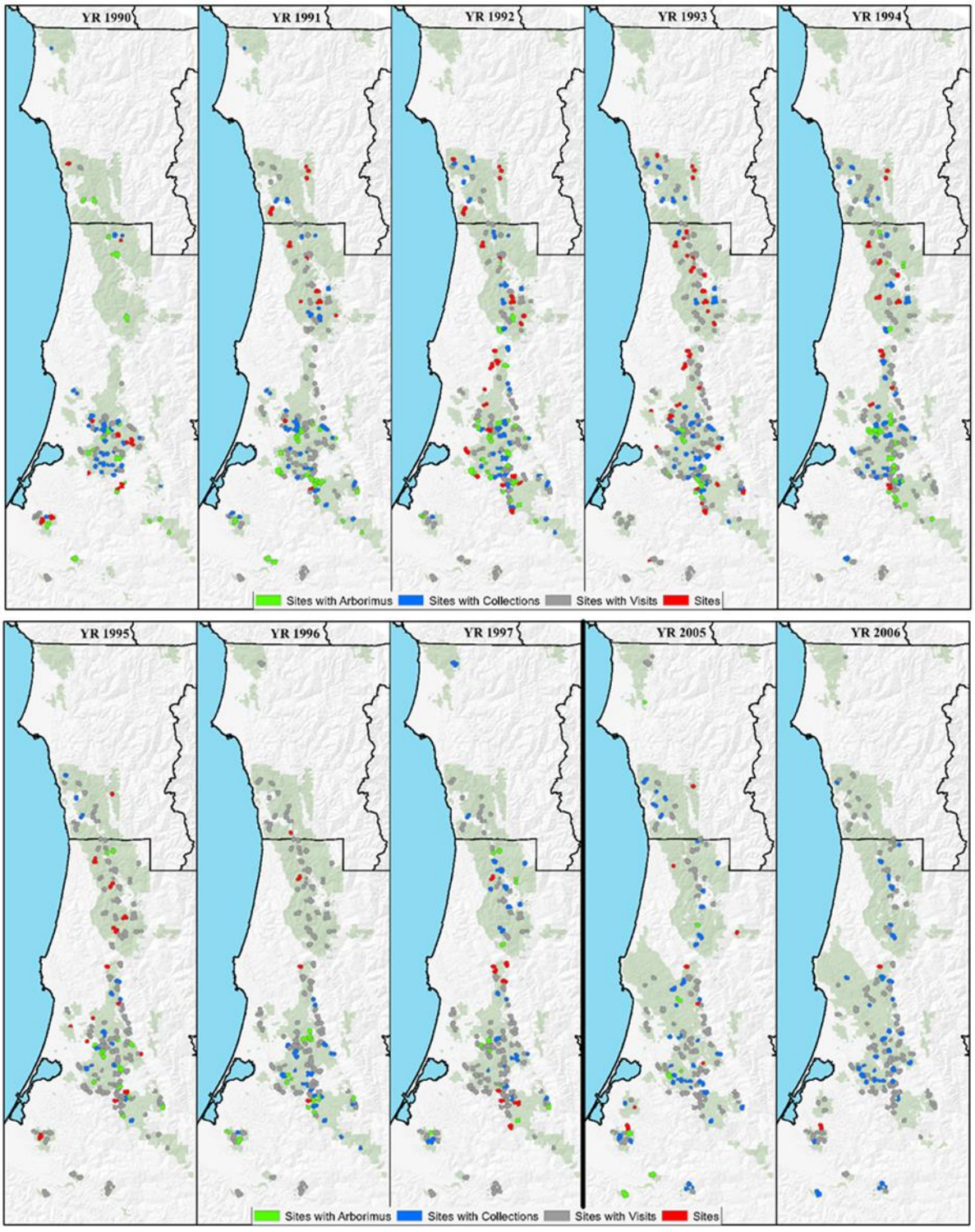
2. Occupancy analysis

Field Sampling

Demographic surveys occurred at an average of 122 occupied owl sites annually from 1990 through 2012 (Table 39) with occupied owl sites distributed more evenly across the Plan Area in the earlier years of the study compared to later years. In the later years of the study, occupied owl sites were more concentrated in the southern half of the Plan Area in the Lower Mad River, North Fork Mad River, Upper Mad River-Upper Redwood Creek, and the Humboldt Bay Owl Management Units (Figures 14). Fewer than 30 pellet samples were collected in years 1998 through 2004 and in 2011, and these years were excluded from the analysis. Therefore, occupancy modeling was based on 15 years of pellet collection data, and pellet samples were collected at an average of 43 owl sites per year (range 23 – 70). A total of 1,118 pellet samples were collected, and 285 pellet samples were confirmed to contain tree vole bones.

Table 39. Number of northern spotted owl sites, pellet samples, samples with *Arborimus* spp., and naïve occupancy rates observed 1990 – 2012 within the Plan Area. 'Inclusion' indicates modeled years (i.e., total pellet samples ≥ 30). 'NSO Sites' is a count of occupied owl sites with at least one daytime visit during the target year and an average of at least two visits per year. A pellet sample is defined as pellets collected at an owl site during a single visit and the 'Pellet Samples' column lists the number of samples and number of owl sites with at least one sample. 'Samples w/*Arborimus*' indicates total number of pellet samples containing tree vole bones and number of sites with pellet samples containing tree vole bones. 'Naïve occupancy rates' lists the raw proportion (un-inflated for detection probability) of sites occupied by pellet samples, samples containing tree vole bones, and sites occupied by tree vole bones.

			Pellet Samples		Samples w/ *Arborimus*		Naïve Occupancy Rates		
Year	Inclusion	NSO Sites	Total	Sites with	Total	Sites with	Sites with Samples	Samples with tree voles	Sites occupied by tree voles
1990	yes	70	119	45	28	18	0.64	0.40	0.26
1991	yes	121	115	56	36	25	0.46	0.45	0.21
1992	yes	128	130	70	46	31	0.55	0.44	0.24
1993	yes	130	54	42	10	10	0.32	0.24	0.08
1994	yes	138	97	56	35	25	0.41	0.45	0.18
1995	yes	127	40	29	17	15	0.23	0.52	0.12
1996	yes	130	58	36	17	13	0.28	0.36	0.10
1997	yes	127	59	33	14	11	0.26	0.33	0.09
1998	-	139	24	20	11	10	-	-	-
1999	-	139	22	21	5	5	-	-	-
2000	-	133	18	14	8	8	-	-	-
2001	-	133	9	8	0	0	-	-	-
2002	-	137	28	25	3	3	-	-	-
2003	-	132	10	5	1	1	-	-	-
2004	-	136	13	11	1	1	-	-	-
2005	yes	117	62	45	8	8	0.38	0.18	0.07
2006	yes	126	43	31	0	0	0.25	0.00	0.00
2007	yes	104	88	51	18	12	0.49	0.24	0.12
2008	yes	97	104	50	22	18	0.52	0.36	0.19
2009	yes	112	43	32	14	13	0.29	0.41	0.12
2010	yes	114	67	45	13	12	0.39	0.27	0.11
2011	-	117	28	20	6	5	-	-	-
2012	yes	110	39	23	7	5	0.21	0.22	0.05


YR 1990
YR 1991
YR 1992
YR 1993
YR 1994
Sites with Arborimus
Sites with Collections
Sites with Visits
Sites
YR 1995
YR 1996
YR 1997
YR 2005
YR 2006
Sites with Arborimus
Sites with Collections
Sites with Visits
Sites

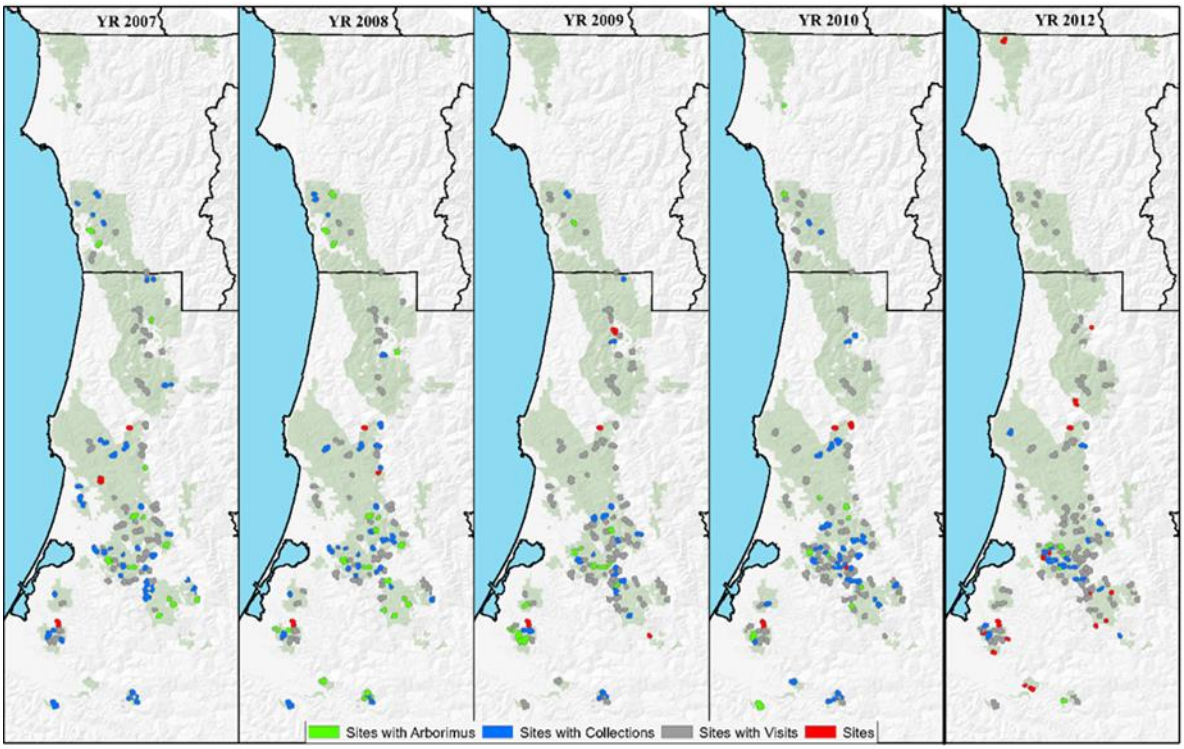


Figure 14. Annual maps for 1990-1997, 2005-2010, and 2012 of occupied owl sites (red), sites with daytime visits (gray), sites with pellet samples (blue), and sites with tree vole bones in pellet samples (green). Light green polygons outline the Plan Area.

Occupancy and Detection Probability Modeling

The Gelman-Rubin statistic indicated that the model converged and mixed well during all years (values <1.01). Trace plots of the MCMC chains indicated complete and stable mixing over the three chains.

Probability of finding and collecting a pellet varied from 0.14 to 0.43 during the study (Table 40), and probability of detecting tree vole bones within a pellet sample varied from 0.12 to 0.77. Pellet samples and detection probabilities generally declined from the early period of the study (1990-1997) to the later period of the study (2005-2012). Within these two periods, collection and detection probabilities declined from 1990-1997 and increased from 2005-2012 (Figure 15).

On average, pellet occupancy of owl sites was identical during the early (0.60) and late periods (0.59) (Table 40). Tree vole occupancy of owl sites with collected pellets averaged 0.62 during the early period and 0.55 during the late period. Annual estimates of the proportion of owl sites occupied by tree voles ranged from 0.07 in 2006 to 0.49 in 1992 (Table 41). The best-fitting weighted trend model for vole occupancy estimates contained *Year* only (ΔAIC = 0.768). From this model, estimated tree vole occupancy of

owl sites declined by -0.55% per year (90% CI = -1.28% to 0.18%) (Figure 16) over the entire study. Tree vole occupancy averaged 0.37 during the early period and 0.32 during the later years of the study (dashed lines, Figure 16).

Table 40. Annual estimates of the probability of collecting pellets (p_p), detecting vole remains in pellets (p_v), occupancy of owl sites by pellets (ψ_p), and occupancy of pellets by tree vole remains (ψ_v). CI's are 90% credible intervals for the true parameter. All parameters were derived from posterior distributions sampled by MCMC.

	Pr(Collection) (p_p)		Pr(Collection) (p_p)		Pellet occupancy of Sites (Ψ_p)		Vole occupancy of Pellets (Ψ_v)	
Year	Estimate	CI	Estimate	CI	Estimate	CI	Estimate	CI
1990	0.43	0.38-0.48	0.43	0.31-0.54	0.72	0.61-0.81	0.62	0.44-0.80
1991	0.38	0.32-0.43	0.46	0.34-0.58	0.61	0.51-0.71	0.71	0.53-0.90
1992	0.43	0.37-0.48	0.51	0.40-0.63	0.7	0.61-0.80	0.70	0.53-0.88
1993	0.19	0.14-0.25	0.48	0.21-0.74	0.76	0.58-0.96	0.45	0.21-0.78
1994	0.34	0.27-0.39	0.77	0.66-0.87	0.60	0.49-0.72	0.54	0.40-0.67
1995	0.16	0.10-0.22	0.57	0.41-0.76	0.54	0.35-0.75	0.80	0.60-1.00
1996	0.28	0.21-0.34	0.70	0.49-0.90	0.41	0.30-0.52	0.46	0.29-0.67
1997	0.22	0.17-0.28	0.35	0.21-0.52	0.45	0.33-0.58	0.69	0.44-0.97
2005	0.14	0.10-0.19	0.24	0.09-0.48	0.78	0.62-0.98	0.58	0.29-0.98
2006	0.14	0.09-0.20	0.12	0.00-0.70	0.57	0.38-0.82	0.12	0.00-0.66
2007	0.25	0.20-0.30	0.50	0.32-0.70	0.66	0.55-0.80	0.39	0.21-0.59
2008	0.26	0.22-0.31	0.30	0.19-0.43	0.65	0.54-0.76	0.73	0.52-0.98
2009	0.16	0.10-0.23	0.39	0.24-0.55	0.55	0.37-0.75	0.83	0.61-1.00
2010	0.25	0.19-0.32	0.32	0.14-0.52	0.6	0.46-0.74	0.64	0.39-0.98
2012	0.27	0.18-0.35	0.33	0.13-0.55	0.32	0.21-0.43	0.53	0.22-0.89

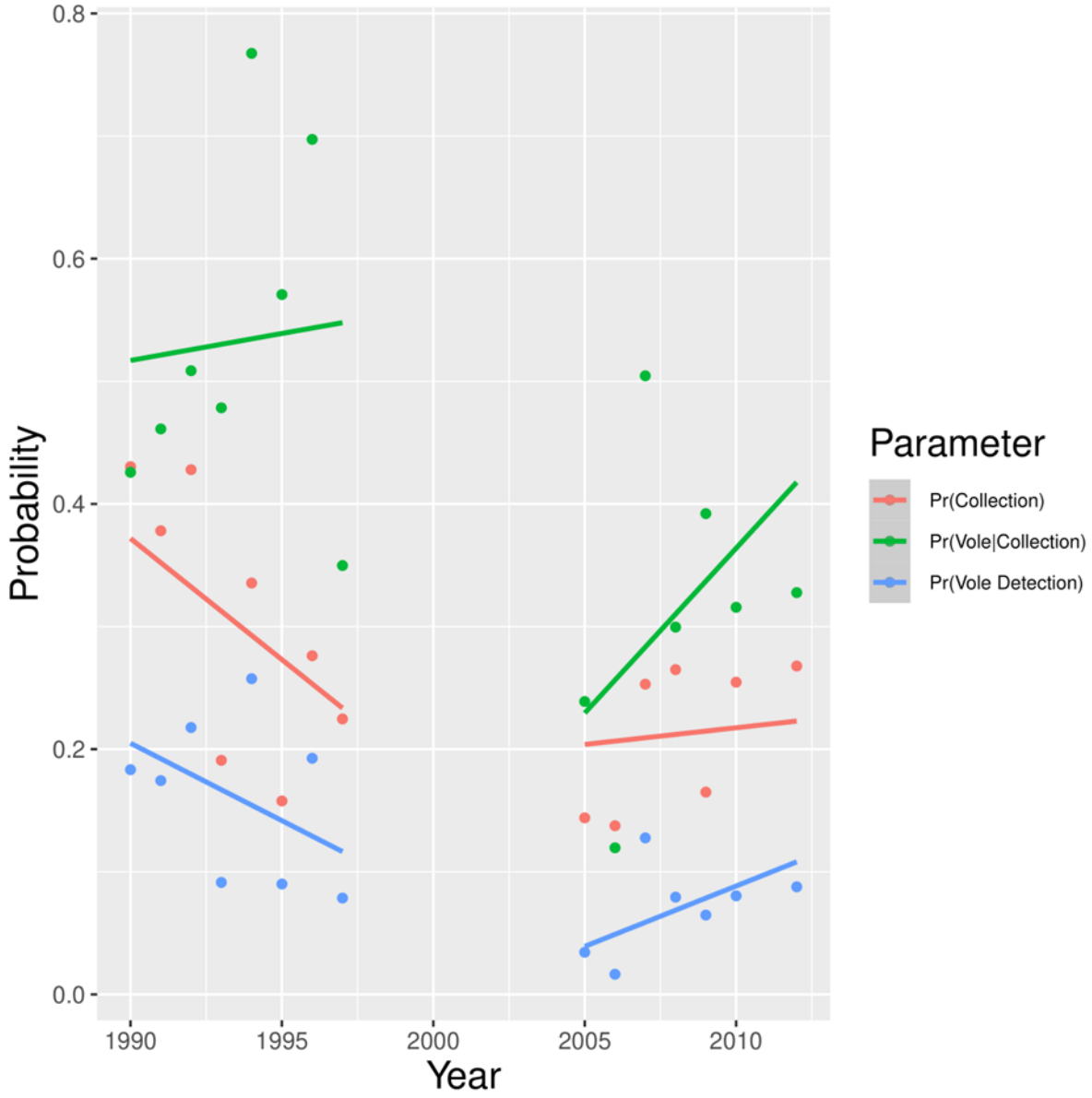


Figure 15. Probability of collecting a pellet ('Pr(Collection)'; p_p), probability of detecting a tree vole in collected pellets ('Pr(Vole|Collection)'; p_v), and aggregate probability of detecting tree voles at owl sites ('Pr(Vole Detection)'; $p_p p_v$). Lines represent linear least-squares trends for each parameter fitted to data from the early (1990-1997) and late (2005-2012) periods.

Table 41. Annual occupancy of owl sites by tree voles during modeled years in the study. Credible intervals are Highest Density Intervals of the posterior distribution.

	Occupancy	Standard	90% Credible Interval	
Year	Estimate (Ψ)	Deviation	Lower	Upper
1990	0.4429	0.0884	0.3087	0.5983
1991	0.4306	0.0816	0.3006	0.5662
1992	0.4912	0.0853	0.3586	0.6376
1993	0.3378	0.1522	0.1308	0.5959
1994	0.3198	0.0623	0.2269	0.4263
1995	0.4218	0.1255	0.2308	0.6253
1996	0.1910	0.0586	0.1079	0.2912
1997	0.3070	0.0935	0.1552	0.4580
2005	0.4421	0.1854	0.1749	0.7643
2006	0.0676	0.1570	0.0000	0.3782
2007	0.2572	0.0887	0.1345	0.4056
2008	0.4693	0.1048	0.3033	0.6432
2009	0.4400	0.1260	0.2492	0.6543
2010	0.3789	0.1256	0.1839	0.5858
2012	0.1676	0.0776	0.0601	0.3005

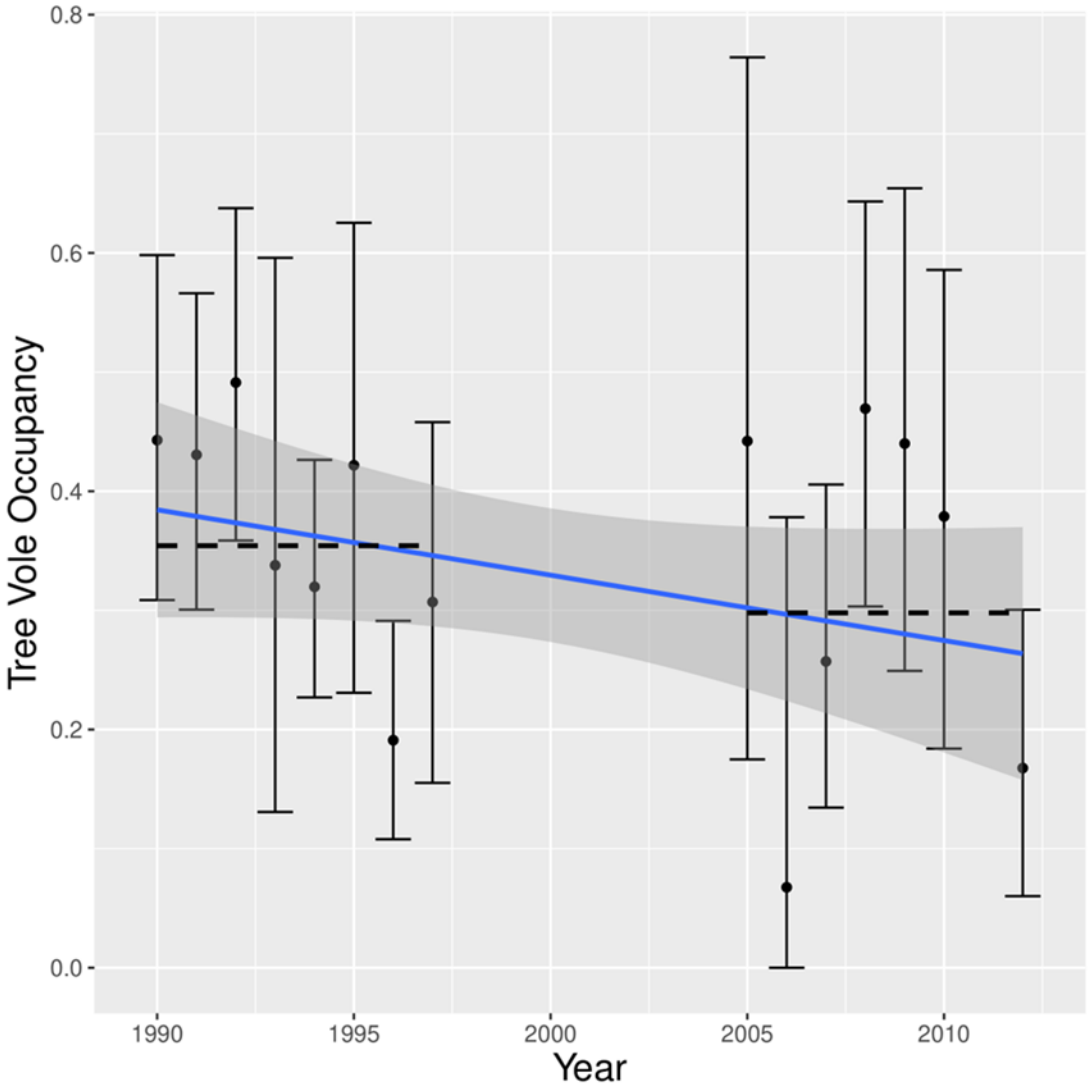


Figure 16. Annual occupancy of owl sites by tree voles during modeled years of the study (dots). Vertical bars represent 90% credible intervals for annual estimates (Table 40). The best-fitting weighted linear regression estimated that occupancy declined by -0.55% per year (blue line) (90% CI on slope = -1.28% to 0.18%). Gray regions outline 90% confidence intervals surrounding occupancy predicted by the linear regression. Dashed lines represent within-period average occupancy.

3. Incidental observations

No incidental observations of tree voles or tree vole nests occurred during the current reporting period.

C. Discussion

In 2021, members of Green Diamond's biological staff worked with vole experts associated with Oregon State University to further refine bone identification techniques and update existing keys resulting in higher classification rates compared to previous reporting periods. As described above, further classification of species belonging to the genus *Arborimus* would potentially require a genetic approach given the similarities in skull and mandible characteristics between *A. longicaudus*, *A. pomo*, and *A. albipes*. However, historic and contemporary survey efforts have demonstrated that presence of *A. albipes* within the Plan Area is rare. Given the habitat associations and foraging behavior of A. albipes, it is extremely unlikely that spotted owls would prey upon *A. albipes*. Therefore, the *Arborimus* specimens are most likely *A. longicaudus* or *A. pomo*.

The digestive process of pellet formation may result in bone loss or degradation, and weathering post regurgitation may further degrade pellet samples. The resulting poor condition of the skulls and mandibles may prevent identification of tree vole specimens (genus *Arborimus*) versus other sympatric vole species using basic skull or teeth morphology. This small subset of samples could be further analyzed using more advanced techniques such as a genetic-based approach to accurately identify individual species. Although the number of bones or individual pellets within a single sample may vary, the overall number of pellet samples collected between 2018 and 2020 declined while pellet samples collected in 2021 increased. The number of pellet samples collected in the current reporting year declined compared to 2021 yet remained higher than the number of pellet samples collected in 2020. Alternative methods for locating pellets in years when spotted owl occupancy within the Plan Area is low may be incorporated in future reporting periods to increase pellet sample size for the occupancy modeling. Based on Green Diamond's spotted owl demographic studies (Chapter VII of this report), the number of occupied and paired sites within the Plan Area declined in recent years with the exception of 2021 where the number of territorial spotted owls did not change, and the number of paired sites increased compared to the previous reporting period. Spotted owl site occupancy has a direct impact on the number of pellet samples available for collection each reporting period and likely contributed to the increase in number of pellet samples collected in 2021. While there was a decrease in the number of territorial owls and paired sites in the current reporting period, increased spotted owl occupancy and paired occupancy expected as a result of the Phase II barred owl removal experiments should result in an increase in the number of pellet samples collected in coming years.

The purpose of the occupancy analysis was to develop initial methods for monitoring tree vole occupancy within the Plan Area. Future analyses will rely on pellet samples collected during the FHCP permit term starting with pellets collected in 2019. Based on this initial analysis, average tree vole occupancy declined during the later years of the study, which may be the result of fewer occupied owl sites within the Plan Area in the later years. Additionally, fewer spotted owl pairs attempted reproduction in the later years. Fewer occupied owl sites and fewer owl pairs attempting reproduction resulted primarily from increased competition with barred owls (Franklin et al. 2021). Pellet samples were more easily collected at sites with reliable nesting spotted owls due to an increased knowledge of nest and roost trees and more concentrated spotted owl activity within the nesting core. Likewise, pellet sample distribution was more concentrated in Owl Management Units with higher owl occupancy and more frequent nesting attempts. Ideally, as the removal experiments continue, spotted owl site occupancy and reproduction will increase within the Plan Area allowing for increased pellet sample collections and more evenly distributed collections. Current and future pellet collection efforts will focus on collecting a greater number of samples per year and increasing effort in Owl Management Units with spotted owl occupancy where pellet collections have been historically low. However, sampling relies heavily on spotted owl occupancy which will vary across Owl Management Units and across years. Therefore, future analyses will need to include statistical methods to deal with changes in tree vole occupancy that may be the result of changes in spotted owl site occupancy.

X. Adaptive Management

The adaptive management process addresses scientific uncertainties through monitoring of Covered Species to determine whether FHCP conservation measures have intended effects. Green Diamond will initiate reviews and implement adaptive management measures in response to monitoring outcomes specific to the Covered Species. A basic premise of adaptive management is that early warning of unanticipated and undesirable outcomes of the FHCP implementation, such as declines in the number and/or distribution of the Covered Species, should be addressed as early as possible. Therefore, the FHCP adaptive management process includes an early warning 'yellow-light' trigger, as well as a second, more urgent 'red light' trigger. Objective yellow light triggers will cause Green Diamond to intensify monitoring efforts. If the monitoring indicates that red light conditions have been triggered, Green Diamond (in coordination with the USFWS and the CDFW) will conduct an assessment to identify the potential cause behind the negative monitoring result, its potential management activity relationship, and any appropriate management changes.

This section of the annual report highlights the prospective adaptive management triggers and commitments, as well as any adaptive management measures implemented.

A. Methods

1. Northern Spotted Owl Adaptive Management Thresholds

a. Threshold One

Prior to model validation, a 'yellow light' condition will be triggered if the northern spotted owl population declines in the 6 years following approval of the FHCP relative to the baseline northern spotted owl population. (i.e., 95% confidence interval (CI) of realized population change does not overlap 1.0 as described in Dugger et al., 2016).

b. Threshold Two

Following model validation, a 'yellow light' condition will be triggered if the 95% CI in realized population change based on mark-recapture or occupancy models does not overlap 1.0 in two of the most recent five years.

c. Threshold Three

Prior to model validation, 'red light' condition will be triggered if the northern spotted owl population continues to decline in the 10 years following approval of the FHCP relative to the northern spotted owl population at the initiation of barred owl removal (i.e., 95% CI of realized population change does not overlap 1.0 as described in Dugger et al., 2016).

d. Threshold Four

Following model validation, a 'red light' condition will be triggered if the 95% CI in realized population change based on mark-recapture or occupancy models does not overlap 1.0 in three out of five years.

e. Threshold Five

Green Diamond will annually assess the mean reproductive success of the northern spotted owl population at all Dynamic Core Areas (DCAs) plus a minimum of 12 other northern spotted owl sites selected by a spatially stratified random sample. The trend in fecundity over the prior six years within the Plan Area will be compared to the trend in a comparable regional mean. A 'red light' condition will be triggered if the trend in mean fecundity estimate from the Plan Area is statistically lower ($p \leq 0.05$) than the comparable regional mean reported for the Willow Creek Study Area.

2. Fisher Adaptive Management Thresholds

a. Threshold One

A 'yellow light' condition will be triggered if there is a statistically significant ($p = 0.05$) decrease in occupancy estimates for a major portion (e.g., ~50,000 acres) of the plan area at 5 years after occupancy model development.

b. Threshold Two

A 'red light' condition will be triggered if there is a statistically significant decrease in occupancy estimates in the same yellow light area at 10 years.

3. Tree Voles

a. Threshold One

A 'yellow light' condition will be triggered if there is a statistically significant ($p=0.05$) decrease in occupancy estimates for a major portion (e.g., ~50,000 acres) of the plan area for three consecutive years.

b. Threshold Two

A 'red light' condition will be triggered if there is a statistically significant ($p=0.05$) decrease in occupancy estimates in the same yellow light area for ≥ 5 consecutive years.

B. Results

1. Northern Spotted Owl Adaptive Management Threshold Evaluation

a. Threshold One

This threshold will be evaluated in the sixth year (2025) following FHCP approval.

b. Threshold Two

This threshold will be evaluated following model validation.

c. Threshold Three

This threshold will be evaluated in the tenth year (2030) following FHCP approval.

d. Threshold Four

This threshold will be evaluated following model validation.

e. Threshold Five

This threshold will be evaluated in the sixth year (2025) following FHCP approval.

2. Fisher Adaptive Management Threshold Evaluation

a. Threshold One

This threshold will be evaluated five years after occupancy model development.

b. Threshold Two

This threshold will be evaluated ten years after occupancy model development.

3. Tree Voles

a. Threshold One

This threshold will be evaluated three years after occupancy model development.

b. Threshold Two

This threshold will be evaluated five years after occupancy model development.

C. Discussion

Adaptive management is an important component of habitat conservation planning that addresses biological uncertainty concerning the needs of the Covered Species throughout the life of the permit. If future monitoring reveals that biological objectives are not being met based on the established monitoring thresholds, then the adaptive management process will be implemented, and if warranted, corrective actions taken. Since the monitoring thresholds established through the adaptive management process are based on assessing trends in habitat or occupancy, several years of data are needed. This is the first full year of FHCP implementation, and adequate time has not passed to assess the conservation commitments.

XI. Implementation Budget

Green Diamond has identified the following 2022 Expenditures and approximate budget for 2023 for implementing the survey, monitoring, and research requirements of the FHCP.

2022 Expenditures

Item	Dollar amount
Payroll (payroll, overtime, and benefits)	719,600
Supplies, Fuel, Repairs and Maintenance (vehicles and equipment)	119,000
Professional Services (consulting fees, statisticians, consulting biologists)	101,500
Total	940,100

2023 Budget

Item	Dollar amount
Payroll (wages and benefits)	739,000
Supplies, Fuel, Repairs, Parts, and Materials (vehicles and equipment)	133,000
Professional Services (consulting fees - statisticians, consulting biologists)	84,000
Total	956,000

Appendix I. Results of THP surveys for spotted owls 2022.

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
09-1501	1-15-068HUM	Stevens Creek Central 16	D	Detection Probability	Y	Middle Stevens Creek
09-2001	1-21-00011HUM	Spread Stevens	D	Detection Probability	Y	Lower Stevens Creek
09-2001	1-21-00011HUM	Spread Stevens	E	Detection Probability/Spot Call	Y	HRC 47, Stevens Creek East
09-2001	1-21-00011HUM	Spread Stevens	F	Detection Probability	Y	HRC 47, Stevens Creek East
14-2001	1-20-00124HUM	Salmon West	A	Detection Probability	Y	
14-2001	1-20-00124HUM	Salmon West	C	Spot Call	Y	Salmon Creek #4, Salmon West
14-2001	1-20-00124HUM	Salmon West	D	Detection Probability	Y	Salmon Creek #2, Salmon West
14-2001	1-20-00124HUM	Salmon West	E	Detection Probability	Y	EBF, Salmon Creek #2
14-2002	1-21-000134HUM	Gas Wells Thinning 22	A	Detection Probability	N	HRC 372, Lower McCloud Creek, McCloud Creek
14-2002	1-21-000134HUM	Gas Wells Thinning 22	B	Detection Probability	N	HRC 372, PL236, Rohner Creek
14-2002	1-21-000134HUM	Gas Wells Thinning 22	C	Detection Probability	N	Lower McCloud Creek, McCloud Creek, Rohner Creek
14-2101	1-22-00173HUM	The McCloud 5	A	Detection Probability	N	HRC 372, Lower McCloud Creak, McCloud Creek
14-2101	1-22-00173HUM	The McCloud 5	B	Detection Probability	N	HRC 372
14-2101	1-22-00173HUM	The McCloud 5	C	Detection Probability	N	Lower McCloud Creek, McCloud Creek
14-2101	1-22-00173HUM	The McCloud 5	D	Detection Probability	N	
14-2101	1-22-00173HUM	The McCloud 5	E	Detection Probability	N	
15-2001	1-21-00022HUM	Jacoby 22	C	Second Year	Y	
15-2001	1-21-00022HUM	Jacoby 22	D	Second Year	Y	
15-2101	1-21-00126HUM	Threes Company	A	Detection Probability	N	
15-2101	1-21-00126HUM	Threes Company	B	Detection Probability	N	
15-2101	1-21-00126HUM	Threes Company	C	Detection Probability	N	
17-1602	1-16-138HUM	Boulder Creek North ‘17	C	Detection Probability	Y	Boulder Creek #4, B.C. Powerline
17-1602	1-16-138HUM	Boulder Creek North ‘17	D	Detection Probability	Y	B.C. Powerline
17-1801	1-18-00144HUM	Brown’s Ridge	C	Detection Probability	Y	Wiggins Cabin

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
17-1801	1-18-00144HUM	Brown's Ridge	H	Detection Probability	Y	
17-1802	1-18-00176HUM	Goodman Prairie '20	B	Detection Probability	Y	Wiggins Pond
17-2001	1-20-00222HUM	Graham Goodman	A	Detection Probability	Y	Wiggins Cabin
17-2001	1-20-00222HUM	Graham Goodman	B	Detection Probability	Y	
17-2001	1-20-00222HUM	Graham Goodman	C	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	A	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	B	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	C	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	D	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	E	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	F	Detection Probability	Y	
17-2002	1-21-00049HUM	Snow Camp Lake '22	G	Detection Probability	Y	
18-1801	1-19-00013HUM	Smokehouse Creek	A	Detection Probability	Y	
18-1801	1-19-00013HUM	Smokehouse Creek	D	Detection Probability	Y	
18-1801	1-19-00013HUM	Smokehouse Creek	F	Detection Probability	Y	
18-2001	1-20-00207HUM	Boulder Bundle	B	Detection Probability	Y	
18-2001	1-20-00207HUM	Boulder Bundle	D	Detection Probability	Y	
18-2001	1-20-00207HUM	Boulder Bundle	E	Detection Probability	Y	
18-2001	1-20-00207HUM	Boulder Bundle	F	Detection Probability	Y	
19-1601	1-16-140HUM	R-13 Thin	A	Detection Probability	Y	
19-1601	1-16-140HUM	R-13 Thin	E	Detection Probability	Y	
19-1602	1-17-033HUM	Ryan Creek Thin '18	A	Detection Probability	N	R-8-1
19-1602	1-17-033HUM	Ryan Creek Thin '18	B	Detection Probability	N	
19-1602	1-17-033HUM	Ryan Creek Thin '18	D	Detection Probability	N	
19-1801	1-19-00074HUM	Bear Gulch Thin	A	Detection Probability	N	
19-1801	1-19-00074HUM	Bear Gulch Thin	B	Detection Probability	N	Henderson Gulch
19-1801	1-19-00074HUM	Bear Gulch Thin	C	Detection Probability	N	R-8-1
19-1801	1-19-00074HUM	Bear Gulch Thin	D	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
22-1401	1-15-043HUM	MR5100 Thin THP '16	A	Detection Probability	N	Lower Quarry Creek
22-1401	1-15-043HUM	MR5100 Thin THP '16	B	Detection Probability	N	Lower Quarry Creek, Quarry Creek
22-1701	1-18-004HUM	Van Cleave	A	Detection Probability	Y	Upper Palmer Creek
22-1701	1-18-004HUM	Van Cleave	D	Detection Probability	Y	Van Cleave South
22-1701	1-18-004HUM	Van Cleave	E	Detection Probability	Y	Quarry Creek
22-1701	1-18-004HUM	Van Cleave	G	Detection Probability	Y	Van Cleave South
22-1901	1-19-00164HUM	Mad Mountain	C	Detection Probability	Y	5700
22-1901	1-19-00164HUM	Mad Mountain	D	Detection Probability	Y	Dry Creek
22-1901	1-19-00164HUM	Mad Mountain	E	Detection Probability	Y	Dry Creek
22-1901	1-19-00164HUM	Mad Mountain	F	Detection Probability	Y	Dry Creek
22-2001	1-21-00124HUM	Fickle Hill 1100	A	Detection Probability	N	
22-2001	1-21-00124HUM	Fickle Hill 1100	B	Detection Probability	N	Jacoby Creek #2
22-2001	1-21-00124HUM	Fickle Hill 1100	C	Detection Probability	Y	
22-2001	1-21-00124HUM	Fickle Hill 1100	D	Detection Probability	Y	Jacoby Creek #1
22-2001	1-21-00124HUM	Fickle Hill 1100	E	Detection Probability	Y	Jacoby Creek #1
22-2001	1-21-00124HUM	Fickle Hill 1100	F	Detection Probability	Y	
22-2001	1-21-00124HUM	Fickle Hill 1100	G	Detection Probability	Y	
24-1901	1-20-00019HUM	Ward Road Combo	C	Detection Probability	Y	Simpson Creek
24-1901	1-20-00019HUM	Ward Road Combo	D	Detection Probability	Y	Simpson Creek
24-1901	1-20-00019HUM	Ward Road Combo	F	Detection Probability	Y	Simpson Creek
24-2001	1-21-00016HUM	Maple Bear	A	Detection Probability	Y	4800, 4851, Wood Ranch
24-2001	1-21-00016HUM	Maple Bear	B	Detection Probability	Y	4800, 4851
24-2001	1-21-00016HUM	Maple Bear	C	Detection Probability	Y	4800, 4851, Bear Creek
24-2001	1-21-00016HUM	Maple Bear	D	Detection Probability	Y	4851
24-2001	1-21-00016HUM	Maple Bear	E	Detection Probability	Y	4851, Maple Creek #1
24-2201	1-22-00118HUM	Canon Ridge	A	Detection Probability	N	Canyon Creek #1
24-2201	1-22-00118HUM	Canon Ridge	B	Detection Probability	N	Canyon Creek #1
26-1602	1-16-083HUM	Cal Barrel 1100 '17	B	Detection Probability	N	Jiggs Creek

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
26-1602	1-16-083HUM	Cal Barrel 1100 '17	D	Detection Probability	N	SF Bald Mt. Creek
26-1602	1-16-083HUM	Cal Barrel 1100 '17	E	Detection Probability	N	SF Bald Mt. Creek
26-1602	1-16-083HUM	Cal Barrel 1100 '17	F	Detection Probability	N	SF Bald Mt. Creek
26-1801	1-18-00109HUM	Bald Mountain Creek	A	Detection Probability	N	
26-1801	1-18-00109HUM	Bald Mountain Creek	B	Detection Probability	N	
26-1801	1-18-00109HUM	Bald Mountain Creek	C	Detection Probability	N	
26-1901	1-19-00161HUM	CB 1000 '20	A	Detection Probability/Spot Call	Y	Cal Barrel, Korbel Mill
26-1901	1-19-00161HUM	CB 1000 '20	B	Detection Probability	Y	
26-1901	1-19-00161HUM	CB 1000 '20	F	Detection Probability	Y	Cal Barrel
26-2001	1-20-00107HUM	Lord Ellis Summit	A	Detection Probability/Spot Call	Y	Wiregrass Ridge
26-2001	1-20-00107HUM	Lord Ellis Summit	B	Detection Probability	Y	
26-2001	1-20-00107HUM	Lord Ellis Summit	C	Detection Probability	Y	
26-2002	1-21-00019HUM	Long Prairie '21	A	Detection Probability	Y	Old 299 Pine Creek
26-2002	1-21-00019HUM	Long Prairie '21	C	Detection Probability	Y	Old 299 #1
26-2002	1-21-00019HUM	Long Prairie '21	E	Detection Probability	Y	
26-2002	1-21-00019HUM	Long Prairie '21	F	Detection Probability	Y	
26-2002	1-21-00019HUM	Long Prairie '21	G	Detection Probability	Y	Old 299 #1
26-2002	1-21-00019HUM	Long Prairie '21	H	Detection Probability	Y	Old 299 #1
26-2101	1-22-00038HUM	Knutz Creek '22	A	Detection Probability	N	
26-2101	1-22-00038HUM	Knutz Creek '22	B	Detection Probability	N	
26-2101	1-22-00038HUM	Knutz Creek '22	C	Detection Probability	N	
26-2101	1-22-00038HUM	Knutz Creek '22	D	Detection Probability	N	
26-2101	1-22-00038HUM	Knutz Creek '22	E	Detection Probability	N	
26-2101	1-22-00038HUM	Knutz Creek '22	F	Detection Probability	N	Freeman
26-2102	1-22-00194HUM	Dolf Prairie 23	A	Detection Probability	N	Cal Barrel Washout
26-2102	1-22-00194HUM	Dolf Prairie 23	B	Detection Probability	N	Cal Barrel Washout
26-2102	1-22-00194HUM	Dolf Prairie 23	C	Detection Probability	N	Cal Barrel Washout
26-2102	1-22-00194HUM	Dolf Prairie 23	D	Detection Probability	N	Cal Barrel Washout

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
26-2102	1-22-00194HUM	Dolf Prairie 23	E	Detection Probability	N	Cal Barrel Washout
26-2102	1-22-00194HUM	Dolf Prairie 23	F	Detection Probability	N	Cal Barrel Washout
26-2102	1-22-00194HUM	Dolf Prairie 23	G	Detection Probability	N	SF Bald Mt. Creek
26-2102	1-22-00194HUM	Dolf Prairie 23	H	Detection Probability	N	
26-2102	1-22-00194HUM	Dolf Prairie 23	I	Detection Probability	N	
26-2102	1-22-00194HUM	Dolf Prairie 23	J	Detection Probability	N	
27-1801	1-18-084HUM	Cutoff Road	D	Detection Probability	Y	Lupton Creek #2
27-1801	1-18-084HUM	Cutoff Road	E	Detection Probability	Y	
27-2001	1-21-00046HUM	Christmas Carroll	A	Detection Probability	Y	
27-2001	1-21-00046HUM	Christmas Carroll	B	Detection Probability	Y	
27-2001	1-21-00046HUM	Christmas Carroll	C	Detection Probability	Y	Fern Prairie
27-2001	1-21-00046HUM	Christmas Carroll	D	Detection Probability	Y	
27-2101	1-22-00059HUM	Noisy Springs	A	Detection Probability	N	Fern Prairie, Windy North
27-2101	1-22-00059HUM	Noisy Springs	B	Detection Probability	N	Tilley Slide, Windy North
27-2101	1-22-00059HUM	Noisy Springs	C	Detection Probability	N	
27-2101	1-22-00059HUM	Noisy Springs	D	Detection Probability	N	
27-2101	1-22-00059HUM	Noisy Springs	E	Detection Probability	N	
27-2101	1-22-00059HUM	Noisy Springs	F	Detection Probability	N	
27-2101	1-22-00059HUM	Noisy Springs	G	Detection Probability	N	High Prairie 340, Kermit
27-2201	1-22-00148HUM	Fernwood Thin	A	Detection Probability	N	Aldo Dusi
34-1601	1-19-00076HUM	Big Mack Combo	A	Detection Probability	N	
34-1601	1-19-00076HUM	Big Mack Combo	B	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	D	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	E	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	F	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	G	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	H	Detection Probability	N	
34-1901	1-19-00076HUM	Big Mack Combo	I	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
34-1901	1-19-00076HUM	Big Mack Combo	J	Detection Probability	N	
35-2201	1-22-00137HUM	Mather 23	A	Detection Probability	N	
35-2201	1-22-00137HUM	Mather 23	B	Detection Probability	N	
35-2201	1-22-00137HUM	Mather 23	C	Detection Probability	N	Mather #1, Mather #2
35-2201	1-22-00137HUM	Mather 23	D	Detection Probability	N	Mather #1, Mather #2
40-2001	1-21-00017HUM	NF 1100	A	Detection Probability/Spot Call	Y	Mule Creek, Old 299 Pine Creek
40-2001	1-21-00017HUM	NF 1100	B	Detection Probability	Y	
40-2001	1-21-00017HUM	NF 1100	C	Detection Probability	Y	
40-2001	1-21-00017HUM	NF 1100	D	Spot Call	Y	
42-2001	1-20-00067HUM	Basin East	F	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	A	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	B	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	C	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	D	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	E	Spot Call	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	F	Detection Probability	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	G	Detection Probability	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	H	Detection Probability	Y	
42-2002	1-21-00091HUM	Canyon Creek ‘22	I	Spot Call	Y	
42-2101	1-22-00069HUM	Beaver Basin	A	Detection Probability	N	
42-2101	1-22-00069HUM	Beaver Basin	B	Detection Probability	N	
42-2101	1-22-00069HUM	Beaver Basin	C	Detection Probability	N	
42-2101	1-22-00069HUM	Beaver Basin	D	Detection Probability	N	
42-2101	1-22-00069HUM	Beaver Basin	E	Detection Probability	N	
42-2101	1-22-00069HUM	Beaver Basin	F	Detection Probability	N	
42-2201	Not Yet Assigned	North Fork ‘23	A	Detection Probability	N	
42-2201	Not Yet Assigned	North Fork ‘23	B	Detection Probability	N	
42-2201	Not Yet Assigned	North Fork ‘23	C	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
42-2201	Not Yet Assigned	North Fork '23	D	Detection Probability	N	
42-2201	Not Yet Assigned	North Fork '23	E	Detection Probability	N	
42-2201	Not Yet Assigned	North Fork '23	F	Detection Probability	N	
43-1801	1-18-00145HUM	Whitehouse '19	K	Detection Probability	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	A	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	B	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	C	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	D	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	E	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	F	Second Year	Y	
43-1802	1-18-00064HUM	Railroad Creek Thin	G	Second Year/Spot Call	Y	
43-1901	1-19-00167HUM	Little Bull Thin	A	Second Year	Y	
43-1904	1-20-00016HUM	Mitsui Thin	A	Second Year/Spot Call	Y	
43-1904	1-20-00016HUM	Mitsui Thin	B	Second Year/Spot Call	Y	
43-1904	1-20-00016HUM	Mitsui Thin	C	Second Year	Y	
43-1904	1-20-00016HUM	Mitsui Thin	D	Second Year	Y	
43-1904	1-20-00016HUM	Mitsui Thin	E	Second Year	Y	
43-1904	1-20-00016HUM	Mitsui Thin	F	Second Year	Y	
43-1904	1-20-00016HUM	Mitsui Thin	G	Second Year	Y	
43-2002	1-20-00106HUM	Little Maple '21	D	Second Year	Y	
43-2002	1-20-00106HUM	Little Maple '21	E	Second Year	Y	
43-2002	1-20-00106HUM	Little Maple '21	F	Second Year	Y	
43-2201	1-23-00004HUM	CR 3300	A	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	B	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	C	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	D	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	E	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	F	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
43-2201	1-23-00004HUM	CR 3300	G	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	H	Detection Probability	N	
43-2201	1-23-00004HUM	CR 3300	I	Detection Probability	N	
43-2202	1-22-00106HUM	Upper South Fork	A	Detection Probability	N	
43-2202	1-22-00106HUM	Upper South Fork	B	Detection Probability	N	
43-2202	1-22-00106HUM	Upper South Fork	C	Detection Probability	N	
43-2203	1-23-00001HUM	White Bull	C	Detection Probability	N	
43-2203	1-23-00001HUM	White Bull	D	Detection Probability	N	
44-1601	1-16-127HUM	Wiregrass East ‘17	A	Detection Probability	N	
44-1601	1-16-127HUM	Wiregrass East ‘17	C	Detection Probability	N	
44-1601	1-16-127HUM	Wiregrass East ‘17	D	Detection Probability	N	
44-1601	1-16-127HUM	Wiregrass East ‘17	F	Detection Probability	N	Upper Toss-Off
44-1601	1-16-127HUM	Wiregrass East ‘17	G	Detection Probability	N	Upper Toss-Off
44-1901	1-19-00065HUM	Wire Canyon	B	Second Year	Y	
44-1901	1-19-00065HUM	Wire Canyon	C	Second Year	Y	
45-2001	1-20-00162HUM	Little Beach Thin	A	Second Year	Y	
45-2001	1-20-00162HUM	Little Beach Thin	B	Second Year	Y	
45-2001	1-20-00162HUM	Little Beach Thin	G	Second Year/Spot Call	Y	
45-2001	1-20-00162HUM	Little Beach Thin	H	Second Year	Y	
45-2101	1-22-00112HUM	CR 2000/2900 Thin	A	Detection Probability	N	
45-2101	1-22-00112HUM	CR 2000/2900 Thin	B	Detection Probability	N	Little River #2
45-2101	1-22-00112HUM	CR 2000/2900 Thin	C	Detection Probability	N	
45-2101	1-22-00112HUM	CR 2000/2900 Thin	D	Detection Probability	N	
45-2101	1-22-00112HUM	CR 2000/2900 Thin	E	Detection Probability	N	
45-2101	1-22-00112HUM	CR 2000/2900 Thin	F	Detection Probability	N	
47-1705	1-17-124HUM	Clear Maple ‘19	B	Detection Probability	N	
47-1802	1-18-00140HUM	North McDonald	C	Detection Probability	N	Stone Lagoon
47-1802	1-18-00140HUM	North McDonald	F	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
47-1901	1-19-00215HUM	CR 1000 West	A	Second Year	Y	
47-1902	1-19-00150HUM	CR 2400/1640	C	Second Year	Y	
47-1902	1-19-00150HUM	CR 2400/1640	D	Spot Call	Y	
47-1904	1-19-00209HUM	Relief Pitcher	B	Second Year	Y	
47-1905	1-20-00046HUM	CR 1008	A	Second Year	Y	
47-2002	1-20-00082HUM	Mc Maple '21	C	Second Year	Y	
47-2002	1-20-00082HUM	Mc Maple '21	E	Second Year	Y	
47-2002	1-20-00082HUM	Mc Maple '21	G	Second Year	Y	
47-2003	1-20-00133HUM	CR 2473/BL 2250	B	Second Year/Spot Call	Y	
47-2004	1-21-00099HUM	Big Diamond	A	Second Year	Y	
47-2004	1-21-00099HUM	Big Diamond	B	Second Year	Y	
47-2004	1-21-00099HUM	Big Diamond	C	Spot Call	Y	
47-2004	1-21-00099HUM	Big Diamond	D	Spot Call	Y	
47-2004	1-21-00099HUM	Big Diamond	E	Second Year	Y	
47-2004	1-21-00099HUM	Big Diamond	F	Second Year	Y	
47-2101	1-21-00147HUM	BL 1800/1900	A	Second Year/Spot Call	Y	
47-2101	1-21-00147HUM	BL 1800/1900	B	Second Year	Y	
47-2101	1-21-00147HUM	BL 1800/1900	C	Second Year	Y	
47-2101	1-21-00147HUM	BL 1800/1900	D	Second Year	Y	
47-2101	1-21-00147HUM	BL 1800/1900	E	Second Year	Y	
47-2102	1-21-00088HUM	Baby Lagoon	B	Second Year	Y	
47-2102	1-21-00088HUM	Baby Lagoon	C	Spot Call	Y	
47-2103	1-21-00143HUM	CR 1000/1900 THP '22	A	Detection Probability	N	
47-2103	1-21-00143HUM	CR 1000/1900 THP '22	B	Detection Probability	N	
47-2103	1-21-00143HUM	CR 1000/1900 THP '22	C	Detection Probability	N	
47-2103	1-21-00143HUM	CR 1000/1900 THP '22	D	Detection Probability	N	
47-2103	1-21-00143HUM	CR 1000/1900 THP '22	E	Detection Probability	N	
47-2104	1-21-00120HUM	South McDonald 2022	A	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
47-2104	1-21-00120HUM	South McDonald 2022	B	Detection Probability	N	Stone Lagoon
47-2104	1-21-00120HUM	South McDonald 2022	C	Spot Call	Y	
47-2104	1-21-00120HUM	South McDonald 2022	D	Second Year	Y	
47-2104	1-21-00120HUM	South McDonald 2022	E	Second Year	Y	
47-2104	1-21-00120HUM	South McDonald 2022	F	Second Year	Y	
47-2105	1-22-00016HUM	Big Beginning	A	Detection Probability	N	
47-2105	1-22-00016HUM	Big Beginning	B	Detection Probability	N	
47-2106	1-22-00037HUM	CR 2960 THP	A	Detection Probability	N	
47-2106	1-22-00037HUM	CR 2960 THP	B	Detection Probability	N	
47-2106	1-22-00037HUM	CR 2960 THP	C	Detection Probability	N	
47-2106	1-22-00037HUM	CR 2960 THP	D	Detection Probability	N	
47-2201	1-22-00144HUM	Clear Creek ‘23	A	Detection Probability	N	
47-2201	1-22-00144HUM	Clear Creek ‘23	B	Detection Probability	N	
47-2201	1-22-00144HUM	Clear Creek ‘23	C	Detection Probability	N	
47-2201	1-22-00144HUM	Clear Creek ‘23	D	Detection Probability	N	
48-2001	1-20-00155HUM	Little Redwood ‘21	B	Spot Call	Y	
48-2001	1-20-00155HUM	Little Redwood ‘21	C	Spot Call	Y	
48-2101	1-22-00013HUM	Roaring Headwaters 22	A	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	B	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	C	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	D	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	E	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	F	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	G	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	H	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	I	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	J	Detection Probability	N	
48-2101	1-22-00013HUM	Roaring Headwaters 22	K	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
48-2102	1-22-00018HUM	CR 2960 THP	A	Detection Probability	N	
48-2102	1-22-00018HUM	CR 2960 THP	B	Detection Probability	N	
48-2102	1-22-00018HUM	CR 2960 THP	C	Detection Probability	N	
48-2102	1-22-00018HUM	CR 2960 THP	D	Detection Probability	N	Panther Bridge
48-2103	1-22-00019HUM	K&K 1000 North	A	Detection Probability	N	Garrett Creek
48-2103	1-22-00019HUM	K&K 1000 North	B	Detection Probability	N	Panther Bridge
48-2103	1-22-00019HUM	K&K 1000 North	C	Detection Probability	N	
48-2103	1-22-00019HUM	K&K 1000 North	D	Detection Probability	N	
48-2103	1-22-00019HUM	K&K 1000 North	E	Detection Probability	N	
51-1704	1-17-136HUM	Johnson/Roach ‘18	G	Second Year	Y	
51-1704	1-17-136HUM	Johnson/Roach ‘18	I	Second Year	Y	
51-1707	1-17-144HUM	HC 1400 ‘18	A	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	B	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	C	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	D	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	E	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	G	Detection Probability	N	
51-1707	1-17-144HUM	HC 1400 ‘18	H	Detection Probability	N	
51-1801	1-18-092HUM	Bear Prairie	B	Second Year	Y	
51-1801	1-18-092HUM	Bear Prairie	C	Detection Probability	N	
51-1801	1-18-092HUM	Bear Prairie	D	Detection Probability	N	
51-1801	1-18-092HUM	Bear Prairie	E	Detection Probability	N	
51-1801	1-18-092HUM	Bear Prairie	F	Detection Probability	N	
51-1901	1-20-00018HUM	Cemetery Gates ‘20	C	Second Year	Y	
51-1901	1-20-00018HUM	Cemetery Gates ‘20	D	Second Year	Y	
51-1901	1-20-00018HUM	Cemetery Gates ‘20	E	Second Year	Y	
51-2001	1-20-00085HUM	Tully Thin	D	Second Year	Y	
51-2001	1-20-00085HUM	Tully Thin	F	Second Year	Y	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
51-2002	1-21-00015HUM	Hancorne 1000 ‘21	A	Detection Probability	N	
51-2002	1-21-00015HUM	Hancorne 1000 ‘21	B	Detection Probability	N	
51-2002	1-21-00015HUM	Hancorne 1000 ‘21	C	Detection Probability	N	
56-1704	1-18-063HUM	J-1700 ‘19	A	Detection Probability	Y	J1600
56-1704	1-18-063HUM	J-1700 ‘19	B	Detection Probability	Y	J1600
56-1704	1-18-063HUM	J-1700 ‘19	C	Detection Probability	Y	
56-1704	1-18-063HUM	J-1700 ‘19	D	Detection Probability	N	Ambrose
56-1704	1-18-063HUM	J-1700 ‘19	E	Detection Probability	Y	
56-1704	1-18-063HUM	J-1700 ‘19	F	Detection Probability	Y	
56-1704	1-18-063HUM	J-1700 ‘19	G	Detection Probability	Y	Ambrose
56-1802	1-19-00002HUM	Buker’s Prairie	D	Second Year	Y	
56-1803	1-18-00141HUM	TT 515 ‘20	C	Second Year	Y	
56-1804	1-18-00173HUM	Tectah 300 ‘20	B	Detection Probability	Y	
56-1804	1-18-00173HUM	Tectah 300 ‘20	C	Detection Probability	Y	
56-1902	1-21-00087HUM	Tectah Straddle	A	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	B	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	C	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	D	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	E	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	F	Second Year	Y	
56-1902	1-21-00087HUM	Tectah Straddle	G	Second Year	Y	
56-1903	1-21-00001HUM	North Johnson ‘21	A	Detection Probability	N	
56-1903	1-21-00001HUM	North Johnson ‘21	B	Detection Probability	N	
56-1903	1-21-00001HUM	North Johnson ‘21	C	Detection Probability	N	
56-1903	1-21-00001HUM	North Johnson ‘21	D	Detection Probability	N	
56-1903	1-21-00001HUM	North Johnson ‘21	E	Detection Probability	N	
56-1903	1-21-00001HUM	North Johnson ‘21	F	Detection Probability	N	Ambrose, Johnson Creek
56-1903	1-21-00001HUM	North Johnson ‘21	G	Detection Probability	N	Johnson Creek

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
56-1904	1-20-00149HUM	A-400	C	Second Year	Y	
56-1904	1-20-00149HUM	A-400	E	Second Year	Y	
56-2001	1-21-00023HUM	Ah Pah 1800 '21	A	Second Year	Y	
56-2001	1-21-00023HUM	Ah Pah 1800 '21	D	Second Year	Y	
56-2001	1-21-00023HUM	Ah Pah 1800 '21	E	Second Year	Y	
56-2002	1-20-00213HUM	West Tectah	F	Second Year	Y	
56-2002	1-20-00213HUM	West Tectah	H	Spot Call	Y	
56-2002	1-20-00213HUM	West Tectah	I	Spot Call	Y	
56-2002	1-20-00213HUM	West Tectah	J	Second Year	Y	
56-2101	1-21-00087HUM	Tectah North	A	Detection Probability	Y	
56-2101	1-21-00087HUM	Tectah North	B	Second Year	Y	
56-2101	1-21-00087HUM	Tectah North	C	Second Year	Y	
56-2101	1-21-00087HUM	Tectah North	D	Second Year	Y	
56-2101	1-21-00087HUM	Tectah North	E	Second Year	Y	
56-2101	1-21-00087HUM	Tectah North	G	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	A	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	B	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	C	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	D	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	E	Second Year	Y	
56-2102	1-21-00168HUM	CL North 1000	F	Second Year	Y	
56-2103	Not Yet Assigned	Tectah 180	A	Detection Probability	N	
56-2103	Not Yet Assigned	Tectah 180	B	Detection Probability	N	
56-2103	Not Yet Assigned	Tectah 180	C	Detection Probability	N	
56-2103	Not Yet Assigned	Tectah 180	D	Detection Probability	N	
56-2103	Not Yet Assigned	Tectah 180	E	Detection Probability	N	
61-1901	1-20-00177HUM	Omagar Creek	A	Second Year	Y	
61-1901	1-20-00177HUM	Omagar Creek	B	Second Year	Y	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
61-1901	1-20-00177HUM	Omagar Creek	C	Second Year	Y	
61-1901	1-20-00177HUM	Omagar Creek	D	Second Year	Y	
61-1901	1-20-00177HUM	Omagar Creek	E	Second Year/Spot Call	Y	
61-1901	1-20-00177HUM	Omagar Creek	F	Second Year/Spot Call	Y	
66-1901	1-19-00142DEL	McGarvey West	G	Detection Probability	Y	
66-1901	1-19-00142DEL	McGarvey West	I	Second Year	Y	
66-2001	1-20-00061DEL	Drury Forks	A	Second Year	Y	
66-2001	1-20-00061DEL	Drury Forks	B	Second Year	Y	
66-2001	1-20-00061DEL	Drury Forks	C	Second Year	Y	
66-2001	1-20-00061DEL	Drury Forks	E	Second Year	Y	
66-2002	1-20-00210DEL	Tarup ‘21	A	Spot Call	Y	
66-2002	1-20-00210DEL	Tarup ‘21	C	Second Year/Spot Call	Y	
67-2001	1-21-00089DEL	Dump Thin	A	Detection Probability	Y	
67-2001	1-21-00089DEL	Dump Thin	B	Second Year	Y	
67-2001	1-21-00089DEL	Dump Thin	C	Detection Probability	Y	
67-2001	1-21-00089DEL	Dump Thin	D	Detection Probability	Y	
67-2001	1-21-00089DEL	Dump Thin	E	Detection Probability	Y	
67-2001	1-21-00089DEL	Dump Thin	F	Second Year	Y	
67-2001	1-21-00089DEL	Dump Thin	G	Detection Probability	Y	
67-2001	1-21-00089DEL	Dump Thin	H	Second Year	Y	
67-2001	1-21-00089DEL	Dump Thin	I	Detection Probability	Y	
70-2001	1-21-00005DEL	Salt Creek	A	Detection Probability	Y	
70-2001	1-21-00005DEL	Salt Creek	B	Detection Probability	Y	
70-2001	1-21-00005DEL	Salt Creek	C	Detection Probability	Y	
70-2001	1-21-00005DEL	Salt Creek	D	Detection Probability	Y	
70-2001	1-21-00005DEL	Salt Creek	E	Detection Probability	Y	
71-1702	1-17-073DEL	West Wilson	A	Detection Probability	Y	
71-1702	1-17-073DEL	West Wilson	B	Detection Probability	Y	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
71-1702	1-17-073DEL	West Wilson	D	Detection Probability	Y	
71-1702	1-17-073DEL	West Wilson	F	Detection Probability	Y	
71-1702	1-17-073DEL	West Wilson	G	Detection Probability	Y	W100
71-1802	1-19-00005DEL	H-210/245	M	Detection Probability	N	
71-1804	1-19-00120DEL	Wilson End	A	Detection Probability	Y	
71-1804	1-19-00120DEL	Wilson End	B	Detection Probability	N	
71-1901	1-20-00080DEL	W150	A	Detection Probability	Y	
71-1901	1-20-00080DEL	W150	B	Detection Probability	Y	
71-1901	1-20-00080DEL	W150	C	Second Year	Y	
71-1901	1-20-00080DEL	W150	D	Detection Probability	Y	
71-1901	1-20-00080DEL	W150	E	Detection Probability	Y	
71-1901	1-20-00080DEL	W150	F	Second Year	Y	
71-1902	1-20-00007DEL	H100	B	Second Year	Y	
71-1903	1-19-00220DEL	Wilson 300	E	Detection Probability	Y	
71-1904	1-20-00004DEL	H-400	B	Spot Call	Y	Hunter 410
71-2001	1-20-00118DEL	Wilson 200	A	Detection Probability	Y	
71-2001	1-20-00118DEL	Wilson 200	B	Detection Probability	Y	
71-2001	1-20-00118DEL	Wilson 200	C	Detection Probability	N	
71-2101	1-22-00004DEL	H-500	A	Detection Probability	N	
71-2101	1-22-00004DEL	H-500	B	Detection Probability	N	
71-2101	1-22-00004DEL	H-500	C	Detection Probability	N	
71-2101	1-22-00004DEL	H-500	D	Detection Probability	N	
71-2101	1-22-00004DEL	H-500	E	Detection Probability	N	
71-2102	1-21-00166DEL	W-160	A	Detection Probability	N	
71-2102	1-21-00166DEL	W-160	B	Detection Probability	N	
71-2102	1-21-00166DEL	W-160	C	Detection Probability	N	
71-2102	1-21-00166DEL	W-160	D	Detection Probability	N	
71-2102	1-21-00166DEL	W-160	E	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
71-2103	1-21-00189DEL	Hunter West	A	Detection Probability	N	
71-2103	1-21-00189DEL	Hunter West	B	Detection Probability	N	
71-2103	1-21-00189DEL	Hunter West	C	Detection Probability	N	Hunter CF
71-2104	1-22-00107DEL	Wilson One Recon	A	Detection Probability	N	
71-2105	1-22-00167DEL	Hunter Wilson 23	C	Detection Probability	N	
71-2105	1-22-00167DEL	Hunter Wilson 23	D	Detection Probability	N	
71-2105	1-22-00167DEL	Hunter Wilson 23	I	Detection Probability	N	
71-2105	1-22-00167DEL	Hunter Wilson 23	J	Detection Probability	N	
73-1901	1-19-00221DEL	Hoppaw 2020	A	Second Year	Y	
73-2001	1-21-00080DEL	T-100	A	Second Year	Y	
73-2001	1-21-00080DEL	T-100	B	Second Year	Y	
73-2001	1-21-00080DEL	T-100	C	Spot Call	Y	
73-2001	1-21-00080DEL	T-100	D	Second Year	Y	
73-2001	1-21-00080DEL	T-100	E	Spot Call	Y	
73-2001	1-21-00080DEL	T-100	F	Second Year	Y	
73-2002	1-21-00002DEL	Mynot 500	A	Detection Probability	Y	
73-2002	1-21-00002DEL	Mynot 500	B	Detection Probability	Y	Upper Mynot Creek
73-2002	1-21-00002DEL	Mynot 500	C	Detection Probability	Y	Upper Mynot Creek
73-2002	1-21-00002DEL	Mynot 500	E	Detection Probability	Y	Mynot School
73-2002	1-21-00002DEL	Mynot 500	F	Detection Probability	Y	Mynot School
73-2002	1-21-00002DEL	Mynot 500	G	Second Year	Y	
73-2101	1-21-00192DEL	Lower Hunter 22	A	Detection Probability	N	
73-2101	1-21-00192DEL	Lower Hunter 22	B	Detection Probability	N	
73-2101	1-21-00192DEL	Lower Hunter 22	C	Detection Probability	N	
73-2101	1-21-00192DEL	Lower Hunter 22	D	Detection Probability	N	
73-2101	1-21-00192DEL	Lower Hunter 22	E	Detection Probability	N	
73-2102	1-21-00195DEL	Dog Box / KM-850	A	Detection Probability	N	
73-2102	1-21-00195DEL	Dog Box / KM-850	B	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
73-2102	1-21-00195DEL	Dog Box / KM-850	C	Detection Probability	N	
73-2103	1-22-00021DEL	Tip of Tepo	A	Detection Probability	N	
73-2103	1-22-00021DEL	Tip of Tepo	B	Detection Probability	N	
73-2103	1-22-00021DEL	Tip of Tepo	C	Detection Probability	N	Hunter 110
73-2103	1-22-00021DEL	Tip of Tepo	D	Detection Probability	N	East Fork Hunter
85-1602	1-18-007DEL	RM 10	F	Detection Probability	Y	
85-1602	1-18-007DEL	RM 10	G	Detection Probability	Y	
85-1802	1-20-00103DEL	Lower Turwar	C	Detection Probability	Y	
85-1803	1-20-00013DEL	Top of Turwar	B	Detection Probability	Y	
85-1803	1-20-00013DEL	Top of Turwar	D	Detection Probability	Y	
85-1803	1-20-00013DEL	Top of Turwar	F	Detection Probability	Y	
85-1803	1-20-00013DEL	Top of Turwar	I	Detection Probability/Spot Call	Y	
85-1901	1-20-00008DEL	Dandy Creek	D	Detection Probability	Y	
85-2001	1-21-00004DEL	Crowley's Corner	A	Spot Call	Y	Hulla Crup Turwar
85-2001	1-21-00004DEL	Crowley's Corner	C	Detection Probability	Y	
85-2001	1-21-00004DEL	Crowley's Corner	E	Second Year	Y	
85-2002	1-21-00146DEL	Nasty Jack	A	Second Year/Spot Call	Y	
85-2002	1-21-00146DEL	Nasty Jack	B	Detection Probability/Spot Call	Y	
85-2002	1-21-00146DEL	Nasty Jack	C	Detection Probability/Spot Call	Y	
85-2002	1-21-00146DEL	Nasty Jack	D	Detection Probability	N	
85-2002	1-21-00146DEL	Nasty Jack	E	Detection Probability	Y	
85-2002	1-21-00146DEL	Nasty Jack	F	Detection Probability	Y	
85-2201	1-23-00002DEL	Beaver Slide 23/24	A	Detection Probability	N	
85-2201	1-23-00002DEL	Beaver Slide 23/24	B	Detection Probability	N	
85-2201	1-23-00002DEL	Beaver Slide 23/24	C	Detection Probability	N	
85-2201	1-23-00002DEL	Beaver Slide 23/24	G	Detection Probability	N	
85-2201	1-23-00002DEL	Beaver Slide 23/24	H	Detection Probability	N	
85-2201	1-23-00002DEL	Beaver Slide 23/24	I	Detection Probability	N	

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
90-1901	1-19-0021DEL	Morrison Thin	A	Second Year	Y	
90-1901	1-19-0021DEL	Morrison Thin	B	Second Year	Y	
90-2101	1-21-00102DEL	Morrison 200	A	Detection Probability	Y	
90-2101	1-21-00102DEL	Morrison 200	B	Detection Probability/Spot Call	Y	
90-2101	1-21-00102DEL	Morrison 200	C	Detection Probability	Y	
90-2101	1-21-00102DEL	Morrison 200	D	Spot Call	Y	
93-1702	1-18-106DEL	South Winchuck	F	Second Year	Y	
93-1801	1-18-00195DEL	Gilbert Winchuck	B	Detection Probability	Y	Winchuck River
93-1801	1-18-00195DEL	Gilbert Winchuck	D	Detection Probability	N	Gilbert Creek
93-1901	Not Yet Assigned	Gilbert Creek	A	Detection Probability	N	
93-1901	Not Yet Assigned	Gilbert Creek	B	Detection Probability	N	
93-1901	Not Yet Assigned	Gilbert Creek	C	Detection Probability	N	
93-2001	1-20-00142DEL	Bear Creek 3	B	Second Year	Y	
93-2001	1-20-00142DEL	Bear Creek 3	C	Second Year	Y	
93-2001	1-20-00142DEL	Bear Creek 3	E	Second Year	Y	
93-2101	1-21-00141DEL	Rod and Gun Club	A	Detection Probability	N	
93-2101	1-21-00141DEL	Rod and Gun Club	B	Detection Probability	N	
93-2101	1-21-00141DEL	Rod and Gun Club	C	Detection Probability	N	
93-2101	1-21-00141DEL	Rod and Gun Club	D	Detection Probability	N	
93-2102	1-21-00165DEL	The Jim Adams	A	Detection Probability	N	
93-2102	1-21-00165DEL	The Jim Adams	B	Detection Probability	N	
93-2102	1-21-00165DEL	The Jim Adams	C	Detection Probability	N	
93-2102	1-21-00165DEL	The Jim Adams	D	Detection Probability	N	Copper Creek
93-2102	1-21-00165DEL	The Jim Adams	E	Detection Probability	N	Copper Creek
93-2102	1-21-00165DEL	The Jim Adams	F	Detection Probability	N	Copper Creek
93-2102	1-21-00165DEL	The Jim Adams	G	Detection Probability	N	Copper Creek
93-2102	1-21-00165DEL	The Jim Adams	H	Detection Probability	N	
93-2102	1-21-00165DEL	The Jim Adams	I	Detection Probability	N	R1400

THP#	State ID	THP Name	Unit ID	Survey Type	Surveyed in previous year	Spotted owl site within 0.5 mile
93-2103	1-22-00066DEL	Savoy 23	A	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	B	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	C	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	D	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	E	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	F	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	G	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	H	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	I	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	J	Detection Probability	N	
93-2103	1-22-00066DEL	Savoy 23	K	Detection Probability	N	
93-2104	1-22-00145DEL	Winchuck	C	Detection Probability	N	
93-2104	1-22-00145DEL	Winchuck	D	Detection Probability	N	
93-2104	1-22-00145DEL	Winchuck	E	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	A	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	B	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	C	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	D	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	E	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	F	Detection Probability	N	
95-2101	1-22-00002DEL	Camp Six THP	G	Detection Probability	N	
98-1801	1-19-00021DEL	The Dump ‘20	A	Second Year	Y	
98-1801	1-19-00021DEL	The Dump ‘20	B	Second Year	Y	
98-1801	1-19-00021DEL	The Dump ‘20	C	Second Year	Y	
98-1801	1-19-00021DEL	The Dump ‘20	D	Second Year	Y	

Spot call survey type refers to units that were cut through the beginning of the 2022 survey period with continuous operations until harvest was complete. Such units were surveyed once per week concurrent with operations until five surveys were completed or less than 10 acres of contiguous timber remained standing. All units that were spot called in 2022 were surveyed in 2021 until 95% probability of detection was achieved.

Detection probability survey type indicates that a unit was surveyed in 2022 prior to operations until 95% probability of detection was achieved (range 4-6 surveys).

Second year survey type indicates that a unit was surveyed in the previous year with the detection probability protocol and no owls were detected. Under these circumstances, a second year survey protocol that incorporates the results from the detection probability analysis described in Chapter II of the annual report may be implemented, and four surveys are required to achieve a 95% probability of detecting an owl.

Detection probability & spot call or second year & Spot call survey types indicate that a portion of the unit was cut continuously through the beginning of the 2022 survey period followed by a delay in harvest of the remaining portion. The portion of the unit harvested through the beginning of the 2022 survey period received spot call surveys. The portion of the unit that remained was surveyed either using the detection probability protocol or second year surveys before operations continued in 2022.

Appendix II: Raw data for habitat retention measures for individual clearcut harvest units summarized in Tables 1, 2, 3, 4, 5, and 6.

THP #	State ID	Unit	Acres	Pre HRA #	Post HRA #	Pre green trees/acre	Post green trees/acre	Pre snags/acre	Post snags/acre	Pre scorecard trees #	Post scorecard trees #	Large woody debris/acre	Dominance	RMZ and Geo Acres
092001	1-21-00011HUM	A	4.65	0	0	1.00	1.00	0.00	0.00	0	0	0.50	Conifer	1.70
092001	1-21-00011HUM	B	16.19	0	0	1.00	1.00	0.00	0.00	0	0	0.50	Conifer	11.75
092001	1-21-00011HUM	C	24.81	0	0	1.00	1.00	0.00	0.00	2	2	0.50	Conifer	7.40
092001	1-21-00011HUM	D	1.03	0	0	1.00	1.00	0.00	0.00	0	0	0.50	Conifer	13.11
142001	1-20-00124HUM	B	26.9	0	0	1.00	1.00	0.10	0.10	10	10	0.10	Conifer	1.43
142001	1-20-00124HUM	C	20.45	0	0	1.00	1.00	0.00	0.10	2	2	1.00	Conifer	8.18
152001	1-21-00022HUM	C	16.17	0	0	1.80	1.80	0.30	0.30	8	8	2.00	Conifer	10.61
172001	1-20-00222HUM	C	14.07	0	0	2.00	2.00	0.00	0.00	40	40	0.10	Conifer	18.06
172002	1-21-00049HUM	B	12.04	0	0	2.75	2.75	0.00	0.50	24	25	3.00	Conifer	5.31
172002	1-21-00049HUM	C	22.09	0	0	2.75	2.75	0.00	0.25	52	52	1.00	Conifer	0.00
182001	1-20-00207HUM	A	30.23	0	0	2.00	2.00	0.00	0.00	9	9	1.00	Conifer	5.40
182001	1-20-00207HUM	B	23.43	0	0	2.00	2.00	0.00	0.00	4	4	1.00	Conifer	2.53
182001	1-20-00207HUM	C	27.06	0	0	2.00	2.00	0.00	0.00	19	19	1.00	Conifer	3.21
191902	1-20-00074HUM	A	23.41	0	0	1.23	1.23	0.25	0.25	0	0	0.50	Conifer	9.51
191902	1-20-00074HUM	B	20.97	1	1	2.00	2.00	0.25	0.25	4	4	0.50	Conifer	5.73
191902	1-20-00074HUM	C	27.77	0	0	1.22	1.22	0.25	0.25	4	5	0.50	Conifer	10.88
191902	1-20-00074HUM	D	28.61	2	2	1.00	1.00	0.25	0.25	0	5	0.50	Conifer	1.46
222001	1-21-00124HUM	G	27.09	1	1	5.00	5.00	0.30	0.30	9	9	0.50	Conifer	1.66
241901	1-20-00019HUM	C	17.44	1	1	2.00	2.00	0.50	0.50	9	9	0.00	Conifer	0.75
242001	1-21-00016HUM	C	26.38	0	0	2.00	2.00	0.25	0.25	8	8	2.00	Conifer	10.37
242001	1-21-00016HUM	D	22.43	0	0	2.00	2.00	0.25	0.25	8	8	2.00	Conifer	2.83
242001	1-21-00016HUM	E	26.03	1	1	2.00	2.00	0.25	0.25	9	9	2.00	Conifer	1.42
261801	1-18-00109HUM	A	28.26	0	0	2.00	2.00	1.00	0.00	49	49	0.10	Conifer	0.00
261801	1-18-00109HUM	B	24.96	0	0	2.00	2.00	1.00	0.00	36	36	0.20	Conifer	3.09
262001	1-20-00133HUM	A	20.34	0	0	2.80	2.80	0.00	0.00	46	46	0.00	Conifer	8.86
262001	1-20-00133HUM	B	13.77	0	0	2.17	2.17	0.00	0.00	30	30	0.00	Hardwood	3.21

THP #	State ID	Unit	Acres	Pre HRA #	Post HRA #	Pre green trees/acre	Post green trees/acre	Pre snags/acre	Post snags/acre	Pre scorecard trees #	Post scorecard trees #	Large woody debris/acre	Dominance	RMZ and Geo Acres
262001	1-20-00133HUM	C	21.04	0	0	2.10	2.10	0.00	0.00	42	42	0.00	Hardwood	0.00
262002	1-21-00019HUM	B	6.11	0	0	7.20	7.20	0.00	0.00	2	2	0.00	Conifer	1.59
262002	1-21-00019HUM	C	24.46	0	0	2.90	2.90	0.00	0.00	2	2	0.00	Conifer	5.24
262002	1-21-00019HUM	D	29.39	0	0	2.10	2.10	0.00	0.00	8	8	0.25	Conifer	9.62
262002	1-21-00019HUM	G	20.22	1	1	2.10	2.10	0.00	0.00	2	2	0.00	Conifer	1.13
262002	1-21-00019HUM	H	13.28	0	0	10.20	10.20	0.00	0.00	9	9	0.25	Conifer	5.46
272001	1-21-00046HUM	A	28.1	1	1	2.00	3.00	0.50	0.50	0	0	3.00	Conifer	0.00
272001	1-21-00046HUM	B	30.14	1	1	2.00	2.00	0.25	0.25	0	0	3.00	Conifer	0.00
272001	1-21-00046HUM	C	23.06	0	0	2.00	2.00	0.25	0.25	0	0	3.00	Conifer	7.86
272001	1-21-00046HUM	D	30.21	1	1	2.00	2.00	0.25	0.25	0	0	3.00	Conifer	0.00
402001	1-21-00017HUM	E	25.97	0	0	2.90	2.90	0.30	0.30	47	47	1.50	Conifer	15.41
402001	1-21-00017HUM	G	23.27	0	0	1.30	1.30	0.30	0.30	15	15	1.00	Conifer	6.10
422002	1-21-00091HUM	A	22.97	1	1	2.00	2.09	1.00	0.70	34	33	0.13	Conifer	1.77
422002	1-21-00091HUM	B	21.49	0	0	1.77	1.77	1.00	0.65	20	19	0.19	Conifer	3.03
422002	1-21-00091HUM	D	24.77	0	0	2.40	2.40	0.10	0.28	65	56	0.08	Conifer	17.22
422002	1-21-00091HUM	F	25.31	0	0	1.00	1.27	0.10	0.15	19	18	0.12	Conifer	10.65
422002	1-21-00091HUM	I	24.76	0	0	2.20	2.12	1.00	0.28	22	20	0.00	Conifer	10.55
451901	1-20-00099HUM	A	26.82	0	0	3.00	3.00	0.50	0.50	73	73	0.50	Conifer	0.00
451901	1-20-00099HUM	B	30.11	0	0	2.00	2.00	0.30	0.30	54	54	0.50	Conifer	0.00
471902	1-19-00150HUM	A	30.09	2	2	0.33	0.33	0.50	0.50	6	6	0.50	Conifer	9.15
471902	1-19-00150HUM	D	28.26	0	0	1.20	1.20	1.00	1.00	6	6	0.00	Conifer	13.14
471903	1-19-00208HUM	B	22.84	0	0	1.00	1.00	0.00	0.10	5	5	0.20	Conifer	13.23
471903	1-19-00208HUM	D	20.48	0	0	1.70	1.70	0.10	0.10	5	5	0.20	Conifer	4.12
471904	1-19-00209HUM	B	28.69	0	0	1.00	1.00	0.00	0.00	6	6	1.00	Conifer	9.80
471906	1-20-00075HUM	C	20.21	0	0	1.00	1.00	0.10	0.50	2	2	0.10	Conifer	16.69
472001	1-20-00088HUM	B	26.08	0	0	2.00	2.00	0.00	0.00	5	5	0.10	Conifer	9.94
472002	1-20-00082HUM	H	25.1	0	0	3.50	3.50	0.30	0.30	28	28	1.00	Conifer	14.19
472002	1-20-00082HUM	I	22.46	0	0	8.00	8.00	0.30	0.30	3	3	1.50	Conifer	14.62

THP #	State ID	Unit	Acres	Pre HRA #	Post HRA #	Pre green trees/acre	Post green trees/acre	Pre snags/acre	Post snags/acre	Pre scorecard trees #	Post scorecard trees #	Large woody debris/acre	Dominance	RMZ and Geo Acres
472003	1-20-00133HUM	A	11.64	0	0	1.50	1.50	0.10	0.10	5	5	1.00	Conifer	16.30
472004	1-21-00099HUM	C	28.94	0	0	1.30	1.30	0.10	0.00	15	13	0.50	Conifer	9.96
472004	1-21-00099HUM	D	24.69	0	0	1.50	2.20	0.10	0.45	0	9	0.16	Conifer	8.86
472004	1-21-00099HUM	E	23.68	0	0	1.30	1.91	0.10	0.38	3	15	0.51	Conifer	4.09
472101	1-21-00147HUM	A	24.36	0	0	2.00	2.00	0.30	0.21	11	11	1.00	Conifer	8.49
472101	1-21-00147HUM	B	28.68	0	0	2.00	2.00	0.00	0.00	4	4	1.00	Conifer	4.86
472101	1-21-00147HUM	E	24.52	0	0	2.00	2.00	0.00	0.00	11	17	1.00	Conifer	9.60
472102	1-21-00088HUM	A	21.44	0	0	2.00	2.00	0.00	0.00	1	1	1.00	Conifer	7.33
472102	1-21-00088HUM	B	28.98	1	1	4.00	4.00	0.00	0.00	1	1	1.00	Conifer	0.00
472102	1-21-00088HUM	C	30.7	1	1	4.00	4.00	0.00	0.00	5	5	1.00	Conifer	0.57
472103	1-21-00143HUM	B	13.5	0	0	4.30	4.30	0.25	0.25	1	1	1.00	Conifer	6.83
472103	1-21-00143HUM	C	8.59	0	0	3.60	3.60	0.25	0.25	1	1	0.00	Conifer	2.39
472104	1-21-00120HUM	C	21.55	0	0	1.00	1.00	0.00	0.00	4	4	0.10	Conifer	5.79
481901	1-20-00026HUM	B	33.48	0	0	2.00	2.00	0.50	0.50	3	3	3.00	Conifer	15.32
482001	1-20-00155HUM	C	21.43	0	0	2.90	2.90	0.30	0.30	33	33	1.00	Conifer	7.45
511801	1-18-00092HUM	B	27.86	0	0	1.60	2.00	1.00	1.00	43	43	1.00	Hardwood	44.17
511801	1-18-00092HUM	C	32.16	0	0	2.00	2.00	1.00	1.00	15	15	1.00	Hardwood	10.22
511801	1-18-00092HUM	F	32.09	0	0	2.00	2.00	1.00	1.00	60	73	1.00	Hardwood	6.40
561806	1-19-00094HUM	F	19.53	0	0	3.00	3.00	0.10	0.10	8	8	0.00	Conifer	26.45
561902	1-20-00021HUM	E	26.15	1	1	2.00	2.00	0.50	0.00	14	10	1.00	Conifer	0.84
561902	1-20-00021HUM	G	24.99	0	0	2.00	2.00	0.50	0.00	17	17	1.00	Conifer	4.53
562001	1-21-00023HUM	B	21.91	0	0	2.30	2.80	0.00	0.20	22	22	0.40	Conifer	0.72
562001	1-21-00023HUM	C	27.83	0	0	1.25	2.30	0.00	0.50	10	10	0.40	Conifer	7.63
562002	1-20-00213HUM	A	20.02	1	1	1.40	1.40	0.50	0.50	0	0	0.50	Conifer	0.44
562002	1-20-00213HUM	B	26.54	2	2	2.00	2.00	0.50	0.50	2	2	0.50	Conifer	1.41
562002	1-20-00213HUM	C	21.4	0	0	2.80	2.80	0.50	0.50	0	0	0.50	Conifer	9.83
562002	1-20-00213HUM	D	22.34	2	2	2.00	2.00	0.00	0.00	0	0	0.50	Conifer	0.00
562002	1-20-00213HUM	E	19.58	0	0	1.00	1.00	0.00	0.00	0	0	0.50	Conifer	5.81

THP #	State ID	Unit	Acres	Pre HRA #	Post HRA #	Pre green trees/acre	Post green trees/acre	Pre snags/acre	Post snags/acre	Pre scorecard trees #	Post scorecard trees #	Large woody debris/acre	Dominance	RMZ and Geo Acres
562002	1-20-00213HUM	F	19.54	0	0	2.10	2.10	0.00	0.00	1	1	0.50	Conifer	7.59
562002	1-20-00213HUM	G	22.86	1	1	2.80	2.80	0.50	0.00	10	10	1.00	Conifer	0.79
562002	1-20-00213HUM	H	24.13	0	0	2.50	2.50	0.00	0.30	3	3	1.00	Conifer	7.52
562002	1-20-00213HUM	I	18.92	0	0	2.10	2.10	0.00	0.30	0	0	1.00	Conifer	5.22
562002	1-20-00213HUM	J	16.24	0	0	2.60	2.60	0.00	0.00	15	15	1.00	Conifer	2.36
562101	1-21-00087HUM	B	26.88	0	0	2.50	2.50	0.50	0.20	0	0	0.50	Conifer	4.96
562101	1-21-00087HUM	E	29.54	0	0	2.70	2.70	0.50	0.20	1	1	0.50	Conifer	18.23
562101	1-21-00087HUM	F	28.78	1	1	2.80	2.80	0.20	0.20	6	6	0.50	Conifer	0.00
562101	1-21-00087HUM	G	23.79	0	0	2.40	2.40	0.50	0.20	4	4	1.00	Conifer	5.87
611901	1-20-00177HUM	A	14.62	0	0	2.00	2.00	2.00	2.00	0	0	2.00	Conifer	7.13
611901	1-20-00177HUM	B	18.6	0	0	2.00	2.00	2.00	2.00	5	5	2.00	Conifer	16.27
611901	1-20-00177HUM	C	27.71	0	0	2.00	2.00	2.00	2.00	4	4	2.00	Conifer	12.56
611901	1-20-00177HUM	D	28.66	1	1	2.00	2.00	2.00	2.00	45	45	2.00	Conifer	1.15
611901	1-20-00177HUM	E	18.1	0	0	2.00	2.00	2.00	2.00	1	1	2.00	Conifer	11.45
611901	1-20-00177HUM	F	16.92	0	0	2.00	2.00	2.00	2.00	1	1	2.00	Conifer	13.00
662002	1-20-00210DEL	A	22.15	0	0	2.00	2.00	0.50	0.50	1	1	3.00	Conifer	10.06
662002	1-20-00210DEL	C	24.26	0	0	2.00	2.00	0.50	0.50	0	0	5.00	Conifer	9.61
662002	1-20-00210DEL	D	26.93	1	1	2.00	2.00	0.50	0.50	4	4	3.00	Conifer	0.00
711901	1-20-00080DEL	A	22.87	0	0	3.60	3.60	0.00	0.20	1	1	0.10	Conifer	11.45
711901	1-20-00080DEL	B	17.41	0	0	2.30	2.30	0.00	0.00	0	0	0.10	Conifer	6.86
711903	1-19-00220DEL	D	24.3	0	0	2.00	2.00	0.50	0.50	8	8	2.00	Conifer	11.02
711904	1-20-00004DEL	A	17.55	0	0	2.00	2.00	1.00	1.00	1	8	1.00	Conifer	5.40
711904	1-20-00004DEL	B	30.62	0	0	2.00	2.00	1.00	1.00	10	10	1.00	Conifer	25.51
731802	1-19-00097DEL	D	29.86	2	2	3.00	3.00	0.20	0.20	0	0	0.50	Conifer	1.66
731901	1-19-00221DEL	A	19.57	2	2	2.00	2.00	0.50	0.50	0	0	2.00	Conifer	0.00
732001	1-21-00080DEL	C	19.32	0	0	2.30	5.00	0.00	0.20	9	9	0.10	Conifer	3.87
732001	1-21-00080DEL	E	26.84	0	0	2.00	3.00	0.00	0.00	3	3	0.00	Conifer	12.99
732002	1-21-00002DEL	D	13.88	0	0	2.00	2.00	0.00	0.10	3	3	0.00	Conifer	4.93

THP #	State ID	Unit	Acres	Pre HRA #	Post HRA #	Pre green trees/acre	Post green trees/acre	Pre snags/acre	Post snags/acre	Pre scorecard trees #	Post scorecard trees #	Large woody debris/acre	Dominance	RMZ and Geo Acres
851802	1-20-00103DEL	B	17.9	1	1	2.00	2.00	0.50	0.50	9	9	3.00	Conifer	0.00
851803	1-20-00013DEL	D	30.78	0	0	2.00	2.00	2.00	2.00	3	3	2.00	Conifer	1.47
851803	1-20-00013DEL	F	11.4	0	0	2.00	2.00	2.00	2.00	4	4	1.00	Conifer	4.01
851901	1-20-00008DEL	B	8.63	0	0	2.00	2.00	2.00	2.00	0	2	2.00	Conifer	15.71
852001	1-21-00004DEL	A	26.06	0	0	2.00	2.00	2.00	2.00	8	8	1.00	Conifer	1.57
852001	1-21-00004DEL	B	20.19	0	0	2.00	2.00	2.00	2.00	2	2	1.00	Conifer	18.02
852001	1-21-00004DEL	C	13.98	0	0	2.00	2.00	2.00	2.00	1	2	1.00	Conifer	16.75
852001	1-21-00004DEL	D	23.05	0	0	2.00	2.00	2.00	2.00	7	7	1.00	Conifer	9.67
852001	1-21-00004DEL	E	26.01	0	0	2.00	2.00	2.00	2.00	4	4	1.00	Conifer	6.83
852002	1-21-00146DEL	A	23.6	1	1	2.00	2.00	2.00	2.00	4	4	2.00	Conifer	2.68
852002	1-21-00146DEL	C	23.83	0	0	2.00	2.00	2.00	2.00	0	0	2.00	Conifer	8.19
852002	1-21-00146DEL	D	16.91	1	1	2.00	2.00	2.00	2.00	24	24	2.00	Conifer	0.65

Appendix III. Vacant and Recolonized owl sites on the Green Diamond Resource Company study area, 1993-2022.

Site Name	Year(s) Vacant	Year(s) Recolonized
4107	1997	2010
4128	1995	2010
4230 #2	1994	2010
4300	1996	2011
4800	2014	
4850	2008	
4910	2021	
6007	1994, 2000	1997, 2001
6000 CF	2019	
6400	2007	
6600	2000	2004
6610	2013	2015
7000	2005	2006
A400	2001	
Aldo Dusi	2000	2003
Arrow Mills	2009	
B.C. Powerline	1996	2014
B1200	1998	
Bald Mt. Creek	2008	
Bear Gulch	2002	
Big Lagoon Mill	2007	
Blue Creek Cabin	2009	
Boulder Creek #1	1998	2011
Boulder Creek #3	2007	2008
Boulder Creek #4	2000	2012
Boulder Creek #5	2007, 2021	2010
Boulder Creek #6	2020	2021
Boundary Creek	2002	2005
Bradshaw	2007	
Bug Creek	2000	
Butler Ridge	2010	
C2300	1998	2001
Cabin North	2001	
Cal Barrel	2012	2019
Camp Bauer	2008	2009
Canyon Creek #2	2000	
Coyote Park	2018	
Crowsfoot	2005	
D100	1999	
Dandy Creek	2005	

Site Name	Year(s) Vacant	Year(s) Recolonized
Deer Creek	1999	
Denman	1995, 2009	2002, 2020
Devil's Creek	1994	1999
Dolf Creek	1998	
Dolly Varden	2009	
Dominie Creek	1994	
East Goodman	2016	
Eighteen Creek	2001	
Fickle Hill Devil	2017	
Fielder Creek	2002	2020
GAP	2007	
Girls Camp	1997, 2021	2013, 2022
Girls Camp North	2001	
Graham Creek	2019	
Graham Ridge	2000, 2017	2013
Graham West	1997	
H132	1995	
Hancorne Prairie	1999	
Humbug South	1997	
Hunter 100	2017	
Hunter 110	1999	2018
Hunter 300	1999, 2008, 2015	2003, 2010
Hunter 410	1996	
Hunter 510	1996, 2019	2014
HWY 101	2013	
Jacoby Barnum	2003	
K&K 1400	2000	
K&K 400	2001	
K&K 600	2001	
Klamath Mill	2011	
L2000	1996	
Lindsay Creek	1998	
Liscom Hill	2001	
Little Boulder Creek	2018	
Little Deer Creek	1997	1998
Little River #1	2010	
Little River #2	2015	2016
Little Surpur	2001	
Lower Beach Creek	2012	2014
Lower Dolf Creek	2016	
Lower Pardee	2020	
Lower Roach	1995, 2007	1996, 2021
Lower SF Winchuck	2017	

Site Name	Year(s) Vacant	Year(s) Recolonized
Lower Simpson	2014	2016
Lower South Fork #1	2004	
Lower South Fork #2	2014	
Lower Stevens Creek	2012	
Lower Tulley Creek	2003, 2015	2007
Lucchesi SPI	2004	2017
Lupton Creek #2	2001, 2005	2002, 2006, 2009
M1150	1995	1996
Madrone Creek	1997, 2007	2001
Madrone South	2008, 2020	2015
Maple B.L. #1	2002	
Maple Creek Bridge	2007	2009
Mather #2	2002	2006
McDonald Creek	2001	
McGarvey Creek	1998	
Mettah Creek #1	1994	
Mettah Creek #2	1999	
Middle Ribar	2010	2015
Middle Tulley Creek	1996	
Mill West	2000, 2019	2015
Miller Ridge	2019	
M-Line Creek	2009	
Morek Creek	2007	2009
Morgan Creek	2008	2011
Mt. Andy	2018	
NF1300	2007, 2018	2009
Noisy Creek	1996, 2014	1997
Noname Creek	2015	
North Fork Maple Creek	2004	
Notchkoo	1996	1997
Nursery	2018	
Old 299 #2	2006	
Old 299 Pine Creek	2018	2020
Omagar Creek	2003	
Panther Creek	2020	
Panther East	2005	
Pardee Creek	1995	
Pecwan Creek	2015	
Pollock Creek #1	1995	
Pollnow Peak	2020	
Powerline East	2015, 2021	2017
Powerline North	2019	2021
Puter Creek	2019	

Site Name	Year(s) Vacant	Year(s) Recolonized
Quarry Creek	2011	2013
R-8-1	2009	2011
R13	2004, 2022	2009
R1400	2008	2021
R15	2008	
Rattlesnake Ranch	2020	2022
Redwood House	2006	2010
R-Line	2021	
Roach LP	1998	
Rock Ranch	2004	2017
Rocky Gulch	2000	
Rowdy Creek	1992	
Ryan Creek	2022	
S12	1999	
Salmon Creek #4	1996	2009
Sampson	1993	
SF Ah Pah Creek	2003	
Snow Camp Creek	2009	
Stevens Creek SPI	2021	
Summit West	1997	
Sunny Slope	2022	
Surpur Creek	1998	
Surpur Mouth	1996	
T-Line	2022	
T300	2003,	2004
Tectah Mouth	2001	
Terwer 200	2001	
Three Cabins	2014	
Tom Creek	2002	
Toss-Off South	2006	
Tree Farm	2003, 2012	2004, 2013
Tree Farm North	1996	2003
Trouble Creek Turwar	2018	
Turwar CF	2022	
Twin Lakes Kinsey	2019	
U10	2000	
U700	1997	
Upper Beach Creek	2016	
Upper Bear Gulch	2017	
Upper Devil’s Creek	2015	
Upper Little River	2009, 2018	2015
Upper Maple BL	2011	2016
Upper Maple Creek	1995	2009

Site Name	Year(s) Vacant	Year(s) Recolonized
Upper Morgan	2008	
Upper Pardee	1997, 2022	2019
Upper Ribar	2002	2022
Upper Roach Creek	2002	2012
Upper South Fork #1	2012	
Upper South Fork #2	2002	
Upper Tulley Creek	1999	
W. Goodman Prairie	2001	
W400	1998, 2021	2008
West Fork Stevens	2006	
Weyerhauser Shop	2000	
Williams Ridge	1998, 2006	2002, 2013
Windy Point	2006	2010
Wiregrass 200	2018	
WM1600	1998	
WM200	2008	

Appendix IV. List of site names, matching state master owl numbers, site status, and barred owl influence for northern spotted owl sites located on the Green Diamond demographic study area and/or the Green Diamond ownership in 2022.

Site Name	Master Owl Number	Site Status	Barred Owl Influence
4076	HUM0207	Unoccupied Perennial	Yes
4107	HUM0201	Unoccupied Perennial	No
4128	HUM0202	Occupied Perennial	Yes
4300	HUM0208	Occupied Perennial	No
4800	HUM1016	Occupied Perennial	No
4850	HUM0217	Vacant	No
4851	HUM0182	Occupied Perennial	Yes
4910	HUM1030	Vacant	No
5700	HUM0211	Occupied Perennial	No
6007	HUM0856	Occupied Perennial	No
6400	HUM0216	Vacant	No
6600	HUM0300	Unoccupied Perennial	Yes
6610	HUM0217	Occupied Perennial	No
7000	HUM0214	Unoccupied Perennial	Yes
4230 #1	HUM0200	Occupied Perennial	Yes
4230 #2	HUM0206	Unoccupied Perennial	Yes
6000 CF	HUM0056	Vacant	No
A400	DNT0124	Vacant	No
Aldo Dusi	HUM0397	Occupied Perennial	Yes
Ambrose	HUM0682	Unoccupied Perennial	Yes
Arrow Mills	DNT0069	Vacant	No
B.C. Powerline	HUM0663	Unoccupied Perennial	Yes
B1200	HUM0431	Vacant	No
Bald Mt. Creek	HUM0291	Vacant	No
Bear Creek	HUM0465	Occupied Perennial	Yes
Bear Gulch	HUM0577	Vacant	No
Beaver Creek	HUM0409	Unoccupied Perennial	Yes
Beaver West	HUM0675	Unoccupied Perennial	Yes
Big Lagoon Mill	HUM0518	Vacant	No
Blue Blossom	HUM1029	Occupied Perennial	Yes
Blue Creek Cabin	HUM0073	Vacant	No
Blue Slide Creek	HUM0378	Unoccupied Perennial	No
Blue Slide North	HUM0740	Unknown	No
Boulder Creek #1	HUM0383	Unoccupied Perennial	Yes
Boulder Creek #2	HUM0384	Unoccupied Perennial	Yes
Boulder Creek #3	HUM0385	Unoccupied Perennial	Yes
Boulder Creek #4	HUM0663	Occupied Perennial	No

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Boulder Creek #5	HUM0857	Vacant	No
Boulder Creek #6	HUM1123	Occupied Perennial	No
Boulder Creek #7	HUM1124	Occupied Perennial	Yes
Boundary Creek	HUM0204	Occupied Perennial	No
Bradshaw	DNT0035	Vacant	No
Bug Creek	HUM0098	Unknown	Yes
Butler Ridge	HUM0391	Vacant	No
C2300	HUM0312	Occupied Perennial	No
Cabin North	HUM0463	Vacant	No
Cal Barrel	HUM0265	Occupied Perennial	Yes
Cal Barrel Washout	HUM0464	Occupied Perennial	No
Camp Bauer	HUM0233	Occupied Perennial	Yes
Camp Gate	HUM1022	Unoccupied Perennial	Yes
Camp Gate North	HUM0382	Unoccupied Perennial	Yes
Camp Gate South	HUM0380	Unoccupied Perennial	Yes
Canyon Creek #1	HUM0181	Occupied Perennial	No
Canyon Creek #2	HUM0302	Vacant	No
Canyon North	HUM0737	Unoccupied Perennial	No
Chaparral Mt.	Not Assigned	Possible New Colonization	No
Clear Creek	HUM0438	Unoccupied Perennial	Yes
Copper Creek	DNT0005	Unknown	No
Coyote North	HUM0411	Unoccupied Perennial	Yes
Coyote Park	HUM0456	Vacant	No
Crowsfoot	HUM0978	Vacant	No
Cuddeback	HUM1148	Occupied Perennial	No
D100	DNT0100	Vacant	No
Dandy Creek	DNT0123	Vacant	No
Davis Creek	HUM0449	Occupied Perennial	Yes
Deer Creek	HUM0309	Unknown	Yes
Delilah Creek	DNT0155	Unoccupied Perennial	Yes
Denman Creek	HUM0285	Occupied Perennial	Yes
Devil's Creek	HUM0215	Unoccupied Perennial	Yes
Dick Bird	HUM0284	Unoccupied Perennial	Yes
Dolf Creek	HUM1043	Vacant	No
Dolly Varden	HUM0334	Vacant	No
Dominie Creek	DNT0054	Vacant	No
Dominie Dogleg	DNT0159	Occupied Perennial	No
Dominie Winchuck	DNT0165	Unoccupied Perennial	No
Dry Creek	HUM0210	Occupied Perennial	No
East Fork Hunter	DNT0095	Unoccupied Perennial	No
East Goodman	HUM1001	Vacant	No

Site Name	Master Owl Number	Site Status	Barred Owl Influence
EBF	HUM0236	Unoccupied Perennial	Yes
Eighteen Creek	HUM0919	Vacant	No
Fern Prairie	HUM1100	Unoccupied Perennial	Yes
Fernwood	HUM0487	Unoccupied Perennial	No
Fickle Hill Devil	HUM1093	Vacant	No
Fickle Jacoby	HUM1149	Occupied Perennial	No
Fielder Creek	HUM0337	Occupied Perennial	No
Freeman	HUM0301	Occupied Perennial	No
GAP	HUM0472	Vacant	No
Garrett Creek	HUM0410	Unoccupied Perennial	Yes
Garrett South	HUM0677	Unoccupied Perennial	Yes
Gilbert Creek	DNT0162	Occupied Perennial	No
Girls Camp	HUM0379	Recolonization	Yes
Graham Creek	HUM0374	Vacant	No
Graham Ridge	HUM0578	Vacant	No
Graham West	HUM0741	Vacant	No
Guptil Gulch	HUM1028	Unoccupied Perennial	Yes
H131	HUM0416	Unknown	Yes
H132	HUM1044	Vacant	No
Halagow West	HUM0999	Unoccupied Perennial	Yes
Hancorne Prairie	HUM0420	Vacant	No
Hancorne Ranch	HUM0317	Unoccupied Perennial	Yes
Henderson Gulch	HUM0063	Unoccupied Perennial	Yes
Hulla Crup Turwar	DNT0156	Unoccupied Perennial	Yes
Humbug Creek	HUM0308	Occupied Perennial	No
Hunter 100	DNT0149	Vacant	No
Hunter 110	DNT0095	Occupied Perennial	No
Hunter 240	DNT0147	Unoccupied Perennial	Yes
Hunter 300	DNT0073	Vacant	No
Hunter 400	DNT0163	Unoccupied Perennial	No
Hunter 410	DNT0117	Possible Recolonization	No
Hunter 500	DNT0073	Occupied Perennial	Yes
Hunter 510	DNT0047	Vacant	No
Hunter CF	DNT0154	Occupied Perennial	No
HWY 101	DNT0094	Vacant	No
J1600	HUM1000	Unoccupied Perennial	Yes
Jackson Hill	HUM0672	Occupied Perennial	Yes
Jacoby Creek #1	HUM0147	Unoccupied Perennial	Yes
Jacoby Creek #2	HUM0394	Occupied Perennial	Yes
Jacoby SPI	HUM0393	Unoccupied Perennial	Yes
Jiggs Creek	HUM0292	Unoccupied Perennial	Yes

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Johnson Creek	HUM0681	Unoccupied Perennial	Yes
Jurin	HUM0587	Unoccupied Perennial	Yes
K&K 1400	HUM0676	Vacant	No
K&K 400	HUM0674	Vacant	No
K&K 600	HUM0673	Vacant	No
Klamath Bar	HUM0402	Unoccupied Perennial	Yes
Klamath Mill	DNT0071	Vacant	No
Korbel Mill	HUM1125	Occupied Perennial	Yes
L2000	HUM0222	Vacant	No
Lindsay Creek	HUM0403	Vacant	No
Liscom Hill	HUM0395	Occupied Perennial	No
Little Boulder Creek	HUM1032	Vacant	No
Little River #1	HUM0549	Vacant	No
Little River #2	HUM0747	Occupied Perennial	No
Little Salmon North	HUM1111	Occupied Perennial	No
Little Surpur	HUM0429	Vacant	No
Lord Ellis Creek	HUM0400	Occupied Perennial	Yes
Lord Ellis North	HUM0792	Unoccupied Perennial	Yes
Lower Beach Creek	HUM0474	Unoccupied Perennial	Yes
Lower Dolf Creek	HUM0404	Vacant	No
Lower Dry Creek	HUM0209	Occupied Perennial	Yes
Lower McCloud Creek	HUM0432	Unoccupied Perennial	Yes
Lower Pardee	HUM0389	Vacant	No
Lower Quarry Creek	HUM1033	Unknown	No
Lower Roach	HUM0459	Occupied Perennial	Yes
Lower SF Winchuck	DNT0157	Vacant	No
Lower Simpson	HUM1017	Occupied Perennial	Yes
Lower South Fork #1	HUM0750	Vacant	No
Lower South Fork #2	HUM0749	Vacant	No
Lower Stevens Creek	HUM0009	Unoccupied Perennial	Yes
Lower Tulley Creek	HUM0418	Vacant	No
Lupton Creek #1	HUM0297	Unoccupied Perennial	Yes
Lupton Creek #2	HUM0296	Unoccupied Perennial	Yes
Lupton Creek #3	HUM0399	Occupied Perennial	Yes
M1150	HUM0403	Unknown	Yes
Mad River Overlook	HUM1102	Occupied Perennial	Yes
Mad River STS	HUM0205	Occupied Perennial	No
Madrone Creek	HUM0741	Vacant	No
Madrone South	HUM0657	Vacant	No
Maple B.L. #1	HUM0519	Vacant	No
Maple Creek #1	HUM0304	Occupied Perennial	Yes

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Maple Creek #2	HUM0669	Unoccupied Perennial	Yes
Maple Creek Bridge	HUM0388	Occupied Perennial	Yes
Mather #1	HUM0736	Unoccupied Perennial	Yes
Mather #2	HUM0836	Unoccupied Perennial	Yes
McCloud Creek	HUM0307	Occupied Perennial	Yes
McDonald Creek	HUM0840	Vacant	No
McGarvey Creek	HUM0697	Vacant	No
Mettah Creek #1	HUM0419	Vacant	No
Mettah Creek #2	HUM0679	Vacant	No
Mettah Forks	HUM0425	Unoccupied Perennial	Yes
Middle Ribar	HUM0453	Unknown	No
Middle Salmon Creek	HUM0838	Unoccupied Perennial	Yes
Middle Stevens Creek	HUM0370	Occupied Perennial	No
Middle Tulley Creek	HUM0458	Vacant	No
Mill West	HUM0407	Vacant	No
Miller Ridge	HUM1035	Vacant	No
M-Line Creek	HUM0338	Vacant	No
Morek Creek	HUM0421	Unoccupied Perennial	Yes
Mt. Andy	HUM0381	Vacant	No
Mule Creek	HUM0235	Occupied Perennial	Yes
Mynot School	DNT0148	Unoccupied Perennial	Yes
N. Goodman Prairie	HUM0376	Unoccupied Perennial	Yes
NF1300	HUM0234	Vacant	No
Noisy Creek	HUM0299	Vacant	No
Noname Creek	HUM0392	Vacant	No
Noname North	HUM1087	Occupied Perennial	Yes
North Fork Maple Creek	HUM0745	Vacant	No
Notchkoo	HUM0423	Occupied Perennial	Yes
Nursery	HUM0199	Vacant	No
Old 299 #1	HUM0295	Occupied Perennial	Yes
Old 299 #2	HUM0294	Vacant	No
Old 299 Pine Creek	HUM0287	Unoccupied Perennial	No
Omagar Creek	DNT0138	Vacant	No
Omagar East	DNT0125	Unknown	No
Panther Bridge	HUM0457	Unoccupied Perennial	Yes
Panther Creek	HUM0489	Vacant	No
Panther East	HUM0946	Vacant	No
Pardee Creek	HUM0191	Vacant	No
Pardee South	HUM1002	Unoccupied Perennial	Yes
Peacock Creek	DNT0050	Unknown	Yes
Pecwan Creek	HUM1045	Vacant	No

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Pollnow Peak	HUM1112	Vacant	No
Pollock Creek #1	HUM0290	Vacant	No
Pollock Creek #2	HUM0396	Occupied Perennial	Yes
Poverty Creek	HUM0289	Occupied Perennial	Yes
Powerline East	HUM0981	Vacant	No
Powerline North	HUM0390	Occupied Perennial	No
Puter Creek	HUM1009	Vacant	No
Quarry Creek	HUM0203	Occupied Perennial	No
Quiet Lane	HUM1037	Occupied Perennial	No
R13	HUM1018	Vacant	No
R1400	DNT0137	Unoccupied Perennial	Yes
R15	HUM0577	Vacant	No
R200	HUM0162	Occupied Perennial	No
R-8-1	HUM0987	Unoccupied Perennial	Yes
Rattlesnake Ranch	HUM1038	Recolonization	No
Redwood House	HUM0625	Unoccupied Perennial	No
Ribar Rock Pit	HUM0288	Unknown	No
R-Line	HUM1091	Vacant	No
Roach LP	HUM0422	Vacant	No
Rock Ranch	HUM0185	Occupied Perennial	Yes
Roddiscraft Powerline	HUM0305	Unoccupied Perennial	Yes
Rohner Creek	HUM1023	Occupied Perennial	Yes
Rowdy Creek	DNT0053	Vacant	No
Ryan Creek	HUM0921	Vacant	No
S12	HUM0462	Vacant	No
Salmon Creek #2	HUM0264	Unoccupied Perennial	No
Salmon Creek #3	HUM0238	Occupied Perennial	Yes
Salmon Creek #4	HUM0274	Occupied Perennial	Yes
Salmon Creek #5	HUM1024	Unoccupied Perennial	Yes
Salmon Creek East	HUM0923	Unoccupied Perennial	Yes
Salmon Creek Far East	HUM1025	Unknown	Yes
Salmon West	Not Assigned	Possible New Colonization	No
Sampson	HUM0306	Vacant	No
SF Ah Pah Creek	HUM0685	Vacant	No
SF Bald Mt. Creek	HUM0293	Occupied Perennial	Yes
Simpson Creek	HUM0213	Unoccupied Perennial	Yes
Snow Camp Creek	HUM0373	Vacant	No
Spring Prairie	HUM1092	Occupied Perennial	No
Stevens Creek East	HUM0858	Unoccupied Perennial	No
Stevens Creek SPI	HUM1126	Vacant	No
Stone Lagoon	HUM0743	Unoccupied Perennial	Yes

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Substation	HUM0387	Unknown	Yes
Sullivan Gulch	HUM1026	Occupied Perennial	No
Summit West	HUM0455	Vacant	No
Sunny Slope	HUM1039	Vacant	No
Surpur Creek	HUM0428	Vacant	No
Surpur Mouth	HUM0687	Vacant	No
Sweet Flat #1	HUM1158	Newly Colonized	No
T300	HUM0427	Occupied Perennial	Yes
Tectah Gap	Not Assigned	Possible New Colonization	No
Tectah Mouth	HUM0461	Unoccupied Perennial	No
Terwer 200	DNT0139	Vacant	No
Three Cabins	HUM0377	Unoccupied Perennial	No
Tilley Slide	HUM0273	Unoccupied Perennial	Yes
Tilley Windy	HUM0398	Unoccupied Perennial	Yes
Tip Top Ridge	HUM1113	Unoccupied Perennial	Yes
T-Line	DNT0102	Vacant	No
Tom Creek	HUM0517	Vacant	No
Toss-Off South	HUM0405	Unknown	Yes
Toss-Up Creek	HUM0406	Occupied Perennial	Yes
Tree Farm	HUM0386	Occupied Perennial	Yes
Tree Farm North	HUM0668	Unoccupied Perennial	Yes
Trouble Creek Turwar	DNT0158	Vacant	No
Turwar CF	DNT0160	Vacant	No
Twin Lakes Kinsey	HUM0192	Vacant	No
U10	DNT0101	Vacant	No
U700	DNT0116	Vacant	No
Upper Beach Creek	HUM0476	Vacant	No
Upper Bear Gulch	HUM1088	Vacant	No
Upper Black Dog Creek	HUM1040	Unoccupied Perennial	Yes
Upper Canyon Creek	HUM0665	Unoccupied Perennial	Yes
Upper Devil's Creek	HUM1027	Vacant	No
Upper Little River	HUM0920	Vacant	No
Upper Maple BL	HUM0475	Unoccupied Perennial	No
Upper Maple Creek	HUM1041	Occupied Perennial	No
Upper Mynot Creek	DNT0153	Unoccupied Perennial	Yes
Upper Noisy Creek	HUM1127	Unoccupied Perennial	Yes
Upper Noname Creek	HUM0582	Unoccupied Perennial	Yes
Upper Palmer Creek	HUM0671	Unoccupied Perennial	Yes
Upper Pardee	HUM0452	Vacant	No
Upper Ribar	HUM0231	Recolonization	No
Upper Roach Creek	HUM0412	Unoccupied Perennial	Yes

Site Name	Master Owl Number	Site Status	Barred Owl Influence
Upper SF Winchuck	DNT0161	Occupied Perennial	Yes
Upper South Fork #1	HUM0748	Vacant	No
Upper South Fork #2	HUM0226	Vacant	No
Upper Stevens Creek	HUM0485	Occupied Perennial	No
Upper Toss-Off	HUM0791	Unoccupied Perennial	Yes
Upper Tulley Creek	HUM0414	Vacant	No
Van Cleave South	HUM0824	Unoccupied Perennial	Yes
W. Goodman Prairie	HUM0375	Vacant	No
W100	DNT0104	Unoccupied Perennial	Yes
W302	DNT0072	Unoccupied Perennial	Yes
W400	DNT0105	Vacant	No
Walsh	HUM0237	Occupied Perennial	Yes
Waukell Creek	HUM0460	Unknown	No
Weyerhauser Shop	HUM0426	Vacant	No
Wiggins Cabin	HUM1159	Newly Colonized	No
Wiggins Pond	HUM0977	Unoccupied Perennial	Yes
Williams Ridge	HUM0283	Unoccupied Perennial	Yes
Winchuck River	DNT0152	Occupied Perennial	Yes
Windy North	HUM0589	Unoccupied Perennial	Yes
Windy Point	HUM0746	Unoccupied Perennial	No
Wiregrass 200	HUM1101	Vacant	No
Wiregrass Ridge	HUM1147	Occupied Perennial	No
WM1600	HUM0417	Vacant	No
WM200	HUM0413	Vacant	No
WM400	HUM0984	Unoccupied Perennial	Yes
Wood Ranch	HUM1019	Unoccupied Perennial	Yes

*** Not Assigned –** master owl number not yet issued by CNDDB spotted owl database manager. Sites in this category were either newly colonized in the current reporting year or possible sites that warrant further investigation in the next reporting year in order to determine the site status.

****Unknown –** site status unknown due to lack of protocol surveys.

Appendix V. Summary of northern spotted owls newly banded, recaptured, or resighted on the Green Diamond Demographic Study Area 2022.

Band Number	Site Name (Capture/Resight Location)	Band Class[1]	Sex	Age[2]	Auxiliary Band Type	Auxiliary Band Primary Color	Auxiliary Band Secondary Color
1177-28831	Wiregrass Ridge	RS	U	A	Solid	Red	Red
1177-41832	Sweet Flat #1	RS	F	A	Bicolor	White	Black
1177-41874	Dry Creek	RS	U	A	Bicolor	Red	Yellow
1177-41878	4230 #1	RS	F	A	Dotted	Green	White
1177-49480	Cal Barrel	RS	F	A	Dotted	White	Red
1177-49505	4128	RS	U	A	Bicolor	Red	Black
1177-49525	Walsh	RS	F	A	Solid	Pink	Pink
1177-49554	4230 #1	RS	U	A	Dotted	White	Black
1177-49563	Camp Bauer	RS	U	A	Dotted	White	Red
1177-49566	C2300	RS	F	A	Dotted	White	Red
1177-49571	Camp Bauer	RS	U	A	Dotted	Yellow	Black
1387-98961	Hunter CF	RS	U	A	Bicolor	White	Purple
1387-99001	Rattlesnake Ranch	RC	U	A	Solid	Black	Black
1687-09324	Upper Maple Creek	RS	M	A	Bicolor	Pink	White
1687-13905	Cal Barrel Washout	RS	M	A	Bicolor	White	Orange
1687-09346	Boulder Creek #7	RS	M	A	Solid	Red	Red
1687-09353	Mad River Overlook	RS	M	A	Solid	Orange	Orange
1687-13914	6007	RS	M	A	Bicolor	Yellow	Black
1687-13918	Boundary Creek	RS	M	A	Bicolor	Green	White
1687-13930	Walsh	RS	M	A	Bicolor	White	Blue
1687-13938	Lower Dry Creek	RS	U	A	Bicolor	White	Black
1687-13945	Girls Camp	RS	M	A	Bicolor	White	Yellow
1687-13950	4128	RS	U	A	Bicolor	White	White
1687-13956	Hunter 500	RS	M	A	Bicolor	yellow	Black
1687-13960	Upper Maple Creek	RS	F	A	Bicolor	White	Green
1687-13979	Jackson Hill	RS	M	A	Bicolor	White	White
1687-13981	Rattlesnake Ranch	RC	U	A	Triangles	Blue	White
1687-13984	Boulder Creek #4	RS	U	A	Triangles	Yellow	Black
1687-13986	Hunter CF	RS	U	A	Diagonal	Blue	Yellow
1687-13988	Upper SF Winchuck	RS	M	A	Solid	Red	Red
1687-13991	6610	RS	M	A	Solid	Blue	Blue
1687-14014	Lower Simpson	RS	M	A	Dotted	Yellow	Black
1687-14021	Little Salmon North	RS	F	A	Diagonal	Pink	White
1687-14023	5700	RS	M	A	Diagonal	Blue	White
1687-14030	Liscom Hill	RS	M	A	Bicolor	White	Green
1687-14053	C2300	RS	M	A	Diagonal	Green	White

Band Number	Site Name (Capture/Resight Location)	Band Class[1]	Sex	Age[2]	Auxiliary Band Type	Auxiliary Band Primary Color	Auxiliary Band Secondary Color
1687-14054	Bear Creek	RS	M	A	Triangles	Green	White
1687-14056	Little Salmon North	RS	M	A	Dotted	Blue	White
1687-14057	Wiregrass Ridge	RS	M	A	Triangles	Pink	White
1687-14058	Toss-Up Creek	RS	F	A	Triangles	Black	White
1687-14061	SF Bald Mt. Creek	RS	F	A	Dotted	White	Blue
1687-14075	4300	RS	M	A	Bicolor	Yellow	Red
1687-14089	Korbel Mill	RS	M	A	Bicolor	Red	White
1687-14093	Gilbert Creek	RS	M	A	Bicolor	Black	Yellow
1687-14094	Dry Creek	RS	M	A	Diagonal	Red	White
1687-14095	Cal Barrel	RS	M	A	Bicolor	Black	Yellow
1687-14097	Upper Stevens Creek	RS	M	A	Dotted	White	Black
1687-14099	McCloud Creek	RS	M	A	Triangles	Green	White
1687-14100	Canyon Creek #1	RS	M	A	Triangles	Red	White
1807-68345	Quarry Creek	RS	M	A	Triangles	Yellow	Black
1857-10180	Aldo Dusi	RS	F	A	Diagonal	Purple	White
1947-54761	Fickle Jacoby	NB	M	A	Solid	Yellow	Yellow
1947-54762	Rattlesnake Ranch	NB	U	J	Cohort	Yellow	Black
1947-54763	Sweet Flat #1	NB	M	A	Bicolor	Blue	White
1947-54765	R200	NB	M	A	Diagonal	Blue	White
1947-54766	Denman Creek	NB	F	S2	Dotted	Blue	White
1947-54767	Quiet Lane	NB	M	S1	Diagonal	Red	Black
1947-54768	Spring Prairie	NB	M	U	Diagonal	Red	Yellow
1947-54780	Blue Blossom	RC	U	S1	Dotted	Red	White
1947-54781	Aldo Dusi	NB	M	S2	Dotted	White	Black
1947-54793	4300	NB	U	J	Cohort	Yellow	Black
1947-55102	Toss-Up Creek	RS	F	A	Dotted	Red	White
1947-55143	Maple Creek Bridge	RS	M	S2	Solid	White	White
1947-55196	Cuddeback	RS	M	A	Solid	Pink	Pink
1947-55198	4800	RC	U	S1	Triangles	Blue	White
1947-55199	Middle Stevens Creek	RS	M	A	Triangles	Yellow	Black
1957-00106	Hunter 500	RS	F	A	Dotted	Red	White
1957-00111	Powerline North	RS	F	A	Dotted	White	Blue
1957-00133	Bear Creek	RS	U	A	Bicolor	Blue	White
1957-00161	Boundary Creek	RS	F	A	Diagonal	Purple	White
1957-00162	Salmon Creek #3	RS	F	A	Solid	Blue	Blue
1957-00163	4300	RS	F	A	Triangles	Red	White
1957-00169	Korbel Mill	RS	U	A	Diagonal	Pink	White
1957-00201	Fielder Creek	RS	F	A	Diagonal	Pink	White
1957-00216	Boulder Creek #4	RS	F	A	Dotted	Green	White

Band Number	Site Name (Capture/Resight Location)	Band Class[1]	Sex	Age[2]	Auxiliary Band Type	Auxiliary Band Primary Color	Auxiliary Band Secondary Color
1957-00217	6007	RS	F	A	Diagonal	Blue	White
1957-00224	Boulder Creek #6	RS	F	A	Bicolor	White	Pink
1957-00228	Liscom Hill	RS	F	A	Diagonal	Red	Black
1957-00247	Girls Camp	RS	F	A	Bicolor	Red	Black
1957-00250	Salmon Creek #4	RS	F	A	Diagonal	Blue	Yellow
1957-00253	Cal Barrel Washout	RS	F	A	Dotted	Red	Black
1957-00256	Old 299 #1	RS	F	A	Bicolor	White	Red
1957-00259	Mad River Overlook	RS	F	S2	Bicolor	Black	White
1957-00264	6610	NB	F	A	Diagonal	Green	White
1957-00281	Old 299 #1	RS	U	A	Triangles	Green	White
1957-00294	Jackson Hill	NB	F	A	Bicolor	Black	Red
1957-00295	Canyon Creek #1	RS	F	A	Diagonal	Red	Yellow
1957-00297	Freeman	RS	M	A	Bicolor	Yellow	Blue
2187-14975	Upper Stevens Creek	RS	F	A	Dotted	Blue	White
2187-14976	Gilbert Creek	RS	F	A	Dotted	Green	White
2187-14978	Wiggins Cabin	NB	F	S1	Diagonal	Pink	White
2187-14979	Spring Prairie	NB	F	A	Diagonal	Orange	White
2187-14980	Lower Simpson	NB	F	S2	Solid	Orange	Orange
2187-15002	Maple Creek Bridge	RS	F	A	Bicolor	Blue	Yellow
2187-15003	Cuddeback	RS	F	A	Diagonal	Blue	White
2187-15011	R200	NB	F	A	Diagonal	Blue	Yellow

[1]Band Class explanation: RS = Resight, RC = Recapture, and NB = Newly Banded, RV = Recovered
[2]Age explanation: J = juvenile (hatch year), S1 – first-year subadult, S2 = second-year subadult, A = adult

Appendix VI. Inspection dates for all water tanks located within the Plan Area in 2022.

Tank ID	Tank Name	Inspection Date
1	7010	10/20/2022
2	2000 Drafting	10/14/2022
3	5000/Dry Creek	10/20/2022
4	U10 Terwar Creek Drafting	10/18/2022
5	BL1100	10/19/2022
6	BL2000	10/19/2022
7	BL3910	10/19/2022
8	C900	10/14/2022
9	Chaparrall	10/13/2022
10	CL South	11/2/2022
11	CR1300 Drafting	10/19/2022
12	CR2700 Drafting	10/27/2022
13	CR2900	10/14/2022
14	CR3000	10/19/2022
15	Crannell Well	10/19/2022
16	D1000/W1000	10/5/2022
17	D1110/Ritmer Creek	10/5/2022
18	Fernwood	10/14/2022
19	Graham Creek Lower	10/14/2022
20	HC120	10/20/2022
21	HC130	10/20/2022
22	HC132	10/20/2022
23	J1100	10/26/2022
24	K&K 900A	10/12/2022
25	K&K LR	10/12/2022
26	K&K North	10/26/2022
27	Little Boulder Creek	10/14/2022
28	Miller's Road	10/13/2022
29	Noisy Creek	10/14/2022
30	Old 299	10/14/2022
31	R120 A	10/26/2022
32	R2000	10/5/2022
33	R4	10/21/2022
34	Ravine Creek	10/28/2022
35	Ribar	10/7/2022
36	Roddiscraft	10/14/2022
37	Snow Camp powerline	10/14/2022

Tank ID	Tank Name	Inspection Date
38	T100 Bridge	10/26/2022
39	Teepo Ridge	10/21/2022
40	Twin Tanks A	10/14/2022
41	U10 Dandy Creek	10/19/2022
42	W2300	10/5/2022
43	Washington Gulch Drafting	10/28/2022
44	Wiregrass South	12/13/2022
45	Wiregrass North	10/28/2022
46	WM10	10/26/2022
47	WM200	10/26/2022
48	WM710	10/26/2022
49	4100	10/7/2022
50	A400 Bridge Drafting	11/2/2022
51	Arrow Mills Historic Mill A	10/21/2022
52	BH1900	10/26/2022
53	BL2011	10/14/2022
54	CP2000	10/14/2022
55	D1000 Culvert Yard	10/5/2022
56	DV2400	10/12/2022
57	H400 A	12/1/2022
58	HC1000	10/20/2022
59	Klamath Mill A	10/21/2022
60	Morgan Creek*	8/3/2022
61	NF1000	12/2/2022
62	SA800	11/2/2022
63	S-Line	11/2/2022
64	Sproul East A*	11/4/2022
65	Sproul West*	11/4/2022
66	T150	10/21/2022
**67	CR3100 A	11/18/2022
72	K&K 900B	10/12/2022
73	Boulder Creek	10/13/2022
74	Twin Tanks B	10/14/2022
75	Klamath Mill B	10/21/2022
76	Klamath Mill C	10/21/2022
77	Klamath Mill D	10/21/2022
78	Klamath Mill E	10/21/2022
79	Klamath Mill F	10/21/2022
80	Klamath Mill G	10/21/2022

Tank ID	Tank Name	Inspection Date
81	Hoppaw Creek A	10/21/2022
82	Hoppaw Creek B	10/21/2022
83	Hoppaw Creek C	10/21/2022
84	Hoppaw Creek D	10/21/2022
85	Arrow Mills Historic Mill B	10/21/2022
86	Arrow Mills Historic Mill C	10/21/2022
87	Sweet Flat A	10/28/2022
88	Sweet Flat B	10/28/2022
89	Sproul East B*	11/4/2022
90	Sproul East C*	11/4/2022
91	Sproul East D*	11/4/2022
92	H400 B	12/1/2022
93	Arrow mills truck	12/1/2022
94	White house	12/2/2022
95	CR2000	12/1/2022
96	CR3100 B	11/18/2022
97	Turkey foot	7/19/2022
98	R120 B	10/26/2022

*Denotes tanks inspected but not located within the FHCP Plan Area, and therefore not included in the report summaries.

**Gaps in sequential numbering are the result of tanks that have been decommissioned and removed from the Plan Area.