2. ALTERNATIVES

2.1 INTRODUCTION

This chapter describes and compares the alternatives considered for the proposed PALCO HCP, SYP, and associated land acquisitions. Following this introduction, Section 2.2 provides a summary of PALCO's proposed HCP/SYP, and Section 2.3 describes the development of alternatives. Section 2.4 then describes alternatives that were considered but not selected for detailed analysis. Section 2.5 presents a no action/no project alternative, three alternatives, and one subalternative for accomplishing the proposed action. Each alternative is a variation in the key components of the acquisition, HCP, SYP, and Reserve configurations. Section 2.6 compares the major characteristics and summarizes the effects of the alternatives in relationship to significant issues. Section 2.7 explains mitigation measures, and Section 2.8 explains the mitigation monitoring plan to be developed by the agencies.

2.2 PALCO'S PROPOSED HCP/SYP

PALCO's original proposed HCP/SYP (PALCO, 1998), also available through the California Environmental Resources Evaluation System web site at the following address: HTTP://ceres.ca.gov, consists of a variety of activities, specific prescriptions, and mitigation measures related to PALCO's timber management and other activities on its 211,000-acre ownership. The description of the proposed HCP contained in PALCO (1998) is incorporated here by reference. In addition, the HCP/SYP analyzed here includes the additional measures of AB 1986 that are required for state funding of the Headwaters Reserve purchase. After reviewing and evaluating public comments on the Draft EIS/EIR, in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. These additional measures are presented in each resource section in Section 3. The complete package of minimization and mitigation measures is presented in the HCP in Appendix P. The placement of land into the Reserve, riparian management, and timber harvest prescriptions are described under the individual alternatives in Section 2.5. The descriptions below summarize information on other activities proposed for coverage in the HCP/SYP.

PALCO has sought to have several of its land management and other activities covered by the HCP and associated ITP. These activities are as follows:

- Timber management
- Road and landing construction, maintenance, and closure
- Near-stream gravel mining
- Commercial rock quarries
- Grazing
- Stream enhancement projects
- Operation of fish rearing facilities
- Scientific surveys and studies
- Recreation

These activities are briefly described below.

Timber management includes timber harvest, site preparation, planting, vegetation management, thinning, fertilization, and fire suppression.

Road and landing construction, maintenance, and closure include proposed stormproofing, construction of new roads, stream crossing, maintenance of surfaced roads, seasonal roads, culverts, bridges, fords, cut and fill slopes, and temporary or permanent road closure.

Gravel and rock extraction includes near-stream gravel mining, borrow pits, and rock quarrying. Near-stream gravel mining includes surface-mining operations (paddle wheel skimming from river bars) on the Eel River above the Van Duzen River. Near-stream gravel mining is subject to a separate permitting process. PALCO currently has two commercial hard rock quarries; the first is in the Yager Creek drainage within the Allen Creek MMCA, and the second is in the Lawrence Creek drainage. PALCO's Mining and Reclamation Plan is part of the administrative record. Summaries are included in PALCO, 1998, Volume I, Parts I and J. Other rock quarries likely will be permitted in the future. Commercial rock quarries also are subject to a separate permitting process.

Cattle grazing occurs under 15 grazing permits. Approximately 5,800 acres are leased to private cattle operations, and about 600 head (i.e., cow-calf pairs) graze on PALCO land. PALCO wants a permit for up to 1,000 head. The grazing lands include young plantations, prairies, and pastures.

PALCO performs stream habitat enhancement projects under an ongoing cooperative agreement with CDFG. About 50 projects are completed each year.

PALCO operates a fish rearing facility at its Yager Logging Camp and at Scotia. There are also two acclimatization tanks at remote sites in the Yager Creek basin. The facilities are used to capture, raise, and release the young of wild anadromous fish from Yager Creek basin.

In connection with existing programs, PALCO conducts surveys for certain federal- and state-listed species. Surveys conducted are consistent with accepted protocols for the individual species. Fish-rearing facilities and scientific surveys and studies require a federal permit under Section 10(a)(1)(A) of the FESA.

Although most of PALCO's lands are closed to the general public, some recreational use does occur. Employees are allowed to hunt on the property, and the lands are used for recreation by a boy scout camp, a church camp, an archery club, and other organized groups.

After further review, the agencies have determined the following:

- Near-stream gravel mining would not be covered under the ITP but remains covered under the incidental take authority in the Army Corps of Engineers (Corps) biological opinion until December 31, 1999. If an ITP is issued for the Final HCP, the agencies would work with PALCO over the next year to include gravel mining as a covered activity.
- The two commercial rock quarries would be covered under the incidental take permit for a period ending on March 1, 2001. The agencies would work with PALCO to process an amendment to the HCP over the next two years to include the rock quarries as a covered activity after March 1, 2001.
- Borrow pits would be covered under the ITP for five years beginning with issuance of the permit. The agencies would work with PALCO to process an amendment to the HCP to continue the coverage of borrow pits after the five-year period.

- Grazing would not be a covered activity under the federal ITP. These activities may be added to the permit at a later date through the amendment process.
- Stream enhancement projects are currently authorized through permits from CDFG and the Corps. Incidental take is authorized through a biological opinion with the Corps. Instream structures would not be covered under the ITP but would continue under the existing regulatory structure.
- The fish hatchery would not be covered under the ITP. It will be included as part of the assessment of the state hatcheries and hatchery program.
- Due to lack of information and uncertainty regarding impacts and mitigation, forest chemicals will not be covered under the incidental take permit. Forest chemicals may be added to the permit at a later date, through the amendment process.
- Due to lack of information and uncertainty regarding impacts, recreation will not be covered under the incidental take permit.

The HCP includes an aquatic conservation strategy that would provide for improvement in aquatic habitat and would, over time, achieve the goals in a federal-state interagency properly functioning habitat matrix (PALCO, 1998, Volume IV, Part D, Section 6). This matrix identifies several biologically important variables for the evaluation of aquatic habitat conditions including the amount of fine sediments (i.e., less than 0.85 mm), median streambed particle size (i.e., D50), water temperature, riparian zone canopy cover, pool abundance and size, large woody debris (LWD) volume, and riparian zone tree abundance. The aquatic conservation strategy also incorporates the measures of AB 1986 (see Section 2.5.2). Marbled murrelet habitat conservation would be provided through the Headwaters Reserve, MMCAs, use of the late seral prescription single tree selection within 300 feet of suitable marbled murrelet habitat on adjacent public lands, and other measures.

PALCO would reduce erosion from roads through its construction and maintenance program, watershed analysis and prescription development, and by the road-storm-proofing program. At a minimum, assessments must be completed as follows: (1) Elk River, Freshwater Creek, and Yager Creek in the first decade; (2) Van Duzen and Middle Eel rivers in the second decade; and (3) Larabee Creek, Salmon Creek, and Mattole and Bear rivers in the third decade.

The proposed 1603 Agreement would cover the following activities: permanent road crossings on Class I and restorable fish-bearing streams, permanent culvert road crossings on Class II and Class III streams, other temporary crossings on non-Class I streams, fords, near-stream gravel mining, and road stormproofing. The proposed 1603 Agreement contains specific measures to be incorporated into each type of activity to protect aquatic resources. See Exhibit B to the IA (Appendix S).

PALCO's proposed HCP/SYP (PALCO, 1998) also contains a variety of detailed management prescriptions and related conservation objectives that constrain the LTSY. These parameters include the following:

- The proposed harvest level throughout the Plan would not increase or decrease by more than 15 percent between the first and second decades, by more than 12.5 percent between the second and third decades, and by more 10 percent thereafter.
- Harvest per decade must be lower than the LTSY. Average growth is computed as the mean annual periodic increment of the last four planning periods for uneven-aged prescriptions

and as the mean annual increment for even-aged prescriptions.

- At least 10 percent of PALCO's forested lands in each watershed analysis area (WAA) would be late seral (excluding WAA 6; WAA 6 is an amalgamation of areas created for analysis purposes rather than an actual watershed).
- At least five percent of PALCO's forested lands in each WAA would be mid-seral.
- At least five percent of PALCO's forested lands in each WAA would be young forest.
- At least 5 percent of PALCO's forested lands within each WAA would be forest openings.
- At least 10 percent of PALCO's forested lands within each WAA (excluding WAA 6) should be suitable nesting habitat for northern spotted owls.

Various monitoring measures are also proposed, including measures for marbled murrelets, northern spotted owls, stream assessment and enhancement, annual harvest levels, and growth in intensively managed units.

2.3 DEVELOPMENT OF ALTERNATIVES

The process used in developing the alternatives for this action began with the review and analysis of the purpose and need for the action, the oral and written comments received during scoping, detailed information provided in the HCP/SYP, and the issues described in the Scoping Report. Through development of the SYP numerous alternative timber harvest scenarios were evaluated. Through development of the HCP, a great many alternatives were formulated to avoid and minimize take of listed species. From these efforts, ten full action alternatives were considered which encompassed the full range of issues and possible combinations of actions. Five of these were not selected for detailed analysis for the reasons listed in Section 2.4. Four action alternatives and one subalternative were carried forward for analysis.

The federal and state actions generally involve three separate types of action: (1) issuance of an ITP based on an HCP, approval of a SYP and other authorizations, (2) acquisition of property by the federal and state governments, and (3) designation of agencies by the federal and state governments to manage the acquired lands. Additionally, the land could be acquired from PALCO by different methods. These three actions and the different acquisition methods can be interchanged. For example, alternative HCPs and SYPs could be approved on different PALCO land bases that remain after various levels of acquisition (or non-acquisition) from PALCO and the Elk River Timber Company with different types of acquisition methods. Then these different possible acquired properties could be managed under different interagency combinations by the federal and state governments. Alternatives to all three actions were considered and then incorporated into four alternatives and one subalternative. The environmental effects associated with issuance of the ITP and approval of the SYP are considered in detail. The environmental effects of subsequent federal and state management of the acquired lands is considered conceptually. After acquisition, detailed management plans and alternatives would be formulated and reviewed under appropriate federal and state laws, including NEPA and CEQA. Table 2.3-1 shows the relationship of the three types of actions and the acquisition methods for the alternatives that are analyzed. The alternatives selected for detailed analysis are described in Section 2.5.

The actions represent a reasonable range of alternatives. In other words, the Final

decision(s) of the agencies may include components of different alternatives that are based on the analysis in this EIS/EIR. The agencies, however, cannot unilaterally impose some components of the alternatives on PALCO (such as the larger reserve) without PALCO's consent.

Any of the acquisition methods indicated in Table 2.3-1 could be used to acquire the PALCO and Elk River Timber Company properties. Acquisition is proposed by purchase, as authorized by Congress and the California legislature. However, all of the indicated acquisition methods were originally considered, and any of them could conceivably occur under any alternative. Since the acquisition method does not affect the environment, individual methods of acquisition are not analyzed separately.

The designation of agencies to manage the Headwaters Reserve if it comes into federal and state ownership is an administrative action and does not require NEPA and CEQA analysis. However, many federal and state agencies and Indian tribal entities were considered for possible management of the Headwaters Reserve if one of the action alternatives is chosen. These agencies included the BLM, USFS, Redwood National Park, FWS, Indian tribal governments, CDF, CDFG, California Department of Parks and Recreation, and a Headwaters Forest Management Trust. The United States Department of the Interior (USDI) identified the BLM as its designated management agency. The state management agency has not yet been identified by the California Resources Agency.

On August 31, 1998, the California state legislature passed AB 1986, which appropriates $130 million to the WCB as the state's share of the cost of acquiring the Headwaters Forest, Elk Head Springs Forest, and Elk River property to consummate the September 28, 1996, agreement. The expenditure of such funds is conditioned on the inclusion of specific conditions as described in Sections 1.1.1 and under AB 1986 conditions after Section 2.5.3 in the Final HCP, IA, and ITPs.

In addition, the state legislation appropriates funds to the WCB, subject to the same conditions, for the purchase and permanent protection of Grizzly Creek MMCA and Owl Creek MMCA, and to the extent funds appropriated for the purchase of Owl Creek MMCA remain after such purchase, for the purchase and permanent protection of the Elk River Property and the previously unlogged ancient Douglas-fir forest land within the Mattole River watershed. As explained in Section 1.1.1, while these appropriations cannot be encumbered unless the Final HCP, IA, and ITPs include the specified conditions, purchase of these properties would not be a component of the HCP, ITPs, and SYP.

2.4 ALTERNATIVES NOT SELECTED FOR DETAILED ANALYSIS

Some of the following alternatives were considered, but are not selected for detailed analysis because they fall within the decision space of the alternatives that are analyzed in detail and thus do not represent separate or distinct courses of action. In other words, many of these components are incorporated in the alternatives analyzed in detail. Other alternatives were not considered reasonable or feasible and, therefore, were not selected for detailed analysis.

2.4.1 Land Acquisition Alternatives

Several alternative methods for transferring the Headwaters Forest and, potentially, other PALCO timberlands, into public ownership were considered but are not included for detailed analysis in the EIS/EIR because none of the acquisition

Table 2.3-1. Relationship of the Three Types of Actions to Alternatives Selected for Detailed Analysis

	Alternative 1 (No Action/ No Project)	Alternative 2 (Proposed Action/ Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Public Reserve)
ACQUISITION OPTIONS FOR HEADWATERS RESERVE					
No Acquisition/No Action	X				
Acquisition by \1					
Federal and state funds		X	X	X	X
Federal and state property		X	X	X	X
Private funds		X	X	X	X
Payment in property by PALCO		X	X	X	X
PROPERTY ACQUISITION FOR HEADWATERS RESERVE					
No Acquisition/No Action	X				
7,503-acre Headwaters acquisition with Elk River Timber Company lands		X		X	
5,739-acre Headwaters acquisition without Elk River Timber Company lands			X		
63,000-acre Headwaters acquisition					X
PERMIT OPTIONS FOR PALCO OPERATIONS					
No ITP or SYP/No Action	X				
ITP and SYP issued		X	X	X	X
No NCCP or 1603 Permit/No Project	X				
NCCP and/or 1603 Permit Issued		X	X	X	X
MANAGEMENT OPTIONS FOR HEADWATERS RESERVE					
BLM and state of California management		X	X	X	X
Other management options (e.g., individually or combinations of the following: BLM, Redwood National Park; U.S. Forest Service, Fish and Wildlife Service, Indian Tribes, California Department of Forestry and Fire Protection, California Department of Fish and Game, California Department of Parks, Headwater Forest Management Trust) \2		X	X	X	X

\1 Legislation enacted by Congress and the California legislature indicates the intent to purchase with federal and state funds. However, any of the indicated acquisition methods could occur under any alternative. Since the method of acquisition does not affect the environment, each individual method of acquisition is not analyzed separately.

\2 The designation of agencies to manage the Headwaters Reserve when it comes into federal and state ownership is an administrative decision. All of the agencies mentioned above were considered prior to the Department of Interior's decision for the BLM to be the federal manager. The state management agency has still not been decided by the California Resources Agency. Initial management responsibility would be under the California Resources Agency until a specific agency is determined.

Source: Foster Wheeler Environmental Corporation

alternatives, with the exception of the alternative providing for an exchange of federal and state lands and other assets, would have an effect on the environment, and, therefore, do not require environmental analysis in the EIR/EIS. The acquisition alternatives considered are (1) acquisition of PALCO lands through a transfer of federal and state property and assets to PALCO, (2) contribution of private funds to finance the acquisition, (3) passage of a California state bond to finance the acquisition, (4) a "debt for nature" swap, and (5) cash payment.

Payment for Headwaters Forest and potentially other PALCO lands through a transfer of federal and state property and assets to the company was contemplated under the 1996 Agreement between the state and federal governments, MAXXAM and PALCO. However, PALCO subsequently rejected all of the properties and assets offered by the federal and state governments. Therefore, the lead agencies have determined that this alternative is not feasible and it has been eliminated from detailed analysis in the EIR/EIS.

No source of private funding has been identified that would enable acquisition of the Headwaters Forest. Thus the likelihood of this acquisition method being employed is very remote and speculative.

Similarly, several recent attempts to acquire the Headwaters Forest through passage of a bond by California voters have failed in recent years and none is currently proposed. Thus, the likelihood of this acquisition method being employed is also very remote and speculative.

A "debt for nature swap" has been raised as an alternative means of acquiring the Headwaters Forest and, potentially, other timberlands on PALCO's property. The concept for this swap involves the government receiving PALCO property with old-growth redwoods in exchange for payments the government has already made to savings and loan depositors. Specifically, Federal Deposit Insurance Corporation (FDIC) versus Hurwitz, CAH 95-3956 (S.D. Tex.) and In the Matter of United Savings Association of Texas and United Financial Group, Inc., et al., Office of Thrift Supervision (OTS) AP 95-40, are separate matters within the purview of the FDIC and the OTS and are the subject of ongoing litigation. A decision to pursue a debt for nature swap would fall under the independent jurisdiction of FDIC and OTS, is speculative, and would be outside the jurisdiction of the decision-making agencies involved in the proposed action. For these reasons, the "debt for nature" acquisition alternative is not considered feasible at this time. In addition, like most of the other acquisition alternatives considered above, the "debt for nature" alternative would not affect the environment. A "debt for nature" swap for PALCO property, if it becomes feasible in the future, can be pursued independently of the proposed actions.

For the reasons above and in consideration of the provisions of PL 105-83 and AB 1986, it appears that purchase through cash payment is the most likely means of acquiring the Headwaters Forest.

2.4.2 Increased Mid-term Harvest Alternative

An initially considered alternative had higher amounts of midterm timber production and narrower riparian buffers than in the Proposed Action. In addition, this alternative harvested all marbled murrelet habitat on PALCO property (excluding the Headwaters Reserve). This alternative was initially developed to determine potential upper ranges to timber production on the ownership. Riparian buffers were 125 feet for Class I streams and 75 feet for Class II streams. The initial timber production modeling indicated potential volumes up to about 40 percent higher than the proposed action. Further evaluation, however, indicated that this

alternative could not be implemented because it might conflict with the requirements of the FESA and FPRs for SYPs with respect to protection of fish, wildlife, and watersheds (FPR 1091.1). For example, this alternative would have resulted in increased levels of timber harvest in the five watersheds that CDF has determined are significantly cumulatively impacted due to sediment. Additionally, preliminary analysis of marbled murrelet populations completed after initial consideration of this alternative indicated that harvesting 100 percent of the habitat outside the Headwaters Reserve could have significant adverse effects on the population in this area. Consequently, this alternative was considered not reasonable and was eliminated from detailed analysis under the EIS/EIR.

2.4.3 Pre-PALCO Management Alternative

Many scoping comments indicated that PALCO should manage its lands as they were managed before MAXXAM's purchase. The primary components of this alternative, i.e., not using even-aged silvicultural systems (e.g., clearcutting) on old-growth redwood, using more partial cutting silvicultural prescriptions, and lower overall timber harvest rates, are contained in alternatives that are examined in detail; in particular, Alternatives 3 and 4 incorporate these components.

2.4.4 Forest Products Certification Management Alternative

Several scoping comments suggested that PALCO be required to manage its lands under some form of third-party forest product certification procedure. While the agencies have no authority to require such management, it is considered in Alternative 3. One plan, the Headwaters Forest Stewardship Plan (Trees Foundation, 1997), was released after the formal scoping period. That plan included suggested management procedures consistent with third-party forest product certification for approximately 60,000 acres. These management prescriptions included protection of core habitat area, habitat recovery zones that surrounded and connected the core habitat areas, and single-tree selection silvicultural prescriptions leaving legacy trees on a forest management component of the landscape outside of the two previous zones. The primary components of third-party forest certification (i.e., no-harvest of old-growth timber, protection of endangered species, and use of best management practices [BMPs] to maintain water quality) are contained in alternatives examined in detail. In particular, Alternative 3 includes protection of all old-growth areas and areas with residual old-growth trees, 600-foot buffers around all of these areas, and a restrictive silvicultural prescription (selective harvest with a target of wildlife habitat relationships [WHR] 6) applied across the remainder of the landscape.

2.4.5 60,000-acre Reserve Alternatives

Some scoping comments indicated that 60,000 acres of PALCO lands encompassing the old-growth redwood groves be transferred to Native American ownership and management. The ecological concepts of land management proposed by these commenters are captured in Alternatives 3 and 4. In addition, federal tribal trust responsibilities are addressed as part of the EIS/EIR.

The agencies considered an alternative that set aside a 60,000-acre Headwaters Reserve, required a third-party forest products certification, harvested no old growth or residual old growth, and applied PALCO's selective harvest with a target of a WHR 6 silvicultural prescription on the remainder of the property. Elements of this alternative are examined in other

alternatives that are receiving detailed analysis. In particular, Alternatives 3 and 4 incorporate all of these components.

2.5 ALTERNATIVES CONSIDERED IN DETAIL

Four alternatives, including one subalternative, were considered in detail. Alternative 1 (No Action/No Project) would not implement an HCP, ITP, SYP, or land acquisition and transfer. This alternative represents the existing and assumed future conditions with which the other alternatives are compared. Alternatives 2 through 4 represent different means of satisfying the purposes and needs of the proposed action and responses to public comments. Because there are several changes in land ownership, different Reserve sizes, and numerous components of the HCP/SYP, and because these items vary in different combinations between alternatives, two sets of figures and two tables are presented that summarize the alternatives. Figures 2.5-1a to 2.5-1d present maps of the PALCO, Elk River Timber Company, and Reserve boundaries by alternative. Figures 2.5-2a to 2.5-2c present a graphical representation of land acquisition and transfer by alternative. These graphical representations do not include the other potential acquisitions associated with the state authorized funding (i.e., the Owl and Grizzly Creek MMCAs and other possible lands) because these acquisitions are still somewhat speculative. Figure 2.5-3a and b present diagrammatic sketches of riparian management zones (RMZs) for Class I and II streams for Alternatives 2, 2a, and 4. Figure 2.5-4 shows the location of the MMCAs for the proposed HCP. Figures 2.5-5a, b, c, and d show the no-harvest areas associated with Alternatives 2, 2a, 3, and 4, respectively. No map is shown for no-harvest areas under Alternative 1 because their exact location is variable or unknown. The potential RMZs under Alternative 1 are variable; additionally the exact location of no-harvest areas associated with marbled murrelets in residual redwood as well as for northern spotted owls are unknown. Table 2.5-1 presents Reserve acreage, no timber harvest acreage, and property changes by alternative. Table 2.5-2 presents some of the primary components of the SYP and HCP by alternative.

The alternatives were developed to examine a range of incidental take and mitigation for federally listed species while still providing sustainable and viable populations of the species, as well as a viable timber production business. The alternatives vary in Reserve size and the level of protection provided to old-growth redwood forests and general habitat preservation and restoration (Table 2.5-1). Alternative 2 (Proposed Action/Proposed Project) also has a subalternative that excludes the Elk River Timber Company lands (Table 2.5-1). This subalternative was considered because agreement might not be reached for the purchase of the Elk River Timber Company lands whose owners were not signatories to the original September 28, 1996, Agreement.

The width of riparian buffers and management activities allowed therein vary among the alternatives and provide differing levels of protection and restoration potential to the riparian and aquatic environment (Table 2.5-2). Whether salvage logging in marbled murrelet habitat is allowed also varies by alternative (Table 2.5-2).

The types of timber harvest activity that can occur within buffers or on the property relate to the 106 silvicultural prescriptions contained in PALCO's SYP and used in its timber production model. The maximum disturbance index per WAA limits the amount of timber harvest that can occur in a given decade (Table 2.5-2). If an alternative is restricted to all selection harvest it indicates that even-aged

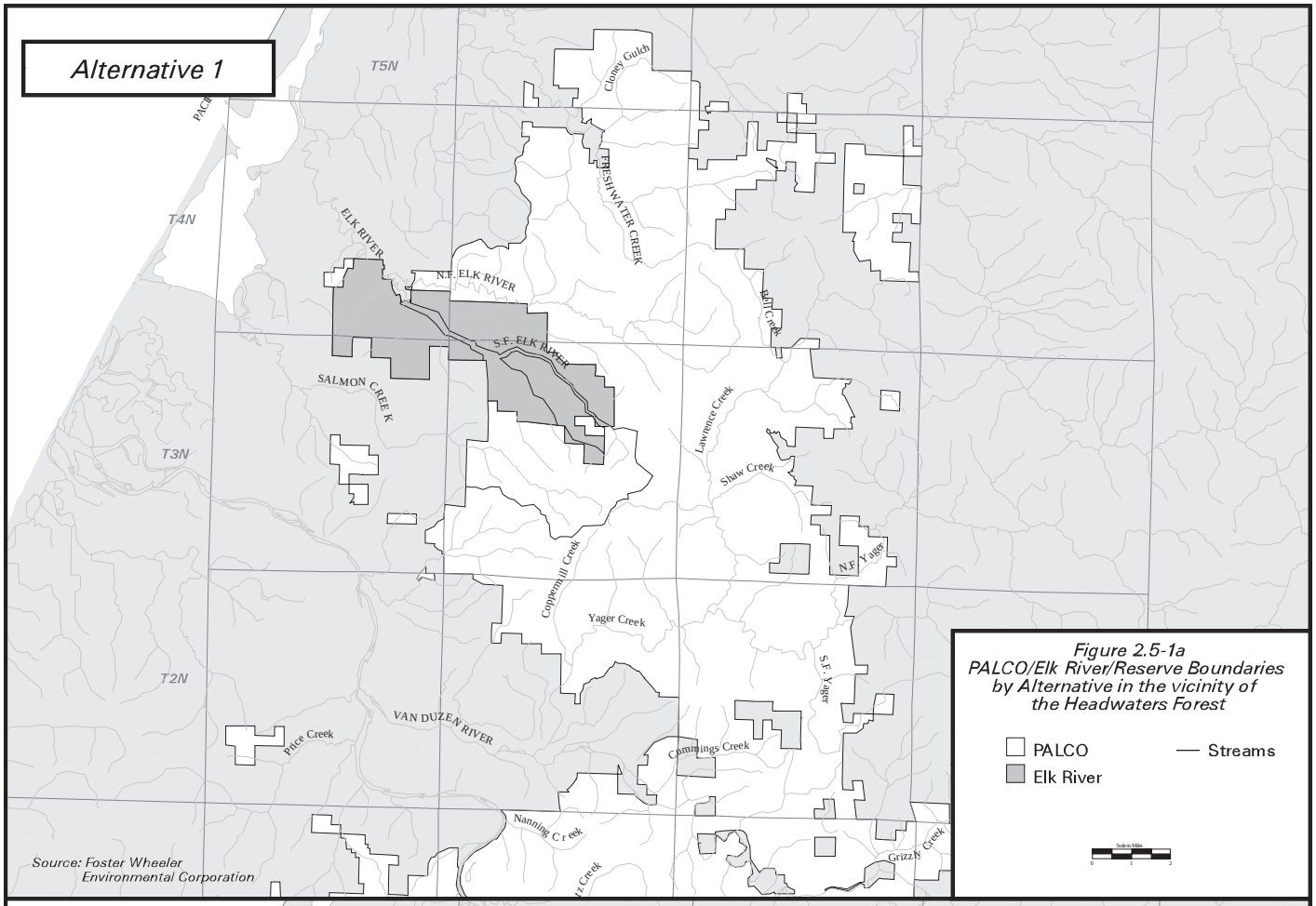

Figure 2.5-1a
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest

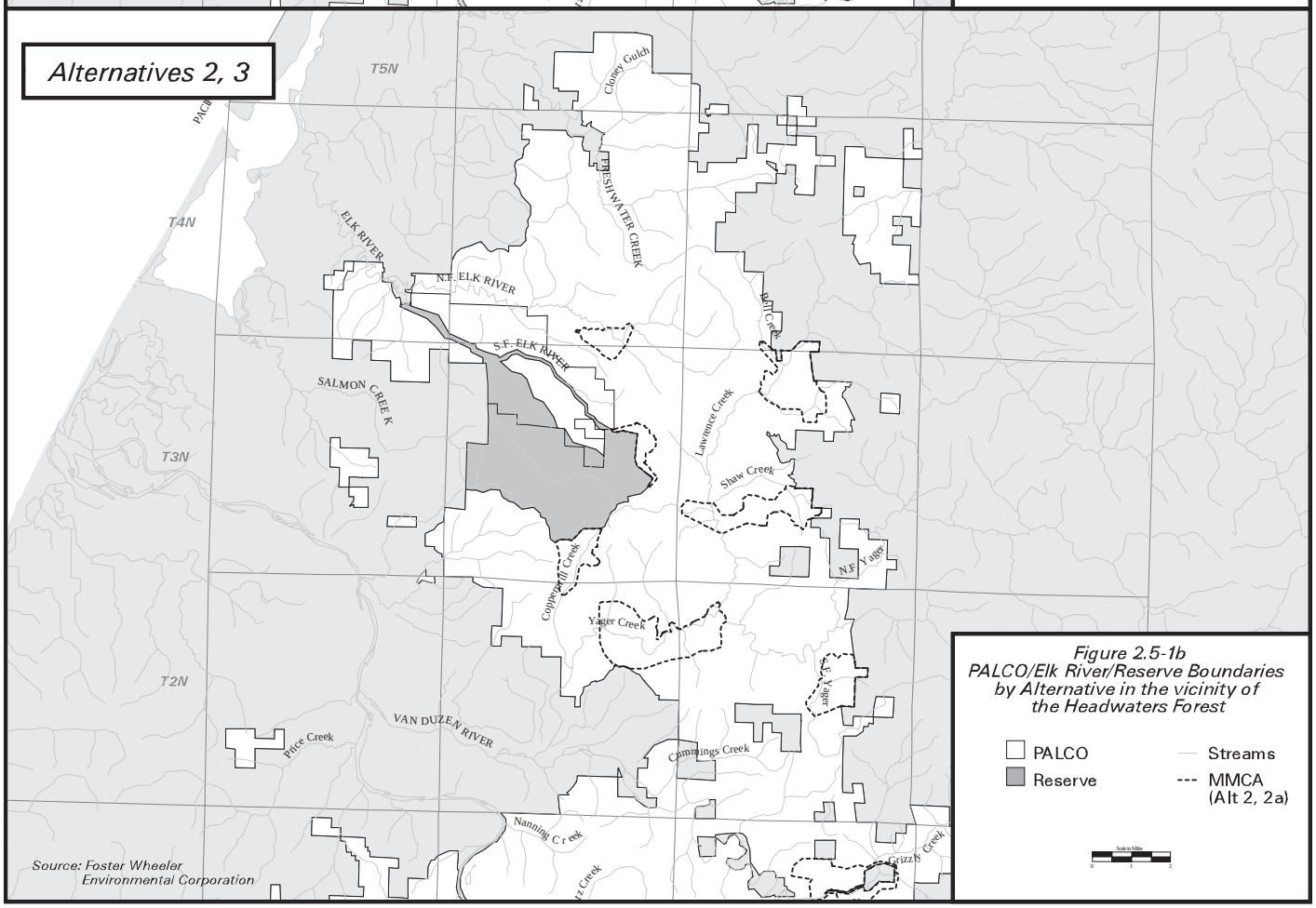

Figure 2.5-1b
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest

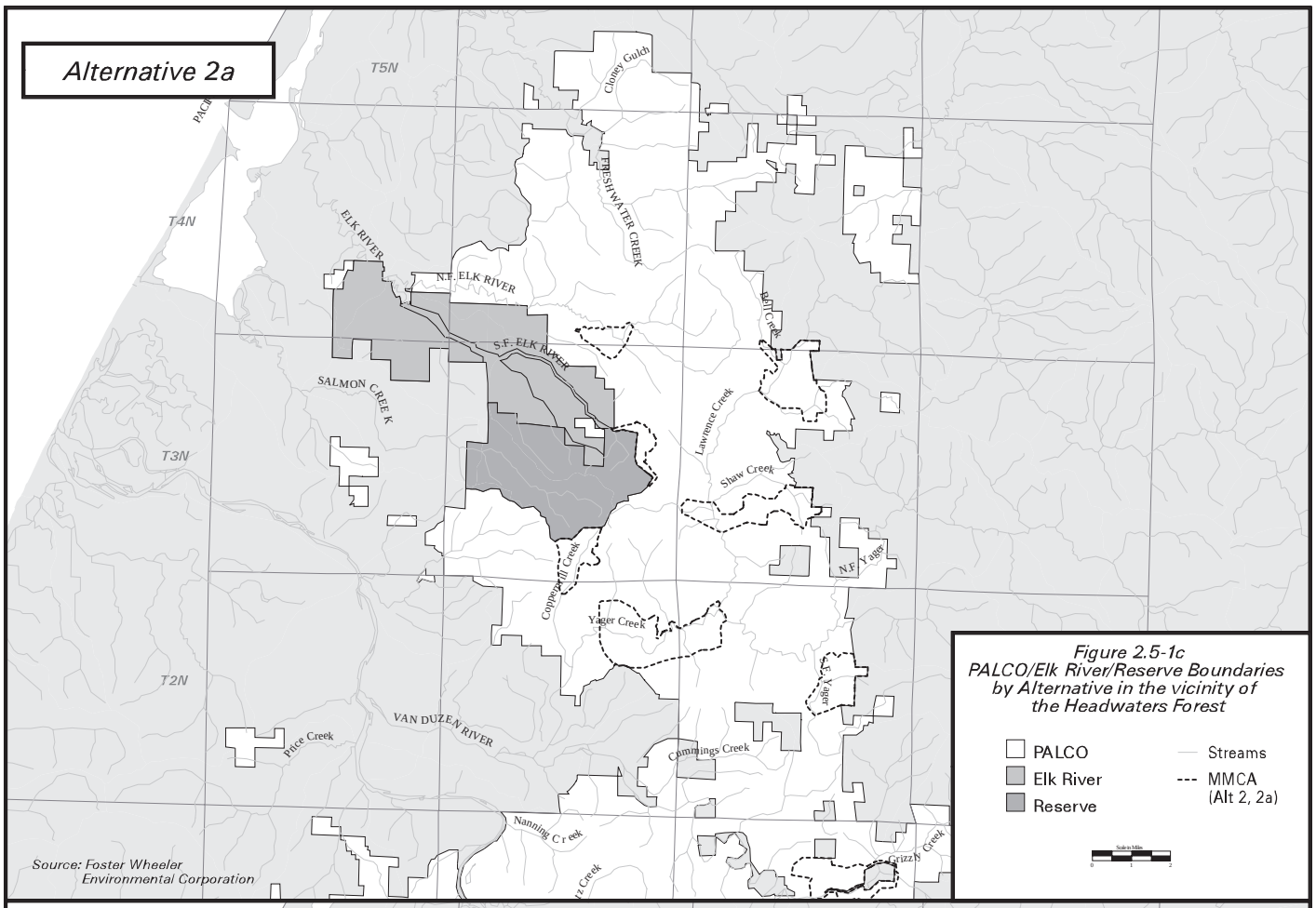

Figure 2.5-1c
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest

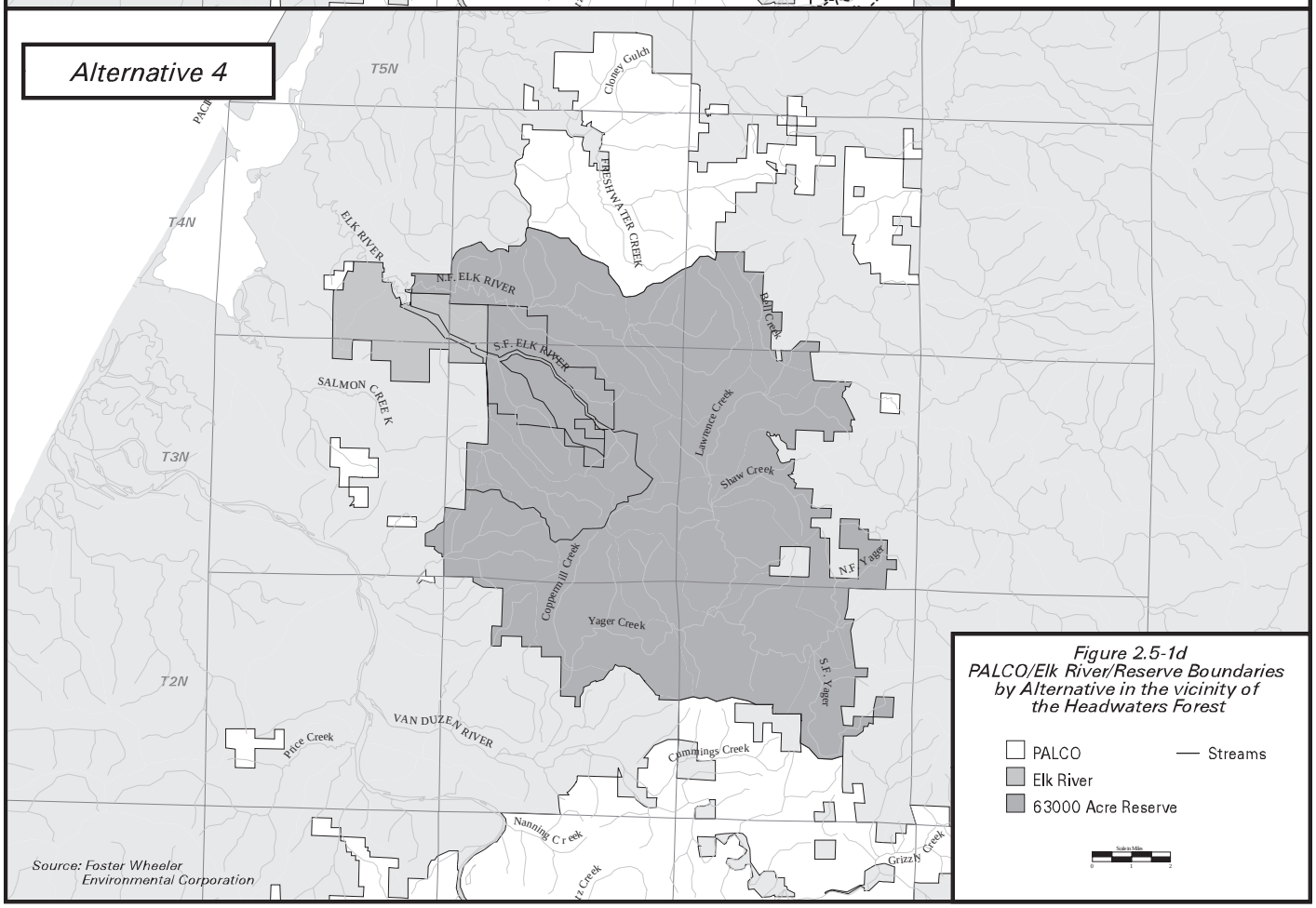

Figure 2.5-1d
PALCO/Elk River/Reserve Boundaries by Alternative in the vicinity of the Headwaters Forest

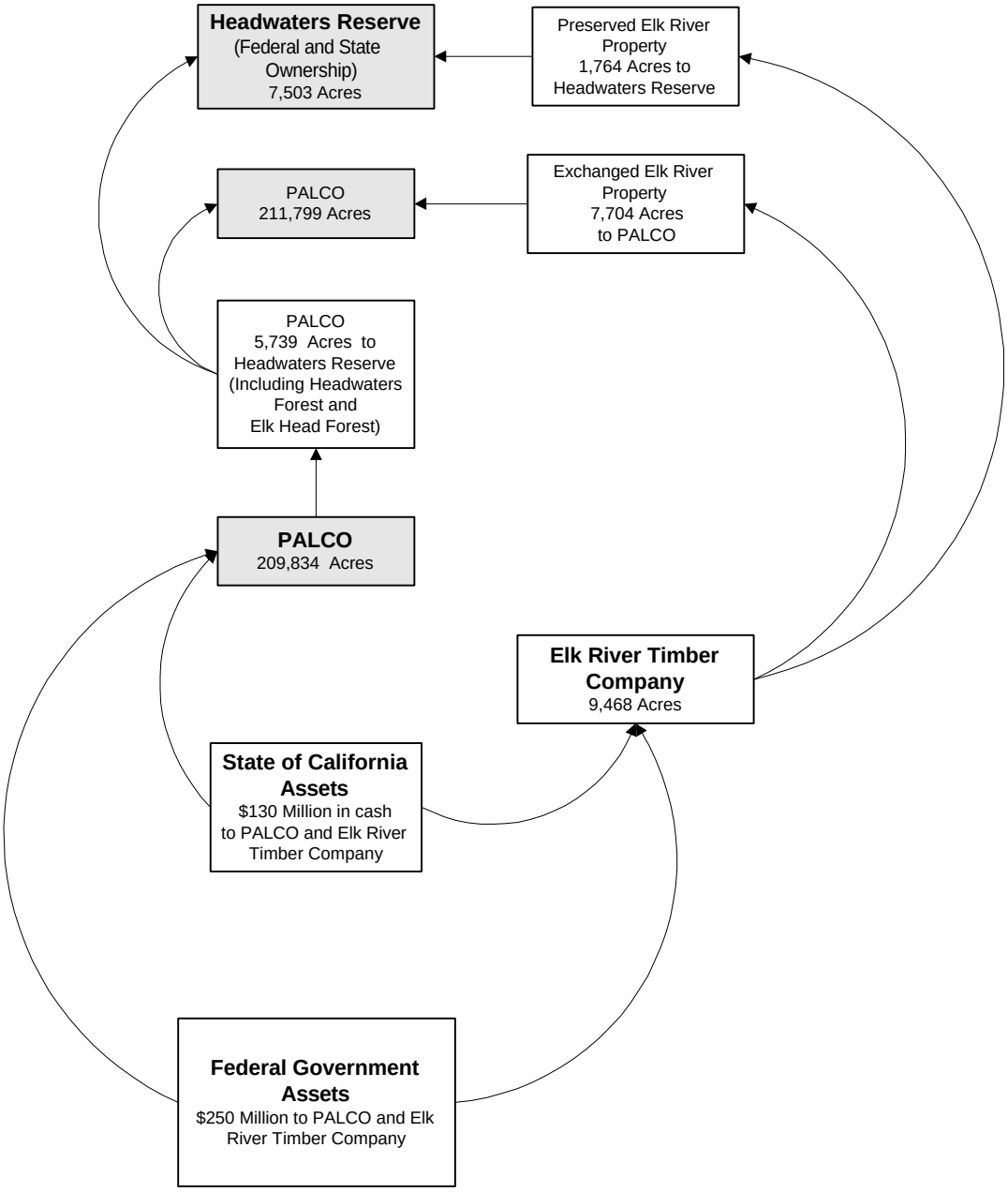

Figure 2.5-2a. Alternatives 2 and 3 Land Acquisition and Asset Exchange*

* All acreages and values are approximate

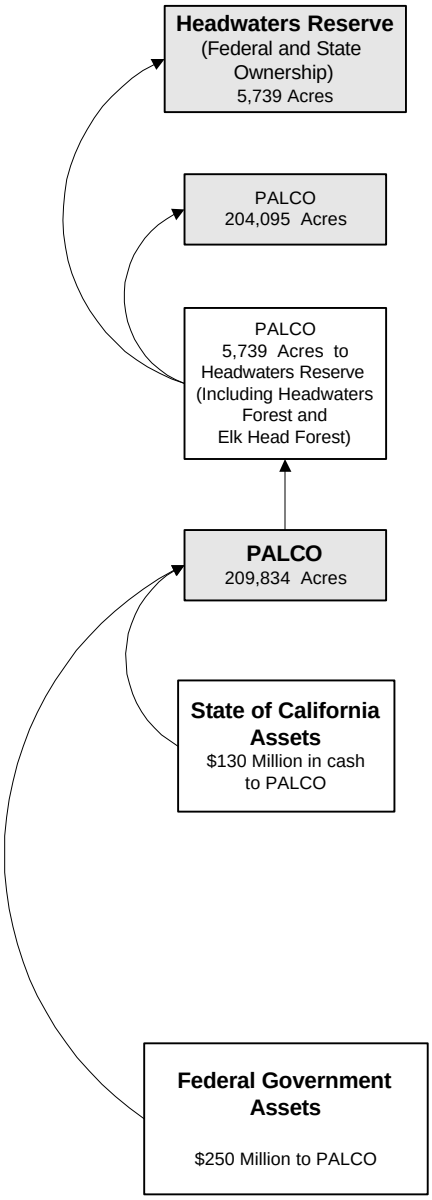

Figure 2.5-2b. Alternative 2a Land Acquisition and Asset Exchange*

* All acreages and values are approximate. Additionally, Alternative 2a does not include the Elk River Timber Company lands.

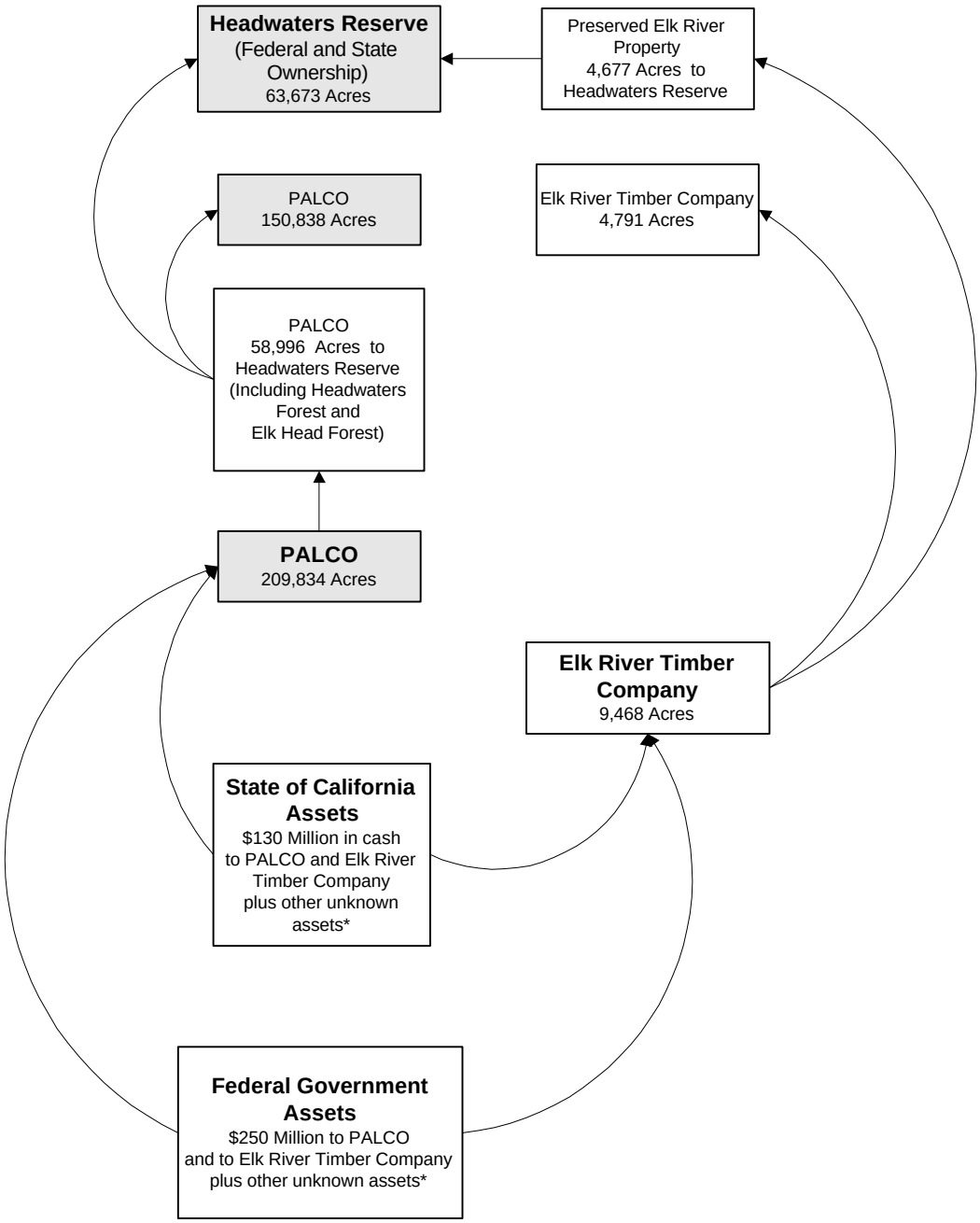

Figure 2.5-2c. Alternative 4 Land Acquisition and Asset Exchange*

* All acreages and values are approximate. Additionally, assets for Alternative 4 include all the assets in Alternatives 2 and 3; however, the availability of specific funds for the additional 50,000-plus acres of PALCO land for the Reserve are unknown.

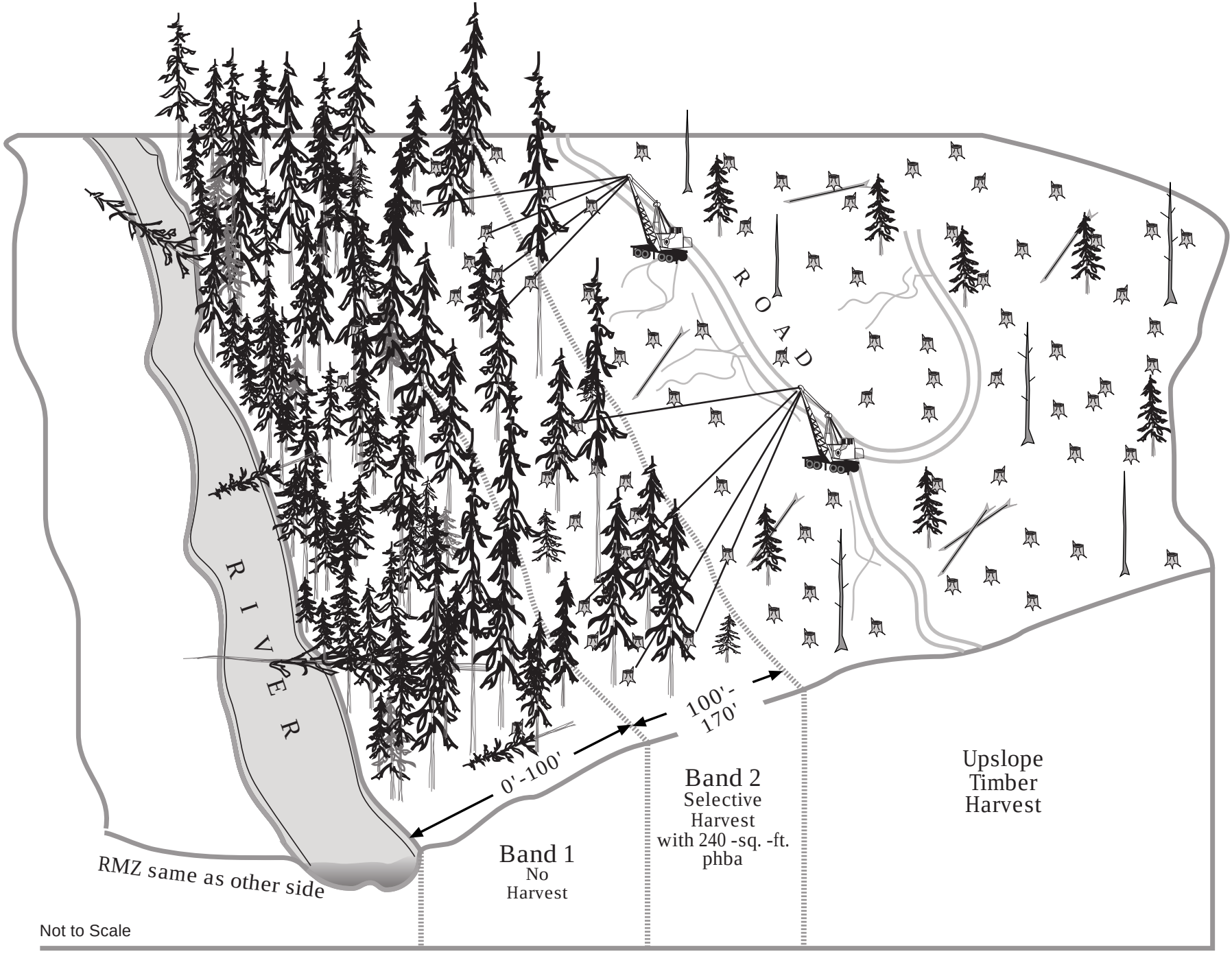

Figure 2.5-3a.
Diagrammatic View of Minimum 170-foot-wide Class I Riparian Management Zone. Alternatives 2, 2a, and 4, Immediately After Timber Harvest.

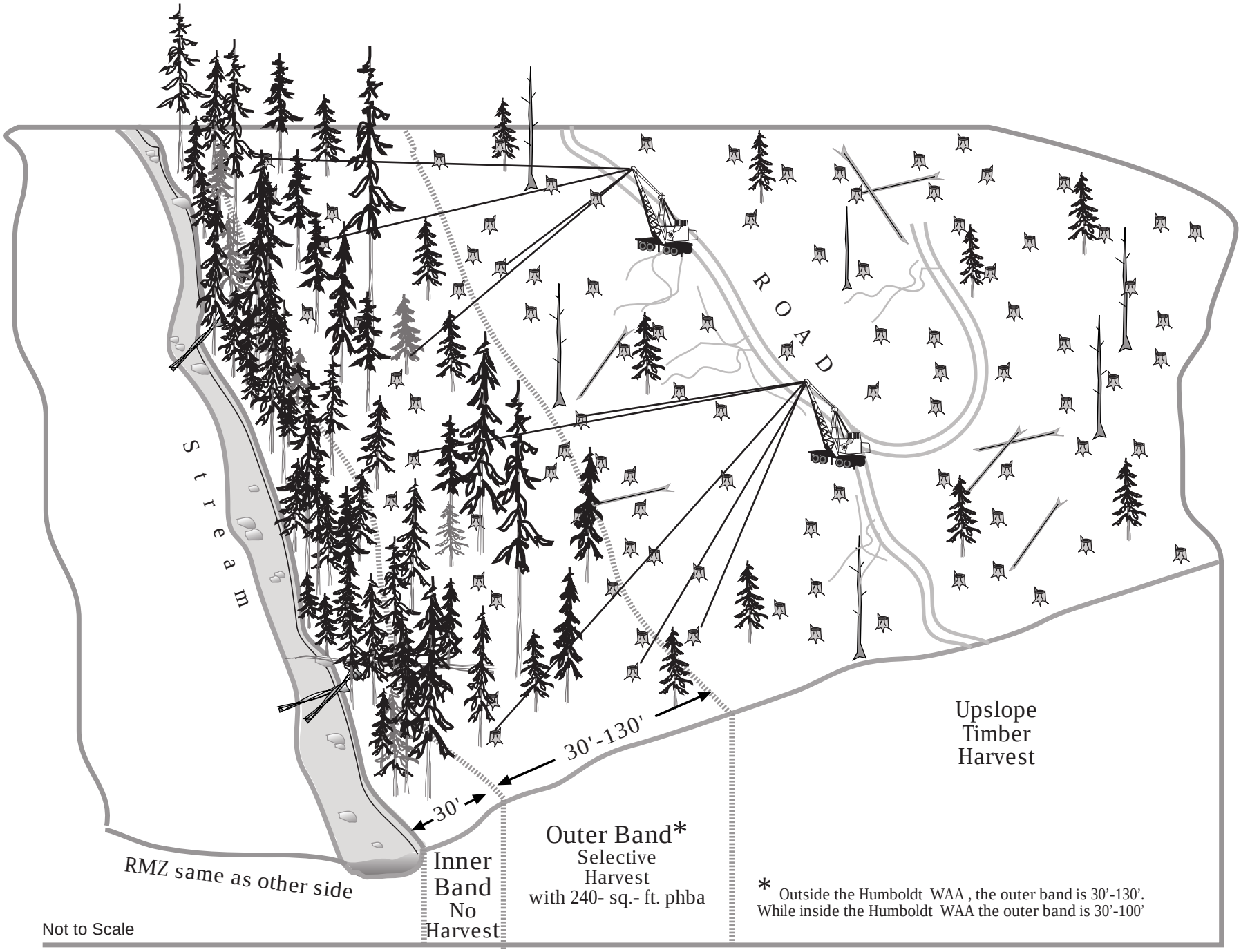

Figure 2.5-3b.
Diagrammatic View of 130-foot-wide Class II Riparian Management Zone. Alternatives 2, 2a, and 4, Immediately After Timber Harvest.

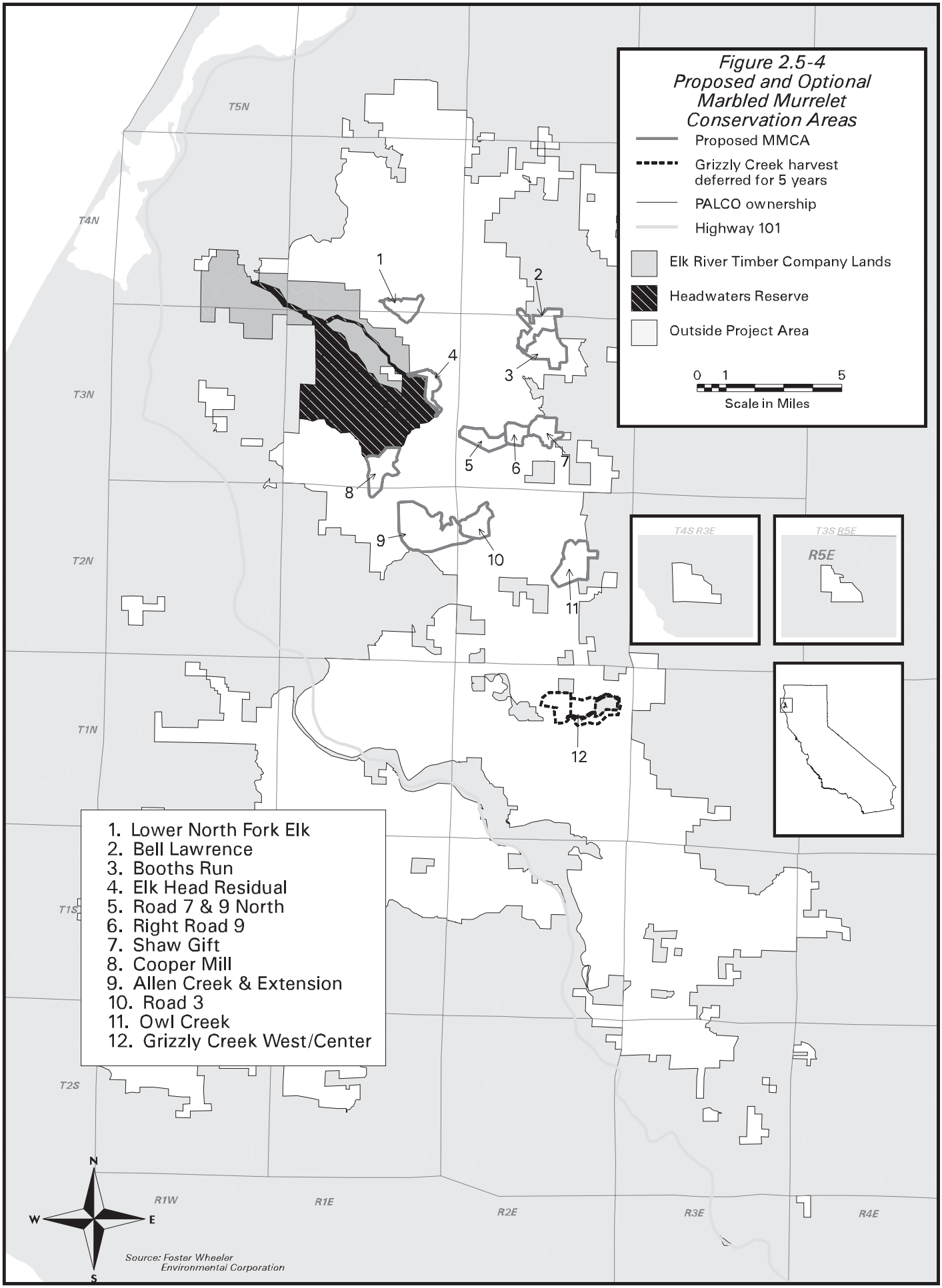
Figure 2.5-4
Proposed and Optional
Marbled Murrelet
Conservation Areas
Proposed MMCA
Grizzly Creek harvest deferred for 5 years
PALCO ownership
Highway 101
Elk River Timber Company Lands
Headwaters Reserve
Outside Project Area
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
1. Lower North Fork Elk
2. Bell Lawrence
3. Booths Run
4. Elk Head Residual
5. Road 7 & 9 North
6. Right Road 9
7. Shaw Gift
8. Cooper Mill
9. Allen Creek & Extension
10. Road 3
11. Owl Creek
12. Grizzly Creek West/Center
N
W
E
S
Source: Foster Wheeler Environmental Corporation

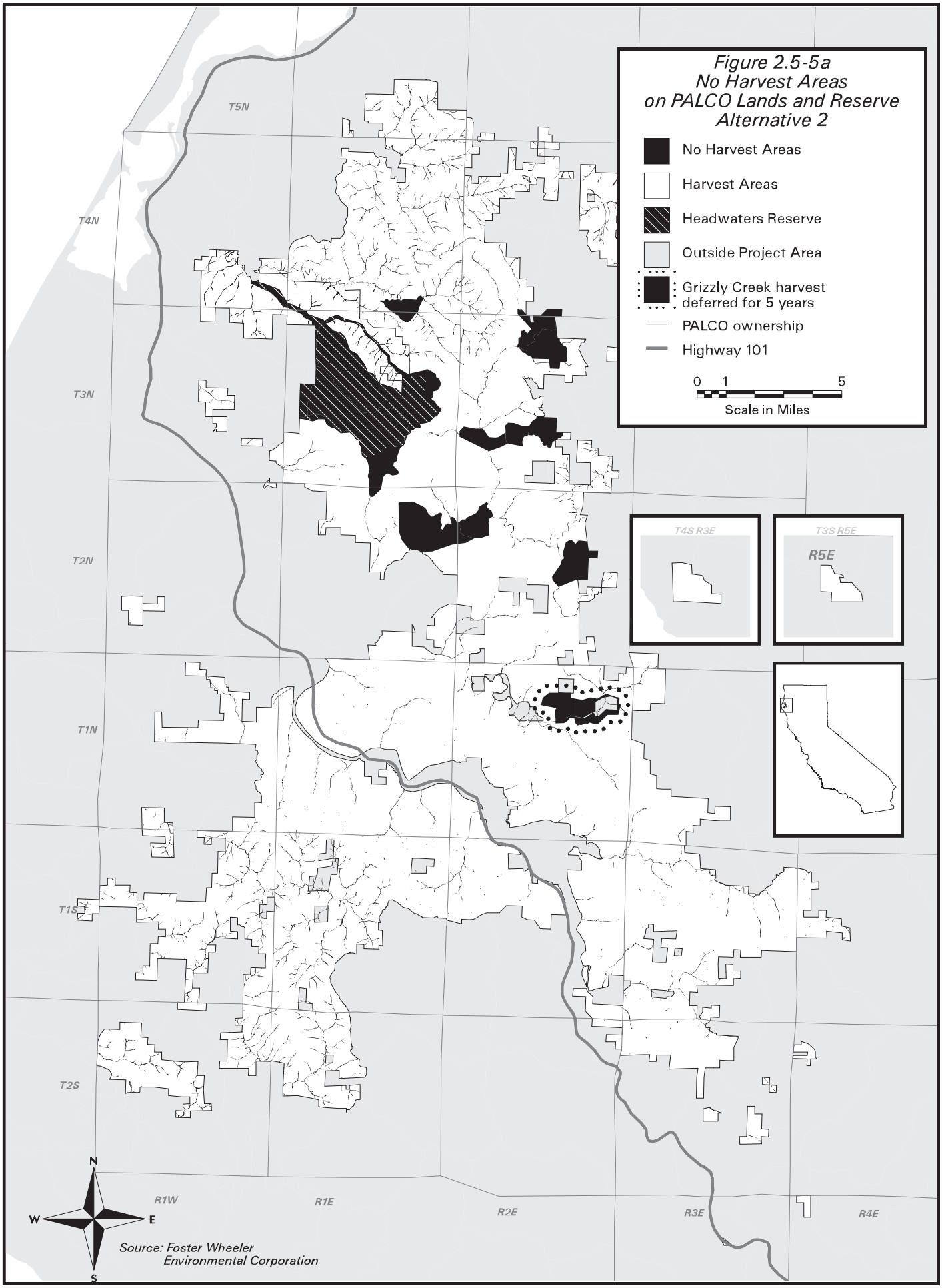
Figure 2.5-5a
No Harvest Areas
on PALCO Lands and Reserve
Alternative 2
No Harvest Areas
Harvest Areas
Headwaters Reserve
Outside Project Area
Grizzly Creek harvest deferred for 5 years
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

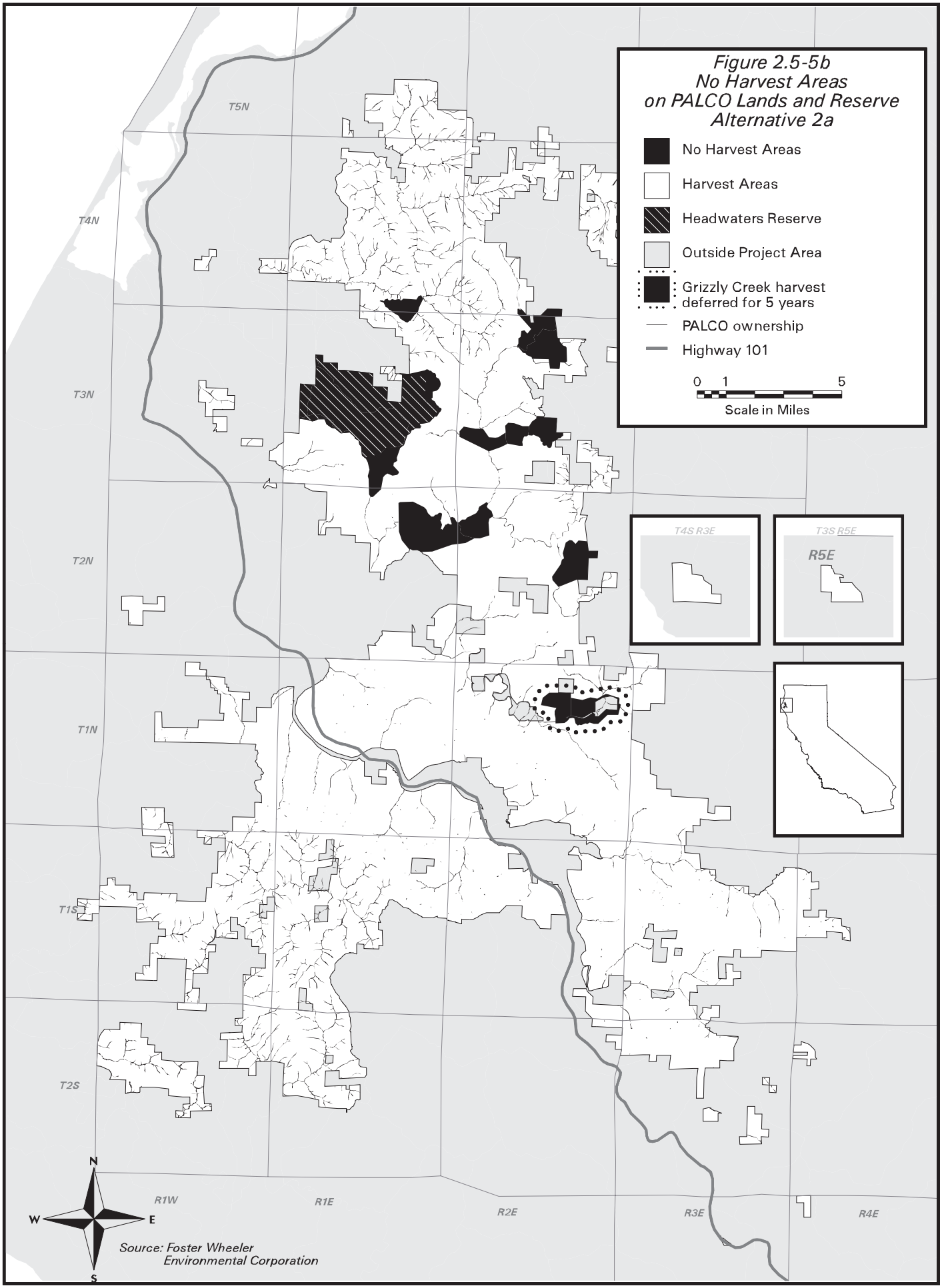
Figure 2.5-5b
No Harvest Areas
on PALCO Lands and Reserve
Alternative 2a
No Harvest Areas
Harvest Areas
Headwaters Reserve
Outside Project Area
Grizzly Creek harvest deferred for 5 years
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
S
E
W
Source: Foster Wheeler
Environmental Corporation

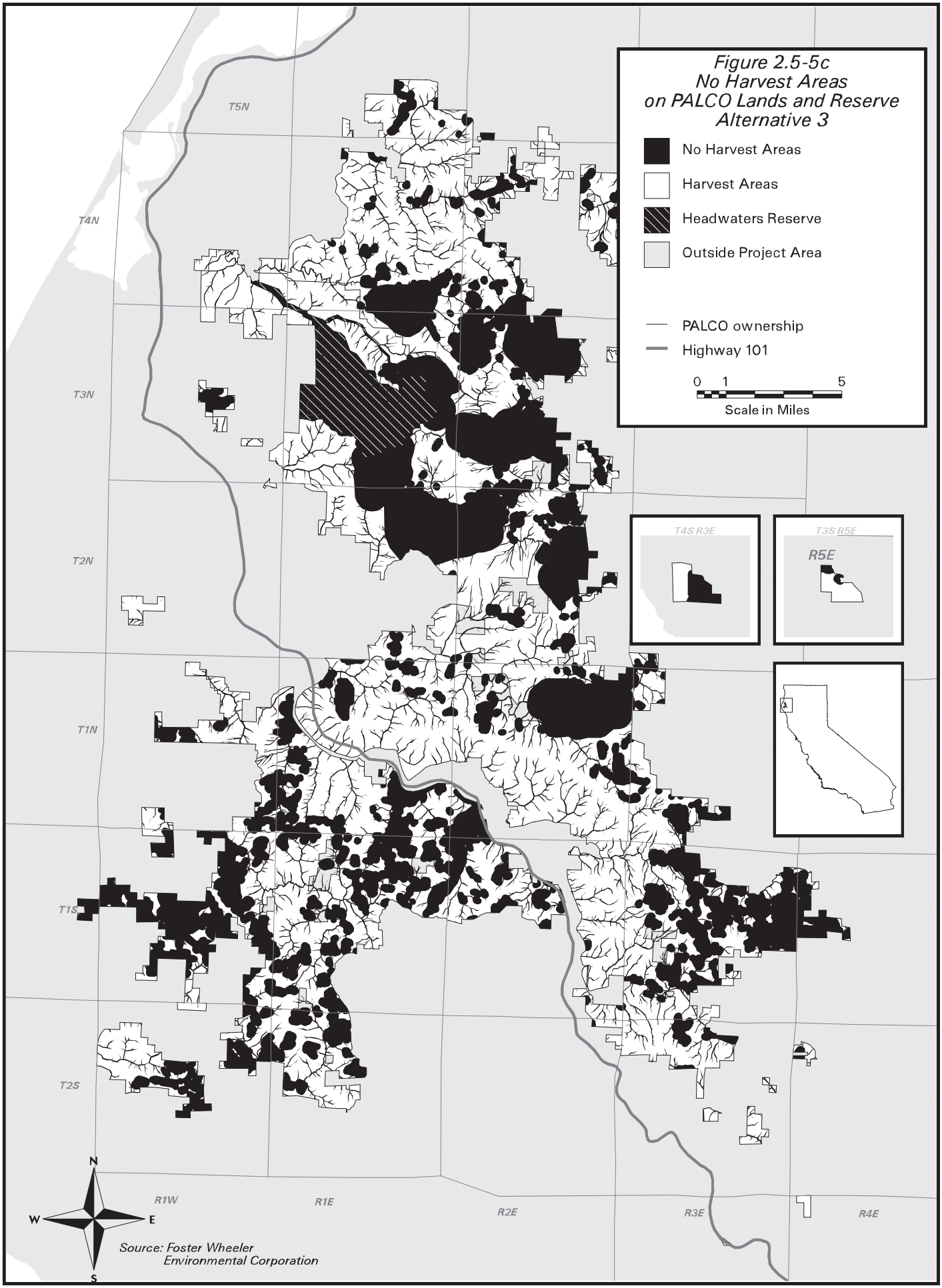
Figure 2.5-5c
No Harvest Areas
on PALCO Lands and Reserve
Alternative 3
No Harvest Areas
Harvest Areas
Headwaters Reserve
Outside Project Area
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

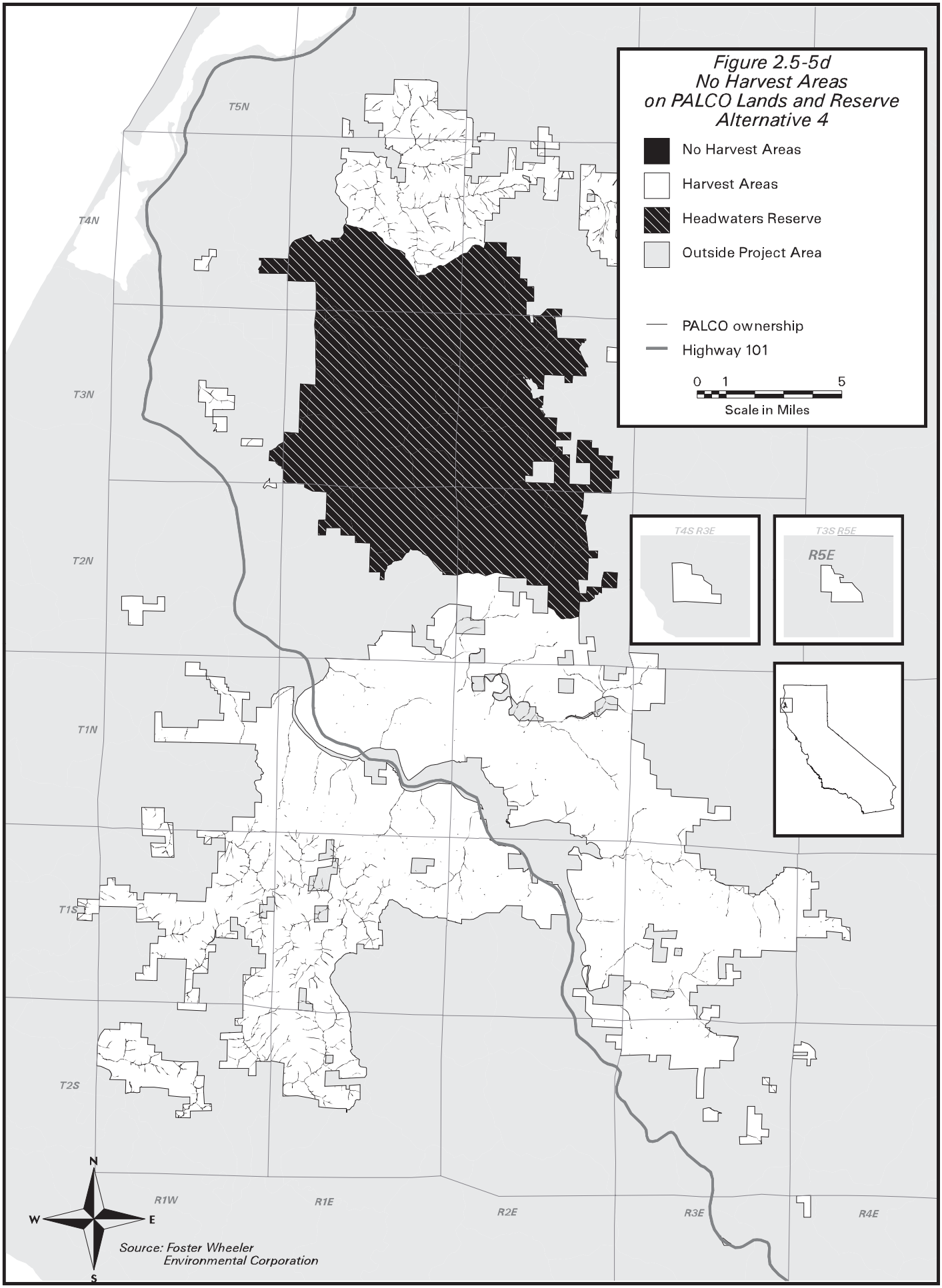
Figure 2.5-5d
No Harvest Areas
on PALCO Lands and Reserve
Alternative 4
No Harvest Areas
Harvest Areas
Headwaters Reserve
Outside Project Area
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

silvicultural prescriptions (e.g., clearcutting) are not allowed (Table 2.5-2). The amount of forest habitat diversity per WAA and property-wide provides differing levels of non-old-growth forest habitat (Table 2.5-2). All the components of the alternatives listed above can affect the LTSY of PALCO's property. Forest habitat diversity by WAA and property-wide, maximum disturbance index per WAA, forest habitat diversity per WAA and forest-wide, and allowed silvicultural prescriptions are specific components of PALCO's timber production model. Though these components of the timber model vary somewhat among alternatives and affect timber volume projections, they are primarily modeling constraints.

2.5.1 Alternative 1 (No Action/No Project)

This alternative was developed to evaluate the conditions related to No Action or No Project (see Figure 2.5-1a and Tables 2.5-1 and 2.5-2). The No Action/No Project alternative examines the consequences of not proceeding with the Agreement, the land transfers, the HCP, the ITPs, the SYP and the 1603 Agreement. The land involved is currently owned by PALCO and its subsidiaries. PALCO is in the business of timber and forest product production, and it can be expected that the company would continue to use the lands for this purpose. In this business they would face constraints from the need to comply with the Forest Practice Act and other state and federal laws, including the FESA and the CESA. Under this alternative, PALCO would not implement an HCP, and FWS and NMFS would not issue ITPs. Additionally, PALCO would not implement a SYP, nor would a SYP be approved by CDF.

The Reserve would not be established and transferred to public ownership. The Headwaters Forest and Elk Head Springs Forest would remain PALCO's property. Second-growth areas next to the older forest in the Headwaters and Elk Head Springs forests would be available for timber harvest. The approximately 9,468 acres of Elk River Timber Company property would remain in the company's ownership and be available for timber harvest. The 1,764 acres of preserved Elk River property would not become part of the Headwaters Reserve and the 7,704 acres of exchanged Elk River property would not be transferred to the federal government and then to PALCO. No state or federal assets would be expended on property acquisition.

Other components of this alternative include a maximum disturbance index of 20 percent per WAA. A systematic road-armoring program would not be instituted on the property, nor would a snag protection and recruitment program.

If none of the actions proposed in this document are taken, PALCO's activities would be subject to existing federal and state laws, including the FESA, CESA, and FPA. PALCO would conduct timber harvest on its lands on a THP-by-THP basis under Forest Practice Rules in a manner similar to present operations. Those THPs would be reviewed by CDF under existing authorities. Each future THP would be individually analyzed, subject to an approved Option A Plan as required by the FPRs, to determine the potential for take of listed species and mitigation applied, if necessary, to avoid take. In addition, PALCO could be expected to continue activities subject to Fish and Game Code Section 1603 on an individual, separate Agreement-by-agreement basis.

For the present analysis, the sustainability requirements for individual THPs would be within the constraints of the proposed SYP. It is also assumed for the purpose of this analysis that there could be harvest in old-growth redwood groves or in groves with

Table 2.5-1. Acreage, No-harvest Acreage, and Property Changes by Alternative (not including riparian zones)

	Alt. 1 (No Action/ No Project)	Alt. 2 (Proposed Action/ Proposed Project)	Alt. 2a (No Elk River Property)	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre No-harvest Public Reserve)
Public Reserve acreage	None	7,503	5,739	7,503	63,673
PALCO Reserve acreage if Owl Creek is purchased	None	8,428	6,664	None	None
PALCO acreage in Public Reserve	None	5,739	5,739	5,739	58,996
ERTC[1/] acreage in Public Reserve	None	1,764	None	1,764	4,677
PALCO acreage in no timber harvest marbled murrelet habitat	11,935[2/]	7,453[4/]	7,453[4/]	22,442 Plus 600-foot buffers around stands	None
Maximum possible PALCO no-timber harvest marbled murrelet habitat	None	8,448[3/]	8,448[3/]	None	None
ERTC[1/] land transferred to PALCO	None	7,704	None	7,704	None

1/ ERTC = Elk River Timber Company

2/ Includes all old-growth redwood and about 7,086 acres of residual old growth that was modeled as occupied by marbled murrelets in this alternative. Also includes old-growth redwood in Headwaters and Elk Head Springs forests. The acreage does not include riparian areas outside of old growth.

3/ Includes total acreage of MMCAs without Owl Creek MMCA without Grizzly Creek MMCA.

4/ Includes total acreage of MMCAs, including Owl Creek and Grizzly Creek. See Table 3.9-2.

Source: Foster Wheeler Environmental Corporation

Table 2.5-2. Some SYP and HCP Components by Alternative

	Alt. 1 (No Action/No Project[1/])	Alt. 2 (Proposed Action/ Proposed Project[4/])	Alt. 2a (No Elk River Property)	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre No-harvest Public Reserve)
Class I RMZ[2/] width (feet)	170 to 340[3/]	170[4/]	170[4/]	340/100[5/]	170[4/]
Class II RMZ[2/] width (feet)	85 to 170[3/]	100[4/]	100[4/]	170/75[5/]	100[4/]
Class III RMZ[2/] width (feet)	50 to 100[3/]	0[4/]	0[4/]	100/25[5/]	0[4/]
Maximum disturbance index per WAA (%)	20	20	20	15	20
All selection harvest	No	No	No	Yes[6/]	No
Forest habitat diversity per WAA and property-wide	5% openings 5% young 5% mid-seral 10% late-seral	5% openings 5% young 5% mid-seral 10% late-seral	5% openings 5% young 5% mid-seral 10% late-seral	0% openings 0% young 0% mid-seral 20% late-seral	5% openings 5% young 5% mid-seral 10% late-seral
Salvage Logging in Murrelet Habitat[7/]	Yes[8/]	No	No	No	No

1/ No SYP or HCP. Components for Alternative 1 relate to normal operations that continue on a THP-by-THP basis for NEPA analysis modeled into the future.

2/ RMZ widths are often related to a distance based on the size to which a redwood or Douglas-fir tree would be expected to grow in 100 years.

3/ No-harvest RMZ. The wider RMZ was used for long-term modeling of Alternative 1 for NEPA purposes.

4/ See the description under Proposed Action/Proposed Project Alternative (Section 2.5) and Table 2.5-3a and b for detailed descriptions of RMZs for Alternatives 2, 2a, and 4.

5/ The first number is the total buffer width. The second number is a no-harvest buffer width used for modeling. The outer area is restricted to the silvicultural prescription "Selection every 20 years Target WHR 6." This prescription is the same as the outer band selective harvest prescription for Class I and II streams under the Alternative 2 strategy (240-square-foot, post-harvest basal area). See Tables 2.5-3a and b.

6/ Only one silvicultural prescription is applied in this alternative, "Selection every 20 years Target WHR 6." This prescription is the same as the outer band selective harvest prescription for Class I and II streams under the Alternative 2 strategy (240-square-foot, post-harvest basal area). See Tables 2.5-3a and b.

7/ Salvage logging of dead and dying trees.

8/ Some restriction of salvage logging near fish-bearing streams.

Source: Foster Wheeler Environmental Corporation

residual old-growth redwood trees if harvesting could be done without take of marbled murrelets and other listed species. Spotted owls would be managed under the FPRs, which avoid take of this species. Salvage logging would continue, though restrictions would occur in the immediate vicinity of Class I and II streams.

The CDF and NMFS assumptions for assessing environmental impacts to aquatic resources under the No Action/No Project alternative differ due differences in analysis approach required by CEQA and NEPA.

CEQA implementing regulations require that an EIR discuss "the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved (14 CFR 15126[d][4])." CEQA does not require either a projection into the long-term future that could be deemed to be speculative, nor does it require a quantitative analysis of the No Project alternative for comparison with the other alternatives.

In CDF's view, a projection into the long-term future assuming that the proposed project is not implemented, is too speculative to evaluate. CDF would not have a SYP from PALCO reflecting an intent to remain in the timber business for the long term. There would be a public outcry over the failure of this effort to protect the Headwaters Forest, and renewed pressures could be expected opposing timber harvesting in the area. Political reactions could be possible in Congress and the California legislature. PALCO would likely go forward with its lawsuits against the state and federal governments. New private investment decisions could mean fundamental changes for PALCO and its holdings. The strong, conflicting pressures would make any long-term projections unrealistic.

Accordingly, the state version of the No Action/No Project alternative focuses on the near term and would be based on individual THPs that would be evaluated on a case-by-case basis. The CDF version of the No Action/No Project alternative does not attempt to forecast how PALCO's entire property would look in 50 years (the term of the proposed ITP). Since it is unknown how many THPs there would be, where they would lie geographically, and how they would differ in detail, no quantitative analysis of THPs has been included in the EIS/EIR discussion of the CDF version of the No Action/No Project alternative.

In CDF's view, the likely No Action/No Project alternative would consist of PALCO operating in a manner similar to current THP practices and subject to the existing regulatory authority of CDF. In reviewing individual THPs, CDF is required to comply with the FPA, the FPRs, and the CEQA through its certified functional equivalent program (see Section 1.4.1). The specific criteria for evaluating THPs contained in the FPRs are combined with the case by case evaluation of each THP for significant effects on the environment followed by consideration of alternatives and mitigation measures to substantially lessen those effects. Under CEQA and the FPRs, CDF must not approve a project including a THP as proposed if it would cause a significant effect on the environment and there is a feasible alternative or feasible mitigation measure available to substantially lessen the effect (PRC 21002, 21080.5[d][2][A], 14 California Code of Regulations [CCR] 896[a]). An adverse effect on a listed threatened or endangered species would be a significant effect under CEQA.

In addition, the present FPRs provide that the Director of CDF shall disapprove a timber harvesting plan as not conforming to the rules if, among other things, the plan would result in either a taking or a finding

of jeopardy of wildlife species listed as rare, threatened, or endangered by the Fish and Game Commission or FWS or would cause significant, long-term damage to listed species (Title 14, CCR 898.2[d]). To make a determination as to the effect of a THP on listed fish or wildlife species, CDF routinely consults with CDFG biologists and notifies federal fish and wildlife agencies. These processes and independent internal review by CDF biologists can result in a THP containing additional site-specific mitigation measures similar to the ones described in the proposed action. The THP review process applied by CDF is described in Section 1.4.1. CDF believes that its existing process using the FPRs and the CEQA THP-by-THP review and mitigation is sufficient to avoid take of listed species.

Under NEPA, the degree of analysis devoted to each alternative in the EIS is to be substantially similar to that devoted to the proposed action. While this requirement does not dictate an amount of information to be provided, it prescribes a level of treatment, which may in turn require varying amounts of information, to enable a reviewer to evaluate and compare alternatives.

Since the listing of the coho salmon as threatened, NMFS has been evaluating potential measures to avoid take by timber harvest activities as well as other human activities that affect the aquatic environment. This evaluation is ongoing. However, NMFS believes measures augmenting the existing FPR process would need to be applied to avoid take of listed species. With respect to aquatic species, a range of potential strategies could be applied under existing state and federal regulatory structures as part of the No Action/No Project alternative. The aquatic system is influenced by upslope activities. These upslope activities influence the influx of sediment and water to streams, can cause increases instream temperature, and can influence aquatic habitat through recruitment of LWD to the stream. Upslope activities could be modified with respect to road building, maintenance and wet weather use, measures to decrease the potential for management-related landslides on steep or unstable slopes, and by varying riparian buffer widths and restricting activities within buffers.

For purposes of analysis under NEPA, NMFS is evaluating a No Action scenario in this EIS/EIR by representing the "additional measures" as RMZs (buffers) rather than management options developed for site-specific conditions. The riparian buffers proposed by NMFS for analysis purposes are based on a range for each stream class: Class I RMZs would be from 0 to 170 or 340 feet; Class II RMZs would be from 0 to 85 or 170 feet; and Class III RMZs would be from 0 to 50 or 100 feet. The impacts analysis projects that these areas would be no-harvest buffers that would be applied to both sides of a stream. Ranges of buffer widths have been applied because it is expected that adequate buffer widths could vary as a result of various conditions on PALCO's land and are consistent with the concept that additional mitigation would be applied to portions of the ownership over time (projected over the length of the proposed permit) on a THP-by-THP basis. The buffer width ranges projected in the EIS/EIR under the NMFS version of the No Action/No Project Alternative maximize the amount of landscape that would be dedicated toward resource conservation. This is accomplished by applying wide riparian buffers in place of other strategies not described here that could result in smaller riparian buffers used in combination with a variety of potential mitigation measures tailored to site-specific conditions.

NMFS recognizes that the use of wide buffers is only one of many approaches that could be employed to describe a No

Action/No Project alternative that would avoid take of listed species. Avoiding take of aquatic species could also be accomplished by other strategies tailored to specific conditions of the particular landscape that would apply smaller buffer widths while restricting activities within the buffers and by managing and controlling sediment from roads and landings. However, NMFS believes the above described approach to assessing environmental change is more practical for projecting how habitat features may change across a landscape over time, produces impacts analysis which can be more readily compared with other alternatives, and thus satisfies the environmental analysis requirements of NEPA.

2.5.2 Alternative 2 (Proposed Action/Proposed Project)

This alternative represents PALCO's submitted HCP and application for an ITP from the FWS, NMFS, and CDFG modified to include the provisions of AB 1986 (Section 2.2). Additionally, this alternative reflects PALCO's SYP submitted to CDF (Section 2.2; Figures 2.5-1b and 2.5-2a and Tables 2.5-1 and 2.5-2). This alternative also includes the proposed 1603 Agreement PALCO submitted to CDFG and the HCP which PALCO asked CDFG to approve as an NCCP. Under this alternative, a Headwaters Reserve of approximately 7,503 acres would be established and held in public ownership. The Reserve would consist of the Headwaters Forest and the Elk Head Springs Forest, currently owned by PALCO, and approximately 1,764 acres of exchanged Elk River property, currently owned by the Elk River Timber Company. The federal and state governments would fund the purchase of approximately 9,468 acres of Elk River Timber Company land. Of this 9,468 acres, 1,764 acres would become part of the Reserve, and the remaining 7,704 acres would be transferred to PALCO. The purchase of property from PALCO and the Elk River Timber Company would be paid for by cash from both the federal government and the state. In addition, the State of California would purchase the Owl Creek Grove (925 acres) from PALCO and the grove would be placed in public ownership. The purchase of Owl Creek would also be dependent upon PALCO deferring harvest in the Grizzly Creek MMCA for five years. During that time additional funds would be sought to add to appropriated state money to purchase that grove as well.

2.5.2.1 Marbled Murrelets

The HCP proposes that approximately 7,521 acres in 12 areas containing old-growth redwoods and Douglas-fir outside of the Headwaters Reserve would be no-harvest areas to minimize take of marbled murrelets and other listed species. (Note: the Draft HCP, PALCO [1998] discusses 8 MMCAs while the EIS/EIR discusses 12 MMCAs. Several of the 12 MMCAs are contiguous to each other and considered as a single MMCA in PALCO [1998]. The contiguous MMCAs are evident in Figure 2.5-4.). All of the MMCAs except Grizzly Creek would be protected from timber harvest for the life of the ITP. Under the provisions of AB 1986, the state of California could purchase the Owl Creek MMCA, placing it in public ownership. Additionally, AB 1986 requires that timber harvest in Grizzly Creek be deferred for five years to enable raising sufficient funds to purchase it. If the purchase did not occur within that time, then the Grizzly Creek MMCA could be harvested. There would be 8,448 acres protected for the 50-year term of the ITP if all 12 MMCAs are not harvested. If Grizzly Creek were not purchased and it was harvested, then there would be 7,453 acres protected in MMCAs for the term of the ITP. The designated MMCA boundaries have incorporated a 300-foot vegetative buffer on existing suitable marbled murrelet nesting habitat. To the greatest extent practical, activities

with potential for disturbance of murrelets nesting in the MMCAs would be conducted outside the marbled murrelet breeding season (March 24 to September 15).

Other marbled murrelet mitigation measures are detailed in PALCO (1998, Volume 4, Part B). All logging, including salvage, and other management activities detrimental to the marbled murrelet or marbled murrelet habitat would not occur in the MMCAs. However, non-old-growth areas in the MMCAs could possibly be managed for recruitment of functional marbled murrelet nesting habitat with review, approval, and at the request of FWS and CDFG. Consequently, thinning or single-tree selection may be permitted by CDFG and FWS if it accelerates attainment of mature forest conditions, the activity occurs outside the marbled murrelet nesting season, and no new roads are built. Other mitigation measures include 300-foot selective harvest buffers around Humboldt Redwoods and Grizzly Creek Redwoods state parks where suitable marbled murrelet nesting habitat occurs at the PALCO boundary. In these areas, there is also a 0.25-mile zone with seasonal restrictions on timber harvest operations during the marbled murrelet nesting season.

2.5.2.2 Spotted Owl

Mitigation for potential impacts on the northern spotted owl would consist primarily of implementing PALCO's Northern Spotted Owl Conservation Plan, combined with other proposed mitigation (e.g., MMCAs and aquatic mitigation measures) (PALCO, 1998, Volume IV, Part C). In general, this mitigation consists of providing nesting, foraging, and dispersal habitat for the northern spotted owl throughout the Plan period, protecting all known nest sites for the first five years of the plan, and minimizing the likelihood that nesting owls would be disturbed during timber harvest. Owl populations would be expected to fluctuate with the amounts of available habitat. The Plan includes conducting yearly census surveys for owls during the first five years to estimate the baseline population of owls in the Plan area. Based on results of this estimate and subsequent yearly monitoring, if the owl population estimate in the Plan area falls below 75 percent of the baseline population for three consecutive years, PALCO would meet with the FWS and CDFG and evaluate reasons for the decline and means for managing the population. If the estimate falls below 67 percent of the baseline population for three consecutive years, PALCO would meet with the FWS and CDFG and implement a no-take management strategy until the estimate is above 67 percent for three consecutive years.

2.5.2.3 Other Species

Mitigation for potential impacts on other covered species of wildlife would consist of measures identified above for the marbled murrelet and northern spotted owl and mitigation provided for a variety of other species. In particular, such mitigation addresses potential impacts on amphibians and reptiles, species associated with snags and downed logs, and known species-specific sites (e.g., nest site protection measures). Mitigation for amphibians and reptiles would consist primarily of the aquatic strategy, combined with an amphibian/reptile monitoring program to ensure that protection of Class I and II streams adequately safeguards these species and their habitat. Information resulting from this monitoring may warrant different (increased or decreased) protection of Class I and II streams on a localized scale (e.g., WAAs). Impacts on amphibians/ reptiles would also be managed through the proposed reduction of sediment delivery to streams and by conducting gravel harvesting operations outside the wetted channel. For species associated with snags and downed logs,

PALCO would determine the status of these structural elements in the Plan area, recruit and maintain a certain number of these elements to provide habitat for such species, and monitor and evaluate the effectiveness of these measures in consultation with the FWS and CDFG. The specific objectives for snags and downed logs would be to retain or recruit the following:

- 1.2 snags/acre at least 30 inches dbh and at least 30 feet tall
- 2.4 snags/acre at least 20 inches dbh and at least 16 feet tall
- 1.2 snags/acre at least 15 inches dbh and at least 12 feet tall

In addition, all safe snags would be left after timber harvest. Two downed logs/acre outside Class I and II RMZs of any decay class greater than 15 inches in diameter at the large end and greater than 20 feet long would be left. There would, however, be no requirement to leave downed logs where they do not already exist. Site protection measures would involve known nest, roost, and/or foraging sites and/or surveying to identify such sites. Species specifically protected by the latter measures are primarily birds, including California fully protected species, but also the northwestern pond turtle.

Impacts to aquatic species from the activities subject to PALCO's proposed 1603 Agreement would be mitigated by the measures set forth in PALCO's proposed programmatic 1603 Agreement or a separate individual 1603 Agreement.

2.5.2.4 Aquatic Measures

Aquatic mitigation measures would be applied in two separate manners: property-wide prescriptions and prescriptions generated from watershed analysis.

Initially, PALCO would follow the property-wide aquatic strategy (Appendix E, part 2). These mitigation measures are titled Interagency Federal-State Aquatic Strategy and Mitigation for Timber Harvest and Roads for the PALCO HCP, dated January 7, 1998 (Appendix E, part 2).

The property-wide prescriptions may be modified as a result of a completed watershed analysis. The Washington State Department of Natural Resources (WDNR) watershed analysis procedure (WDNR, 1995) will be used, as modified for PALCO's land and to attain the objectives of the HCP (Appendix G). The watershed analysis process evaluates and categorizes the landscape and the road system based on their potential for producing sediment inputs to streams. Additionally, it evaluates the aquatic and riparian system with regards to the habitat condition (e.g., pools, sedimentation, water temperature, level of LWD in the channel, ability of the riparian zone to provide protection for water temperature, LWD influx, and sediment filtering). Based on these evaluations, site-specific prescriptions would be developed for timber harvest and road maintenance to reduce sediment delivery to streams and for riparian zones to ensure suitable water temperature and input of LWD. Though the watershed analysis prescriptions can differ from the property-wide prescriptions, they would have to meet the goal of attaining a properly functioning aquatic system. The watershed analysis generated prescriptions would be developed collaboratively by a prescription team that includes representatives from federal and state agencies. The NMFS Regional Administrator, the FWS Regional Director or CDFG Director, will establish the final site-specific prescriptions. The watershed analyses shall be completed on all PALCO lands within five years of the issuance of an ITP. In addition, the FWS and NMFS, in consultation with CDF, NCRWQCB, and CDFG shall develop a peer review process to evaluate, on a spot-check basis, the

appropriateness of completed analyses and prescriptions that are developed through the watershed process.

Channel migration zones (CMZ) would be established along Class I and II streams. Within the CMZs timber harvest and salvage logging are prohibited. Exceptions to no salvage are as follows:

1. Where there is potential for loss of life or loss of property because instream LWD imperils bridges or capital improvements such as roadways or other structures
2. In the case of other emergencies per agreement with NMFS, and/or FWS, and/or CDFG, consistent with biological opinions issued on the HCP

Class I Streams, Property-wide Strategy— Tables 2.5-3a and b provide summaries of RMZ prescriptions. Figures 2.5-3a and b provide diagrammatic representations of Class I and II RMZs. Class I streams would receive a 170-foot RMZ (based on a site-potential tree height for a 100-year-old tree on a Class II high site) RMZ measured by slope distance, and divided into two separate bands with differing management prescriptions. The inner band, Band 1, of that buffer (from the edge of the CMZ or vegetation transition line to 100 feet) would be a no-harvest zone, there would also be no salvage of dead and dying trees or downed trees, and it would also be an equipment exclusion zone [EEZ]) with the exception of use of existing open roads.

The outer band, Band 2, (from 100 feet to 170 feet) would allow selective timber harvest and would also be an EEZ. At least 276 square feet of pre-harvest conifer basal area per acre of RMZ would be required, with at least 240 square feet of post harvest conifer basal area per acre of RMZ. Timber harvest would be single tree selection using PALCO's Late Seral, Selection Target WHR 6 Prescription. There would be a maximum of one entry every 20 years, and no more than 40 percent of conifer basal area could be removed in a single entry. For slopes less than 50 percent in Band 2, portions of downed wood can be removed. For slopes greater than or equal to 50 percent in Band 2, all downed wood must be retained except in specified situations (Appendix E).

The post harvest conifer basal area in Band 2 has required tree size distributions. On slopes greater than 50 percent, Band 2 is to be extended to the break in slope or a distance determined by the mass wasting team (i.e., where the slope declines to less than 50 percent).

Class II Streams, Property-wide Strategy— Timber harvest along Class II (Appendix E) streams takes into account several specific aspects of the riparian zone (Table 2.5-3b and Figure 2.5-3b). The first consideration is whether the area is within the Humboldt WAA. Mitigation measures also vary according to whether the stream channel sideslope is less than or greater than 50 percent.

For Class II streams, there are several varying proposed prescriptions (Appendix E). Class II streams would have a 130-foot RMZ measured by slope distance, except in the Humboldt WAA where they would have a 100-foot RMZ. Similar to Class I streams, RMZs along Class II streams would be divided into bands with differing management prescriptions (Table 2.5-3b).

The inner band, from the edge of the CMZ or vegetation transition line to 30 feet, in and out of the Humboldt WAA, would be a no-harvest zone; there would also be no salvage of dead and dying trees or downed trees, and it would be an EEZ with the exception of use of existing open roads. The second band, from 30 to 100 feet, in the Humboldt WAA and 30 to 130 feet outside the Humboldt WAA, would be a selective entry zone with no salvage of dead, dying, or downed trees. There would be a minimum of 276 square feet of preharvest conifer basal area per acre for each side of

Table 2.5-3a. Summary of RMZ Prescriptions for the Proposed HCP (Alternatives 2 and 2a) and Alternative 4

Stream Class	Property-wide Bands	Property-wide RMZ Prescriptions
Class I[1/]	**RMZ totals 170 feet**	
	Band 1 0 to 100 feet	No-harvest and EEZ[2/]
	Band 2 100 to 170 feet	Late seral prescription[2/]; 240 square-foot post-harvest basal area and size distribution required; on slopes greater than 50 percent RMZ is extended all the way to break in slope
Class II	See Table 2.5-3b	See Table 2.5-3b
Class III	0 to 25 feet for slopes less than 30 percent	ELZ and downed trees remain
	0 to 50 feet for slopes 30 to 50 percent	ELZ and downed trees remain
	0 to 100 feet for slopes greater than 50 percent	ELZ and downed trees remain

1/ In addition to the prescriptions detailed in the table, all dead and dying trees in Class I and II RMZs must be retained, and all exposed soil areas greater than 100 square feet on slopes greater than 30 percent must be treated with erosion control.
2/ Tree size distribution requirements are discussed in Sections 2.5 and 3.7.4.3.
Source: Foster Wheeler Environmental Corporation

Table 2.5-3b. Summary of Class II Property-wide RMZ Prescriptions for the Proposed HCP (Alternatives 2 and 2a) and Alternative 4[1/]

RMZs vary from 0 to 100 feet or 0 to 130 feet	No-harvest (EEZ)	Late Seral Prescription, Post Harvest 240-square-foot Basal Area and dbh Tree Size Distribution Required[2/]; (EEZ)
Slopes less than 50 percent		
In Humboldt WAA	0 to 30 feet	30 to 100 feet
Outside the Humboldt WAA	0 to 30 feet	30 to 130 feet
Slopes greater than 50 percent		
In Humboldt WAA	0 to 30 feet	30 to 100 feet or to slope break[3/]
Outside the Humboldt WAA	0 to 30 feet	30 to 130 feet or to slope break[3/]

1/ In addition to the prescriptions detailed in the table, all dead and dying trees in Class I and II RMZs must be retained, all exposed soil areas greater than 100 square feet must be treated using erosion control, and all areas with less than 100 square feet of exposed mineral soil on sideslopes greater than 30 percent must be treated if the site can deliver fine sediment to the watercourse.
2/ Tree size distribution requirements are discussed in Sections 2.5 and 3.7.
3/ If a steep sideslope extends beyond the indicated distance, the prescription must be applied all the way to the break-in-slope (i.e., where the slope declines to less than 50 percent, or a distance determined by the mass wasting team).
Source: Foster Wheeler Environmental Corporation

the stream and a minimum of 240 square feet of post harvest conifer basal area per acre. Timber harvest would be single tree selection using PALCO's Late Seral, Selection Target WHR 6 Prescription. Basal area measurements would be made for conformance no less than every 200 lineal feet of RMZ and there would be a maximum of one entry every 20 years. No more than 40 percent of conifer basal area could be removed in a single entry. Only full suspension skyline logging would be allowed through the RMZs, except in specified situations. The second band would also be an EEZ.

Post-watershed analysis RMZ prescriptions for both Class I and II watercourses shall be no less than 30 feet no-cut (slope measurement) and no more than 170 feet (horizontal measurement) on each side of the watercourse. With respect to the minimum 30-foot no-cut buffer (slope measurement) on Class II watercourses, the NMFS and FWS may adjust the buffer to a minimum of 10 feet no-cut buffer if it is determined that it would benefit aquatic habitat or species.

Class III Streams—Timber harvest along Class III streams would be allowed to streambank, but there would be either an equipment limitation zone (ELZ) or an EEZ, the width of which would vary with slope (Table 3.5-3a). For slopes less than 30 percent, the ELZ would be 25 feet; for slopes from 30 to 50 percent, the ELZ would be 50 feet; and for slopes greater than 50 percent, the EEZ would be 100 feet. No fire ignition would be allowed in these ELZs. In addition to the above, LWD in the channel would not be removed. Also, there would be no removal of downed wood within the ELZ or EEZ, except for emergencies per agreement with NMFS, FWS, consistent with the HCP, the NMFS and FWS biological opinions, and the IA.

Hillslope Management—Under the hillslope management default prescriptions (Appendix E), landslide hazard zone areas with ratings of extreme, very high, and high (including inner gorges) would be no-harvest zones and would have no new roads built. These restrictions would apply unless a professional geologist, a forester, and at least one agency biologist determine if alternative prescriptions are appropriate and are not likely to increase the risk of hillslope failure. Additional details are included in Appendix E.

*Road Management, Strategy—S*ee Appendix E. PALCO would ensure that all new roads and landings related to THPs comply with the specifications described in the Handbook for Forest and Ranch Roads (Weaver and Hagans, 1994). Four hundred miles of new roads will be constructed under this alternative with an undetermined/unlimited amount of road reconstruction. Some of the construction/reconstruction constraints are as follows:

- Construction would be avoided in high risk areas such as inner gorges, unstable terrain, and on slopes greater than 50 percent unless the roads are evaluated by a certified engineering geologist and submitted to the agencies with the THP before THP pre-harvest inspection.
- The existing road network would also be intensely monitored for sediment production problems once yearly and incidentally during the winter period.

In addition to the above, the road management prescriptions (Appendix E) include an assessment of the existing road network and sediment sources, restoration of sediment delivery sites, storm-proofing all roads at a rate of at least 500 miles per decade over a 30 year period, upgrading THP related roads, and maintenance and use of existing roads.

With respect to road management activities, the legislation requires the

inclusion of prescriptions on road-related activities that, on balance, are no less protective of species and habitat than the provisions contained in the February 27, 1998, Pre-Permit Agreement in Principle.

Other components and additional details of the proposed HCP are described in Section 2.2 and in PALCO (1998).

2.5.2.5 Reserve Management

The purpose of acquiring the Headwaters Forest area is to protect old-growth redwood forests and associated threatened and endangered species. The Secretary of the Interior has identified the BLM as the federal agency responsible for managing the Headwaters Reserve. The California Resources Agency would be responsible for managing the Headwaters or would appoint a state agency to carry out that role. Acquisition of the Headwaters Forest by the federal and state governments would require a detailed schedule of management activities to accomplish the goals of protecting old-growth redwood forests and associated threatened and endangered species. The current EIS/EIR does not seek to develop that detailed schedule, or to approve site-specific management actions. Rather, it provides broad management direction for the Headwaters Reserve, consistent with the conservation purposes for which the lands are to be acquired. Management would be guided by the following fundamental principles:

- Protection and monitoring of terrestrial and aquatic threatened and endangered species
- Protection of other wildlife species
- Protection of natural values, particularly old-growth and riparian values
- Providing the public reasonable access to, and an opportunity to enjoy, the Headwaters area consistent with protection of wildlife and other natural resources and so that late-successional and old-growth habitats would not be compromised by visitor levels
- Rehabilitation and restoration of previously logged areas within the acquired lands
- Collaborative federal, state, and local government management responsibility

Section 501 of the 1998 Department of Interior Appropriations Act, PL 105-83 (Appendix B) indicates that a concise management plan for the Headwaters Reserve shall be developed and periodically amended as necessary by the Secretary of the Interior in consultation with the state of California. The management goals for the plan shall be to conserve and study the land, fish, wildlife, and forests occurring in the Reserve, while providing for recreational opportunities and other management goals. The plan shall address these management issues:

- Scientific research on forests, fish, wildlife, and other activities that would be fostered and permitted on the Headwaters Reserve
- Providing recreational opportunities on the Headwaters Reserve
- Access to the Headwaters Reserve
- Construction of minimally necessary facilities within the Headwaters Reserve so as to maintain its ecological integrity
- Other management needs
- An annual budget for the management of the Reserve, including projected revenues (such as fees for research and recreation) and projected expenses

The initial federal financial plan for the Headwaters Reserve Acquisition, which was submitted to Congress on May 5, 1998, is contained in Appendix F. This plan was developed cooperatively with the California Resources Agency and other state and federal agencies. That financial plan

indicates that the management plan for the Headwaters Reserve would rely on findings of a detailed and comprehensive ecosystem (watershed) analysis and an assessment of forest stand conditions as prescribed by the Northwest Forest Plan. Extensive public involvement would be a fundamental component of that analysis.

Because the primary purposes of the acquisition and management of the Headwaters Forest are protection and enhancement of old-growth redwood forest and threatened and endangered species, general public use would also be focused on non-disturbing, low-impact activities such as hiking, animal watching, and interpretive education. Similarly, other management activities within the Headwaters Reserve, including rehabilitation and restoration, would be consistent with the primary purpose of habitat and species protection. Public access could be provided from the north or side of the Headwaters Reserve. Additional administrative access would be necessary in order to be able enter other parts of the Headwaters Reserve. Maintenance agreements with PALCO for roads across their property would be needed.

The Headwaters Reserve is expected to be managed cooperatively by the federal, state, and local governments. This combined approach would allow the agencies to combine their strengths and involve the public in a cooperative resource management planning (CRMP) approach. Examples of this type of collaborative approach used in California include the Consumnes River Preserve in south Sacramento County, the Carrizo Plain Natural Area in San Luis Obispo County, and the Santa Rosa National Scenic Area in Riverside County. The BLM and California are interested in developing and participating in a collaborative management approach for the Headwaters Reserve. Once the Headwaters Reserve is acquired, such a cooperative agreement probably would be developed among the parties. Such an agreement is expected to outline each agency's roles and responsibilities for managing the forest and the budgetary resources needed for implementation.

Additionally, Section 501(h) of the 1998 Department of Interior Appropriations Act, PL 105-83 (Appendix B) authorized the establishment of the Headwaters Forest Management Trust. This possibility would be considered as an option once the acquisition is complete, and the cooperative management plan has been developed.

Site-specific management and restoration activities within the Headwaters Reserve would require separate NEPA and CEQA analysis before for approval. Public participation would occur during these processes. Costs for preparing and implementing management activities would be borne by each of the cooperating agencies.

Under AB 1986, the Owl Creek MMCA would be protected from harvest for the life of the ITPs, and the Grizzly Creek MMCA would be protected for five years from the date of the adoption of the Final HCP with the possibility of some form of combined state and private purchase within that time frame. AB 1986 also appropriates additional funding to purchase the Owl Creek MMCA in the future. Any funds remaining from those appropriated for the purchase of the Owl Creek MMCA could be used to purchase tracts of the Elk River Property and previously unlogged Douglas-fir forestland within the Mattole River watershed.

The state managing agency and management prescriptions for these potential acquisitions are unknown, and these acquisitions are somewhat speculative. Considering the legislative intent behind AB 1986, it is assumed that purchased lands would be managed similarly to the Headwaters Reserve.

These anticipated acquisitions would protect old-growth and residual redwood stands and some Douglas-fir stands within these tracts in perpetuity.

2.5.3 Subalternative 2a (No Elk River Property)

This subalternative was developed to respond to the possibility that no agreement can be reached between the PALCO and Elk River Timber Company for a land purchase (see Figures 2.5-1c and 2.5-2b and Tables 2.5-1 and 2.5-2). Under this alternative, the Elk River Property would not be purchased and split among PALCO and the federal and state governments. Consequently, a smaller reserve would be established than in Alternative 2 because the 1,764 acres of Preserved Elk River Property would not be included. The reserve would be approximately 5,739 acres and would be in public ownership. The reserve would consist of 4,586 acres of the Headwaters Forest and 1,125 acres of Elk Head Springs Forest currently owned by PALCO. It would be managed as described in Alternative 2. The federal and state governments would pay for the property purchase from PALCO by cash only. All other components of this subalternative are the same as for Alternative 2.

As a general matter, the legislation requires that the Final HCP be no less protective of aquatic or avian species than the Draft HCP, as amended by the provisions of the legislation.

2.5.4 Alternative 3 (Property-wide Selective Harvest)

This alternative was developed to respond to issues related to elimination of clearcut silvicultural prescriptions, reducing the level of timber harvest, and increasing habitat potential across the property (see Figure 2.5-1b and 2.5-2a and Tables 2.5-1 and 2.5-2). This alternative has many components that differ from PALCO's proposed HCP/SYP. The maximum yearly timber harvest is restricted to two percent of the timber inventory. Additionally, at least 20 percent of the property must be late-seral habitat. The only silvicultural prescription allowed would be selective harvest every 20 years with a target of WHR 6. Under this alternative, the same reserve would be established and managed as described in Alternative 2. The federal and state cash assets provided would also be the same as Alternative 2.

Approximately 9,134 acres of stands with residual old-growth redwoods outside of the reserve would not be harvested so as to minimize take of marbled murrelets and other listed species. In addition, each individual stand would have a 600-foot, no-commercial-timber-harvest buffer around it to minimize edge effects in the residual stand and to enhance the development of old-growth habitat over time. Under this alternative, no salvage logging would occur, as currently approved by CDF.

On the remaining property, stream buffers would be established based on a site potential tree height of 170 feet. Class I buffers would be 340 feet, Class II buffers would be 170 feet, and Class III buffers would be 100 feet. They would initially be no-harvest buffers. Similar to Northwest Forest Plan procedures, however, timber harvest could occur in the buffers after watershed analysis was conducted, and site-specific harvest prescriptions were identified based on watershed-level and site-specific hillslope, riparian, and stream conditions. For the purposes of modeling within this alternative, therefore, no-harvest buffers for Class I streams are 100 feet, Class II streams are 75 feet, and Class III streams are 25 feet. These buffer widths were chosen because, combined with the adjacent selective harvest, they provide high levels of aquatic zone protection, while still allowing timber harvest. Within the harvestable portion of the stream buffers, late seral conditions

would be maintained. For the purposes of modeling, only selection harvest every 20 years with a target of WHR 6 is used. The Final HCP, ITP, and SYP would reflect conditions and operations corresponding to those described in this alternative.

Another component of this alternative is a maximum disturbance index of 15 percent per WAA.

This alternative would reduce sediment delivery to streams on PALCO property by incorporating a zero net sediment discharge requirement on the five watersheds identified by CDF as cumulatively impacted for sediment. Additionally, it would incorporate the procedures described in the *Handbook for Forest and Ranch Roads* for road sediment (Weaver and Hagans, 1994) and would use the sediment source investigation of the lower Eel River (Pacific Watershed Associates, 1998) to begin minimizing existing sediment delivery to the streams. These two procedures would be applied at a rate that would address all hydrologic units (HUs) on PALCO's ownership by the end of the 50-year HCP period. To accomplish this goal, four HUs would have to be addressed per decade in decades one and two, and three HUs would have to be addressed per decade in decades three, four, and five.

2.5.5 Alternative 4 (63,000-acre No-harvest Public Reserve)

This alternative was developed to respond to the issue of preserving a large area of PALCO property (see Figures 2.5-1d, and 2.5-2c and Tables 2.5-1 and 2.5-2). Under this alternative, a 63,673-acre no-harvest Reserve would be established. This Reserve boundary was obtained from the Trees Foundation. It would encompass all six groves of redwoods identified in the scoping comments and 11 of the 12 MMCAs (i.e., all but Grizzly Creek South/West/ Center). Approximately 58,996 acres of the Reserve would consist of PALCO lands. Of that amount, about 5,711 acres is in the Headwaters Forest and Elk Head Springs Forest. Approximately 4,677 acres of Elk River Timber Company land would also become part of the reserve. The Reserve would be managed as described in Alternative 2. On the remainder of the property outside the 63,673 acre no-harvest reserve, the conservation strategies of the proposed HCP (i.e., Alternative 2) would be applied. See Section 2.5 for details on those conservation strategies.

The United States and the State of California would acquire the 63,673-acre reserve area from PALCO and Elk River Timber Company. The United States and the State of California would pay for the purchase of property from PALCO by cash only. The United States and the State of California would also pay for the Elk River Timber Company lands with cash. Approximately 4,791 acres of Elk River Timber Company land that is outside the boundary of the 63,000-acre reserve would remain the property of Elk River Timber Company. The available assets are those described for the smaller reserve, as defined in Alternatives 2 and 3. The availability of federal, state, or private assets for payment for the remainder of the reserve defined in this alternative and whether PALCO would be a willing seller are unknown. The Final HCP, ITP, and SYP would reflect corresponding conditions and operations to those described in this alternative.

2.6 COMPARISON AND EVALUATION OF ALTERNATIVES CONSIDERED IN DETAIL

2.6.1 Comparison and Evaluation of Alternatives

This section presents the environmental consequences of the alternatives in a comparative format. Table 2.6-1 presents a

summary of the physical, biological, employment, and tax revenue consequences of the alternatives. Table 2.6-2 summarizes the levels of significance of the various alternatives in relationship to all the factors discussed in Chapter 3.

Table 2.6-2 indicates that implementation of the alternatives would result in few significant impacts for CEQA purposes. Since the alternatives are addressing a wide variety of species occupying a wide variety of habitats on the Project Area, measures to minimize and mitigate the potential effects of take are applied over the majority of the landscape. Thus, the application of mitigation measures over the landscape reduces most impacts to less-than-significant levels for CEQA purposes.

Below, the alternatives are compared and evaluated in relation to major issues. These major issues are: Issue 1 - Old-growth and residual redwood and Douglas-fir forest and old-growth redwood and Douglas-fir trees; Issue 2 - Threatened and endangered species (addressing the following three priority species: the marbled murrelet, the northern spotted owl, and the coho salmon); Issue 3 - Wildlife habitat and natural communities; Issue 4 - Fish habitat, water quality, and water quantity; and Issue 5 - Timber supply, employment, and government revenue. Both quantitative and qualitative information is presented that is derived from the analyses presented in Chapter 3. Quantitative information for the alternatives is summarized in Table 2.6-1. In addition, Tables 2.5-1, 2.5-2, and 2.5-3a and 2.5-3b provide information relevant to comparing the alternatives. Figures 2.5-2a, b, c, and d also show no-harvest areas for Alternatives 2 to 4. Chapter 3 provides descriptions of the affected environment and the full range of environmental consequences associated with the alternatives, including several environmental components and effects that are not summarized here.

As noted in Section 2.5.1, the evaluation of the No Action/No Project differs under CEQA and NEPA. For CEQA the No Action alternative is not projected into the long-term future. In the short term, the conformance with the FPRs, the FESA and CESA, and other federal and state laws is determined on a THP- and site-specific basis. A wide variety of mitigation measures tailored to local conditions is applied with the purpose of avoiding significant environmental effects and take of listed species. Consequently, most significant environmental effects of individual THPs can be expected to be mitigated to a level of less than significant through implementation of the No Action/No Project alternative.

As noted in Section 2.5.1, the NEPA evaluation of the No Action alternative considers the implementation of wide, no-harvest RMZs as well as restrictions on the harvest of old-growth redwood forest to model conditions over the short and long term. Ranges of RMZs are considered qualitatively because adequate buffer widths could vary as a result of varying conditions on PALCO lands. In the following section, the Alternative 1 discussion presents a summary of the effects of Alternative 1 under the NEPA long-term assumptions.

2.6.2 Issue 1: Old-growth and Residual Redwood and Douglas-Fir Forest and Old-growth Redwood and Douglas-fir Trees

2.6.2.1 Alternative 1 (No Action/No Project)

Under Alternative 1, old-growth redwood trees in areas occupied by marbled murrelets would not be harvested but many old-growth redwood trees in areas not occupied by marbled murrelets would be harvested. Occupied areas are predominantly in stands dominated by old-growth trees, particularly the Headwaters

Table 2.6-1. Comparison of Alternatives

	Alternative 1 (No Action/No Project)	Alternative 2 (Proposed Action-Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Reserve)
Headwaters Reserve—total acres	No Reserve	7,503	5,739	7,503	63,673
Old-growth redwood in Reserve	No Reserve	3,117	3,117	3,117	4,648
Residual redwood in Reserve	No Reserve	666	666	666	6,472
Old-growth Douglas-fir in Reserve	No Reserve	0	0	0	217
Residual Douglas-fir in Reserve	No Reserve	0	0	0	113
PALCO Ownership (acres)	209,834	211,799	204,095	211,799	150,838
Old-growth and Residual Redwood and Douglas-fir on PALCO Ownership (acres)					
Old-growth redwood—year 0	5,140	2,023	2,023	2,023	488
Old-growth redwood—total harvested at end of 50 years	0	581	581	0	481
Old-growth redwood remaining on PALCO ownership at end of 50 years	5,140	1,442	1,442	2,023	7
Residual redwood—year 0	12,478	11,812	11,812	11,812	6,387
Residual redwood—total harvested at end of 50 years	5,392	8,886	8,886	0	6,174
Residual redwood remaining on PALCO ownership at end of 50 years	7,086	2,926	2,926	11,812	213
Old-growth Douglas-fir—year 0	4,174	4,174	4,174	4,174	4,174
Old-growth Douglas-fir—total harvested at end of 50 years	2,186	2,429	2,429	0	2,274
Old-growth Douglas-fir remaining on PALCO ownership at end of 50 years	1,988	1,735	1,735	4,174	1,678
Residual Douglas-fir—year 0	4,433	4,433	4,433	4,433	4,320
Residual Douglas-fir—total harvested at end of 50 years	2,761	3,560	3,560	0	3,527
Residual Douglas-fir remaining on PALCO ownership at end of 50 years	1,672	873	873	4,433	793

	Alternative 1 (No Action/No Project)	Alternative 2 (Proposed Action-Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Reserve)
Forest Seral Stages on PALCO Ownership (acres)					
LSH[1/]—year 0	62,150	63,170	58,351	63,170	44,714
LSH[1/] at 10 years	45,252	38,479	34,787	65,983	28,907
LSH[1/] at 50 years	38,809	23,576	22,805	91,917	21,704
Mid seral—year 0	80,847	82,362	80,290	82,362	65,483
Mid seral at 10 years	77,774	78,701	77,188	79,713	62,617
Mid seral at 50 years	92,399	97,816	94,913	108,506	70,340
Young forest—year 0	43,682	43,021	42,333	43,021	21,380
Young forest at 10 years	54,566	54,062	53,338	53,855	29,292
Young forest at 50 years	48,568	58,066	53,630	13	38,027
Marbled Murrelet Habitat Harvested (acres)					
Suitable and possibly suitable murrelet habitat within DCH[2/] harvested by end of 10 years	None	1,660	1,660	0	6
Total suitable and possibly suitable murrelet habitat within DCH[2/] harvested at end of 50 years	None	1,660	1,660	0	6
Suitable and possibly suitable habitat harvested by end of 10 years	None	8,292	8,292	0	5,875
Total suitable and possibly suitable habitat harvested by end of 50 years	None	9,301	9,301	0	6,655
Marbled Murrelet Habitat Improvement on PALCO Ownership—MMCAs (acres)[3/]					
MMCA total acreage with Grizzly Creek/total acreage without Grizzly Creek protected for 50 years	Not applicable	8,448/7,453	8,448/7,453	Not applicable	Not applicable
Old growth and residual redwood with Grizzly Creek/without Grizzly Creek	Not applicable	4,696/4,048	4,696/4,048	Not applicable	Not applicable
Residual redwood with Grizzly Creek/without Grizzly Creek	Not applicable	3,174/2,644	3,174/2,644	Not applicable	Not applicable

	Alternative 1 (No Action/No Project)	Alternative 2 (Proposed Action-Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Reserve)
Second-growth forest beneath residual redwood 60-100 ft plus tall that would provide cover for potential nesting within 50 yrs resulting in improved habitat quality in the residual stand and MMCAs (with Owl Creek harvested)	Not applicable	1,327	1,327	Not applicable	Not applicable
Northern Spotted Owl Suitable Nesting Habitat Harvested—Net Change (acres)					
Harvest at end of 10 years	-10,015[5/]	-14,200	-14,447	7,220	-6,045
Total harvest at end of 50 years	-11,820[5/]	-32,505	-32,549	49,156	955
Riparian Management Zone on PALCO Ownership (acres)					
No harvest[4/]	58,811	3,769	3,561	14,000	2,585
Selective harvest—240 sq ft phba[5/]	0	22,018	21,153	23,228	16,389
Total	**58,811**	**29,892**	**28,455**	**37,228**	**21,694**
Riparian Function[6/]					
Shade (water temperature)	Complete	Moderate to High	Moderate to High	Complete	Moderate to High
Large woody debris (LWD) recruitment	Complete	Moderate	Moderate	Complete	Moderate
Leaf and needle litter	Complete	Moderate	Moderate	Complete	Moderate
Streambank stability	Complete	Moderate to High	Moderate to High	Complete	Moderate to High
Sediment control	Complete	Moderate to High	Moderate to High	Complete	Moderate to High
Microclimate (terrestrial)	Moderate to High	Low to Moderate	Low to Moderate	High	Low to Moderate
Upslope Sediment Control (road and hillslope failure)	Risk of road failures not reduced from present. Hillslope failure risk similar to present	Risk of road and hillslope failures reduced from existing conditions	Risk of road and hillslope failures reduced from existing conditions	Risk of road and hillslope failures reduced from existing conditions	Risk of road and hillslope failures reduced from existing conditions

	Alternative 1 (No Action/No Project)	Alternative 2 (Proposed Action-Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Reserve)
Timber Volume in 1st Decade from PALCO ownership (thousands of board feet net per decade)					
PALCO timber harvest forecast	171,252	233,519	221,481	86,878	165,021
PALCO volume change in comparison to the proposed action/proposed project	-26.7%	Not applicable	Not applicable	-62.8%	-29.3%
PALCO volume change in comparison to previous decade average of 250,000 mbfn/yr	31.5%	6.5%	11.4%	65.2%	34%
Humboldt County volume change in comparison to historic volume	-14.9%	-5.2%	-5.3%	-33.2%	-17.1%
First Decade Employment from Timber Harvest on PALCO Ownership					
PALCO and contract lumber and wood products workers	1,148	1,564	1,484	582	1,106
PALCO and contract lumber and wood products workers in comparison to historic employment	-31.7%	-6.9%	-11.7%	-65.4%	-34.2%
Humboldt County timber-related employment forecast in comparison to historic employment	-14.9%	-5.2%	-5.3%	-33.2%	-17.2%
Humboldt County loss of timber-related employment forecast in comparison to projected total employment	1.6%	<1%	<1%	3.2%	1.7%
Government Revenues (average annual)					
Timber yield tax-reduction in revenues to Humboldt County from PALCO	-$920,990	-$192,752	-$333,541	-$1,907,779	-$993,864
Sales tax reduction in revenues to Humboldt County from PALCO	-$183,469	-$39,585	-$67,467	-$377,954	-$197,582
Net effects on taxes and revenues (1-5 years) to Humboldt County from PALCO in comparison to historic revenues	-$1,090,328	-$198,737	-$385,666	-$2,252,133	-$1,164,927

	Alternative 1 (No Action/No Project)	Alternative 2 (Proposed Action-Proposed Project)	Alternative 2a (No Elk River Property)	Alternative 3 (Property-wide Selective Harvest)	Alternative 4 (63,000-acre No-harvest Reserve)
Net effects on taxes and revenues to Humboldt County from PALCO in comparison to historic total revenues (1994-1995)	-0.8%	-0.1%	-0.3%	-1.6%	-0.9%

1/ LSH = Late successional habitat
2/ DCH = Designated critical habitat
3/ MMCAs provide 50 years of protection for old growth and residual redwood forest regardless of occupancy. The quality of the suitable or possibly suitable habitat protected within MMCAs is anticipated to improve significantly because of maturation of second growth beneath residual old-growth redwood trees and buffering at the edges of all suitable and possibly suitable habitat within the MMCAs.
4/ No-harvest riparian zones on PALCO lands outside of other no-harvest areas
5/ phba = post-harvest basal area
6/ Overall function integrated for Class I, II, and III streams and the associated importance of function for each stream class. See Section 3.7.3 and Table 3.7-11 for additional detail.

Source: Foster Wheeler Environmental Corporation

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Geology and Mineral Resources				
Mineral resources	Less than significant		Less than significant	Less than significant
Water Quality, Hydrology, and Floodplains				
Color	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Settleable Material	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Floating Material	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Sediment	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Turbidity	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Dissolved Oxygen	Less than significant and beneficial		Less than significant and beneficial	Less than significant and beneficial
Temperature	Less than significant and beneficial	Less than significant and beneficial; however, the lack of marked trees and required size distribution for post-harvest trees create additional risk of potential effects on stream shade in localized areas.	Less than significant and beneficial	Less than significant and beneficial

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Pesticides/Herbicides	Less than significant on human health and for water quality, some compounds potentially significant for some aquatic species.		Less than significant	Less than significant on human health and for water quality, some compounds potentially significant for some aquatic species.
Biostimulatory Substances (e.g., Nitrates)	Less than significant		Less than significant	Less than significant
Peak Flows	See People and Property and Fish and Aquatic Habitat		See People and Property and Fish and Aquatic Habitat	See People and Property and Fish and Aquatic Habitat
Low Flows	Very short-term beneficial effect		Very short-term beneficial effect	Very short-term beneficial effect
Floodplains/Channel Morphology	See People and Property and Fish and Aquatic Habitat		See People and Property and Fish and Aquatic Habitat	See People and Property and Fish and Aquatic Habitat
Soils and Geomorphology				
Hillslope Erosion	See Water Quality and Fish and Aquatic Habitat		See Water Quality and Fish and Aquatic Habitat	See Water Quality and Fish and Aquatic Habitat
Road Surface Erosion	See Water Quality and Fish and Aquatic Habitat		See Water Quality and Fish and Aquatic Habitat	See Water Quality and Fish and Aquatic Habitat
Road-related Mass Wasting/stream erosion	See Water Quality, People and Property, and Fish and Aquatic Habitat		See Water Quality, People and Property, and Fish and Aquatic Habitat	See Water Quality, People and Property, and Fish and Aquatic Habitat
Timber Harvest Related Mass Wasting	See Water Quality, People and Property, and Fish and Aquatic Habitat		See Water Quality, People and Property, and Fish and Aquatic Habitat	See Water Quality, People and Property, and Fish and Aquatic Habitat
Soil Productivity	Less than significant		Less than significant	Less than significant
Prescribed Fire	Less than significant		Less than significant	Less than significant

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Livestock Grazing	Less than significant		Less than significant	Less than significant
People and Property	Less than significant		Less than significant	Less than significant
Wetlands and Riparian Lands				
Wetlands	Less than significant		Less than significant	Less than significant
Riparian- Stream Shade	see Water Quality and Fish and Aquatic Habitat		see Water Quality and Fish and Aquatic Habitat	see Water Quality and Fish and Aquatic Habitat
Riparian - LWD Recruitment	see Fish and Aquatic Habitat		see Fish and Aquatic Habitat	see Fish and Aquatic Habitat
Riparian - Detritus Production	see Fish and Aquatic Habitat		see Fish and Aquatic Habitat	see Fish and Aquatic Habitat
Riparian - Bank Stability	see Fish and Aquatic Habitat		see Fish and Aquatic Habitat (priority amphibians)	see Fish and Aquatic Habitat
Riparian - Microclimate	see Wildlife (priority amphibians)		see Wildlife (priority amphibians)	see Wildlife (priority amphibians)
Riparian - Sediment Control	see Water Quality and Fish and Aquatic Habitat		see Water Quality and Fish and Aquatic Habitat	see Water Quality and Fish and Aquatic Habitat
Fish and Aquatic Habitat				
Coho salmon	Minimized and mitigated to a level less than significant		Minimized and mitigated to a level less than significant	Minimized and mitigated to a level less than significant

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Properly Functioning Aquatic System	Less than significant and beneficial	Less than significant and beneficial; however, the lack of marked trees and required size distribution for post-harvest trees create additional risk of potential effects on LWD recruitment and stream shade in localized areas.	Less than significant and beneficial	Less than significant and beneficial
Vegetation and Timber				
Rare and Uncommon Flora	Probable significant adverse effect; less than significant with agency proposed mitigation of preharvest surveys and avoidance		Less than significant	Significant adverse effect, less than significant with agency proposed mitigation
Natural Communities (old-growth redwood and Douglas-fir; wetlands; riparian areas; prairies)	Less than significant		Less than significant	Less than significant
Old-growth Redwood and Douglas-fir Forest	The loss of old-growth forest is considered a significant effect based primarily on the unique characteristics of and inability to replace old-growth forest and the substantial body of public opinion that would consider this loss significant.		Under this alternative, there would be no loss of old-growth forest and, consequently, no significant impacts.	The loss of old-growth forest is considered a significant effect based primarily on the unique characteristics of and inability to replace old-growth forest and the substantial body of public opinion that would consider this loss significant.
Timber Production - Long-term Sustained Yield	Less than significant		Significant adverse effect on forest products production	Less than significant

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Wildlife				
Priority Species of Wildlife				
Priority Amphibians and Reptiles				
Foothill yellow-legged frog	Less than significant		Less than significant	Less than significant
Northwestern pond turtle	Less than significant		Less than significant	Less than significant
Southern torrent salamander and tailed frog	Less than significant		Less than significant	Less than significant
Priority Birds				
American peregrine falcon and golden eagle	Less than significant		Less than significant	Less than significant
Bald eagle	Less than significant		Less than significant	Less than significant
Bank swallow	Less than significant		Less than significant	Less than significant
Great gray owl	Less than significant		Less than significant	Less than significant
Marbled murrelet	Short-term effects may be significant, but minimized and mitigated to less than significant over the long term		Less than significant and beneficial	Short-term effects may be significant, but minimized and mitigated to less than significant over the long term
Northern goshawk	Less than significant		Less than significant	Less than significant
Northern spotted owl	Less than significant		Less than significant and beneficial	Less than significant
Western snowy plover	Less than significant		Less than significant	Less than significant
Priority Mammals				
California wolverine	Less than significant		Less than significant	Less than significant
Other Priority Species/ Groups				

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Other LSH associates	Less than significant		Less than significant	Less than significant
Other wetland/riparian associates	Less than significant		Less than significant	Less than significant
Other cliff/rock outcrop associates	Less than significant		Less than significant	Less than significant
Other snag/downed log associates	Less than significant		Less than significant	Less than significant
Other open habitat associates	Less than significant		Less than significant	Less than significant
Game Species	Less than significant		Less than significant	Less than significant
Land Use				
Local plans and policies	Less than significant		Less than significant	Less than significant
Compatibility with surrounding land use	Less than significant		Less than significant	Less than significant
Public access	Less than significant		Less than significant	Less than significant
Transportation and Traffic				
Local roads and highways	Less than significant		Less than significant	Less than significant
Economic and Social Environment	Less than significant		Less than significant	Less than significant
Timber harvest	Less than significant		Less than significant	Less than significant
Employment in timber-related jobs	Less than significant		Significant effect	Significant effect
Population	Less than significant		Less than significant	Less than significant
Tax revenues to Humboldt County	Less than significant		Less than significant	Less than significant
Herbicides	Less than significant		Less than significant	Less than significant
Cultural Resources	Less than significant		Less than significant	Less than significant

Table 2.6-2. Significance of Effects According to CEQA for each Environmental Component by Alternative[1/]

Environmental Component	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [47-yr Default Prescriptions]	Alt. 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property) [3-yr Interim Prescriptions—only when different than 47-yr]	Alt. 3 (Property-wide Selective Harvest)	Alt. 4 (63,000-acre Public Reserve)
Visual Resources				
Views from Key Viewing Areas	Less than significant		Less than significant	Less than significant
Recreation				
State Park Land	Less than significant		Less than significant	Less than significant
Roadless Areas, Wilderness, and Wild and Scenic Rivers	Less than significant		Less than significant	Less than significant
Tribal Trust Resources and other Indian Tribal Issues	Less than significant		Less than significant	Less than significant
Growth Inducing Impacts	Less than significant		Less than significant	Less than significant

1/ Note that the proposed HCP is a mitigation plan designed to reduce potential effects to listed and permit species. The plan is comprehensive in nature, addressing the range of species in terrestrial and aquatic habitats, which reduces the levels of effects for most environmental components to less than significant for Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property).

2/ The Alternative 1 column addresses only short-term CEQA effects, not long-term NEPA effects. See Section 2.5.1.

Source: Foster Wheeler Environmental Corporation

Forest, Elk Head Springs Forest, and a variety of other areas that are sometimes called lesser cathedrals or MMCAs in Alternatives 2 and 2a. Some of these areas are relatively untouched by timber harvest, while others have been substantially reduced in size and isolated by past timber harvest. There are about 5,140 acres of old-growth redwood forest that would not be harvested under Alternative 1.

In addition to those areas that are dominated by old-growth redwood, timber harvest would also be restricted by marbled murrelet occupation in some of the areas that are mapped as redwood residual. These residual areas are previously entered stands where varying numbers of older trees have been harvested and varying amounts of older trees have been left. These areas are of varying sizes, are scattered across the PALCO ownership, and all are isolated by young second-growth forest to varying degrees. Despite the presence of old-growth redwood trees, however, these stands are considered to be lower quality habitat and may not be occupied by marbled murrelets. When surveys indicate marbled murrelet presence, timber harvest in these stands would not be permitted. However, when surveys indicate that these stands are not occupied by marbled murrelets, timber harvest would be permitted. Full surveys of areas mapped as redwood residual have not been completed so the amount of residual that would be logged is only estimated. These estimates indicate that approximately 7,000 acres of redwood residual habitat could possibly be logged. In addition, legally permitted logging in existing second growth next to residual stands and within unoccupied residual stands, could reduce the quality of habitat of the occupied residual stands. Over time, the reduction in habitat quality could cause abandonment of some currently occupied stands. At some time in the future the abandonment of previously occupied stands could allow them to be harvested as well.

Additionally, under Alternative 1 salvage removal of downed wood is currently allowed by CDF based on recommendations by FWS and CDFG. Salvage logging of such trees outside the marbled murrelet nesting season has been determined not to result in the take of marbled murrelets. Salvage logging can legally take place in all areas whether they are dominated by old-growth redwood or mapped as redwood residual.

Under this alternative, old-growth Douglas-fir forests and trees could be harvested. Under this alternative, about 2,186 acres of old-growth Douglas-fir forest and 2,761 acres of old-growth Douglas-fir residual would be harvested.

Under this alternative, Public law 105-83 and AB 1986 would not be implemented, and the Headwaters Reserve would not be established and protected under public ownership.

2.6.2.2 Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Under Alternatives 2 and 2a, the proposed Headwaters Reserve would be created placing about 3,117 acres of old-growth redwood and about 666 acres of residual redwood into public ownership and protection. The Reserve would contain two large intact areas of old-growth redwood, i.e., the Headwaters Forest and Elk Head Springs Forest. Although the Reserve would contain old-growth Douglas-fir trees as part of the species mix, there are no stands dominated by Douglas-fir old growth or residual in the proposed Reserve. There would be about 1,521 acres of other late-seral, old-growth habitat (LSH) and about 2,000 acres of young and mid-seral forest in the Reserve.

On the remaining PALCO ownership the only areas with substantial amounts of old-

growth redwood in relatively contiguous areas would be placed into 12 MMCAs (note that several of these 12 areas are next to each other and are grouped into 8 MMCAs in PALCO's Draft HCP [PALCO, 1998]; see Figure 2.5-4 and Table 3.9-2). The MMCAs not only contain the majority of the contiguous old growth, they also contain about 3,174 acres of residual redwood. As the taller second-growth understory grows over the next 50 years, it will provide cover for potential nesting sites in the residual trees resulting in improved habitat quality in these residual stands. These areas present the only available opportunity on the PALCO ownership to provide larger aggregations of good quality marbled murrelet habitat than currently exist within a reasonable time frame. Under the proposed HCP, the 12 MMCAs contain 1,522 acres of old-growth redwood and 3,174 acres of residual redwood. If Grizzly West/Center were harvested, after the five-year moratorium, the protected acreage of old-growth and residual redwood would be about 1,404 and 2,644, respectively (or 118 acres and 530 acres harvested, respectively). On the remaining PALCO ownership there would be about 2,023 acres of scattered patches of old-growth redwood and 11,812 acres of residual redwood available for harvest. Projections indicate that about 1,242 acres of old-growth redwood and 3,209 acres of residual redwood would be harvested by year 50.

Under this alternative, old-growth Douglas-fir forests and trees could be harvested. Under these alternatives, about 2,452 acres of old-growth Douglas-fir forest and 3,566 acres of old-growth Douglas-fir residual would be harvested.

The loss of old-growth forest is considered a significant effect based primarily on the unique characteristics of and inability to replace old-growth forest and the substantial body of public opinion that would consider this loss significant.

Additional Measures

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. The primary mitigation that is pertinent here are buffers on Class III streams and those for the marbled murrelet. These buffers would reduce the acreage available for harvest and protect both redwood and Douglas-fir forest.

The exact effects on vegetation and acres provided for harvest or stream protection depends, in part, on the results of watershed analysis. Also, the area purchased by the government under AB 1986 to protect old growth and old-growth dependent species depends on the exact areas considered for purchase and the appraised value of those areas. PALCO has estimated that approximately 16,783 acres would be included in the Class III stream buffers. The additional marbled murrelet measures would also enlarge the Owl Creek MMCA by about 274 acres and the Grizzly Creek tract by about 353 acres. If at the end of five years from the date of ITP issuance, protection of the Grizzly Creek tract was necessary to avoid jeopardy to the marbled murrelet, it would be protected as an MMCA for the term of the ITPs. An additional 300-foot buffer around the south edge of the Headwaters Reserve. All of these additional measures would provide for additional protection of old-growth and residual redwood and Douglas-fir and would also protect more old-growth redwood and Douglas-fir trees.

2.6.2.3 Alternative 3 (Property-wide Selective Harvest)

Under Alternative 3 on PALCO lands all old-growth redwood forest, residual redwood forest, old-growth Douglas-fir forest, and residual Douglas-fir forest would not be available for harvest. Consequently, no old-growth trees would be harvested. Approximately 2,023 acres of redwood old growth, 11,812 acres of residual redwood, 4,174 acres of Douglas-fir old growth, and 4,433 acres of Douglas-fir residual would not be harvested on PALCO lands.

Because there would be no-harvest of old-growth redwood and Douglas-fir trees there would be no significant effect.

The Headwaters Reserve would be the same as under Alternative 2 and would contain about 3,117 acres of redwood old growth, 666 acres of redwood residual, no Douglas-fir old growth, and no Douglas-fir residual. These acreages are primarily in the Headwaters Forest and the Elk Head Springs Forest. There would be about 1,521 acres of other LSH and about 2,000 acres of young and mid seral forest in the Reserve.

2.6.2.4 Alternative 4 (63,000-acre No-harvest Public Reserve)

Under Alternative 4, a greater amount of old-growth redwood and residual redwood would be protected in the 63,000-acre no-harvest public Reserve than in Alternatives 2 and 2a. However, outside the Reserve all such trees would be available for harvest. The Reserve would contain about 4,652 acres of old-growth redwood, 6,095 acres of residual redwood, 217 acres of old-growth Douglas-fir, and 113 acres of residual Douglas-fir. On PALCO lands, about 7 acres of old-growth redwood, 213 acres of redwood residual, 1,678 acres of Douglas-fir old growth, and 793 acres of Douglas-fir residual are projected to remain at the end of 50 years. On the other hand, 481 acres of redwood old growth, 6,174 acres of residual redwood, 2,274 acres of Douglas-fir old growth, and 3,527 acres of Douglas-fir residual are projected to be harvested by the end of 50 years.

The loss of old-growth forest is considered a significant effect based primarily on the unique characteristics of and inability to replace old-growth forest and the substantial body of public opinion that would consider this loss significant.

2.6.3 Issue 2: Wildlife Habitat and Natural Communities

2.6.3.1 Alternative 1 (No Action/No Project)

For the purposes of this analysis, LSH is considered to be old growth, residual old growth, and late successional forest stands. Under Alternative 1, the projections indicate that LSH would decline from 62,150 acres presently (year 0) to 45,252 acres at year 10 and to 38,809 acres at year 50. Redwood forest is described above under Issue 1. Douglas-fir old growth would be reduced from 4,174 acres at year 0 to 1,988 acres at year 50. Douglas-fir residual would be reduced from 4,443 acres at year 0 to 1,672 acres at year 50.

Mid-seral forest acreage would be 80,847 (year 0), 77,774 (year 10), and 92,399 (year 50). Young forest acreage would be 43,682; 54,566; and 48,568, respectively. Prairie acreage declines from 5,687 acres at year 0 to 5,202 acres at year 50. This decline relates to the fact that some areas mapped as prairie are previously converted forest lands that are intended for reforestation. Riparian lands would be managed with relatively wide no-harvest buffers in the short to long term which would maintain riparian functions at a high or complete level. Under this alternative 401 acres of mapped wetlands in the project area would be within no-harvest buffers. An additional 85 acres would be outside of RMZs and would not be buffered though

road building and other activities would not occur on them. In general, habitats that add diversity would be reduced over time, although PALCO lands would still contribute to local and regional vegetation patterns.

2.6.3.2 Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Under Alternative 2 (2a), the projections indicate that LSH would decline from 63,170 (58,351) acres presently (year 0) to 38,479 (34,787) acres at year 10 and to 23,576 (22,805) acres at year 50. Redwood forest is described above under Issue 1. Douglas-fir old growth would be reduced from 4,174 acres at year 0 to 1,722 acres at year 50. Douglas-fir residual would be reduced from 4,443 at year 0 to 867 acres at year 50.

Mid-seral forest acreage would be 82,362 (year 0), 78,701 (year 10), and 97,816 (year 50). Young forest acreage would be 43,021; 54,062; and 58,066, respectively. Prairie acreage declines from 5,687 acres at year 0 to 3,832 acres at year 50. Values for Alternative 2a would be slightly less. This decline relates to the fact that some areas mapped as prairie are previously converted forest lands that are intended for reforestation. Riparian lands would be managed with relatively wide no-harvest and selective buffers in the short to long term which would maintain riparian functions at a moderate to high level. Under this alternative 81 (77 acres for Alternative 2a) acres of mapped wetlands in the project area would be within no-harvest buffers. An additional 243 acres would be within selective harvest RMZs and 162 acres would be outside of RMZs and would not be buffered though road building and other activities would not occur on them. Consequently, no significant effects would be expected on these wetlands. In general, habitats that add diversity would be reduced over time, although PALCO lands would still contribute to local and regional vegetation patterns. The effects on natural vegetation are, therefore, considered less than significant.

Additional Measures

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. The primary mitigation that is pertinent here are buffers on Class III streams and those for the marbled murrelet. These buffers would reduce the acreage available for harvest and protect both redwood and Douglas-fir forest. See the Additional Measures under Section 2.6.2.2 above for an overview of the pertinent measures. These measures would provide for additional forested habitat that could develop into late seral stages over the term of the ITP and that would provide additional riparian habitat along Class III streams.

2.6.3.3 Alternative 3 (Property-wide Selective Harvest)

Under Alternative 3, the projections indicate that LSH would increase from 63,170 acres presently (year 0) to 65,983 acres at year 10 and to 91,917 acres at year 50. This increase in LSH acreage reflects the fact that under this alternative PALCO lands would be managed solely under a selective harvest regime. The silvicultural prescription used for this selective harvest regime allows the development of LSH over time. This level of habitat would provide for increases in wildlife populations that are either dependent upon or utilize such habitat. In addition, the dominance of LSH

on PALCO ownership would provide for substantial connectivity between the areas to the south and north of the current PALCO ownership. Douglas-fir old growth would remain the same at 4,174 acres. Douglas-fir residual would also remain the same at 4,433 acres.

Mid-seral forest acreage would be 82,362 (year 0), 79,713 (year 10), and 108,506 (year 50). Young forest acreage would be 43,021 at year 0, 53,855 at year 10, but would decline to 13 at year 50. Prairie acreage increases from 5,687 acres at year 0 to 6,029 acres at year 50. Riparian lands would be managed with relatively wide no-harvest and selective buffers in the short to long term which would maintain riparian functions at a moderate to high level. Under this alternative 396 acres of mapped wetlands in the project area would be within no-harvest buffers. Another 13 acres would be within selective harvest RMZs and 77 acres would be outside of RMZs and would not be buffered though road building and other activities would not occur on them. Consequently, no significant effects would be expected on these wetlands. In general, habitats that add diversity will be reduced over time, although PALCO lands would still contribute to local and regional vegetation patterns. The effects on natural vegetation are, therefore, considered less than significant.

2.6.3.4 Alternative 4 (63,000-acre No-harvest Public Reserve)

Under Alternative 4, the projections on PALCO lands indicate that LSH would decline from 44,714 acres presently (year 0) to 28,907 acres at year 10 and to 21,704 acres at year 50. These lower numbers compared to Alternative 2 reflect the smaller acreage of PALCO ownership under this alternative because of the larger Reserve. Douglas-fir old growth would be reduced from 3,957 acres at year 0 to 1,678 acres at year 50. Douglas-fir residual would be reduced from 4,320 at year 0 to 793 acres at year 50.

Mid-seral forest acreage would be 65,483 (year 0), 62,617 (year 10), and 70,340 (year 50). Young forest acreage would be 21,380; 29,292; and 38,027, respectively. Prairie acreage declines from 5,450 acres at year 0 to 3,525 acres at year 50. This decline relates to the fact that some areas mapped as prairie are previously converted forest lands that are intended for reforestation. Riparian habitats would be managed in the same manner as for Alternative 2 with most riparian functions being protected at a moderate to high level (see Issue 4 Fish Habitat, Water Quality, and Water Quantity. Under this alternative 172 acres of mapped wetlands in the project area would be within no-harvest buffers. An additional 206 acres would be within selective harvest RMZs and 108 acres would be outside of RMZs and would not be buffered, though road building and other activities would not occur on them. Consequently, no significant effects would be expected on these wetlands. In general, habitats that add diversity will be reduced over time, although PALCO lands would still contribute to local and regional vegetation patterns. The effects on natural vegetation are, therefore, considered less than significant.

2.6.4 Issue 3: Threatened and Endangered Species

2.6.4.1 Alternative 1 (No Action/No Project)

Marbled Murrelet—Under Alternative 1, no take of marbled murrelets would be expected to occur. However, the long-term population effects are uncertain. The populations would be expected to remain about the same on PALCO land because occupied habitat would not be harvested. As noted under Issue 1 above, some currently occupied habitat could be lost over time as the quality of currently occupied residual habitat declines. On the

other hand, in some areas where occupation prevented the harvest of contiguous old-growth stands currently isolated by residual or second growth habitat quality would improve over time.

No Headwaters Reserve would be created under this alternative; consequently, there would be no additional long-term protection of marbled murrelet habitat provided by public ownership of lands not managed for timber harvest.

Northern Spotted Owl—Under Alternative 1, no take of northern spotted owls would be anticipated because FPRs and FESA regulations prohibit take of owls. However, over time, permitted timber harvest can reduce the overall quality of owl habitat over the ownership. Approximately 11,820 acres of northern spotted owl nesting habitat could be harvested by the end of 50 years.

Coho salmon—Under Alternative 1, the quality of aquatic habitat used by coho salmon on PALCO property would be expected to improve. As discussed below under Issue 4 Aquatic Habitat, Water Quality, and Water Quantity, the RMZs considered as part of this alternative would provide for improvement in aquatic habitat and would contribute towards developing a properly functioning aquatic system if applied over the long-term (i.e., approximately 50 years). The main activities that would improve habitat are prescriptions related to relatively wide, no-harvest RMZs. However, the lack of a road improvement program would not reduce the potential for road failures and the related coarse sediment influx to streams which could degrade or prevent the improvement of aquatic habitat and thereby prevent improvements in coho salmon populations. There would still be risk to the aquatic environment and to coho salmon from management activities compared to an unmanaged landscape, but these risks would be reduced compared to existing conditions because of the wider RMZs.

No Headwaters Reserve would be created under this alternative; consequently, there would be no additional long-term protection of coho salmon habitat provided by public ownership of lands not managed for timber harvest.

2.6.4.2 Alternative 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Marbled Murrelets—Under Alternatives 2 and 2a, the combination of the Headwaters Reserve in public ownership and the MMCAs on PALCO ownership would protect 93 percent of the available high quality habitat that exists on PALCO's current ownership (i.e., 93 percent of the old-growth redwood in the Headwaters Reserve and MMCAs) assuming that the Owl Creek MMCA is harvested. The high quality habitat harvested is the 118 acres of old growth in the Grizzly Creek MMCA. In addition to this old-growth redwood, harvest of the Grizzly Creek MMCA would remove 530 acres of higher quality residual redwood. Any acreage placed in public ownership would be protected in perpetuity while the MMCAs managed as part of PALCO's proposed HCP would be protected for 50 years. The MMCAs protect not only the bulk of the high quality old-growth habitat, but they also protect the areas of residual redwood with the best opportunity for substantial residual habitat improvement. They offer the only available opportunity to provide larger aggregations of good quality habitat than exists today within a reasonable time frame (see below). By the end of the permit period, there will be more closed canopy forest with old growth nesting substrate in the HCP area than exists today, and that habitat will be aggregated near high quality uncut old growth. The amount of MMCA reserve habitat improved would be less than the amount of occupied habitat harvested in

strictly numeric terms, but the added value provided in the reserves by aggregating and improving residual habitat in association with high quality habitat would mitigate for the loss of larger amounts of scattered lower quality habitat. The proposed HCP is also consistent with the direction of the Marbled Murrelet Recovery Plan, because it brings important habitat into public ownership, preserves most of the high quality occupied habitat remaining in PALCO ownership, and provides for improvement of reserve habitat in a key portion of the range of the species.

Outside the Reserve and MMCAs, 581 acres of old-growth habitat and 8,886 acres of residual redwood would be harvested. The harvest of lower-quality residual and the higher-quality habitat mentioned above could result in the potential take of between 241 and 340 individual marbled murrelets over the life of the permit. This estimated take is based on a worst-case, one-to-one relationship between habitat loss and at-sea populations of marbled murrelets in the bioregion. This amount of potential take, balanced with the protections afforded MMCAs and the anticipated improvement in habitat within them that would occur over the next decades (see discussion below), is not expected to threaten the population of marbled murrelets in southern Humboldt County or the bioregion. The short-term effects on the marbled murrelet may be significant but would be minimized and mitigated to a less-than-significant level over the long term for CEQA purposes.

Marbled murrelet habitat on PALCO property consists of old-growth redwood and residual redwood. Old-growth redwood generally provides high-quality habitat because the trees have large limbs that serve as nesting platforms, and the stands have relatively closed canopies which protect young birds from predation and the weather (heat, cold, wind, rain).

Several physical factors suggest that the residual redwood stands provide habitat that is of lower quality for supporting murrelet reproduction. The trees left unharvested in residual stands were often somewhat smaller than the ones harvested, so the occurrence of large limbs and deformities suitable for murrelet nesting are probably less than in an uncut stand. Perhaps more importantly, in most residual stands the scattered distribution and low canopy closure among the remaining trees result in little apparent protection for existing nesting platforms. Such locations appear to provide relatively easy access for nest predators and reduced protection from the weather. Thus, even where occupied behaviors have been observed in residual stands, the assumption is that the residual habitat is of considerably lower value than uncut old-growth.

Two primary types of information are available to assist in judging the present quality of marbled murrelet habitat in residual stands and the potential that substantial improvement in habitat quality could occur in these stands during the 50-year ITP period. This information includes canopy closure of the residual trees and the height of second growth stands beneath the residual trees. In general it is assumed that the best habitat in residual stands, currently and in the future, would be provided where maximum canopy closure among the overstory is combined with maximum height of the underlying second growth stand. Thus, within residual stands where second growth is tall enough to provide protection for the canopy of the old-growth trees, habitat appears to be of better quality. Second-growth trees improve the quality of the residual habitat when they reach about 120 feet in height. Although conditions vary on PALCO's ownership, most second-growth stands would not exceed 120 feet in height until they are older than 60 years.

The potential of residual stands to provide future marbled murrelet habitat must also be considered because old-growth stands probably cannot be produced for several hundred years. However, by providing protective cover around the remaining old trees in residual stands, the regeneration of second-growth may improve the quality of the residual habitat within a few decades. Because the initial partial harvest in many residual stands occurred in recent decades, there are currently few stands where the second growth exceeds 100 feet in height. Second growth between 60 and 100 feet in height within residual stands totals about 4,036 acres on the ownership. Approximately 1,327 acres of these are in the MMCAs (assuming that the Grizzly Creek MMCA is harvested).

The condition of second-growth within residual stands is particularly important where residual stands are found near occupied old-growth stands, because old-growth stands could provide the source for reoccupation of the improving residual habitat. Notably, these areas hold the only available opportunity on PALCO ownership to provide larger aggregations of good-quality habitat than exists currently within a reasonable time frame. Consequently, the residual stands incorporated into the MMCAs are regarded as substantially more valuable than residual stands that are isolated from old-growth stands. Residual stands with well-developed second growth that neighbor old-growth stands offer the highest available potential for habitat improvement within the life of the ITP. These areas are incorporated into the proposed MMCAs.

The effects of this alternative may be significant in the short term, but are minimized and mitigated to a less-than-significant level in the long term for CEQA purposes.

Additional Measures

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. The additional marbled murrelet measures would enlarge the Owl Creek MMCA by about 274 acres and the Grizzly Creek tract by about 353 acres. If, at the end of five years, the wildlife agencies determined that harvest of Grizzly Creek tract would likely jeopardize the marbled murrelet, the tract would be protected as an MMCA for the term of the ITPs. An additional 300-foot buffer would also be provided around the south edge of the Headwaters Reserve. These additional measures would provide for more protection of old-growth and residual redwood habitat contiguous with the MMCAs and Headwaters Reserve. These mitigation measures reduce the proportional impact of the action on habitat in the bioregion.

Northern Spotted Owl—No direct take would occur because PALCO does not propose to take nesting owls under the HCP, and the HCP provides measures to avoid such take. Effects would occur due to harvest of suitable habitat within owl nest circles and allowing for potential reduction of 33 percent of the baseline owl population on PALCO lands through this habitat reduction. About 32,505 acres of nesting habitat would be harvested by the end of 50 years. These effects would be minimized and mitigated by providing nesting and foraging habitat for northern spotted owls throughout the ITP period, by protecting all known nest sites for the first five years of the HCP, and by reducing the likelihood that nesting owls would be disturbed

during timber harvest and other activities. This alternative would not be expected to threaten northern spotted owl populations at a local or regional level. Even if the population declines to its lowest allowable level, the populations would still substantially exceed the population size recommended for southern Humboldt County by the Draft Spotted Owl Recovery Plan. Consequently, the effects of this alternative on the northern spotted owl would be minimized and mitigated to a less-than-significant level.

Additional Measures

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. With respect to the northern spotted owl (NSO), there are increased management objectives (e.g., maintain NSO pairs on an average of 80 percent of the activity sites on the ownership) and additional conservation measures, including annual censuses to monitor all activity sites on the ownership and determine numbers of pairs, nesting pairs, and reproductive rates. There are also additional adaptive management measures. These additional measures would provide increased certainty of persistence of northern spotted owls on the PALCO ownership and adjacent areas.

Coho Salmon—Under Alternatives 2 and 2a, the quality of aquatic habitat used by coho salmon on PALCO property would be expected to improve over the 50-year life of the ITP. As discussed below under Issue 4, Aquatic Habitat, Water Quality, and Water Quantity, the aquatic management strategy proposed for PALCO lands would provide for improvement in aquatic habitat and would achieve, over time, a properly functioning aquatic system over the life of the ITP. The main activities that would improve habitat are prescriptions related to RMZs and upslope activities. Additionally, the protection of CMZs on floodplains means that this habitat would be protected for the life of the ITP. This habitat improvement would provide the opportunity for coho salmon populations to improve on PALCO's property and thereby to make a substantial contribution to healthy populations in the watersheds where PALCO owns a large percentage of the land. There would still be risk to the aquatic environment and to coho salmon from management activities compared to an unmanaged landscape, but these risks would be reduced compared to existing conditions. Effects on coho salmon would be beneficial, minimized, and mitigated to a less-than-significant level for CEQA purposes.

Within the Headwaters Reserve, the quality of aquatic habitat used by coho salmon would be expected to remain the same in previously unharvested areas and to improve in a similar manner to that described for PALCO lands where previously harvested. Because these lands would not be managed for timber harvest, however, the risks to the aquatic environment would be lower or non-existent. As restoration activities are implemented in the Reserve, as riparian forests regrow, and as the landscape develops towards an unmanaged character, even these low risks would be minimized.

Additional Measures

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of

take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. A variety of additional mitigation measures are relevant to the coho salmon. Additional mitigation has been added for (1) sediment assessment; (2) road stormproofing; (3) road construction, reconstruction, and improvement; (4) road inspections; (5) wet weather road-use restrictions; (6) hillslope management; and (7) riparian buffers. All of these measures will directly reduce, or reduce the likelihood of, both fine and coarse-grained sediment influxes from both surface erosion and mass wasting to Class I and II streams. These reductions would achieve, over time, a properly functioning aquatic habitat and would reduce the likelihood of individual events that reduce habitat quality.

2.6.4.3 Alternative 3 (Property-wide Selective Harvest)

Marbled Murrelets—Under this Alternative, all old-growth and residual old-growth areas, including the 600-foot buffers placed around them, would not be available for timber harvest. Consequently, there would be no take of marbled murrelets associated with timber harvest. Over the long term, there would be increases in marbled murrelet habitat as the second growth forests among and beside the old-growth and residual areas grows. The growth of these trees would enhance the habitat inside these areas in the same manner as described for the MMCAs under Alternative 2. Over the next 50 years, this alternative would provide only slightly more improved habitat than Alternative 2. Because Alternative 3 would have no take and would allow for habitat improvement, this alternative would have the most positive effect of all the alternatives on marbled murrelet populations. This alternative would have a significant beneficial effect on the murrelet.

Northern Spotted Owl—Under Alternative 3 there would be no anticipated effect on spotted owl nests and the selective harvest regime on the entire PALCO landscape would result in a long-term net increase in suitable habitat. Nesting habitat would be expected to increase by 49,156 acres by the end of 50 years. Consequently, the effects of this alternative on the northern spotted owl would be beneficial and less than significant.

Coho Salmon—Under Alternative 3, the quality of aquatic habitat used by coho salmon on PALCO property would be expected to improve over the long term. As discussed below under Issue 4 Aquatic Habitat, Water Quality, and Water Quantity, the combination of relatively wide no-harvest riparian buffers and a road improvement program would contribute substantially towards developing a properly functioning aquatic system over the long term. This improvement in habitat would provide the opportunity for coho salmon populations to improve on PALCO's property and thereby to make a substantial contribution to healthy populations in the southern Humboldt bioregion. The effects on coho salmon would be beneficial and less than significant.

Under Alternative 3, the Headwaters Reserve would be the same as under Alternative 2. Consequently, the conditions described under that alternative would apply. Within the Headwaters Reserve, the quality of aquatic habitat used by coho salmon would be expected to remain the same in previously unharvested areas and to improve in a similar manner to that described for PALCO lands where previously harvested. Because these lands would not be managed for timber harvest, the risks to the aquatic environment would be lower or non-existent. As restoration

activities are implemented in the Reserve, as riparian forests regrow, and as the landscape develops towards an unmanaged character, even these low risks would be minimized.

2.6.4.4 Alternative 4 (63,000-acre No-harvest Public Reserve)

Marbled Murrelets—Under Alternative 4, no marbled murrelet habitat would be protected on PALCO ownership. All high quality habitat except for the Grizzly Creek area would be protected in the 63,673-acre Reserve. Harvest of Grizzly Creek would harvest 118 acres of old-growth redwood and 530 acres of residual redwood. On the remainder of PALCO's ownership about 481 acres of old-growth redwood and 6,174 acres of residual old-growth redwood would be harvested by the end of the HCP period. The harvest of lower-quality residual and the higher-quality habitat mentioned above would result in the potential take of 177 and 237 individual marbled murrelets. This estimated take is based on a worst-case, one-to-one relationship between habitat loss and at-sea populations of marbled murrelets in the bioregion. This amount of take, balanced with the protections provided by the Reserve, is not expected to threaten the population of marbled murrelets in Southern Humboldt County or the bioregion. The short-term-term effects on the marbled murrelet may be significant, but over the long term would be minimized, mitigated, and less than significant.

Northern Spotted Owl—Under Alternative 4, the effects on the northern spotted owl on PALCO lands would be similar to those under Alternative 2. No take would occur because PALCO does not propose to take nesting owls under the HCP, and the HCP provides measures to avoid such take. Effects would occur due to harvest of suitable habitat within owl nest circles and allowing for potential reduction of 33 percent of the baseline owl population on PALCO lands through this habitat reduction. There would be a decline of about 6,045 acres of nesting habitat by year 10 but an increase of 955 acres by year 50. PALCO ownership is less under this alternative and the actual number of owls that could be affected would be proportionately less. Impacts from these takings would be minimized and mitigated by providing nesting and foraging habitat for northern spotted owls throughout the ITP period, by protecting all known nest sites for the first five years of the HCP, and by reducing the likelihood that nesting owls would be disturbed during timber harvest and other activities. This alternative would not be expected to threaten northern spotted owl populations at a local or regional level. Even if the population declines to its lowest allowable level, the populations would still substantially exceed the population size recommended for Southern Humboldt County by the Draft Spotted Owl Recovery Plan. The Reserve would also serve as a relatively large refuge for northern spotted owls in an otherwise largely managed landscape. Consequently, the effects of this alternative on the northern spotted owl would be minimized and mitigated to a less-than-significant level.

Coho Salmon—Under Alternative 4, the quality of aquatic habitat used by coho salmon on PALCO property would be expected to improve over the 50-year life of the ITP in the same manner as described under Alternative 2. As discussed under Issue 4 Aquatic Habitat, Water Quality, and Water Quantity for Alternative 2, the aquatic management strategy designed for PALCO lands would provide for improvement in aquatic habitat and would contribute substantially towards developing a properly functioning aquatic system over the life of the ITP. The main activities that would improve habitat are prescriptions related to RMZs and upslope activities. Additionally, the protection of

CMZs on floodplains means that this habitat would be protected for the life of the ITP. This habitat improvement would provide the opportunity for coho salmon populations to improve on PALCO's property and thereby to make a substantial contribution to healthy populations in the watersheds where PALCO owns a large percentage of the land. Effects on coho salmon would be minimized, fully mitigated, beneficial, and less than significant.

Under this alternative a large 63,000-acre Reserve would be created. In the smaller unharvested areas, the conditions for coho salmon would be as described under Alternatives 2 and 3. The remainder of the Reserve under this alternative, however, has been managed for timber production. It has a high road density, is dominated by early and mid-seral forest, and has riparian zones composed of forests of varying ages that provide varying levels of function. The creation of the Reserve would allow forests to regrow and would reduce road use. Riparian areas would generally regain function as the existing streamside forest regrows. However, a road improvement program would be necessary to minimize the potential for road-related sediment (both fine- and coarse-grained) to enter streams. Such a program is not part of this alternative but such actions would be expected to be implemented if this area came into public ownership.

2.6.5 Issue 4: Aquatic Habitat, Water Quality, and Water Quantity

2.6.5.1 Alternative 1 (No Action/No Project)

Aquatic Habitat—The riparian management strategy under Alternative 1 would contribute to improved riparian and aquatic conditions. The 0 to 170 or 340-foot RMZs for Class I (fish-bearing streams), 0 to 85 or 170-foot RMZs for Class II streams (aquatic life but non-fish bearing), and 0 to 50 or 100-foot RMZs for Class III streams (intermittent streams with no aquatic life) would provide for improvements in the important riparian functions of stream shade, LWD recruitment, leaf and needle litter, streambank stability, and sediment control. The upper end of these RMZ widths provide for high levels of protection of all of these components. The lower end of these RMZ widths provide for moderate to high levels of protection of all these riparian components.

Water Quality—The RMZs considered under this alternative would contribute to improving water quality in the area. These improvements would result from increased shading along Class I and II streams which improves water temperature and from increased sediment filtering capability from wider riparian buffers.

The existing road network on PALCO lands would generally not be upgraded except as required under an individual THP. Consequently, the risk of road failures and the resultant coarse sediment influx would not be reduced from present conditions.

Hillslope management prescriptions would continue to occur under FPRs with site specific identification, avoidance, and mitigation measures applied. These provisions reduce, but do not eliminate, the risk of hillslope failures.

Water Quantity— Increased channel aggradation has been observed by residents and resource agency personnel in some streams below PALCO property. In these aggraded conditions, overbank flooding may occur with increased frequency, and increased sedimentation adjacent to stream channels may be associated with flooding. Only long-term monitoring of channel conditions and stream flows could confirm an increase in flooding with channel aggradation, however.

Under the provisions of this No Action alternative there would be no road management program. Consequently,

there would be no reduction in the potential for road-related mass wasting and no reduction in the risk of flooding to people and property. Because PALCO lands would continue to be managed for timber production and the existing road network would remain, the risk of management-related (i.e., road or hillslope) mass wasting and associated coarse sediment influx would remain similar to present. The risk of this mass wasting is considered moderate.

2.6.5.2 Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Aquatic Habitat—PALCO's proposed aquatic management strategy, road management strategy, and hillslope strategy would contribute substantially to improving aquatic habitat and water quality over the 50-year term of the ITP. The 170-foot RMZs for Class I (fish-bearing streams), 100- to 130-foot RMZs for Class II streams (aquatic life but non-fish bearing), and EEZs and ELZs for Class III streams (intermittent streams with no aquatic life) would provide for improvements in the riparian functions of stream shade, LWD recruitment, leaf and needle litter, streambank stability, and sediment control. The RMZ widths and prescriptions within them provide for moderate to high levels of protection of all of these components. The indicated RMZ widths apply to both sides of streams.

In addition, the road management guidelines proposed by PALCO provide for improvements in the existing road network. These improvements provide for larger culverts and stormproofing at road-stream crossings. Additionally, more ditch relief culverts would be placed along roads between stream crossings. These two provisions would reduce the risk of road failures which can produce significant influxes of coarse sediment to streams thereby degrading the quality of aquatic habitat.

Hillslope management prescriptions would minimize activities on potentially unstable features such as headwall swales, inner gorges, unstable areas and other steep slopes. These prescriptions would also reduce the risk of hillslope failures which can also produce significant influxes of coarse sediment to streams thereby degrading aquatic habitat.

The reduction of these road and hillslope related coarse sediment influxes would allow improvement of aquatic habitat even in currently adversely impacted stream channels such as the five watersheds identified by CDF as cumulatively impacted by sediment (i.e., Bear Creek, Jordan Creek, Stitz Creek, Elk River, and Freshwater Creek). Because PALCO lands would continue to be managed for timber production, the risk of management related (i.e., road or hillslope) mass wasting and associated coarse sediment influx would not be eliminated. However, the types of hazards identified and the types of prescriptions applied would maintain such risk at, or reduce it to, low to moderate levels. The effects on aquatic habitat would be beneficial.

Water Quality—The aquatic management strategy, road management strategy, and hillslope strategy developed for PALCO lands would also contribute substantially to improving water quality in the area. These improvements would result from increased shading along Class I and II streams which improves water temperature. Wider RMZs than current FPRs plus the requirement that all dead and dying trees must be retained and all exposed soil areas greater than 100 square feet on slopes greater than 30 percent must be treated with erosion control along Class I and II RMZs would minimize the potential influx of fine sediment from hillslopes which would improve sediment and turbidity conditions.

The RMZs would improve water temperature, sediment conditions, and turbidity as well as other water quality parameters. The road improvement program would reduce the potential for coarse sediment influx as well. Except as noted below, the effects of the proposed HCP on water quality would be beneficial and less than significant.

The prescriptions for road construction do not allow new road construction and stormproofing during the winter period (October 15 to May 1). Road construction also would not occur during periods of measurable precipitation.

In addition, the wet weather road use prescriptions in the July HCP present a moderate risk to water quality. This risk has been minimized to a level of less than significant because the HCP requires that road use activities cease when activities result in a visible increase in turbidity in any drainage facility or road surface that drains directly to a Class I, II, or III watercourse, or a visible increase in turbidity in any Class I, II, or III watercourse.

Water Quantity— Increased channel aggradation has been observed by residents and resource agency personnel in some streams below PALCO property. In these aggraded conditions, overbank flooding may occur with increased frequency, and increased sedimentation adjacent to stream channels may be associated with flooding. Only long-term monitoring of channel conditions and stream flows could confirm an increase in flooding with channel aggradation, however.

Under the Proposed Action/Proposed Project there would be a specific road management program designed to reduce the likelihood of road-related mass wasting compared to Alternative 1. Consequently, the potential for future channel aggradation from coarse-sediment influx would be reduced. Over time streams would become more channelized and their water capacity would increase. This combination would result in a reduction in the risk of flooding to people and property. Because PALCO lands would continue to be managed for timber production and the existing road network would remain, the risk of management-related (i.e., road or hillslope) mass wasting and associated coarse sediment influx would remain but would be considered moderate and less than significant, for CEQA purposes.

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. A variety of additional mitigation measures are relevant to aquatic habitat and water quality. Additional mitigation has been added for (1) sediment assessment; (2) road stormproofing; (3) road construction, reconstruction, and upgrades; (4) road inspections; (5) wet weather road-use restrictions; (6) hillslope management; and (7) riparian buffers. These additional measures are summarized in Section 3.4.3.8. All of these measures will directly reduce, or reduce the likelihood of, fine and coarse-grained sediment influxes to Class I and II streams from both surface erosion and mass wasting. These reductions would improve the likelihood of achieving, over time, a properly functioning aquatic habitat, as well as the likelihood of individual events that would reduce habitat quality and water quality. The additional measures for (2) and (3) above also apply to winter road construction and stormproofing. These additional measures would maintain water quality objectives and, therefore, the effects of such winter

activities would be below the threshold of significance.

2.6.5.3 Alternative 3 (Property-wide Selective Harvest)

Aquatic Habitat—Under Alternative 3, the aquatic management strategy, road management strategy, and hillslope strategy would contribute substantially to improving aquatic habitat and water quality over the 50-year term of the ITP.

RMZs would be similar to those described under Alternative 1 although their widths could be reduced if watershed analysis showed that riparian and aquatic functions would be maintained. These RMZs would provide for improvements in the riparian functions of stream shade, LWD recruitment, leaf and needle litter, streambank stability, and sediment control. The RMZ widths and prescriptions within them provide for moderate to high levels of protection of all of these components.

In addition, the road management guidelines similar to those proposed for Alternative 2 provide for improvements in the existing road network. These improvements provide for larger culverts and stormproofing at road-stream crossings. Additionally, more ditch relief culverts would be placed along roads between stream crossings. These two provisions would reduce the risk of road failures which can produce significant influxes of coarse sediment to streams thereby degrading the quality of aquatic habitat.

In general selective harvest would be expected to reduce the potential for mass wasting and should reduce potential mass wasting and associated coarse sediment influx to streams. However, if selective logging was done by repeated tractor entries it is possible that mass wasting potential might not be reduced over current conditions.

The reduction of road and likely hillslope related coarse sediment influxes would allow improvement of aquatic habitat even in currently adversely impacted stream channels such as the five watersheds identified by CDF as cumulatively impacted by sediment (i.e., Bear Creek, Jordan Creek, Stitz Creek, Elk River, and Freshwater Creek). Because PALCO lands would continue to be managed for timber production, the risk of management related (i.e., road or hillslope) mass wasting and associated coarse sediment influx would not be eliminated. However, the types of hazards identified and the types of prescriptions applied would maintain such risk at, or reduce it to, low to moderate levels. The effects on aquatic habitat would be beneficial and less than significant.

Water Quality—The aquatic management strategy, road management strategy, and hillslope strategy proposed under this alternative would also contribute substantially to improving water quality in the area. These improvements would result from increased shading along Class I and II streams which improves water temperature. Wide RMZs that encompass essentially full protection for riparian function would also minimize the potential influx of fine sediment from hillslopes which would improve sediment and turbidity conditions. The RMZs would improve water temperature, sediment conditions, and turbidity as well as other water quality parameters. The road improvement program would reduce the potential for coarse sediment influx as well. The effects of this alternative on water quality would be beneficial and less than significant.

Water Quantity— Increased channel aggradation has been observed by residents and resource agency personnel in some streams below PALCO property. In these aggraded conditions, overbank flooding may occur with increased frequency, and

increased sedimentation adjacent to stream channels may be associated with flooding. Only long-term monitoring of channel conditions and stream flows could confirm an increase in flooding with channel aggradation, however.

Under this alternative there would be a specific road management program designed to reduce the likelihood of road-related mass wasting compared to Alternative 1. Consequently, the potential for future channel aggradation from coarse-sediment influx would be reduced. Over time streams would become more channelized and their water capacity would increase. This combination would result in a reduction in the risk of flooding to people and property. Because PALCO lands would continue to be managed for timber production and the existing road network would remain, the risk of management-related (i.e., road or hillslope) mass wasting and associated coarse sediment influx would remain but would be considered moderate and less than significant.

2.6.5.4 Alternative 4 (63,000-acre No-harvest Public Reserve)

Aquatic Habitat—The effects under this alternative would be the same as described under Alternatives 2 and 2a except for the creation of a larger Reserve. The effects would be the same on PALCO ownership because the same HCP/SYP prescriptions would be applied, although to a smaller landbase.

Under this alternative a large 63,000-acre Reserve would be created. In the smaller unharvested areas, the conditions for aquatic habitat would be as described under Alternatives 2 and 3. The remainder of the Reserve under this alternative, however, has been managed for timber production. It has a high road density, is dominated by early and mid-seral forest, and has riparian zones composed of forests of varying ages that provide varying levels of function. The creation of the Reserve would allow forests to regrow and would reduce road use. Riparian areas would generally regain function as the existing streamside forest regrows and provide for improvement of aquatic habitat. However, a road improvement program would be necessary to minimize the potential for road-related sediment (both fine- and coarse-grained) to enter streams. Such a program is not part of this alternative but such actions would be expected to be implemented if this area came into public ownership.

Water Quality—The effects under this alternative would be the same as described under Alternatives 2 and 2a except for the creation of a larger Reserve. The effects would be the same on PALCO ownership because the same HCP/SYP prescriptions would be applied, although to a smaller landbase.

Water Quantity—The effects under this alternative would be the same as described under Alternatives 2 and 2a except for the creation of a larger Reserve. The effects would be the same on PALCO ownership because the same HCP/SYP prescriptions would be applied, although to a smaller landbase.

2.6.6 Issue 5: Timber Supply, Employment , and Government Revenues

2.6.6.1 Alternative 1 (No Action/No Project)

Timber Supply—Under the No Action alternative first-decade timber harvest would be about 171,252 thousand board feet net per year (mbfn/yr). This volume was calculated using the currently known stream miles on the PALCO ownership. Class III streams mileage and locations are poorly known, however, because they are difficult to map. Consequently, their mileage is very likely much higher than indicated in the GIS database. Because Class III streams receive a 100-foot, no-harvest buffer under this alternative the

actual available timber volume could be much lower. In addition, the frequency of Class III streams on the landscape can reduce operability (i.e., the ability to physically access timber) and therefore further reduce available timber volume.

The modeled volume is about 31 percent lower than the average for the previous decade of about 250,000 mbfn/yr. It is also about 26 percent lower than the proposed action. In addition, this reduction in timber harvest volumes would be expected to reduce average annual total county harvest volumes by an estimated 15 percent.

Employment—Employment estimates are directly related to timber volumes. Under Alternative 1, timber harvest and mill-related direct and contract labor would be reduced by a net of 533 jobs. This is approximately 32 percent fewer PALCO and contract workers than historic values and 15 percent fewer Humboldt County lumber and wood products jobs. This estimated loss of timber-related jobs, however, would be less than 2 percent of projected total county employment.

Government Revenues. Humboldt County average annual net taxes and revenues for years one to five would decline by $1,090,328, or 6.8 percent. This value includes federal payments in lieu of taxes (PILT) to the county, timber production zone (TPZ) property tax changes, timber yield tax, and sales tax. The Humboldt County average annual timber yield tax would decline by $920,990, or about 15 percent, from historic values. The potential loss of sales tax revenue due to a decline in PALCO timber-related jobs would be an estimated $183,469.

2.6.6.2 Alternative 2 (Proposed Action/Proposed Project) and 2a (No Elk River Timber Company Lands)

Timber Supply—Under the proposed HCP/SYP (Alternative 2), timber harvest would be about 233,519 mbfn/yr for the first decade. This volume is the highest among the alternatives. This volume is about 7 percent lower than PALCO's average for the previous decade of about 250,000 mbfn/yr. This reduction in timber-harvest volume would result in a decline in total county harvest volumes of approximately 5 percent in comparison to historic data.

Under Alternative 2a, first-decade timber harvest would be 221,481 mbfn/yr. This volume is about 11 percent lower than the average for the previous decade of about 250,000 mbfn/yr and would be expected to reduce total county harvest volumes by an estimated 5 percent in comparison to historic data.

Employment—Employment estimates are directly related to timber volumes. Under Alternative 2, timber harvest and mill-related direct and contract labor would be reduced by an estimated 115 jobs per year. Under Alternative 2a, timber harvest and mill-related direct and contract labor would be reduced by a net of 196 jobs per year. These reductions would result in an estimated 7 percent and 12 percent loss of PALCO-related jobs, respectively. Total timber-related employment reductions, however, would be only an estimated 5 percent of total projected employment for Humboldt County.

Government Revenue—Humboldt County average annual net taxes and tax revenues for years one to five would decline by $198,737 under Alternative 2. This value includes federal PILT to the county, TPZ property taxes, timber yield taxes, and sales tax. The Humboldt County average annual timber yield tax would decline by $192,752, or about 5 percent, from historic values. Similar declines in sales tax revenues would total an estimated $39,585 per year. In total, the calculated loss of revenues would be a large sum of money but less than 1 percent of total county

revenues. Under Alternative 2a, effects on government taxes and revenues would be 2 to 3 times greater than under Alternative 2. Average annual timber yield losses would increase to an estimated $333,541 and the reduction in sales tax revenue to the county would be approximately $67,000. This value includes the effects of the transfer of the Headwaters Reserve out of private and into public ownership. The federal government would provide $10 million in economic assistance to Humboldt County under the provisions of public law 105-83.

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P. The mitigation measures applied for marbled murrelets and for water quality, aquatic habitat, and coho salmon (particularly Class III stream buffers), substantially reduce the amount of timber available for harvest. These and other mitigation measures listed in Appendix P could reduce LTSY by approximately 15 percent over the entire analysis period. Field exams may indicate that more Class II and III streams exist than are currently estimated, requiring more extensive buffers. On the other hand, watershed analysis could determine that less area has to be withdrawn for stream protection. Therefore, the effect on LTSY cannot be determined accurately. Given the range of variability of the model, a long-term reduction of 15 percent seems reasonable. In contrast, the reduction in timber volume harvested for Decade 1 would be about 25 percent with a concomitant loss of lumber and wood-products-related jobs.

2.6.6.3 Alternative 3 (Property-wide Selective Harvest)

Timber Supply—Under this alternative, first-decade average annual timber harvest volume would be 86,878 mbfn/yr. This volume is the lowest of all the alternatives evaluated in detail. This volume is about 65 percent lower than the average for the previous decade of about 250,000 mbfn/yr. This volume is also about 62 percent lower than the proposed action. This reduction in PALCO harvest would substantially reduce total Humboldt County harvest volumes, by an estimated 33 percent.

Employment—Employment estimates are directly related to timber volumes. Under Alternative 3, timber harvest and mill-related direct and contract labor would be reduced by a net 1,098 jobs. In comparison to historic data, this would be a reduction of about 65 percent in PALCO-related employment and a reduction of approximately 33 percent in total Humboldt County timber-related employment. The total impact to the projected Humboldt County employment is estimated to be a reduction of 3 percent.

Government Revenue—Humboldt County average annual net taxes and revenues for years one to five would decline by $2,252,133. This value includes federal transfer PILT to the county, TPZ property tax changes, timber yield revenues, and sales tax. This value includes the effects of the transfer of the Headwaters Reserve out of private and into public ownership. The Humboldt County average annual timber yield tax would decline by $1,907,779, or about 65 percent, from historic values. In addition, the assumed loss of timber-related jobs associated with the substantial reduction in timber harvest volumes under this alternative could result in a loss of nearly $378,000 in sales tax revenue.

2.6.6.4 Alternative 4 (63,000-acre No-harvest Public Reserve)

Timber Supply—Under this alternative, average annual timber volumes would be 165,021 mbfn/yr for the first decade. This volume is about 34 percent lower than the average for the previous decade of about 250,000 mbfn per year. This volume is also about 29 percent lower than the proposed action. In comparison to historic Humboldt County timber harvest, this figure is a reduction of approximately 17 percent per year.

Employment—Under Alternative 4, timber harvest and mill-related direct and contract labor would be reduced by a net 602 jobs for anticipated timber harvests on both PALCO and Elk River Timber Company lands. This is a reduction of nearly 34 percent in PALCO-related lumber and wood products jobs, though only a loss of 1.7 percent in projected employment due to the loss of timber-related workers.

Government Revenue—Humboldt County average annual net taxes and revenues for years one to five would decline by $1.2 million. This value includes federal PILT to the county, TPZ property tax changes, timber yield revenues, and sales tax. This value includes the effects of the transfer of the Headwaters Reserve out of private and into public ownership. In addition, the Humboldt County average annual timber yield tax would decline by $993,864, or about 34 percent, from historic values. Loss of sales tax revenues from the forecasted reduction in timber-related workers is estimated to be $197,582. The net loss of total revenue, however, would be less than 1 percent of historic Humboldt County total revenues from all sources.

2.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Alternative 3 (Property-wide Selective Harvest) is the environmentally superior alternative. It harvests no old-growth forest or trees (either redwood or Douglas-fir) and, consequently, protects all habitat for the marbled murrelet and most high-quality nesting habitat for the northern spotted owl except when they nest in second growth. In addition, habitat for these species would expand over a 50-year period because of the establishment of 600-foot buffers around them. All species using older forests would benefit from this alternative. The establishment of relatively wide RMZs and a road improvement program would also protect riparian functions and result in long-term improvements in aquatic habitat that would benefit coho salmon and other aquatic species.

2.8 MITIGATION MEASURES

Mitigation measures are specific actions proposed to avoid or minimize significant effects associated with the implementation of a project. The acquisition and creation of the Reserve is not considered mitigation.

It is important to recognize that HCPs are mitigation plans for the incidental take of federal or state listed species. PALCO's proposed HCP/SYP (PALCO, 1998) present proposed management actions that would result in take of listed species, but would provide for protection of those species on other parts of an ownership by imposing specific management constraints. Effects are expected to occur, but they may be deemed acceptable within the context of the HCP. Whether PALCO's proposed HCP/SYP provide acceptable levels of mitigation and whether an ITP, SYP, or 1603 Agreement permit should, therefore, be issued or approved are decisions to be made by the USFWS, NMFS, CDF, and

CDFG. SYPs are also required to contain information on feasible measures to avoid or mitigate potentially significant adverse impacts on fish and wildlife. Determining conformance for a SYP includes evaluating whether feasible measures exist to mitigate or avoid significant adverse impacts to watersheds, fisheries, and wildlife issues and whether the SYP is consistent with 14 CCR 897 (b). The proposed mitigation and avoidance measures are contained in PALCO's proposed HCP/SYP (PALCO, 1998). The various resource sections in Chapter 3 identify potential significant effects associated with the proposed action and its alternatives, including associated mitigation measures. It should be noted that the establishment of the Headwaters Reserve would not be considered mitigation for PALCO's actions.

Because the proposed HCP is a mitigation plan, the mitigation associated with it is described in detail in PALCO (1998). Additionally the brief descriptions of PALCO's proposed HCP/SYP (Section 2.2), and the description of the Proposed Action/Proposed Project presented in Section 2.5 include the primary mitigation measures contained in the HCP/SYP. Appendix E provides detailed information on proposed mitigation for the aquatic system and hillslope and road management.

AB 1986 conditions the expenditure of state funds for land acquisition on the inclusion of several provisions in the Final HCP intended to strengthen protections for covered species, previously described in Section 1.1.1, under AB 1986 Conditions after Section 2.5.3, and in Appendix B.

After reviewing and evaluating public comments on the Draft EIS/EIR in light of FESA and CESA permit issuance criteria, the wildlife agencies have determined that additional measures are appropriate to minimize and fully mitigate the impacts of take and to further reduce potential adverse effects. The complete package of minimization and mitigation measures is presented in the HCP's Operating Conservation Program in Appendix P.

2.9 MONITORING PLAN

An interim mitigation monitoring plan is presented in Appendix R. This plan presents an intermediate phase in the development of the final mitigation plan. A final mitigation plan will be available at the time of the final notice of determination and record of decision.