LANDOWNER COOPERATIVE AGREEMENT FOR THE BRADFORD RANCH NTMP UNDER THE BLENCOWE PROGRAMMATIC SAFE HARBOR AGREEMENT, MENDOCINO COUNTY CALIFORNIA

This is a voluntary agreement that recognizes the unique and important role that private landowners in California can play in helping wildlife valued by the people of the State and of the nation. The purpose of the Agreement is to enable land management activities beneficial to northern spotted owl to be carried out on privately owned land while minimizing the impact of such activities on the right and ability of the owner or manager thereof to use it as he or she wishes. The terms of the agreement are as follows:

1. INVOLVED PARTIES

This Cooperative Agreement, between Registered Professional Foresters Christopher Blencowe and Craig Blencowe, and Marti and Peter Bradford (Cooperators), is intended to promote good land stewardship by assisting the Cooperators in carrying out actions to benefit northern spotted owl (*Strix occidentalis caurina*) on land owned by the Cooperator. Participation in this Cooperative Agreement is a prerequisite for obtaining a Certificate of Inclusion [reference attachment to this Cooperative Agreement] from the Service as part of the agreement between the Service and Craig and Christopher Blencowe titled, *Programmatic Safe Harbor Agreement with Craig Blencowe and Christopher Blencowe for Northern Spotted Owl, Mendocino County, California* (Blencowe SHA).

Safe Harbor Agreements do not release landowners from the responsibility to avoid taking any listed species that already occupy portions of the property.

2. ENROLLED PROPERTY

The Cooperators own the 2,363-acre property known as the Bradford Ranch, located in Sections 18, 19, 20, 30, and 31; Township 13 North; Range 13 West; and Sections 8, 11-14, 16, 17, 21-27, 35, and 36; Township 13 North; Range 14 West, M. D. B. & M., in Mendocino County, California. Timber management activities for the property are described in the Bradford Ranch Non-industrial Timber Management Plan (NTMP), 1-97NTMP-043 MEN. The property contains habitat that is used by northern spotted owl for nesting, sheltering, and foraging purposes. The Service will enroll 2,363 acres of this property under the Agreement, as shown on the attached property map (Figure 1). No other federally listed species of plants or animals are known to occur on the property, and no incidental take of species other than northern spotted owl is authorized or permitted under this Cooperative Agreement.

3. BASELINE RESPONSIBILITIES

The baseline for this property is set at 2,363 acres of forested habitat suitable for nesting, sheltering, and foraging by northern spotted owls (reference map is attached to this Landowner Cooperative Agreement; see Figure 1). Specifically, based primarily on tree size, basal area, and canopy cover, the entire 2,363-acre property has been categorized as northern spotted owl nesting/roosting habitat. A summary of the stand inventory data for each management unit is

included in Appendix A outlining the basal area for conifers and hardwoods, percentage of species, and volume and percentage of tree size classes.

There is one known northern spotted owl territory (MEN0655) with an activity center located on the Bradford Ranch at the start of the SHA permit term. The territory was discovered in 2017 (two adults and two fledged chicks) and occurs in an area selectively harvested in 2004. The northern spotted owl territory is centered on a residual coast redwood *(Sequoia sempervirens)* tree located at the following geographic location (in decimal degrees, NAD84): 38.98594 latitude, -123.41049. There are no other known NSO territories with activity centers located within the Bradford Ranch NTMP at the start of the SHA permit term. There is one northern spotted owl territory (MEN0604) with an activity center located approximately 0.12-mile from the Bradford Ranch property at the start of the SHA permit term. The 2017 activity center for MEN0604 is located at the following geographic location (in decimal degrees, NAD84): 38.958644 latitude, -123.383076 longitude. As of the start of the permit term for the SHA, a nest tree has not been located for MEN0604.

In coast redwood forests, suitable northern spotted owl nests typically occur in older, larger trees, and/or trees with defects such as cavities, or platforms formed by mistletoe infections. Trees with these characteristics have been observed in stands that contain trees as young as 40 years old. Therefore, any northern spotted owl nest tree(s) found on the Bradford Ranch property subsequent to the issuance of the permit for the SHA will be considered to have been suitable (but not known) at the start of the SHA permit term. Any nest tree(s) located after the start of the SHA permit term will be considered retroactively part of the baseline. Any northern spotted owl nest tree(s) found off the Bradford Ranch property that are associated with northern spotted owl territories with activity on the Bradford Ranch subsequent to the issuance of the permit for the SHA will not be considered retroactively part of the baseline.

“Force majeure” events such as severe storms, severe drought, fires, or insect/disease epidemics are beyond the reasonable control of the Cooperators, and could either extirpate northern spotted owl from the Enrolled Lands or render northern spotted owl habitat on enrolled lands unsuitable for continued occupation. These events may reduce northern spotted owl numbers or habitat below original baseline conditions through no fault of or negligence of the Cooperators. In such circumstances the Cooperators, the Permittee or Registered Professional Forester (RPF) holding the permit, the Service, and the California Department of Fish and Wildlife (since northern spotted owl is also State listed) may agree to coordinate and revise the Cooperative Agreement’s baseline conditions to reflect the new circumstances.

4. CONSERVATION MEASURES

The Bradford Ranch NTMP (1-97NTMP-043 MEN) describes in detail, and this document summarizes timber management techniques to be implemented on the Bradford Ranch property that will serve as conservation measures for northern spotted owl and are expected to benefit the species.

4.1 Habitat Retention

In general, the management goals will improve functionality of northern spotted owl habitat by: 1) increasing the average quadratic mean diameter (QMD) of the conifer trees on the Property

after each harvest entry until Maximum Sustained Production (MSP) is attained, at which time QMD shall be maintained and not decrease; 2) retaining a greater average post-harvest basal area (square feet per acre) for trees greater than 12 inches diameter at breast height (dbh) as compared to the post-harvest basal area for trees of these dimensions from the previous harvest entry. This will be accomplished until MSP is attained, at which time basal area shall be maintained and not decrease; 3) increasing the average number of legacy trees on the property with a minimum of one legacy tree per acre, including trees with basal hollows, broken tops, complex crowns, large limbs, epicormic branching, furrowed and loose bark, fire scarring, cavities, bole deformities, defects, and/or mistletoe infections, and the surrounding habitat; and 4) retaining downed cull logs and snags. The proposed harvest schedules for the 6 management units on the Bradford Ranch are described in Appendix A of this document. To prioritize the identification and retention of decadent trees with characteristics most suitable for northern spotted owls, and example of a wildlife tree retention strategy is included in Appendix B with metrics for evaluating decadent trees with characteristics optimal for wildlife.

In addition, timber management on the Bradford Ranch NTMP will adhere to the following conditions:

- No-cut buffer of 500 feet around the active activity center.

- From 500 feet to 1,000 feet from the active activity center, no more than 25% of the standing volume shall be harvested in any one entry.

- To provide insulation to nesting owls, a multi-storied canopy will be retained to serve as protection for northern spotted owls against storms and predators. To ensure a multi-storied canopy, from 500 feet to 1000 feet, timber harvest shall be limited within each tree size class as follows:

12-16 inch dbh	No more than 20% of the volume
18-24 inch dbh	No more than 25% of the volume
26-34 inch dbh	No more than 25% of the volume
36 inch + dbh	No more than 30% of the volume

- Nesting and roosting habitat will remain as nesting and roosting habitat before and after harvest
- No openings shall be created larger than ½ acre
- The only silviculture shall be single-tree selection
- No operations within 0.25-mile of a Safe Harbor Activity Center until after 15 July

The following late seral features will be retained to provide potential NSO nesting structure:

- All legacy (i.e., old growth trees)
- All 90 to 100-year-old Douglas-fir with more than 50% conk
- All green culls, regardless of species or size

- All trees with broken tops, complex crowns, large limbs and other nesting platforms, deformities, and/or cavities
- All snags, where worker safety is not a concern
- The large tree diameter class (i.e., 36-inch + dbh) will be managed to continually comprise at least 15% of the stand volume.

4.2 Northern Spotted Owl Activity Center Protection

Northern spotted owl habitat will be protected on the Enrolled Lands through the establishment of three protection areas or zones around each Safe Harbor Activity Center, as described below.

(1) *Nest Protection Area*. A Nest Protection Area will be established around each Safe Harbor Activity Center that includes all forested areas within 500 feet and contiguous to the Safe Harbor Activity Center. The Nest Protection Area may not be entirely circular (but will comprise 18 acres) and may be adjusted slightly (through coordination between the RPF and the Service) to account for topographical habitat features ("topographic nest protection area"). Allowable timber harvest activities are described in Table 1.

(2) *Roost Protection Area*. Includes all forested areas on the Enrolled Lands between 501 feet and 1,000 feet from each Safe Harbor Activity Center. Geometrically, a ring between 501 and 1,000 feet of a radius will comprise approximately 54 acres. However, based on the geographic location of each Safe Harbor Activity Center (as of 2016), 54 acres of Roost Protection Area may or may not occur entirely on the Enrolled Lands. The Roost Protection Area may not be entirely circular and may be adjusted slightly (through coordination between the RPF and the Service) to account for topographical habitat features ("topographic roost protection area"). Allowable timber harvest activities are described in Table 1.

(3) *Support Habitat Area*. Includes all forested areas on the Enrolled Lands greater than 1,000 feet from each Safe Harbor Activity Center. Allowable timber harvest activities are described in Table 1.

During the permit term, if northern spotted owls are determined to be nesting within the Enrolled Lands at a location greater than 500 feet from the geographic location of each Safe Harbor Activity Center (location at the start of permit term), habitat at the new nesting location will be protected through the establishment of the three protection areas described in items 1-3 above. The three protection areas described above do not apply to the previous nesting location, which will instead receive the following protection measures:

(4) *Screen Tree Protection Area*. A Screen Tree Protection Area will be established around the inactive nest tree that includes all forested areas within 100 feet and contiguous to the nest tree. Implementation of protection measures around the inactive original nest tree will run concurrently with implementation of protection

measures around the new nest tree. Allowable timber harvest activities are described in Table 1.

(5) *Screen Tree Support Area.* Includes all forested areas on the Enrolled Lands between 101 feet and 1,000 feet from each inactive Safe Harbor Activity Center. Allowable timber harvest activities are described in Table 1.

Table 1. Activity center protection areas for the Bradford Ranch NTMP under the Blencowe Programmatic Safe Harbor Agreement.

Protection Area	**Distance (in feet) around Activity Center**	**Allowable Silviculture Activities**
Nest Protection Area[1]	500	No timber harvest or yarding.
Roost Protection Area[1]	501 to 1,000	Single-tree selection only, which does not reduce the pre-harvest canopy closure of trees at least 12 inches DBH below 60%. Trees slated for harvest will be felled in a direction away from the Nest Protection Area, to the extent practicable. No more than 30% of the standing volume shall be harvested in any one entry, and trees of each tree class size will be retained (see section 4.1)
Support Habitat Area[1]	greater than 1,000	Single-tree selection and/or group selection.
Screen Tree Protection Area[2]	100	No timber harvest or yarding.
Screen Tree Support Area[2]	101 to 1,000	Single-tree selection only. No more than 30% of the standing volume shall be harvested in any one entry, and trees of each tree class size will be retained (see section 4.1).

Footnotes **–**[1] – active nest tree; [2] – inactive nest tree (defined as a previously-used nest tree determined [through coordination between RPF, Service and CDFW] not to be occupied by northern spotted owls during a particular timber harvest entry, likely because of concurrent use by northern spotted owls of another nearby nest tree).

Establishment of Roost Protection and Support Habitat areas around an inactive nest tree may not be necessary due to the establishment of protection areas established around the new nest tree. Only uneven-aged forestry practices will occur outside the Screen Tree Core Area. However, the Service and RPF will coordinate to evaluate additional necessary protection measures around an inactive nest tree. In addition, the re-designation of the status of any activity center will be determined through prior coordination between the RPF and the Service.

4.3 Northern Spotted Owl Surveys

Northern spotted owl surveys and monitoring will be conducted as follows:

1) Surveys will adhere to current Service northern spotted owl survey protocol and will commence no later than 2 years prior to proposed timber harvest activities within the NTMP;

2) For any year when timber harvest activities are proposed to occur within the NTMP, survey data will be provided (electronic mail is acceptable) to the appropriate AFWO biologist and CDFW Spotted Owl Observation Database at the end of each survey season and a minimum of 15 days prior to the start of operations;

3) For any year when timber harvest activities are not proposed to occur in the NTMP, surveys may occur but are not required, and information regarding whether surveys were conducted or not (including survey results, if surveys were conducted) will be provided (electronic mail is acceptable) to the appropriate AFWO biologist and to the CDFW Spotted Owl Observation Database by 31 July;

4) Survey information from adjacent landowners may be used in conjunction with survey information from the NTMP.

5. RESPONSIBILITIES OF THE PARTIES

The Cooperators and the Permittee or RPF agree to carry out certain responsibilities under this Cooperative Agreement. The Cooperators understand that in order to fulfill the responsibilities of the Safe Harbor Agreement, the Permittee or RPF must report to the Service all implementation and monitoring activities related to northern spotted owl management in accordance with the Safe Harbor Agreement. Responsibilities of the Parties (Permittee and Service) are described in detail in section 7 of the Blencowe Safe Harbor Agreement.

6. AGREEMENT DURATION

Obligations under this Cooperative Agreement will be in effect from the date the Cooperative Agreement is executed until the permit term (45-year permit term) and the Blencowe Programmatic Safe Harbor Agreement (40-year term) expires. Upon signing the Cooperative Agreement, the Permittee or RPF will issue a Certificate of Inclusion to the Cooperators under the Federal Permit [permit reference number] the Permittee or RPF holds, authorizing the incidental take of northern spotted owl on the Enrolled Lands.

7. INCIDENTAL TAKE

The Service's responsibilities include administering the Endangered Species Act of 1973, as amended (Act). Section 3(19) of the Act defines take to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, but not the purpose of, carrying out an otherwise lawful activity. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. "Harass" is further defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns including, but not limited to, breeding, feeding, or sheltering. Incidental take is any take of federally listed wildlife or State listed wildlife and plants that is incidental to, but not the purpose of, otherwise lawful activities.

Under the terms of this Cooperative Agreement, the Cooperators are authorized to make use of his/her Enrolled Property in any manner that does not result in reducing the population and/or occupied habitat of northern spotted owl below the established baseline conditions, as described in section 10 of the Blencowe Safe Harbor Agreement.

8. TERMS AND CONDITIONS

This Cooperative Agreement is subject to all the terms and conditions described in the *Programmatic Safe Harbor Agreement with Craig Blencowe and Christopher Blencowe for Northern Spotted Owl, Mendocino County, California*.

8.1 Termination of the Cooperative Agreement

As provided for in Part 12 of the Service's Safe Harbor Policy (64 FR 32717), Cooperators may terminate implementation of their Cooperative Agreements before their expiration date for circumstances beyond the Cooperators' control. In such instances, Cooperators will provide 90 calendar days' prior written notice to the Permittee, who will notify the Service. In such circumstances, the Cooperatosr may return the Enrolled Property to baseline conditions even if the expected net conservation benefit has not been realized, provided that baseline conditions have been maintained and as long as agreed upon conservation measures were implemented. Cooperators must provide the Permittee the opportunity to locate northern spotted owl(s), possibly with the assistance of the Service, within 60 calendar days of receiving that notice. The Cooperators also may terminate their Cooperative Agreement at any time for any other reason, but termination for reasons other than uncontrollable circumstances shall terminate the Cooperators' permission to take northern spotted owl, and the Cooperators must relinquish their Certificate of Inclusion to the Permittee.

8.2 Certificate of Inclusion Suspension or Revocation

The Service or Permittee may suspend or revoke a Cooperators' Certificate of Inclusion if a Cooperator has breached his/her obligations under a Cooperative Agreement and has failed to cure the breach in a timely manner. This effect of the breach will diminish the likelihood that the Cooperative Agreement will achieve its goals.

8.3 Succession and Transfer

The rights and obligations under this Cooperative Agreement shall run with the ownership of the Enrolled Property and are transferable to subsequent private property owners pursuant to 50 CFR 13.25. The Certificate of Inclusion issued to the Cooperators will be extended to the new owner. By becoming a party to the original Cooperative Agreement and permit, the new owner will have the same rights and obligations with respect to the Enrolled Property as the original owner at the original baseline. The Cooperators shall notify the Permittee of any transfer of ownership at least 90 calendar days prior to the intended transfer, so that the Permittee can attempt to contact the new owner, explain the baseline conditions and management responsibilities applicable to the property, and seek to interest the new owner in signing the existing Cooperative Agreement or a new one to benefit northern spotted owl on the property.

8.4 Remedies

Each party shall have all remedies otherwise available to enforce the terms of the Cooperative Agreement and the Certificate of Inclusion, except that no party shall be liable in damages for any breach of this Agreement, any performance or failure to perform an obligation under this Cooperative Agreement or any other cause of action arising from this Cooperative Agreement.

9. NOTIFICATION

Communication and correspondence required by this Cooperative Agreement should be directed to the addresses below. Names and addresses may be changed upon written notice to all Parties.

Peter and Marti Bradford
Bradford Ranch
PO Box 629
Boonville, California 95415

Christopher Blencowe
Registered Professional Forester (#2905)
32001 O'Bayley Drive
Fort Bragg, California 95437

Craig Blencowe
Registered Professional Forester (#2003)
2339 Mill Creek Lane
Healdsburg, California 95448

IN WITNESS WHEREOF, each party hereto has caused this Cooperative Agreement to be executed by an authorized official on the day and year set forth opposite their signature.

COOPERATOR

By: _____

_____

Date: _____

CHRISTOPHER BLENCOWE

By: _____

Date: _____

Registered Professional Forester (#2905)

CRAIG BLENCOWE

By: _____

Date: _____

Registered Professional Forester (#2003)

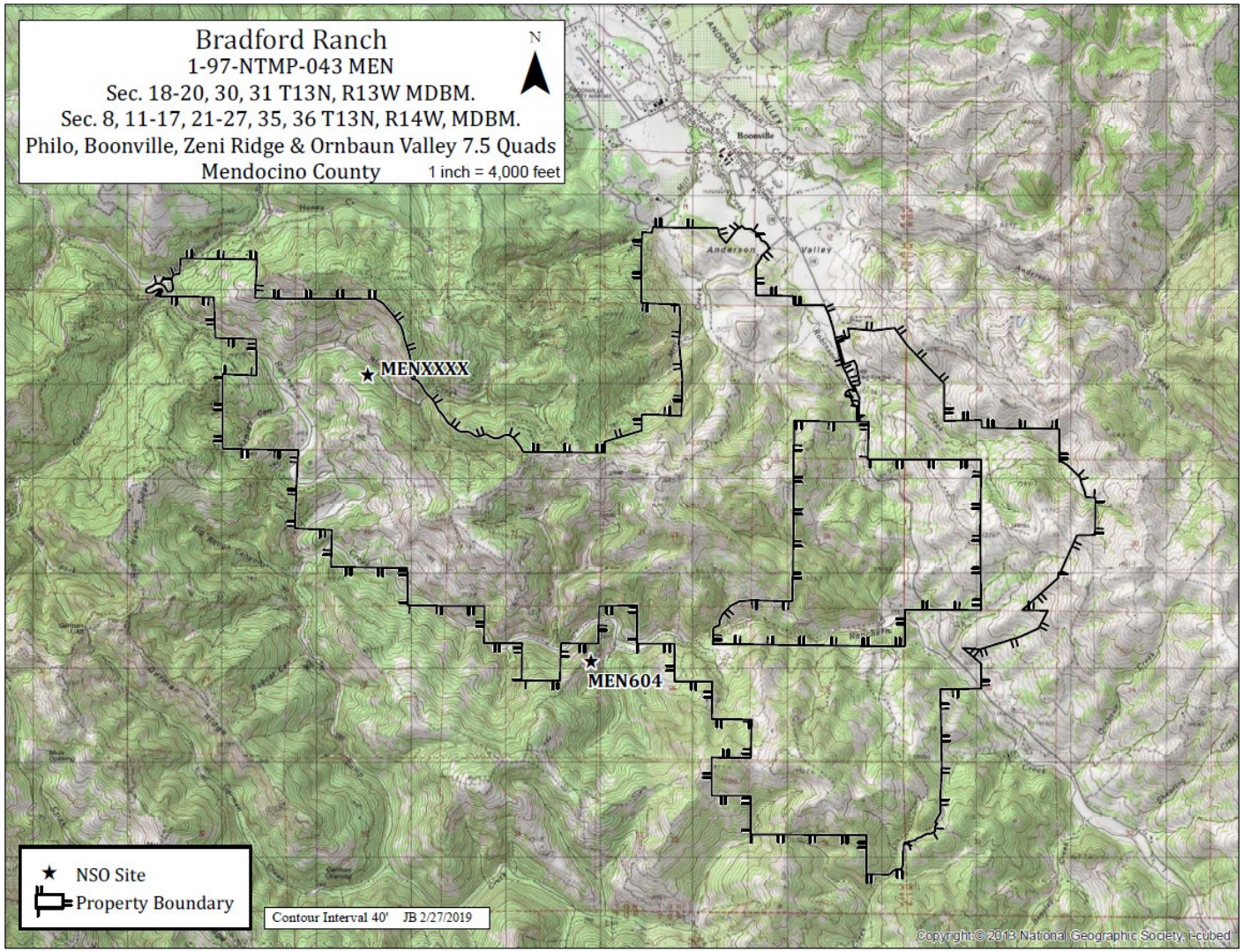

Figure 1. Map of Bradford Ranch NTMP (1-97NTMP-043 MEN) and activity centers associated with northern spotted owl territories MEN0604 and MENXXXX, Mendocino County, California.

Appendix A. Proposed harvest schedule and stand inventory data for the six management units within the Bradford Ranch NTMP (1-97NTMP-043 MEN), Mendocino County, California.

Unit 1—"Hutsell"

Unit 1—Hutsell Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	2,377,000	0	2,377,000	152,128	3.2%
2023	2,529,128	632,282	1,896,846	606,991	3.2%
2033	2,503,837	625,959	1,877,878	657,257	3.5%
2043	2,535,135	633,784	1,901,351	665,473	3.5%
2053	2,566,824	641,706	1,925,118	673,791	3.5%
2063	2,598,909	649,727	1,949,182	682,214	3.5%
			SUSTAINED		

Bradford Ranch NTMP Unit 1					
Stand Data Summary 2021					
"Hutsell" Management Unit					
Unit Size:	212 acres				
Total Conifer Volume:	2,377,000	board feet			
Conifer Volume per acre:	11,213	board feet			
Hardwood Volume per acre:	24	BA/acre			
Total Volume by species:	redwood	61%			
	Douglas-fir	39%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	298,817	571,684	461,108	112,268	1,443,877
Douglas-fir	353,541	456,124	89,890	32,909	933,123
TOTAL	653,017	1,027,808	550,998	145,178	2,377,000
Total Annual Growth:	76,064	board feet			
Growth per acre:	359	board feet			
Annual Rate:	3.2%				
Average Basal Area:	118	sqft per acre			

Unit 2—"Hall Canyon"

Unit 2—Hall Canyon Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	4,673,000	0	4,673,000	490,665	3.5%
2024	5,163,665	1,445,826	3,717,839	1,301,244	3.5%
2034	5,019,082	1,254,771	3,764,312	1,317,509	3.5%
2044	5,081,821	1,270,455	3,811,366	1,333,978	3.5%
2054	5,145,344	1,286,336	3,859,008	1,350,653	3.5%
2064	5,209,660	1,302,415	3,907,245	1,367,536	3.5%
			SUSTAINED		

Bradford Ranch NTMP Unit 2					
Stand Data Summary 2021					
"Hall Canyon" Management Unit					
Unit Size:	272 acres				
Total Conifer Volume:	4,673,000	board feet			
Conifer Volume per acre:	17,180	board feet			
Hardwood Volume per acre:	43	BA/acre			
Total Volume by species:	redwood	65%			
	Douglas-fir	35%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	836,931	1,320,947	592,840	300,827	3,051,546
Douglas-fir	618,964	771,541	156,905	74,045	1,621,454
TOTAL	1,455,575	2,092,489	749,744	374,872	4,673,000
Total Annual Growth:	163,555	board feet			
Growth per acre:	601	board feet			
Annual Rate:	3.5%				
Average Basal Area:	154	sqft per acre			

Unit 3---"Alder Creek"

Unit 3—Alder Creek Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	1,525,000	0	1,525,000	341,600	3.2%
2028	1,866,600	522,648	1,343,952	470,383	3.5%
2038	1,814,335	508,014	1,306,321	457,212	3.5%
2048	1,763,534	440,883	1,322,650	462,928	3.5%
2058	1,785,578	446,394	1,339,183	468,714	3.5%
2068	1,807,898	451,974	1,355,923	474,573	3.5%
			SUSTAINED		

Bradford Ranch NTMP Unit 3					
Stand Data Summary 2021					
"Alder Canyon" Management Unit					
Unit Size:	273 acres				
Total Conifer Volume:	1,525,000	board feet			
Conifer Volume per acre:	5,586	board feet			
Hardwood BA per acre:	27	BA/acre			
Total Volume by species:	redwood	51%			
	Douglas-fir	49%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	249,279	194,291	287,770	46,740	778,080
Douglas-fir	462,816	208,954	44,907	30,243	746,920
TOTAL	712,094	403,245	332,677	76,983	1,525,000
Total Annual Growth:	48,800	board feet			
Growth per acre:	179	board feet			
Annual Rate:	3.2%				
Average Basal Area:	115	sq ft per acre			

Unit 4—"Hobson"

Unit 4—Hobson Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	3,359,000	685,000	2,674,000	1,069,600	4.0%
2031	3,743,600	1,048,208	2,695,392	1,078,157	4.0%
2041	3,773,549	1,056,594	2,716,955	1,086,782	4.0%
2051	3,803,737	1,065,046	2,738,691	1,095,476	4.0%
2061	3,834,167	1,073,567	2,760,600	1,104,240	4.0%
2071	3,864,840	1,082,155	2,782,685	1,113,074	4.0%
			SUSTAINED		

Bradford Ranch NTMP Unit 4					
Stand Data Summary 2021					
"Hobson" Management Unit					
Unit Size:	315 acres				
Total Conifer Volume:	3,359,000	board feet			
Conifer Volume per acre:	10,663	board feet			
Hardwood BA per acre:	46.9259	BA/acre			
Total Volume by species:	redwood	47%			
	Douglas-fir	53%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	272,385	678,205	525,200	108,705	1,584,494
Douglas-fir	657,923	362,053	375,575	378,955	1,774,506
TOTAL	930,308	1,040,258	900,774	487,660	3,359,000
Total Annual Growth:	134,360	board feet			
Growth per acre:	427	board feet			
Annual Rate:	4.0%				
Average Basal Area:	126	sqft per acre			

Unit 5---"Incense Cedar"

Unit 5—Incense Cedar Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	1,444,000	0	1,444,000	231,040	1.6%
2031	1,675,040	469,011	1,206,029	361,809	2.0%
2046	1,567,837	438,994	1,128,843	423,316	2.5%
2056	1,552,159	388,040	1,164,119	436,545	2.5%
2066	1,600,664	400,166	1,200,498	450,187	2.5%
2076	1,650,685	412,671	1,238,014	464,255	2.5%
			SUSTAINED		

Bradford Ranch NTMP Unit 5					
Stand Data Summary 2021					
"Camp" Management Unit					
Unit Size:	155 acres				
Total Conifer Volume:	1,444,000	board feet			
Conifer Volume per acre:	9,316	board feet			
Hardwood BA per acre:	12	BA/acre			
Total Volume by species:	incense cedar	91%			
	Douglas-fir	9%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	91,669	366,816	379,832	471,640	1,309,958
Douglas-fir	21,463	68,406	44,173	0	134,042
TOTAL	113,133	435,222	424,005	471,640	1,444,000
Total Annual Growth:	23,104	board feet			
Growth per acre:	149	board feet			
Annual Rate:	1.6%				
Average Basal Area:	126	sq ft per acre			

Unit 6---"Outlying"

Unit 6—Outlying Potential Harvest Schedule--- (Volume in net board feet Scribner log scale)

Year	Pre-harvest Volume	Harvest Volume	Post-harvest Volume	Growth next 10-year period Volume	Growth Annual Percent
2021	1,410,000	0	1,410,000	169,200	3.0%
2025	1,579,200	631,680	947,520	568,512	3.0%
2045	1,516,032	530,611	985,421	591,252	3.0%
2065	1,576,673	551,836	1,024,838	614,903	3.0%
2085	1,639,740	573,909	1,065,831	639,499	3.0%
2105	1,705,330	596,865	1,108,464	665,079	3.0%
			SUSTAINED		

Bradford Ranch NTMP Unit 6					
Stand Data Summary 2021					
"Outlying" Management Unit					
Unit Size:	88 acres				
Total Conifer Volume:	1,410,000	board feet			
Conifer Volume per acre:	16,023	board feet			
Hardwood BA per acre:	56	BA/acre			
Total Volume by species:	redwood	36%			
	Douglas-fir	64%			
Conifer volume by dbh class (board feet):					
	12-16"	18-24"	26-34"	36"+	Total
Redwood	153,580	158,647	138,204	61,502	511,933
Douglas-fir	224,517	296,327	242,513	134,710	898,067
TOTAL	378,097	454,974	380,717	196,212	1,410,000
Total Annual Growth:	42,300	board feet			
Growth per acre:	481	board feet			
Annual Rate:	3.0%				
Average Basal Area:	203	sq ft per acre			

Appendix B. California Department of Fish and Wildlife's "Wildlife Tree Retention Strategy."

Wildlife Tree Retention Strategy

Key to Wildlife Tree Retention/Late Seral Element Scorecard

Trees and Snags with obvious wildlife value that may not need to be evaluated with the Scorecard

Residual tree (Legacy tree): A tree that existed in a stand prior to the most recent harvest entry. This is clearly most distinct and applicable if the stands were managed under even-aged silviculture methods – however, the concept still applies in selection systems.

Description: Structure and appearance varies substantially depending on residual tree age, species, and harvest history of the stand. For conifers, the residual tree will almost always exhibit a greater age and diameter (i.e. predominant tree) than the trees regenerated by the prior harvests. If the residual has a live top it will likely project well above the surrounding canopy.

Two types of residual trees may be recognized:

Old-growth residual (Legacy tree): A tree that was dominant or co-dominant at the time of the original harvest. Minimum age varies by species. For practical purposes, these trees are irreplaceable features in most forests under current management programs.

Description: Usually has a greater diameter than the second-growth trees in the stand and often relatively tall (at "true" site potential height for site class). In addition to large size, old-growth residual trees usually exhibit one to several readily observable features of "old-growth" including: broken top; large reiterations and large-diameter limbs; thick bark that may have deep furrows; fire scars; a basal cavity; other cavities; and possibly well-developed duff layers, moss, or lichen accumulations on horizontal limbs or platforms. Crown architecture visible from the air may include emergent crown (where the surrounding stand is relatively young), irregular or flat-topped shape (as opposed to conical top), obvious dead or spike top (note these may also occur in large second-growth trees), and/or multiple leaders due to large reiterations (which may give the crown the appearance of a cluster of tall young trees).

"Mature" residual ("Bastard-growth"; Legacy tree): A tree that was sub-canopy at the time of the initial harvest. These trees are variably replaceable under current management timber management programs.

Description: Usually at or above the maximum dbh of the second-growth trees in the stand. Other characteristics (height and defect) vary depending on age, age relative to other trees in the stand, fire history, and whether the tree was damaged to the residual during the initial entry. Typically, "mature" residuals show a much smaller dbh than an old-growth residual for the site class and exhibit fewer of the structural features listed above for old-growth residuals. From the air, the crown of a "mature" residual tree may emerge above the surrounding canopy (where the surrounding stand is relatively young) or may not be particularly evident if the surrounding stand is mature second-growth. A "mature" residual that grew for an extended period above a regenerating stand may exhibit a relatively broad crown and high degree of taper, but otherwise be relatively free of physically induced defect.

Snag: A standing dead tree.

Description: Snags vary tremendously in appearance and function for wildlife depending on species, size, and decay class.

Wildlife Tree Scorecard Definitions and Values

For all trees larger than 36 inches in diameter at breast height, assess the base, bole and canopy for the elements, features, and structures described below. Calculate a wildlife tree score by entering the associated value for each applicable feature; then add all the associated tree values to determine a score for the assessed tree. A structural element may score under several categories, include all applicable values for the feature (i.e. a reiterative limb may have epiphytic growth and epicormic branching, or a tree with minor conk may have a cavity and sloughing bark).

BOLE FEATURES

Cavities and Hollows

Cavity: Cavity (or void within a tree bole or large limb) with a relatively small entrance suitable for use by a variety of wildlife species, such as small to large woodpeckers, secondary cavity-nesting birds, wood ducks, Vaux's swift, Purple Martin, bats, Douglas squirrel, owls, wood rats, Pacific fisher, or American marten. The small entrance precludes the entry of larger predators into the cavity. Cavities with larger entrances may also be used by these species. A cavity may be as large as several feet deep with an entrance size ranging from about 1.5 to 6 inches diameter. Entrance height is often at least 10 feet above the ground, but lower entrances may also be used. In practice, interior dimensions will usually just be a guess based on entrance size and appearance, as well as the characteristics of the tree, plus any observations of wildlife use of the cavity. More than a single entrance hole suggests more extensive internal cavity development.

- CAVITY SMALL (**1** per opening) Opening 1.5 inches to 3 inches in diameter
- CAVITY LARGE (**3** per opening) Opening >3 inches in diameter

Hollow: A large cavity with an entrance or opening greater than 6 inches diameter. Description: Hollows have similar interior dimensions as large cavities and may be used by the same suite of species for cover; however, the larger entrance size of a hollow may not prevent larger predators from entering the hollow.

- HOLLOW MINOR (**3**) – A bole hollow with an opening > than 6 inches diameter and less than 2 feet[2]
- HOLLOW MAJOR (**5**) – A bole hollow with an opening > than 2 feet[2]

Basal hollow (Goose pen/cat faces): A hollow at or near ground level typically created by fire that destroys the cambium on a portion of the bole's circumference. Repeated fires play an important role in maintaining and enlarging basal hollows[1].

Description: A basal hollow is a hollow that extends into the bole near the buttress. A cavity may have formed above the opening. Basal hollows are used by a large assortment of wildlife.

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[1] Fire Cavities: Indicators of Past Fire Regimes in Coast Redwood provides a discussion of the role of fire and basal hollow formation, as well as a Redwood Cavity Index (RCI) classification system.

- BASAL HOLLOW MINOR (**1**)– cat face or basal burn scar, 2 feet^2 with no opening or cavity (RCI 1 or potentially 2)

- BASAL HOLLOW MEDIUM (**3**)– basal hollow with an opening > 2 feet^2 and/or with a cavity extending > 6 inches above the top of the hollow opening (RCI 2 and potentially 3)

- BASAL HOLLOW MAJOR (**5**)– basal hollow with an opening >4 feet^2 and/or with a cavity extending >2 feet above the top of the basal hollow opening (RCI 3, 4, and 5)

Crack (Fissure): A longitudinal gap in the bole of a tree caused either by physical damage (including wind, lighting, or fire) or by growth of two trees or leaders into each other where the gap provides cover for wildlife.
Description: Cracks must be sufficiently deep relative to their width to provide partial cover for foraging birds or complete cover for nesting birds, roosting bats, or small- to medium sized mammals. Longitudinal indentations in which the deepest portions are visible from outside the tree are not considered cracks unless they are capable of providing cover for foraging or roosting small vertebrates.

- CRACK SMALL (**0.5** per crack) Crack >2 feet in length, >1 inch deep and >0.5 inch wide

- CRACK MEDIUM (**1** per crack) Crack >5 feet in length, >1 inch deep and >0.5 inch wide

- CRACK LARGE (**2** per crack) Crack >10 feet in length, >1 inch deep and >0.5 inch wide

- CRACK EXTRA-LARGE (**3**) Crack >20 feet in length, >4 inch deep and >0.5 inch wide

Internal decay (Heart rot): Widespread or localized heart rot fungus infection within the bole of a tree. Decayed, softened wood encompasses at least enough volume to allow excavation of a small cavity.
Description: Decayed wood in old scars may be visible at ground level or with binoculars well above the ground. Good indicators of internal decay include fungal fruiting bodies, such as conk, cavity entrances, and sloughing wood and bark. In practice, it may be difficult to discern the extent of internal decay in some cases.

- DECAY MINOR (**1**) Trees with obvious decay over less than 25% of the bole. May show minimal conk in only a small portion of the bole.

- DECAY MEDIUM (**3**) Trees with 25% to 75% effected boles. They may show evidence of conk over a portion of the bole's length. Increased likelihood to be a cull tree.

- DECAY MAJOR (**5**) Trees with more than 75% effected boles. They may show evidence of extensive conk and have sloughing bark or wood. Most likely to be a cull tree.

Epicormic branching and structures: Re-sprouting limbs from dormant, damaged, or scarred branch nodes. Often associated with decadent tree
Description: Epicormic branching may be develop ledges and/or platforms at the branching node/s. These structures may support epiphytic growth and/or provide resting and nesting habitat for various wildlife species.

- EPICORMIC BRANCH – MINOR (**1**) Early epicormic branching – 3 branches (or more) < 1 inch in diameter at a single node.
- EPICORMIC BRANCH – MEDIUM (**2**) Developing epicormic branching – 3 branches (or more) >1 inch and < 3 inches in diameter at a single node.
- EPICORMIC BRANCH – MAJOR (**4**) Developed epicormic branching with a high potential for ledges and/or platforms – 3 branches (or more) >3 inches in diameter at a single node.

Furrowed bark: A relatively deep linear indentation in the bark of a tree capable of providing cover for roosting bats or foraging bole-gleaners.
Description: Furrowed bark occurs where an underlying defect (crack, old lightning or fire scar, narrow strip of removed cambium) or the line of contact between two trees growing into each other has been covered by bark. The furrow is sufficiently deep and narrow to be capable of providing cover for small vertebrates or colonies of invertebrates.

- FURROWED BARK (**3**)

Loose bark: A discrete, large piece of bark that has separated from the underlying tree bole but remains attached to the tree.
Description: "Loose bark" refers to a portion of a tree's bark that provides cover for roosting bats, nesting birds, or possibly foraging bole gleaners. Typically, such bark pieces provide relatively tight, stable cover for small animals. The distance of separation from the underlying tree should be 2 inches or less and should not be so loose that the bark piece flaps in the wind. As a general rule, loose bark is attached along at least one edge at least 1 foot long. Although some bear-stripped trees may meet the definition of "loose bark", most recently bear-stripped trees have bark that has been pulled away from the bole along most of the strip's edges, flaps against the underlying wood in the wind, and only provides a small amount of cover at one end of the strip. Such recent bear-stripped bark should not be scored as "loose bark".

- LOOSE BARK – MINOR (**1**) Bark segment <3 feet in length
- LOOSE BARK – MAJOR (**3**) Bark segment >3 feet in length

Deformities/Scarring: Basal fire scars and burls resulting from damage to the bole. These deformities may provide ledges, cracks/crevices, or cavities.

- SCAR – SMALL (**1** each) Scarring or burls up to 2 feet^2 extending out from the >4 inches

- SCAR – MEDIUM (**2** each) Scarring or burl up to 4 feet^2 extending out from the bole >6 inches

- SCAR – LARGE (**4** each) Scarring or burl > 4 feet^2 extending out of the bole > 6 inches

CROWN FEATURES

Epiphytic growth: Fern, Mistletoe (Witch's broom), moss, lichen, other growth supported within on limbs, forks, and nodes within the canopy. A compact spray of branches infected with mistletoe.
Description: A tree should be scored for mistletoe broom if the structure is large and solid enough to provide an opportunity for resting or nesting of vertebrate wildlife, or if smaller brooms occur in multiple locations within the tree.

- EPIPHYTE MINOR (**0.5** each patch) Epiphytes/Ferns/Mistletoe present in lesser amounts (patch size is < 16 inches^2 (4 inch by 4 inch area) on larger limbs, deformities, broken top/s, branch nodes or within the canopy structure.

- EPIPHYTE MAJOR (**2** each patch) Epiphytes/Ferns/Mistletoe or other growth present in patch size of > 16 inches^2 (4 inch by 4 inch area) on larger limbs, deformities, broken top/s, branch nodes or within the canopy structure.

Complex Crown

Dead top (Spike): A dead tree leader.
Description: "Dead top" refers to dead leaders that are evidenced by leaf die-back along at least the top one-fifth of the tree height or with a minimum diameter at the lowest extent of leaf die-back of about 12 inches.

- DEADTOP (**5**)

Broken top: A tree with the original leader broken off.
Description: "Broken top" refers to broken-topped trees with a minimum diameter at the original break of about 12 inches.

- BROKEN TOP (**5**)

Reiteration (Reiterated top, Bayonet, "Schoolmarm", Candelabra): A sprouted leader or limb that exhibits apical dominance.
Description: Reiterations vary greatly depending on relative age and position on tree. All reiterations include some vertical growth that gives them the appearance of a "tree-on-a-tree". Reiteration can provide opportunities for resting, denning, or nesting, and may support epiphytes.

- REITERATION SMALL (**2** each) Reiterative limbs < 6 inches in diameter

- REITERATION MEDIUM (**3** each) Reiterative limbs >6 inches and <12 inches in diameter

- REITERATION LARGE (**5** each) Reiterative limbs > 12 inches in diameter

Forked top: A split in a tree's leader.
Description: A tree should be scored for a forked top if the structure provides an opportunity for resting or nesting for vertebrate wildlife, or if defect associated with the fork suggests that other structures may be present (such as internal rot or cavity).

- FORKED TOP (**3**)

Large limb (Platform limb): A relatively horizontal limb of sufficient girth for vertebrate wildlife to use the structure for resting or nesting (but not including bird perches).

- LARGE LIMB – MINOR (**0.5** each) Limb/s with a diameter >6 inches

- LARGE LIMB – MEDIUM (**2** each) Limbs with a diameter >8 inches

- LARGE LIMB – MAJOR (**5** each) Limbs with a diameter >12 inches

Intermingled limbs with HIGH VALUE WILDLIFE TREE: Trees with limbs intermingled with HIGH VALUE WILDLIFE trees and/or residuals provide cover (screening) and can maintain microclimates favorable to wildlife such as daytime shading and/or wind shielding or cover from precipitation.

- INTERMINGLED LIMBS – MINOR (**1**) Tree that intermingles less than 1/3 of the HIGH WILDLIFE TREE canopy radius.

- INTERMINGLED LIMBS – MAJOR (**5**) Tree that intermingles greater than 1/3 of the HIGH WILDLIFE TREE canopy radius.

ACTIVELY USED WILDLIFE TREES

Trees associated to raptor nesting and/or Sonoma red tree vole: A tree used by nesting raptors or that has Sonoma red tree vole, including perch and/or screen trees.

- NEST TREE (**5**) Tree containing the nest of raptor or Sonoma red tree vole, or tree providing screening or associated raptor perch tree.

Granaries

- GRANARY SMALL (**3**) Tree with less than 100 holes that are either filled with acorns or capable of containing acorns.

- GRANARY LARGE (**5**) Tree with 100 or more holes that are either filled with acorns or capable of containing acorns.

Wildlife Tree Retention Strategy

WILDIFE TREE SCORECARD – Side A

Feature/ Structure		Category	Score/Value						Tree Tally						
			0.5	1	2	3	4	5	Tree 1	Tree 2	Tree 3	Tree 4	Tree 5	Tree 6	Tree 7
Bole opening	Cavity	Small		1											
		Large				3									
	Hollow	Minor				3									
		Major						5							
	Basal Hollow	Minor		1											
		Medium				3									
		Major						5							
	Crack	Small	0.5												
		Medium		1											
		Large			2										
		Extra-large				3									
Evidence of Decay		Minor		1											
		Medium				3									
		Major						5							
Epicormic Branching		Minor		1											
		Medium			2										
		Major					4								
Deep furrowed bark						3									
Loose Bark		Minor		1											
		Major				3									
Scarring/deformities		Minor		1											
		Medium			2										
		Major					4								
Epiphytic Growth		Minor	0.5												
		Major			2										
Dead Top								5							
Broken Top								5							
Side A (bole feature) total To be added to Side B for total wildlife tree score															

Wildlife Tree Retention Strategy

WILDLIFE TREE SCORECARD – Side B

Feature/ Structure	Category	Score/Value						Tree Talley						
		0.5	1	2	3	4	5	Tree 1	Tree 2	Tree 3	Tree 4	Tree 5	Tree 6	Tree 7
Limb Reiteration	Small			2										
	Medium				3									
	Major						5							
Split bole/forked top					3									
Large Limb	Minor	0.5												
	Medium			2										
	Major						5							
Intermingling limbs with HIGH VALUE WILDLIFE TREE	< 1/3 canopy radius		1											
	>1/3 canopy radius						5							
Raptor/tree vole nest trees							5							
Granary	small				3									
	large						5							
Side B (Canopy feature) total														
TOTAL WILDLIFE TREE SCORE/S (Side A + Side B)														

Trees with a score equal to/or greater than 5 are HIGH VALUE WILDLIFE trees and shall be retained.

If there are less than 6 HIGH VALUE WILDLIFE trees per acre in the area under the planned NTO, the 6 highest scoring trees per acre shall be retained.

Note: Trees not meeting the minimum retention score but exhibiting high potential defect (standing slash) or high harvesting costs so as to negate their value should also be considered as prime candidates for meeting green tree retention guidelines if high-scoring trees are not available