ELK CREEK WETLAND
SPECIAL STUDY

I. INTRODUCTION

Elk Creek, with headwaters originating in the forested uplands of Jedediah Smith Redwoods State Park, flows in a general southwesterly direction to the Crescent City Harbor. A portion of this stream, together with its wetlands and wildlife are the subject of this special study.

The Del Norte County General Plan (1976) and the California Coastal Commission (1977) have both recognized the lower reaches of Elk Creek and its associated wetland as a sensitive habitat requiring particular attention in the process of coastal planning. The primary difficulty in attempting to develop a plan for this area is that the actual drainage patterns and wetland limits of Elk Creek are unknown. In addition, the overall resource value of the Elk Creek wetland is not fully understood and the measures necessary to maintain the habitat are in question. The purpose of this study is to define the limits of the Elk Creek wetland and identify its sensitive resources in order to permit logical and compatible development within the area.

A universally acceptable definition of wetland is difficult to establish. Wetlands are generally viewed as areas of low topography, poor drainage and seasonally standing water. The California Coastal Act of 1976 defines a wetland as follows:

> 30121. "Wetland" means lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.

This study adopts the Coastal Act definition of wetland and further extends the term to include certain areas in which wetland indicator plant species are present. The definition and utilization of indicator species will be discussed in the methodology section. Wetland in this report refers to all marshlands, riparian corridors, seasonally flooded areas, and certain poorly drained pasturelands.

This report summarizes the accomplishments of the Elk Creek Wetland Special Study. First, a general description of the study area's location, physical features, history and present-day uses is presented and previous studies concerning the Elk Creek drainage are reviewed. Second, the methods used to conduct the mapping and resource inventory of Elk Creek are discussed followed by a presentation of the findings. Finally, specific policies and recommendations designed to maintain and enhance the resource values of Elk Creek are presented.

An atlas of the Elk Creek Special Study area with maps at the scale of 1:12000 has been compiled to accompany this presentation. This map series illustrates the drainage courses, wetland areas and principal wildlife habitats as found by the study and includes also maps of the area's topography, soils, flood hazards, parcels and zoning as compiled from various sources.

II. STUDY AREA DESCRIPTION

A. Location: Elk Creek, with a drainage basin covering approximately 4120 acres, is located immediately northeast of the City of Crescent City. Elk Creek originates in the upland forests of Jedediah Smith Redwoods State Park and flows southwesterly to the Crescent City Harbor.

The portion of the Elk Creek drainage system examined by this study is bounded by Elk Valley Road, Parkway Drive, the City limits of Crescent City and the watershed divide separating Elk Creek from Jordan Creek (see Figure 1). The study area encompasses nearly 2000 acres.

B. Climate: The climate of coastal Del Norte County is influenced greatly by the Pacific Ocean. It is characterized by moderate temperatures throughout the year, considerable winter rainfall and cool foggy summers. The microclimatic conditions of the Elk Creek drainage are not well documented, but differences in moisture, temperature and wind are known to exist. These relate closely to topography, vegetative cover and distance from the ocean.

C. Topography: Elevations in the study area range from sea level to approximately 70 feet. Overall the study area is quite flat, but slopes between 20 to 50% occur in branch drainage systems.

D. Geology: Elk Creek lies within a coastal lowland area underlain by the Franciscan Complex. This area, known as the Crescent City Platform, was once a part of the Coast Range Mountains until some 25 million years ago when this block of mountains separated and slowly sank into the sea. Two formations have since been deposited over the original Franciscan formation and for the last 200,000 years the plateau has been rising to its present elevation.

1. St. George Formation: The lower formation, deposited during the Pliocene Epoch, is the 350-400 foot thick St. George Formation. This geologic layer is composed of fine grained sediments and is fairly impervious to water.

2. Battery Formation: The topmost deposit, known as the Battery Formation, is approximately 66 feet thick and consists of weakly consolidated material; alternating silt, clay and fine-to-medium grained quartz sands.[1] This formation may be subject to liquefaction: a sudden collapse of soil structure

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1. Terra Scan Inc., 1976 Seismic Safety and Safety Element: An Element of the Del Norte County General Plan p. 11.

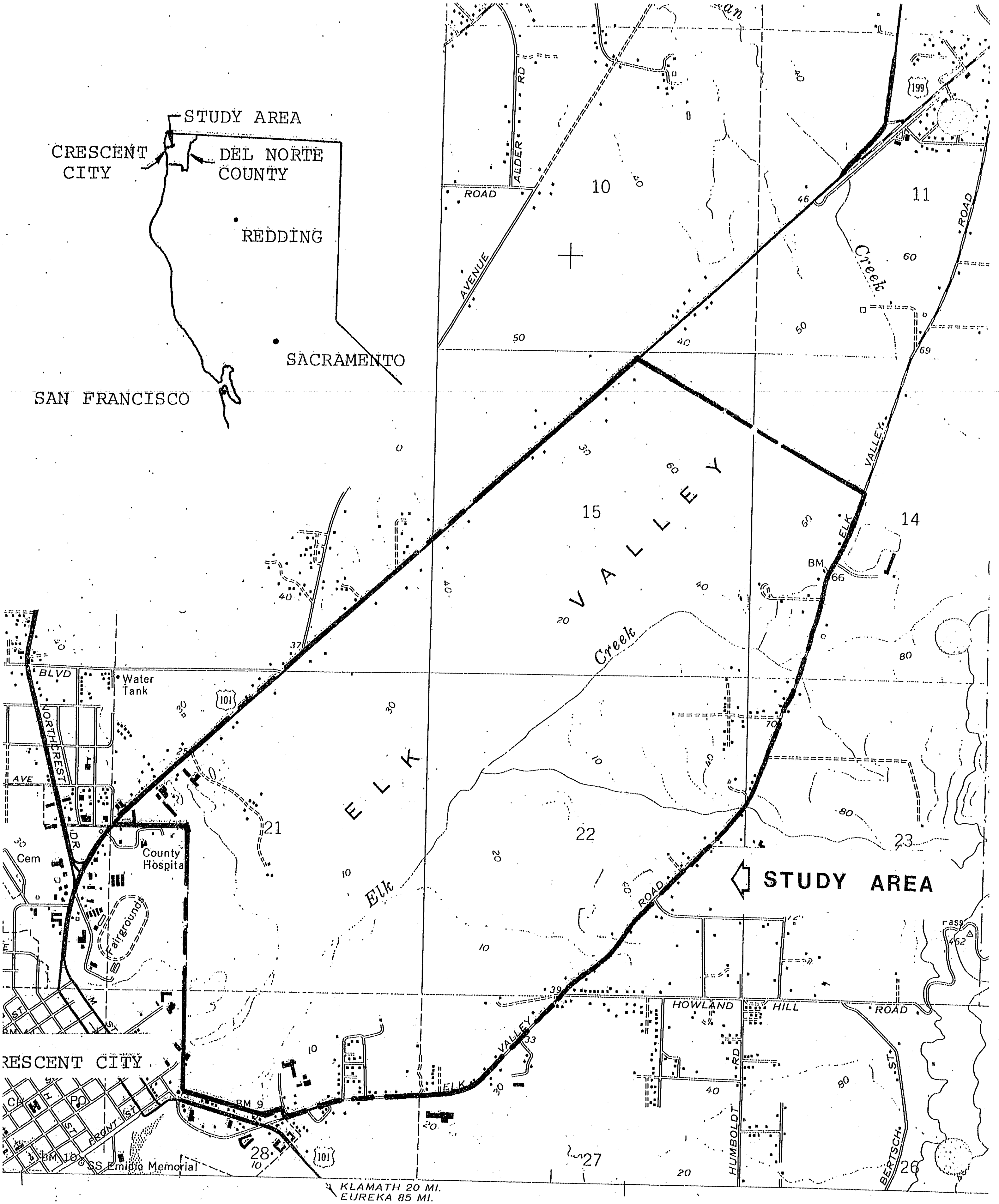

Figure 1: Location Map

and a temporary increase of the material into a fluid mass associated with earthquake activity. The area has a shallow water table; during periods of heavy precipitation standing water often occurs in low-lying areas.

E. Soils: Approximately 75 percent of the soils within the Elk Creek study area have been identified in a survey of the agricultural soils of coastal Del Norte County by U.C. Davis. Soil types recognized are as follows:

Talawa Fine Sandy Loam	(Ta 2)
Talawa Poorly Drained	(Ta 3)
Hutsinpillar Silty Clay Loam	(Hp 2)
Peat Bog	(PB)
Arcata Loam	(Ar 2)

1. Talawa Soils: The Talawa soils occur on low marine terraces that have been slightly uplifted. Generally they are well drained unless situated in depressed areas. Elk Creek soils of this type are in some instances poorly drained as is evidenced by standing water.

2. Hutsinpillar Soils: The Hutsinpillar soil-type typically occurs in basins of small streams draining the nearby Franciscan formation. This soil is poorly drained, fine textured, and has a well developed profile.

3. Peat Bog: Peat bog occurs in areas where organic matter has accumulated in excess of mineral matter. It is poorly to very poorly drained. The depth of these peat layers usually does not exceed three feet.

4. Arcata Soils: The Arcata loam occurs on old marine terraces. Slopes are usually less than 4 percent. This soil is well drained; its permeability is moderately rapid.

The principal soil types of Elk Creek and their physical characteristics are summarized in Table 1.

F. Vegetation: Vegetation may be defined as the aggregation of plant life and a landscape. Vegetation is particularly useful as an indicator of environmental conditions in that the growth forms and species composition of a given vegetation type represent integrated expressions of prevailing climatic, soil and other physical/biological factors.

Vegetation types within the Elk Creek Study Area progress from

SOIL TYPE	SYMBOL	% SLOPE	INTERNAL DRAINAGE	% MAPPED IN STUDY AREA	DOMINANT VEGETATION
Arcata Loam	Ar 2	0-3	Good	2	Grasses; bracken fern
Talawa Fine Sandy Loam	Ta 2	0-3	Good	66	Redwood; Spruce; Hemlock; Cascara; Huckleberry; Salal
Talawa Fine Sandy Loam (poorly drained)	Ta 3	0-3	Poor	5	Spruce; Skunk Cabbage; Horsetail; Various water-loving plants
Hutsinpillar Silty Clay Loam	Hp 2	0-3	Poor	23	Grasses; Bulrush; Silver-weed; water-loving plants
Peat Bog	PB	---	Poor	4	Grasses; Sedges; Rushes

TABLE 1: Soils of Elk Creek

saturated wetlands in the lower reaches to the somewhat drier upland forests. The lower end of the Elk Creek Wetland consists of a variety of herbaceous plants. Chief among these are numerous pastureland grasses and clovers. Further upstream are dense growths of rushes and sedges: these are located primarily in the boggy, poorly drained areas. On the periphery of the bogs are dense shrubby thickets of spirea and several willow species. From the shrub thickets to the upper reaches of the study area are numerous riparian corridors associated with Elk Creek and its tributaries. Dense overgrowths of alders and berries line the banks of the streams. Skunk cabbage and horsetail fern are also present. Second growth Sitka spruce, Douglas fir, and isolated redwoods are situated on the cutover upland areas. Understory primarily consists of huckleberry and salal.

G. Wildlife: The diverse habitats of the Elk Creek Special Study area support a wide variety of wildlife. Many species of birds, mammals, and reptiles have been observed and are known to frequent the area.

Large mammals utilizing the area include the black bear and more commonly, the blacktail deer. Also thought to utilize the area are the coyote, gray fox, bobcat, raccoon, spotted skunk, and stripped skunk. Small mammals include hares, rabbits, gophers, squirrels, moles, shrews and bats. Associated rodents include mice and voles.

The Elk Creek area supports local bird populations as well as Pacific Flyway migrants. Song birds frequenting the area include juncos, finches, larks, sparrows, thrushes, warblers and wrens. Quail and doves utilize the brushy areas. Raptor species in the Elk Creek area include hawks, kites, and owls. Great blue herons, ducks and geese are known to use the habitat.

Historically, Elk Creek supported a large anadromous and adfluvial fishery. The present extent of the fishery is unknown. Debris appears to block several areas.

Various reptiles and amphibians including: salamanders, the western toad, the Pacific tree frog, the common western fence lizard, garter snake, gopher snake and others exist in the Elk Creek drainage.

A partial listing of species sited in the course of this study as well as some which are generally known to utilize the wetland and the associated riparian habitat during all or part of their lifecycle may be found in Appendix II. An intensive, year-round field study is recommended to complete the species list.

H. Historical Land Uses: The first known man-related land use of the Elk Creek area was by the local Talawa Indians. The Talawa are known to have fished for salmon offshore from Crescent Bay near the mouth of Elk Creek. Elk and deer were abundant; for this reason early explorers christened the valley "Elk Valley". Early records describe the valley as being covered with willow, alder, salmonberry, blackberry, raspberry bushes and ferns. The associated foothills were covered by redwoods, spruce and fir with an estimated 24,300 acres of timber available.[2]

Early settlers successfully cleared the land for farming and dairying; the various products were used locally as well as for export. A brickyard which enabled Crescent City to erect its first brick building was located in the Valley as well as a barrel factory.

Historically Elk Creek, or Elk River as it was once known, drained a low, marshy prairie for several miles. Fish were abundant and the slough served as a local swimming hole. Berry picking was another commonplace activity.

In 1871 Hobbs, Pomeroy and Company built the Elk River Mill which utilized logs transported from harvest sites, first by skid trails and then by flotation down the slough.[3] In the 1880's a railroad was built to transport logs; the railroad bed is still evident to this day.

The once expansive farms and ranches of Elk Valley have since been subdivided. Places such as Howland Hill, McNamara Mound and numerous streets, buildings and other areas remain as testimony to the early pioneers. Farming, logging, recreation and industry have remained important activities through the years.

J. Present-Day Land Use: Present-day land uses in the Elk Creek area include: agriculture; forestry; recreation; industrial; residential and open space. Each will be examined briefly.

1. Agriculture: Grazing is the predominant agricultural activity in the Elk Creek area. This land use is generally limited to the lower portion of Elk Creek where extensive pasturelands for horses and cows are maintained.

2. Forestry: Logging in the Elk Creek drainage has occurred on a regular basis since the 19th century. The exact history of cutting is unknown, but it is safe to say that most

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2. Bledsoe, A.J., (1881), History of Del Norte County, p. 122

3. McBeth, Frances Turner, (1960), Pioneers of Elk Valley, p. 57

forested areas today are at least 2nd or 3rd growth timber. The most recent timber harvest activities have taken place in the area between Parkway Drive and Elk Creek.

3. Recreation: A 46 acre recreational vehicle park and campground exists off Parkway Drive near Washington Blvd. This is the only commercial recreation land use within the study area.

4. Industrial: Most of the existing industrial land uses within and adjacent to the Elk Creek study area are located on Elk Valley Road between Highway 101 and Howland Hill Road. Industrial land uses throughout the Elk Creek area include: timber processing; fishpacking; and various vehicle repair facilities. A timber mill is located adjacent to the lower drainage area and a particle board mill is situated just south of Elk Valley Road. The fish packaging facility is located north of Elk Valley Road between Iowa and National Streets. Vehicle repair shops exist on Parkway Drive and Elk Valley Road.

5. Residential: Residential development has taken place on the periphery of Elk Creek. In general residential lots range from one to ten acres in size and the structures on these lots vary from mobilehomes to ranch-style homes.

6. Open Space: Recognizing the sensitivity of the Elk Creek wetlands, the County's General Plan designated the interior portions as open space. These areas remain undeveloped today.

III. PREVIOUS STUDIES

Investigations concerning the extent and resource value of the Elk Creek wetland and associated drainage are few. Maps and other information from previous studies are often in disagreement as to the limits of the wetland and the drainage patterns of Elk Creek. This section will briefly review the accomplishments of past studies.

A. Haley Land Classification: An early study in which the Elk Creek marshland was delineated occurs in the 1925 Land Classification maps of H.D. Haley and Company of Portland, Oregon. A portion of one of these maps is shown in Figure 2. The accuracy of these early maps is quite good: unfortunately the coverage for Elk Creek is limited. For the portions mapped there appears to have been little change in the extent of the marsh in the fifty-four years since this mapping effort.

B. Flood Control Studies: Studies of the drainage problems in the lower portion of Elk Creek were conducted by the Del Norte County Flood Control District with assistance from the California Division of Highways between 1957 and 1966. Bridge and culvert reconstructions together with interior channel and pond improvements were made in this time period to help relieve drainage and flooding problems. Hydrologic data and general descriptions of the lower portions of Elk Creek are available from these studies.

C. Soils Survey: The soils of coastal Del Norte County were mapped by soil scientists of the University of California, Davis in 1966. This survey included a portion of the Elk Creek special study area. The soil types of Elk Creek as mapped by the U.C. Davis study are presented in the accompanying atlas.

D. Natural Vegetation Map: Küchler mapped and described the natural vegetation of California in 1977. Although the scale of the map (1:1000000) makes its direct application to the Elk Creek study impractical, the major vegetation types described for coastal Del Norte County are useful. The vegetation units of Küchler are those that may be expected to exist if "not appreciably disturbed by man" or those which would return in time (i.e., potential or climax vegetation). The vegetation of Elk Creek has been significantly disturbed, but remnants and descendants of the original vegetation do exist. Using Küchler's designations, the natural vegetations types of Elk Creek are: Coastal Prairie/Scrub Mosaic; Sitka Spruce Forest; Redwood Forest; and Coastal Saltmarsh.

E. Flood Drainage Study: A flood drainage study north of Crescent City, including portions of Elk Creek, was completed by CH_2M Hill in 1978. The study was conducted for the Del Norte County Department of Public Works to determine storm drainage deficiencies

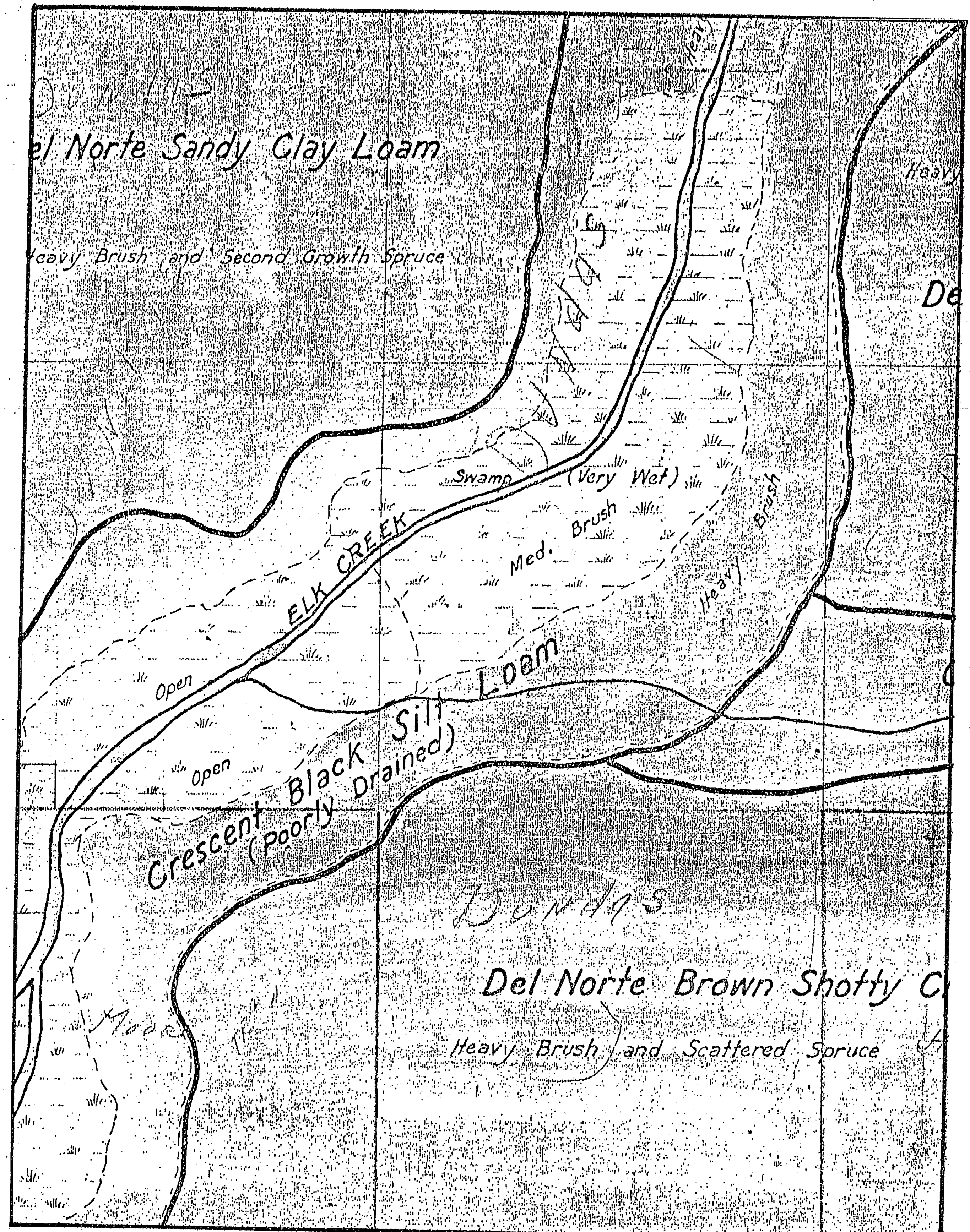

FIGURE 2: Early Map of the Elk Creek Marsh showing portions of Section 22.

FROM: H. D. Hadley and Company (1925) "Official Land Classification for Del Norte County".

and recommend solutions to these problems. A further objective of the study was to identify flood hazards along major drainage channels. The flood hazard areas were delineated on topographic maps at the scale 1" = 100' with 2 foot contour intervals.

IV. METHODOLOGY

This section will present the research methods of the Elk Creek Wetland Special Study. The resource inventory and mapping project for the Elk Creek Wetland was conducted in June and July of 1979. The purpose of this effort was to establish a more precise location of the Elk Creek Drainage system and its associated wetland and to better identify the resource values and sensitivity of the area.

A. Mapping: The Elk Creek Wetland was mapped using a combination of air photo interpretation techniques, indicator species identifications and field measurements.

1. Photo Interpretation: Black and white panchromatic and U-2 color infrared aerial photography were utilized to determine wetland boundaries in general terms. Color Infrared Film (CIR), originally developed for camouflage detection, was especially useful in distinguishing vegetation types and differentating water surfaces and wet soils.

Drainage patterns and wetland limits were recorded on the aerial photographs and after field checking were transferred to a base map of the scale of 1:12000.

2. Indicator Species: An indicator species is a plant that because of its specific ecological requirements for growth and reproduction lives only in certain habitats. Such a plant may indicate that a certain habitat exists if the particular species is present. Indicator species used to identify the limits of the Elk Creek Wetland included: sedges; rushes; horsetail; skunk cabbage; and willows.

3. Field Measurements: In areas where the wetland limits were not readily identified on aerial photography a field check was conducted. The field checking procedure was to first identify the wetland limits on the ground using indicator species. The wetland boundary locations were then measured with compass and tape from identifiable points such as survey monuments or road intersections and transferred to the base map.

An atlas with maps at the scale of 1:12000 was prepared to delineate the drainage patterns and wetland areas as determined by this study. Various other maps including topography, flood hazards, soils, land divisions and existing zoning are also presented. Note that these maps are intended for planning purposes only and are not to be used for detailed engineering or surveys.

B. Resource Inventory: The resource inventory aspects for the Elk Creek Special Study involved delimiting the significant wildlife habitats of the area and identifying species utilizing these habitats.

1. Wildlife Habitats: A habitat is a place where an animal lives. For example, the long-billed marsh wren lives in marsh habitats. Other birds and animals are known to range through more than one habitat type.

The identification of wildlife habitats has been emphasized in this study over other methods of wildlife research such as population counts or detailed species inventories. Establishing the locations and relative value of various wildlife habitats will better serve the purpose of this study: that is to determine those areas most suitable for development while maintaining the integrity and productivity of surrounding sensitive lands and waters.

The principal wildlife habitats identified by this study have been differentiated on the basis of vegetation types and water conditions.

2. Wildlife Inventory: A systematic inventory of wildlife was not conducted by this study. Casual observations were made, however, during the progress of field mapping.

The observation periods amounted to approximately 20 hours over the course of 1½ summer months. Thus, by no means have the full diurnal and seasonal uses of Elk Creek's principal wildlife habitats been examined. Additional work is needed to further understand the organization and interactions of the wildlife communities recognized by this study. It is therefore recommended that a thorough wildlife inventory and analysis be conducted (including night observations) for at least a one year period.

V. FINDINGS

The major findings of this study involve the delineation of the drainage patterns of Elk Creek and the determination of the wetland's extent. Further results include the identification of principal wildlife habitats within the study area and a better understanding of the habitat sensitivity of Elk Creek. The significant findings of this study will be summarized in this section.

A. Drainage Patterns: Previous mapping efforts of Elk Creek have resulted in confusion concerning the location of the main channel and its branch streams: no two maps depict these in the same locations.

An important result of this study is a more precise delineation of the Elk Creek drainage patterns. This was required to fully understand the extent of the marshlands in Elk Creek. The drainage patterns mapped by this study are shown in the accompanying atlas.

A second finding concerning the drainage patterns of Elk Creek is that considerable topographic differences exist between the northwesterly and the southeasterly portions of the basin. The topography in the four branch streams entering Elk Creek from the northwest is quite steep with slopes up to 50%. The branch streams entering from the southeast on the other hand, lie in channels with relatively flat relief.

Figures 3A and 3B illustrate the topographic differences between the northwesterly and southeasterly sides of Elk Creek. These topographic patterns greatly influence the extent of the Elk Creek wetlands. The channels in the northwest section tend to be quite narrow, restricted by the steep topography. The stream channels entering from the southeast, conversely, tend to be wider and the surrounding area subject to more extensive flooding because of its flat relief. We thus find the wetland extending a greater distance from the streams in the southeasterly portion of Elk Creek than the northwest.

B. Wetland Extent: A wetland, in general, may be identified as a tract of relatively low, periodically inundated ground. Typical plant species of wetlands are grasses, sedges and rushes.

The delineation of the Elk Creek Wetland is complicated by several factors. First of all, the complex history of land use in the area has greatly altered natural patterns. For example, road building has created new marshland in upland areas. Second, the wetland extends well into densely forested areas in numerous locations. This makes interpretation of the wetland's precise limits from aerial photography impossible in many instances. Field checking in these areas is also difficult due to the lack of available reference points. Finally, the plant species characterizing

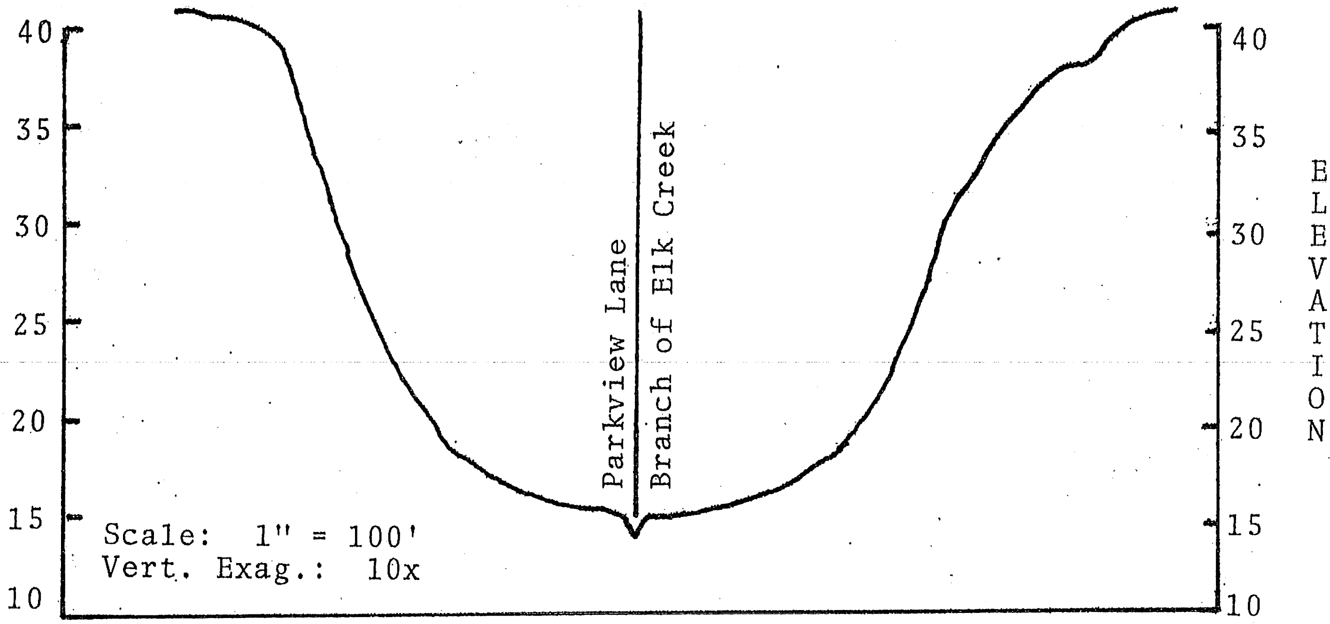

Figure 3A: Topographic X-Section of tributary in northwesterly portion of Elk Creek near Parkview Lane and Cessna Drive.

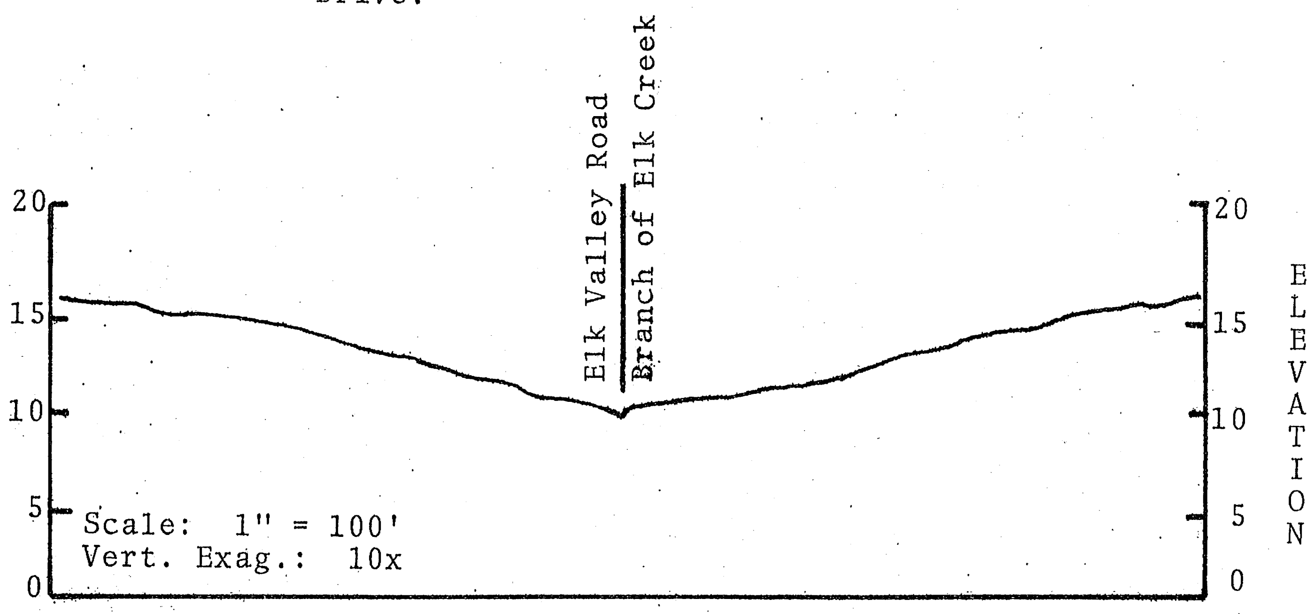

Figure 3B: Topographic X-Section of tributary in southeasterly portion of Elk Creek near Elk Valley and Howland Hill Roads.

the Elk Creek Wetland are much more complex than the typical grasses, sedges and rushes of many wetland areas. Shrubs and trees often dominate within the Elk Creek Wetland.

The extent of the Elk Creek Wetland as found by this study is shown in the atlas. This includes several wetland subtypes and riparian vegetation as well. The boundary of the wetland is shown as a dashed line to indicate the approximate limits of the wetland. In nature such boundaries are rarely ever distinct lines. They tend rather to transitional zones gradually changing from one type to another (e.g. marshland→marsh and scattered trees→forestland marsh→forestland). The wetland boundaries thus shown are not intended to be precise delimiters of the wetland, but indicate regions of transition. Specific findings will be required on a parcel by parcel basis concerning building sites and septic tank leach fields at or near the wetland boundary zone.

C. <u>Wetland Vegetation Types and Hydrologic Conditions</u>: Eight major wetland vegetation types have been differentiated in the Elk Creek study area. A brief description of the plant composition and hydrologic conditions of each will be presented.

1. <u>Pastureland</u>: This portion of the Elk Creek wetland is located in the lower reaches of the drainage and is presently being grazed by cattle. Principal plant species are: bentgrass; redtop; cow's clover; sheep sorrel; sedge; daisy; and tansey ragwort. The pastureland portions of Elk Creek are moderately to poorly drained and generally flood on a seasonal basis.

2. <u>Saltgrass Marsh</u>: The saltgrass marsh areas are located immediately upstream from the pasturelands. Major species in the saltgrass marsh include: saltgrass; arrow-grass; cinquefoil; and curly dock. This portion of the Elk Creek wetland contains numerous small interlacing rivulets: evidence of regular seasonal inundation.

3. <u>Sedge Marsh</u>: The sedge marsh, consisting of dense growths of slough sedge, is situated upstream from the grasslands. Other plant species occurring in the sedge marsh include: cinquefoil, Queen Anne's lace and isolated patches of willows and shrubs. The sedge marsh is inundated seasonally.

4. <u>Rush Marsh</u>: Rushes are located in year-round flooded portions of the Elk Creek wetland such as along stream channels and in various shallow ponds. Typical plant species of the rush marsh community are: bulrush; salt rush; spikerush; soft rush; and bur-reed.

5. <u>Shrub Marsh</u>: The shrub marsh may be considered a transitional area or ecotone between the sedge marsh and

forested areas of the Elk Creek drainage. The shrub marsh consists of very dense populations of willows and shrubs such as Douglas spirea and twinberry. Horsetail ferns, sedges and grasses are also present. The shrub marsh is a seasonally flooded area.

6. Forestland Marsh: In various locations the Elk Creek marsh extends into forested regions. The major tree species in the forestland marsh are Sitka spruce, redwood and western hemlock. The understory includes: huckleberry; thimbleberry; sword fern; horsetail fern; and skunk cabbage. Moist conditions prevail in the forestland marsh and it tends to be flooded occassionally.

7. Upland Marsh: Several small marshland areas are located above and away from the Elk Creek drainage and wetland. These non-contiguous, seasonally flooded areas appear to have been created by road building activities and occur principally on the northwesterly side of Elk Creek. Their plant composition is quite variable depending upon the size of the inundated area. Snags are common together with various shrubs, sedges and grasses.

8. Riparian Community: Riparian vegetation is the plant cover growing in association with streams and other water courses. It is usually characterized by dense growths of trees and shrubs.

The riparian vegetation of Elk Creek is distinguished in the study as a relatively narrow strip of vegetation growing in close association with upper drainage courses. It is difficult to identify this vegetation type in Elk Creek, except for its proximity to water courses, in that the riparian community grades into the forestland without distinctive boundaries. Riparian vegetation is also found around the perimeters of various ponds in Elk Creek.

Plant species typically found in the riparian communities of Elk Creek are: willows; red alder; wax-myrtle; spirea and blackberry.

Table 2 summarizes the typical vegetation and general hydrologic conditions found in the eight marsh communities identified within the Elk Creek Special Study area.

D. Principal Wildlife Habitats: Six principal wildlife habitats within the Elk Creek study area have been identified on the basis of vegetation types and hydrologic conditions. These are: ponds; pastureland; marshland; brushland; forestland; and riparian.

1. Ponds: Numerous ponds are located within the Elk Creek study area. These range from shallow depressions in poorly

COMMUNITY	TYPICAL VEGETATION	HYDROLOGIC CONDITIONS
Pastureland	Grasses, Sedges, Clover, Sorrel, Tansey Ragwort	Moderately to poorly drained. Seasonally flooded.
Saltgrass Marsh	Saltgrass, Arrowgrass, Curly Dock, Cinquefoil	Moist to wet conditions. Seasonally flooded.
Sedge Marsh	Slough Sedge, Cinquefoil, Queen Anne's lace	Moist to wet conditions. Seasonally flooded.
Rush Marsh	Bulrush, Spikerush, Salt Rush, Bur-reed	Shallow flooded areas. Often along drainage channels.
Shrub Marsh	Willows, Spirea, Twinberry, Horsetail, Sedges, Grasses	Moist conditions. Seasonally flooded.
Forestland Marsh	Sitka Spruce, Redwood, Alder, Salmonberry, Skunk Cabbage	Moist conditions. Occasionally flooded.
Upland Marsh	Snags, Bay, Azalea, Sedges, Grasses	Areas of standing water or wet conditions--occasionally drying-out.
Riparian	Willows, Alder, Wax-Myrtle, Spirea, Blackberry	Associated with water courses.

TABLE 2: Marshland Plant Communities of Elk Creek

drained areas to large open water detention ponds in the lower marsh. Ducks, geese, kingfishers and heron are representative birds which use this habitat.

2. Pastureland: Pasturelands are found in the lower portions of the Elk Creek Wetland. Waterfowl and wading birds utilize this habitat as auxiliary feeding grounds.

3. Marshland: The saltgrass, sedge, and shrub marshes are combined to describe this habitat type. It consists of moist conditions and generally dense cover for a variety of wildlife. Hawks, kites, wrens and warblers are known to live in or frequent the marshland habitat.

4. Brushland: Brushland habitats are located above the marshlands on drier sites. These are generally cut-over areas that have not yet returned to forest vegetation. They often contain an abundance of new tree growth including Douglas fir, spruce, pine and cedar seedlings and redwood sprouts. In this early successional stage they provide forage for a wide variety of wildlife. Representative species of the brushland habitat are: quail, deer and rabbits. Bear and feral pigs are also known to exist in the brushlands of Elk Creek.

5. Forestland: Forests with dominants of Sitka spruce, redwood and Douglas fir occur in the Elk Creek area. Other tree species include: western hemlock; western red cedar; cascara buckthorn; madrone; and red alder. The forest areas provide dense cover for such species as: owls; woodpeckers; sapsuckers; thrushes; and a variety of rodents.

6. Riparian: Riparian habitat is dense vegetative cover associated with water courses. Willows, alders and various shrubs are common. Sparrows, thrushes, warblers, and juncos utilize this habitat.

The principal wildlife habitats of Elk Creek are illustrated in the accompanying atlas. A summary of each habitat type indicating typical vegetation species and representative wildlife is presented in Table 3.

E. Resource Value: The overall resource value of the Elk Creek wetland may be summarized as follows:

1. Through the natural filtering action of aquatic plants and organic matter, the quality of water flowing from the Elk Creek wetland is improved. Sediment and other impurities are trapped and harbor waters and marine resources are thus protected and maintained by the wetland.

HABITAT	TYPICAL VEGETATION	REPRESENTATIVE WILDLIFE
Ponds	Pondweed, Pond Lily, Rushes, Willows, Snags	Ducks, Geese, Kingfisher Heron, Muskrat, Frogs
Pastureland	Grasses, Sedges, Clover, Sorrel, Tansey Ragwort	Egret, Goldfinch, Swallows, Rodents, Moles
Marshland	Saltgrass, Sedges, Arrow-grass, Rushes, Silverweed, Willows	Hawks, Kites, Wrens, Warblers, Blackbirds
Brushland	Huckleberry, Salal, Scotch Broom, Coyote Brush, Ninebark	Quail, Stellar's Jay, Deer, Bear, Feral Pig, Rabbits
Forest	Sitka Spruce, Redwood, Douglas Fir, Shrubs, Ferns, Herbs	Owls, Woodpeckers, Sapsucker, Thrushes, Skunks, Rodents
Riparian	Willows, Alders, Wax-Myrtle, Spirea, Salmonberry, Blackberry	Sparrows, Thrushes, Warblers, Junco, Racoon

TABLE 3: Principal Wildlife Habitats of Elk Creek

2. The Elk Creek wetland acts to some measure as a regulator of surface and subsurface water flow. The wetland helps to retain water during dry seasons and absorb storm impact during periods of heavy rainfall. Thus the wetland protects against both flooding and drought.

3. The Elk Creek wetland functions as important breeding, nesting, resting and feeding grounds for a wide variety of wildlife. The numerous vegetation types found throughout and immediately adjacent to the wetland provides for diversity of habitat and wildlife species.

F. Habitat Sensitivity: Each habitat type in this study varies in its ability to assimilate impacts as well as its sensitivity to change. This variability helps to diversify the entire community, thereby increasing an area's ability to absorb stressful impacts. This section will identify the sensitivity of each habitat by recognizing human needs and impacts: i.e., planning issues. Probably most sensitive and least tolerant to impacts are the pond, marshland and riparian habitats. The pastureland and forest can adjust to impacts somewhat more readily, while the brushland are relatively tolerant.

1. Ponds:

a) Ponds serve as resting areas for game as well as non-game waterfowl and other birds.

b) The water in Elk Creek ponds is that which feeds into the bay and eventually the ocean. Chemicals directly discharged or allowed to seep through groundwater supplies will eventually enter the bay and ocean via these ponds.

c) Vegetation growing in and along the banks of these ponds acts to slow the rate of discharge into the bay as well as the related quantity of sediment.

2. Marshland:

a) Marshlands act as a natural sponge to slow and filter water.

b) This area absorbs water during floods and retains water during dry periods, thus keeping the water table relatively stable.

c) Vegetation removal may result in: 1) flooding during periods of excessive rainfall; or 2) a drop in the water table leading to saltwater intrusion in dry periods.

d) Marshlands provide a unique and valuable wildlife habitat.

3. Riparian:

   a) Upstream land use practices may increase rates of siltation which will decrease water quality.

   b) Excessive siltation and debris may clog marshland and pond areas which could lead to flooding and/or disease problems.

   c) Maintenance of riparian vegetation and/or mitigation of stream vegetation removal will keep rates of siltation in the marsh and the bay stable.

   d) Riparian areas serve as cool protective sites for wildlife feeding, resting and drinking.

4. Pastureland:

   a) Pasturelands are quite frequently used as resting and feeding areas for many birds.

   b) They are also productive and useful agricultural areas.

   c) At the same time they serve as buffers from urban impacts on rural areas.

   d) The improper use of chemicals in these areas may result in contamination to humans and wildlife via water courses and the food chain.

5. Forestlands:

   a) Forests provide man with valuable timber and revenue.

   b) They provide wildlife habitat and act as a corridor for their passage from upland areas to water and feeding sources.

   c) Forests can moderate wind and storms and are able to absorb noise from traffic and industrial areas.

   d) These areas also act to slow runoff.

   e) Forests can be particularly attractive sites for recreation and with wise planning, real estate values can be maintained.

6. Brushlands:

a) Because of its relatively quick ability to replace itself, brushland areas are seen as relatively tolerant of various impacts.

b) Brushlands tend to reduce pedestrian entrances into areas.

c) They also act to buffer noise and wind.

d) They provide protective cover necessary for wildlife to rest, nest, feed and hide in.

VI. POLICIES AND RECOMMENDATIONS

A. Coastal Act Policies: The Coastal Act of 1976 set forth several policies as regards sensitive habitats and marine resources. An environmentally sensitive habitat is defined as:

"...any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments." (Coastal Act, Section 30107.5)

Section 30121 of the Coastal Act defines wetland as follows:

"Wetland" means lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.

Specifically, Coastal Act policies concerned with the maintenance of sensitive coastal habitats and resources are:

30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing alteration of natural streams.

30233. (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible, mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a bioligically productive wetland; provided, however, that in no event shall the size of the wetland area used for such boating facility, including berthing space, turning basin, necessary navigation channels, and any necessary support service facilities, be greater than 25 percent of the total wetland area to be restored.

(4) In open coastal water, other than wetlands, including streams, estuaries and lakes, new or expanded boating facilities.

(5) Incidental public service purposed, including, but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource-dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such to appropriate beaches or into suitable longshore current systems.

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, of otherwise in accordance with this division.

30236. Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible and be limited to (1) necessary water supply projects; (2) flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.

30607.1 Where any dike and fill development is permitted in wetlands in conformity with this division, mitigation measures shall include, at a minimum, either acquisition of equivalent areas if equal or greater biological productivity or opening up equivalent areas to tidal action; provided, however, that if no appropriate restoration site is available, an in-lieu fee sufficient to provide an area of equivalent productive value or surface areas shall be dedicated to an appropriate public agency, or such replacement site shall be purchased before the dike or fill development may proceed. Such mitigation measures shall not be required for temporary or short term fill or diking; provided, that a bond or other evidence of financial responsibility is provided to assure that restoration will be accomplished in the shortest feasible time.

B. Present Local Policies: County Policies concerning marshlands and riparian habitats were adopted in the Del Norte County General Plan of 1976. Policies from the conservation element designed towards the continued use and maintenance of wildlife, habitat and vegetation are:

1. The County should require Environmental Impact Reports to insure the protection of fish, wildlife and plant species in the area considered for development.

2. Development to "improve" the Klamath and Smith Rivers with flood control facilities should be carefully reviewed and evaluated. Efforts should be made to maintain the natural function of the rivers.

3. The County should maintain all existing species of fish, wildlife, and vegetation for their economic, intrinsic and ecological values as well as providing adequate protection of rare and endangered species.

4. Del Norte County should provide for diversified recreational use of fish and wildlife while providing preservation of their habitat.

5. The County should maintain forest lands in production under the multiple use concept which includes recreation and wildlife habitat.

6. Del Norte County should recognize and encourage the various uses of wildlife and their habitat, including such activities as passive watching, scientific studies, educational purposes and hunting and fishing.

7. The following areas are recognized as major locations of excellent wildlife habitat, native or natural vegetation and of aesthetic value. These areas should be maintained as wildlife habitat and protected from adverse activity. No further commitment to development should be allowed except that which is in the best interest of the public health, safety and welfare, or as noted.

   a) All offshore rocks and islands (seaward of the mean high tide line) excluding Whaler and Battery Islands.

   b) Inland of the mean high tide line to the first line of vegetation (except in the areas of coastal bluffs when the area will be to the crest of the bluff), excluding the harbor area.

   c) Lakes Earl and Talawa and their immediate marshland, allowing continued agricultural uses.

   d) Sand dunes and wet sand areas, excluding limited development in appropriate areas.

   e) The tidal influenced areas of the Smith and Klamath Rivers. Commercial-Recreational and Public-Recreational development should be allowed but be carefully controlled to prevent significant alteration of the habitat areas. Gravel extraction should be allowed on a small scale consistent with local policy and state regulations.

8. The County should establish riparian corridors along local streams, creeks and sloughs to maintain their aesthetic appeal, wildlife habitat, control of erosion, and to provide natural vegetation separations between developed uses.

9. The County should establish selected woodland and forest areas to provide aesthetic appeal, wildlife habitat and natural separation between residential, commercial, industrial and other uses as warranted.

10. The County should pursue a cooperative role with the Forest Service in the protection and continued maintenance of all plants and animal species and their habitat.

Also of interest to this Elk Creek study are existing County policies regarding extractive resources.

1. No extraction should be permitted in areas where it would significantly harm, alter or destroy wildlife habitat, fisheries or archeological or historic sites and no adequate mitigation measures are deemed adequate.

2. Operators of extraction operations should take all precautions necessary to avoid contamination from waste disposal or general operation activity of the site, nearby streams or rivers, air and the environment in general. Existing and future local, State and Federal regulations will be met or exceeded.

C. <u>LCP Policies</u>: Policies concerning sensitive habitats as well as marine, water and extractive resources have been developed in other components of Del Norte County's Local Coastal Plan. This section will present specific policies and recommendations for the Elk Creek Special Study area.

1. Performance standards shall be developed and implemented which will guide development adjacent to upland marsh areas identified in the Elk Creek Special Study so as to permit utilization of land areas compatible with other policies while providing adequate maintenance of the subject marsh area.

2. A buffer strip, shall be maintained in natural conditions around the Elk Creek wetlands where adjacent land uses are found incompatible with the productivity or maintenance of the wetlands.

3. New development adjacent to the Elk Creek wetlands shall not result in adverse levels or additional sediment, runoff, noise, wastewater or other disturbances.

4. Snags shall be maintained within the Elk Creek wetland for their value to wildlife.

5. No motorized vehicle traffic shall be permitted within the Elk Creek wetlands except for agriculture and forestry.

6. Riparian vegetation along the course of Elk Creek and its branch streams shall be maintained for their qualities of wildlife habitat and stream buffer zones.

7. In areas where the boundary of the Elk Creek wetland is in doubt, a detailed survey of a parcel and the location of the marsh shall be required to determine the suitability of said parcel for dwelling or other building site and sewage disposal system before a permit is issued.

8. In that the pasturelands in the lower portion of Elk Creek are subject to extensive flooding and provide valuable habitat for wildlife, they should be maintained in their existing use as agricultural grazing.

9. Vegetation and debris removal in the Elk Creek wetland shall

be limited to that necessary to maintain the free flow of the drainage courses and only when excessive impediment creates flooding hazards on adjacent lands.

10. The County should encourage and support educational programs in schools, park programs and community organizations which seek to increase public awareness and understanding of sensitive habitats and the need for their protection.

11. The County should investigate the feasibility and seek funds to establish a bicycle/hiking trail along the old Hobbs-Wall railroad right-of-way in the lower portions of Elk Creek.

A P P E N D I X

APPENDIX I. Plants in the Elk Creek Study Area.

Scientific Name	Common Name
FERNS:	
Blechnum Spicant	Deer Fern
Dryopteris arguta	Wood Fern
Polystichum munitum	Sword Fern
Pteridium aquilinium	Bracken Fern
HERBS:	
Achillea borealis	Yarrow
Anagallis arvensis	Pimpernel
Asarum caudatum	Wild-Ginger
Carex obnupta	Slough Sedge
Chrysanthemum leucanthemum	Ox-eye Daisy
Cirsium vulgare	Bull Thistle
Cyperus niger	Umbrella-Sedge
Daucus Carota	Queen Anne's Lace
Digitalis purpurea	Foxglove
Epilobium Watsonii	Fireweed
Equisetum arvense	Horsetail
Heleocharis palustris	Common Spike-Rush
Iris Douglasiana	Iris
Juncus effusus	Soft Rush
Juncus Lesueurii	Soft Rush
Lotus formosissimus	Bi-Colored Lotus
Lupinus littoralis	Lupine
Lysichiton americanum	Yellow Skunk-Cabbage
Maianthemum dilatatum	False Lily-of-the-Valley
Nuphar polysepalum	Yellow Pond-Lily
Plantago Hookeriana	Plantain
Potentilla Egedei	Silverweed
Potentilla palustris	Marsh Potentilla
Prunella vulgaris	Selfheal
Ranunculus repens	Buttercup
Rumex Acetosella	Sheep Sorrel

APPENDIX I. Plants in the Elk Creek Study Area (continued).

Scientific Name	Common Name
Rumex crispus	Curley Dock
Senecio Jacobaea	Tansy Ragwort
Sparganium eurycarpum	Giant Bur-Reed
Stachys Emersonii	Hedge-Nettle
Taraxacum officinale	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Triglochin concinna	Arrow-Grass
Typha latifolia	Cattail
Viola adunca	Violet
GRASSES:	
Agrostis alba	Redtop Grass
Aira caryophyllea	Hairgrass
Anthoxanthum odoratum	Sweet Vernal Grass
Bromus rigidus	Ripgut
Distichlis spicata	Salt Grass
Festuca sp.	Fescue
Poa sp.	Bluegrass
SHRUBS:	
Baccharis pilularis	Coyote Bush
Cytisus scoparius	Scotch Broom
Gaultheria Shallon	Salal
Ledum columbianum	Labrador Tea
Lithocarpus ________	Tanoak
Lonicera involucrata	Twinberry
Malus fusca	Oregon Crab Apple
Physocarpus capitatus	Ninebark
Rhamnus Purshiana	Cascara
Rhus diversilobum	Poison-Oak
Ribes lacustre	Swamp Gooseberry
Rosa sp.	Wild Rose
Rubus parviflorus	Thimbleberry
Rubus procerus	Himalaya-Berry

APPENDIX I. Plants in the Elk Creek Study Area (continued).

Scientific Name	Common Name
Rubus spectabilis	Salmon Berry
Rubus vitifolius	California Blackberry
Salix Hookeriana	Hooker's Willow
Salix sp.	Willow
Sambucus callicarpa	Elderberry
Spirea Douglasii	Douglas Spiraea
Vaccinium ovatum	California Huckleberry
Vaccinium parvifolium	Red Huckleberry
TREES:	
Alnus rubra	Red Alder
Arbutus Menziesii	Madrone
Chamaecyparis Lawsoniana	Port-Orford-Cedar
Cornus nuttalli	Pacific Dogwood
Myrica californica	Wax-Myrtle
Picea sitchensis	Sitka Spruce
Pinus contorta	Shore Pine, Bull Pine
Pseudotsuga Menziesii	Douglas-Fir
Sequoia sempervirens	Redwood
Thuja plicata	Western Redcedar
Tsuga heterophylla	Western Hemlock
Umbellaria californica	California-Bay, Oregon-Myrtle

APPENDIX II. Birds in the Elk Creek Study Area.

Common Name	Scientific Name
American Bittern	*Botaurus lentiginosus*
*American Goldfinch	*Spinus tristis*
American Green-winged Teal	*Anas crecca carolinensis*
American Kestrel	*Falco sparverius*
American Widgeon	*Mareca americana*
Arctic Loon	*Gavia arctica*
Bald Eagle	*Haliaeetus leucocephalus*
Bank Swallow	*Riparia riparia*
Barn Owl	*Tyto alba*
*Barn Swallow	*Hirundo rustica*
*Belted Kingfisher	*Megaceryle alcyon*
Black Brant	*Branta bernicla*
Black-crowned Night Heron	*Nycticorax nycticorax*
Black-necked Stilt	*Himantopus mexicanus*
Black Tern	*Chlidonias niger*
Blue-winged Teal	*Anas discors*
Bonaparte's Gull	*Larus philadelphia*
California Quail	*Lophortyx californicus*
Caspian Tern	*Hydroprogne caspia*
Cattle Egret	*Bubulcus ibis*
*Cedar Waxwing	*Bombycilla cedrorum*
Cinnamon Teal	*Anas cyanoptera*
Common Goldeneye	*Bucephala clangula*
*Common Loon	*Gavia immer*
Commom Merganser	*Mergus merganser*
Common Nighthawk	*Chordeiles minor*
Common Snipe	*Capella gallinago*
*Cooper's Hawk	*Accipiter Cooperii*
Forster's Tern	*Sterna forsteri*
Glaucous-winged Gull	*Larus glaucescens*
*Great Blue Heron	*Ardea herodias*
*Green Heron	*Butorides virescens*
Killdeer	*Charadrius vociferus*

APPENDIX II. Birds in the Elk Creek Study Area (continued).

Common Name	Scientific Name
Long-billed Dowitcher	*Limnodromus scolopaceus*
*Long-billed Marsh Wren	*Telmatodytes palustris*
Long-eared Owl	*Asio otus*
Mallard	*Anas platyrhynchos*
Marbled Godwit	*Limosa fedoa*
*Marsh Hawk	*Circus cyaneus*
Northern Shoveler	*Anas clypeata*
Osprey	*Pandion haliaetus*
Peregrine Falcon	*Falco peregrinus*
*Pileated Woodpecker	*Dryocopus pileatus*
Pied-billed Grebe	*Podilymbus podiceps*
Pintail	*Anas acuta*
Prairie Falcon	*Falco mexicanus*
Red-breasted Merganser	*Mergus serrator*
Redhead	*Aythya americana*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-throated Loon	*Gavia stellata*
Red-winged Blackbird	*Agelaius phoeniceus*
Ring-billed Gull	*Larus delawarensis*
Ring-necked Duck	*Aythya collaris*
Rough-legged Hawk	*Buteo lagopus*
Rough-winged Swallow	*Stelgidopteryx ruficollis*
Ruddy Duck	*Oxyura jamaicensis*
Scrub Jay	*Aphelocoma coerulescens*
Sharp-shinned Hawk	*Accipiter striatus*
Short-eared Owl	*Asio flammeus*
Snowy Egret	*Leucophoyx thula*
Snowy Owl	*Nyctea scandiaca*
Snowy Plover	*Charadrius alexandrinus*
Solitary Sandpiper	*Tringa solitaria*
* Song Sparrow	*Melospiza melodia*
Sora Rail	*Porzana carolina*

APPEDNDIX II. Birds in the Elk Creek Study Area (continued).

Common Name	Scientific Name
Spotted Sandpiper	Actitis macularia
*Stellar's Jay	Cyanocitta stelleri
Tree Swallow	Iridoprocne bicolor
Tricolored Blackbird	Agelaius tricolor
Turkey Vulture	Cathartes aura
*Vaux's Swift	Chaetura vauxi
Violet-green Swallow	Tachycineta thalassina
Virginia Rail	Rallus limicola
Whistling Swan	Olor columbianus
*White-tailed Kite	Elanus leucurus
White-winged Scoter	Melanitta fusca
Willet	Catoptrophorus semipalmatus
Wilson's Phalarope	Steganopus tricolor
Wood Duck	Aix sponsa
*Wrentit	Chamaea fasciata

* Observed in the course of this study.

APPENDIX III. Mammals in the Elk Creek Study Area.

Common Name	Scientific Name
Beaver	*Castor canadensis*
*Beechey Ground Squirrel	*Otospermophilus beecheyi*
Big Brown Bat	*Eptesicus fuscus*
*Black Bear	*Ursus americanus*
Black Rat	*Rattus rattus*
*Black-tailed Deer	*Odocoileus hemionus columbianus*
Brush Rabbit	*Sylvilagus bachmani*
California Myotis	*Myotis californicus*
*Chimpanzee	*Pan troglodytes*
Coast Mole	*Scapanus orarius*
Coyote	*Canis latrans*
Deer Mouse	*Peromyscus maniculatus*
Dusky-footed Wood Rat	*Neotoma fuscipes*
Gray Fox	*Urocyon cinereoargenteus*
Gray Squirrel	*Sciurus griseus*
Hoary Bat	*Lasiurus cinereus*
Little Brown Myotis	*Myotis lucifugus*
*Long-tailed Weasel	*Mustela frenata*
Marsh Shrew	*Sorex bendiri*
Mountain Beaver	*Aplodontia rufa*
Muskrat	*Ondatra zibethica*
Pacific Shrew	*Sorex pacificus*
*Pig	*Sus scrofa*
Pocket Gopher	*Thomomys bottae*
Porcupine	*Erethizon dorsatum*
Raccoon	*Procyon lotor*
River Otter	*Lutra canadensis*
Spotted Skunk	*Spilogale putorius*
Striped Skunk	*Mephitis mephitis*
Townsend Chipmunk	*Eutamias townsendi*
Trowbridge Shrew	*Sorex trowbridgei*
Western Harvest Mouse	*Reithrodontomys megalotis*
White-footed Vole	*Phenacomys albipea*

*Observed in the course of this study.

APPENDIX IV. Amphibians and Reptiles in the Elk Creek Study Area.

Common Name	Scientific Name
Bull Frog	*Rana catesbeiana*
California Slender Salamander	*Batrachoseps attenuatus*
Gopher Snake	*Pituophis melanoleucus*
*Northwestern Garter Snake	*Thamnophis ordinoides*
Pacific Giant Salamander	*Dicamptodon ensatus*
*Pacific Tree Frog	*Hyla regilla*
Red-legged Frog	*Rana aurora*
Rough-skinned Newt	*Taricha ganulosa*
Western Fence Lizard	*Sceloporus occidentalis*
Western Pond Turtle	*Clemmys marmorata*
Western Toad	*Bufo boreas*

* Observed in the course of this study.

GLOSSARY

adfluvial fishery: composed of freshwater fish

anadromous fishery; composed of fish which migrate from the sea back to a river to spawn

diurnal: daily change

ecotone: the transitional zone between two distinct communities, characterized by a mixture of plant and animal species of its own.

extractive resource: mineral derived resource i.e., gravel, clay

food chain: refers to the dependence for food or organisms upon each other in a series, beginning with plants and ending with the largest carnivores

habitat: the place where an organism lives

herbaceous: herb-like; not woody

impediment: debris i.e., slash; gravel

inundated: flooded

leach field: an area used for filtering waste water

marine terrace: land which was once submerged below sea level but has since been uplifted

Multiple use concept: the idea of using an area for a combination of various uses, i.e.; recreation, agriculture, forestry

Pacific Flyway: The area along the Pacific coast which birds use as a part of their migration route from north to south

panchromatic film: film which is sensitive to all visible wavelengths-has a sensitivity range similar to the human eye

permeability: the ability of soil or rock to transmit water or air riparian: native vegetation associated with watercourses.

rivulets: small drainageways where water runs only during periods of excess runoff.

saltwater intrusion: displacement of fresh surface water or groundwater by the advance of seawater sometimes caused by well overdrafting.

second growth: a tree which comes up after the removal of the old stand by cutting, fire, etc.

U-2 infrared color photograph: photograph taken at high altitude which have recorded visible light and some reflected infrared radiation.

wetland: "Wetland" means lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens. (Section 30121, Coastal Act of 1976)

Wetland as used in this report is further defined as land where the water table is at, near, or above the surface supporting the growth of water-loving plants (hydrophytes). As defined wetland areas include: all marshlands; riparian corridors; seasonally flooded areas; and poorly drained pasturelands.