

Mitigation Banking at Jacoby Creek Land Trust

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Mitigation banking is the restoration, creation, enhancement, and in exceptional circumstances, preservation of a wetland. Mitigation banks are dual purposed, providing stream and habitat compensation for adverse impacts to similar ecosystems. This process is utilized for the compensation of unavoidable wetland losses prior to development actions, when such mitigation cannot be achieved on site. The goal is to replace the loss of function and value of the specific ecosystem services adversely affected by a proposed project. Mitigation banking has become increasingly popular as a mitigation tool.

Since the 1980's the Army Corp of Engineers and USEPA (United States Environmental Protection Agency) have been implementing mitigation banks to help restore and conserve habitats. Mitigation is tool for optimizing land use, increasing profits, while preserving and improving land quality. Over 950 wetland and stream mitigation banks have been approved by the Army Corps of Engineers and USEPA as of January 2010. This has ensured the well-being of over 960,000 acres of vital habitats. These are permanently protected areas that are deemed valuable and contain productive stores of natural resources. The main issues addressed on each site are water quality, flood amelioration, ecological diversity and managed wildlife habitat (Mitigation Banks, 2011). These banks serve as offsets for adverse impacts that have been sustained elsewhere or "off-site mitigation". A specified number of credits are issued to bank owners, who then sell them to developers once they are approved by federal agencies (Conservation Banks, 2011). Mitigation credits represent the environmental value of the restoration that is being implemented for a specific area. The value of these credits vary depending on hydrology, vegetation and presence of

endangered species. These are the main parameters that are used to verify the function of the site, the number of credits that will be awarded to the site, and how much the credits are worth (Ecosystem Marketplace, 2010). The national cost of wetlands ranges from \$3,000 to \$653,000 per credit; California wetlands range from \$50,000 to \$400,000 per credit. The national range of stream value per credit is \$15-\$700 with an average of about \$260. Some habitats such as vernal and tidal pools drive up the value of the credits due to the fact that they are rare and beneficial (Mitigation & Conservation Banking in the United States, 2010).

In addition to credits, compensation ratios are good indicators of how much of an area needs to be mitigated to make up for lost or degraded habitats. The number of acres restored, created or enhanced for each parcel of impacted habitat is known as the compensation ratio. This form of compensation ratio can vary based on the conditions of the site and needs of the species that inhabit the area. The basic mitigation ratio is 2:1, but it can be as low as 1:1 or much higher (e.g. 10:1) depending on the conditions of the restoration. Since there have been no scientific studies that quantify temporal loss of functions in a habitat, the amount of land requiring restoration to compensate for the loss of habitat is based on the judgment of practitioners (Rationale for the Guidance on Recommended Ratios for Compensatory Mitigation, 2005). Compensation ratios promote national consistency and increase responsibility by holding businesses accountable for the habitat destruction they caused. This forces companies to reconsider the ecological, financial and long term integrity of mitigation banking and recognize how their project impacts the environment. These ratios and credits are an important factor for meeting the goals of the Clean Water Act: to restore the physical,

biological and chemical integrity of the nation's waters. Comprehensive monitoring is important in ensuring the quality of compensation for a destructed site.

Mitigation banking has several drawbacks that can deviate from its goals. Habitat restoration projects may require long lead times to ensure success before credits are withdrawn. Post project preparation can take up to four years and post project monitoring can last anywhere from one to five years. There is also significant time and effort that is required to set up and implement agreements. These drawbacks were collected from a document found online; see appendix for link.

Wetlands are among the most credited ecosystems due to historical land use. Wetlands weren't always known for the important ecosystem services they provide to people and the environment. Wetlands were once considered worthless because of their inability to produce crops or timber for harvesting. Wetlands were regularly drained or filled to provide productive land for agricultural uses. Naturalists began to explore the benefits of wetlands and discovered that they were an important staple in our environment. Wetlands are efficient at taking in sun rays to feed the food chain, and they are important in the global cycle of water, nitrogen, carbon, and sulfur. They also provide habitat for birds and aquatic or threatened species, and are useful for water storage, purification, flood prevention, timber and food production. Due to human interference, wetlands are subject to a range of damages which negatively affects a wetlands' quality or size. In the 1600's there were over 220 million acres of wetlands in the lower 48 states (Major Causes of Wetland Loss and Degradation). Since then, there has been a rapid decline in wetlands in the United States. There are many activities associated with the degradation of wetlands, including agriculture, commercial and

residential development, road construction, impoundment, resource extraction, dredge disposal, and waste. The effects generated by these activities include: sediment, nutrient, pesticide, salt, heavy metal, and selenium pollution; buildup of weeds; low dissolved oxygen; and extreme pH (Major Causes of Wetland Loss and Degradation). Today, over half of the nation's original wetlands have been lost due to drainage, or filled in for agriculture. California alone has lost about 99% of their natural wetlands (Major Causes of Wetland Loss and Degradation).

From Mendocino to Humboldt County there are approximately 31,300 acres of wetlands (Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone , 1994). Humboldt Bay is home to several hundred of those wetland acres and is fed by five tributaries. The Jacoby Creek Land Trust in Humboldt County, California is one of five tributaries and the only remaining tributary unaltered by logging.

Jacoby Creek prior land use history and current conservation efforts makes it an ideal site for a mitigation bank. In the 1860's Jacoby Creek was densely populated by alder, willow, pepperwood, and cottonwood, as well as elk, deer, bear and salmon. For the first 30 years of the timber industry, loggers selected trees along river banks and tidewaters to be harvested, so that they could float the logs to mills downstream. Streams running from the hills into the bay were altered or straightened in order to more easily transport old growth logs to trains and ships (Natural Resources Services RCAA, 2005). Once all of the viable trees along waterways were cut, oxen and horses were used to drag logs to the water. Harvesting ranges increased once railroads were introduced to the area. There are still railroad remnants that can be seen through the marsh at Old Arcata and Jacoby Creek roads. Around 1910 swamp and overflow lands

(once marshlands) were converted into pastureland. This resulted in increased sedimentation and compaction due to the grazing of cattle.

Jacoby Creek today is under the management of the Jacoby Creek Land Trust. This organization is community based and dedicated to the protection of land with a conservation ideology for scientific, historic, cultural, educational, recreational, and scenic values of the Jacoby creek watershed. The area protected by the land trust is open to the public and is used by Humboldt State University environmental science students to perform experiments and learn restoration techniques. The land is also home to several small restoration projects focused on repairing damage left behind from the timber industry due to log decks and roads. Jacoby Creek Land Trust is attempting to restore several acres of wetlands impacted by past logging activities. The creation of a mitigation bank would fund future restoration projects, conserve culturally and ecologically important wetlands, and provide an excellent study aid to HSU Students.

In preparation for a mitigation bank at the Jacoby Creek Land Trust, a prospectus must be drafted and given to potential investors. The prospectus contains information about the site including: site inventory, wetland delineations, historical trajectory and ownership information. The prospectus also includes restoration plans to guide landowners through the mitigation banking process.

The restoration plan included in the prospectus for Jacoby Creek Land Trust will include stream and wetland restoration. Restoration will be focused on two sites on the property. The first site is a meander scar that running through grazed pasture (see figure 1). Through restoration, the meander scar could easily be reincorporated into

seasonal wetlands and backwater channels. During flood events, overflowing water could link the main stem of the creek to the meander scar and providing slackwater habitat for migrating fish and juvenile rearing areas. The second site is a elongated oxbow lake running parallel to the main stem of Jacoby Creek supplied by upland runoff. Site number 2, as seen in figure 2, is connected to the main stem of the stream seasonally by a small creek highly trampled by cattle. Both sites are planned to be modified to encourage a significant increase of native riparian species and encourage growth of wetland and facultative wetland species. Suggested restoration activities for the two sites identified in the site map (Figure 3) are as follows:

1. Reposition levee to allow for yearly overbank flow.
2. 100 foot exclusion fence around remnant meander scars
3. Plant natives in and around scar
 - a. Willow
 - b. Cottonwood
 - c. Sedges
 - d. Rushes
4. Willow wear along bank, capture sediment
5. Insert LWD into site 1
6. Day light and widen stream from Jacoby Creek to Site 2
 - a. Exclusion fence around stream

After restoration is complete, post assessment work will determine how many credits can be banked at the site and the value of those credits. The site will be evaluated before and after restoration to determine lift, or how much the site has been

improved. Lift will play a large role in determining how many credits the site will be given. Once the site has been restored and credits have been assigned, a banking organization must be found to advertise the credits to.

Wetlands are extremely valuable and should be protected whenever possible. The goals forward thinking community of Humboldt County creates a strong support system and physical means for the creation of a mitigation bank on Jacoby Creek. The mitigation bank would not only provide an educational opportunity for community members and Humboldt State University students but also provide a source of revenue for Jacoby Creek Land Trust to purchase further acres of land for conservation and restoration. The revenue generated by the selling of mitigation credits and the involvement of Humboldt State University students allows this project to be completely sustainable post grant. In circumstances where the destruction of wetlands is unavoidable, mitigation banking is an ideal way to ensure that we do not lose the critical ecosystem services that they provide to the world.

Prospectus for Mitigation Banks [Revised September 2010 by the Multi-Agency Product Delivery Team]

Please refer to the Cover Sheet, revised September 2010, for information and instructions related to the submission requirements for a mitigation bank proposal.¹ Please provide the following information and a copy of this checklist with the submittal of a Prospectus:

Proposed Bank Name -Jacoby Creek Land Trust Mitigation Bank

Bank contacts – Include the name, address, phone, fax, and email for: Bank Sponsor, Property Owner, Consultants, etc;

Jacoby Creek Land Trust. PO Box 33, Bayside, CA 95524. (707) 822-0900 ~ jcstrandtrust@yahoo.com.

Susan Ornelas (Member of Board of Directors): 707-826-2722

General location map and address of the proposed Bank Property (figure 3)



Accurate current map of the proposed Bank Property on a 7.5-minute USGS map showing proposed boundaries of the mitigation bank;

Jacoby Creek Mitigation Site: Wetland Delineations



Site conditions description. This should include a BRIEF description of: site conditions; habitats and species known or potentially present; photos of the Bank Property; description and acreage of existing wetlands and other waters of the U.S. present on the proposed Bank Property; hydrology; methods for establishing, restoring, rehabilitating, and/or preserving wetlands and other waters of the U.S., and habitat for federal, and state listed species; and site history, including past and present land uses, surrounding land uses and zoning along with the anticipated future development in the area;

Humboldt Bay located in northern California's Humboldt County, is a highly productive multi-basin, bar-built coastal lagoon. The bay is home to over 100 species of marine and estuarine fish, including federally endangered species: Coho salmon and Tidewater goby (Natural Resources and Hazards). Decades of logging and overgrazing have altered the morphology and composition of the streams in the area, and Jacoby creek is Humboldt Bay's last remaining un-diverted/altered tributary stream (Murry, Robert.1980). The Jacoby Creek Watershed drains an area of 17.34 square miles and contains a 11.1mile long main channel flowing northwesterly into Humboldt Bay (Murry, Robert.1980).

For thousands of years streams carved out channels through ancient Franciscan formations forming Cretaceous sediments (Murry, Robert.1980). The most common of these sediments in Jacoby Creek is greywacke sandstone, coarse dark gray sandstone of firmly cemented materials (Murry, Robert.1980). The greywacke parent material, recent alluvium deposits and climate of the region has formed three distinct genetically related soils associated with the Jacoby Creek floodplain area:

Bayside - Bayside occupies the lowest or basin position. This soil is characteristic of the reclaimed tidal marsh flats at the edge of Arcata Bay. It occurs at elevations from 10' to 50'. This soil is imperfectly to poorly drained and is fine textured (Murry, Robert.1980).

Loleta - Loleta occurs in a fan or low terrace position at elevations below 100'. It has a dark surface and is moderately to imperfectly drained and medium textured (Murry, Robert.1980).

Russ - Russ is an undifferentiated young alluvial soil occurring on stream banks at elevations between 50' and 150'. It is better drained and coarser textured than the other two alluvial soils. It is also more strongly acid and lighter in color (Murry, Robert.1980).

The unique climate of Humboldt County has a strong influence on both abiotic and biotic factors in the Jacoby Creek Watershed. In the summer a subtropical high-pressure zone lies off the Oregon coast in the Pacific Ocean (Murry, Robert.1980). Outbreaks of cold marine air from polar regions sweeping eastward, cause the subtropical high pressure zone to descend, preventing it from precipitating its moisture; creating summer drought period. Most rain in the Humboldt county region falls between November and April (Murry, Robert.1980). In 1972, the city of Sunny Brae reported a ten-year average of 60.65 inches (Murry, Robert.1980). Jacoby Creek Watershed receives year round precipitation due to coastal fog and oceanographic effect brought on by the mountainous terrain in its upper basin. The upper basin is receives year round precipitation, as a result of moisture-laden coastal fog cooling as they are forced upward in elevation as they climb the mountains in the upper basin, allowing them to hold less water (Murry, Robert.1980). The year round precipitation provides for year round stream flows.

The year round precipitation and mountains terrain in the upper basin produce arterial streams. These streams are classified as either 1st, 2nd, third, forth or fifth orders depending on how many streams they intersect with (Murry, Robert.1980). The smallest streams, first order, have no surface tributaries and flow intermittently. Two first order streams join to form a channel segment of order two, and so forth until the highest

order channel segment is formed. Jacoby Creek has over 160 first order segments, 40 second order, 11 third order, 2 fourth order and the 11.5 mile main stem fifth order (Murry, Robert.1980). In terms of miles of stream, Jacoby Creek has 26.5 miles flowing the year long and 49.8 miles of intermittent tributaries (Murry, Robert.1980). The six square miles of the upper basin averaged was 15.6 cfs or 11,290 acre feet a year from 1954-1965 (Murry, Robert.1980).

The unique regionally microclimate and year round precipitation allow for a wide range of plant communities. The following plant communities have been identified with the Jacoby Creek Watershed: Salt Marsh, North Coastal Coniferous Forest, Redwood Forest, Douglas Fir Hardwood, Mixed Evergreen Forest, Coastal Prairie and Riparian. Situated on top of the mountainous ridge tops are coastal prairie plant communities.

The species in these plant communities include:

Riparian/Streamside Vegetation- sedge, cattail (*Typhalatifolia*), rush (*Juncus bufonius*), brass buttons (*Cotula coronopifolia*), spike-rush (*Eleocharis macrostachya*). willow (*Salix* spp.), *S. parksiana*, *S. lasiandra*, *S. sitchensis*, *Equisetum hymale*, *E. telmateia*, (*Populus trichocarpa*). (Murry, Robert.1980)

Understory Vegetation- ninebark (*Physocarpus capitatus*), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parvifolius*), stink currant (*Ribes bracteosum*), (*Rubus ursinus*), rchard grass (*Holcus lanatus*), chickweed (*Stellaria media*), siberian miner's lettuce (*Montia sibirica*), new Zealand fireweed (*Erechtites prenanthoides*), western coltsfoot (*Petasites palmatus*), sweet clover (*Meliolotus alba*, (*Alnus oregona*), licorice fern (*Polypodium scouleri*), figwort (*Scrophularia californica*), wood rush (*Luzula subsessilis*). (Murry, Robert.1980)

Conifers- sitka spruce (*Picea sitchensis*), grand fir (*Abies grandis*), canoecedar (*Thula plicata*), western hemlock (*Tsuga heterophylla*), douglas fir (*Pseudotsuga menziesii*), port orford cedar (*Chamaecyparis lawsoniana*), big-leaf maple (*Acer macrophyllum*), cascara (*Rhamnus purshiana*). (Murry, Robert.1980)

Redwood Forest Plant Community- swordfern (*Polystichum munitum*), redwood violet (*Viola sempervirens*),salal (*Gaultheria shallon*), rhododendron (*Rhododendron macrophyllum*), black and red huckleberry (*Vaccinium ovatum* and *parvilolium*), wax myrtle (*Myrica californica*), redwood sorrel (*Oxalis oregona*), redwood violet, trillium (*Trillium ovatum*), fetid Adder's tongue (*Scoliopus bigelovii*), anemone (*Anemone quinquefolia*), vanilla grass (*Hierochloe occidentalis*), fairy lantern (*Disporum smithii*),woodland star (*Trientalis latifolia*), queen's cup (*Clintonia andrewsiana*), red-flowering currant (*Ribes sanguinum*), red elderberry (*Sambucus callicarpa*), lady fern (*Athyrium filix-femina*), spike moss (*Selaginella oregona*). (Murry, Robert.1980)

Common Herbs- redwood sorrel, redwood violet, inside out flower (*Vancouveria hexandra*), fairy bells (*Disporum smithii*), Yerba de Selva (*Whipplea modesta*), red-flowered honeysuckle predominate. (Murry, Robert.1980)

Uncommon Species in Jacoby Creek Watershed- calypso orchid (*Calypso bulbosa*), rattlesnake plantain (*Goodyera oblongifolia*), burning bush (*Euonymus occidentalis*), yew (*Taxus brevifolius*). (Murry, Robert.1980)

The perennial cold water of, and dense forest in the Jacoby Creek Watershed provide excellent habitat for cold water aquatic species and an abundance of terrestrial

wildlife. Coho Salmon (*Oncorhynchus kisutch*) and Steelhead Trout (*Salmo gairdnerii*) and Coastal Cutthroat Trout (*Salmo clarkii*) have been seen and documented on the site (Murry, Robert.1980). Anadromous fish species such as Three-spined Stickleback, Pacific Lamprey and Sculpin are found in the waters of the creek (Murry, Robert.1980). The following wildlife that has been documented to occur in Jacoby Creek Watershed:

KEY

C	Common or resident	?	Unknown
U	Uncommon	V	Visitant
R	Rare	SV	Summer Visitant
X	Species present, status undertermined	WV	Winter Visitant
		E	Extinct

Amphibians

Northwestern Salamander	X	Clouded Salamander	?
Pacific Giant Salamander	C	Arboreal Salamander	?
Olympic Salamander	X	California Slender Salamander	X
Western Red-bellied Newt	C	Western Toad	C
Rough Skinned Newt	X	Pacific Tree Frog	C
Ensatina	X	Red-legged Frog	C
Bull Frog	?	Tailed Frog	?

Reptiles

Pacific Pond Turtle	U	Common Gartersnake	X
Northwestern Fence Lizard	C	Western Rattlesnake	R
Western Skink	C	Rubber Boa	X
Southern Alligator Lizard	?	Pacific Gopher Snake	X
Northern Alligator Lizard	?	Western Gartersnake	X
Sagebrush Lizard	X	Sharp-tailed Snake	?
		Ring-necked Snake	?

KEY

A	Abundant	r	Resident
C	Common	s	Summer visitant
U	Uncommon	w	Winter visitant
R	Rare	v	Irregular visitant
cas	Casual	m	Spring and fall migrant
Ac	Accidental	sp	Spring migrant
*	Known to breed	f	Fall migrant

** Arctic Loon	** Snowy Egret: U-r: *
** Red throated Loon	Black-crowned Night Heron: C-r: *
** Common Loon: C-w: R-s	White-faced Ibis: Ac-f
** Eared Grebe: C-w	** Black Brant: U-f: R-w: A-sp
** Western Grebe: C-w: U-s	Ross's Goose: Cas-f
** Pied-billed Grebe: U-r: *	Mallard: C-r: *
** Brown Pelican: C-s, f	** Gadwall: U-w: R-s: *
** Double-crested Cormorant: C-r:*	** Pintail: C-w: R-s: *
Great Blue Heron: C-R:*	** Common Teal: Cas-w
Green Heron: U-r: *	** Green-winged Teal: C-w: R-s: *
Common Egret: C-r: *	** Blue-winged Teal: R-s: *

** Cinnamon Teal: C-s: R-w: *	California Quail: C-R: *
** European Widgeon: R-w	Ring-necked Pheasant: R-r: *
** American Widgeon: C-w	Coot: C-w: U-s: *
** Shoveler: C-w: R-s:*	** Semipalmated Plover: U-w: R-s
** Redhead: C-w	Killdeer: A-w: C-s: *
** Canvasback: C-w	** Black-bellied Plover: C-w: R-s
** Greater Scaup: C-w:R-s	** Black Turnstone: C-w
** Lesser Scaup: C-w: R-s	Common Snipe: C-w
** White-winged Scoter: C-w: U-s	** Long-billed Curlew: U-w
** Ruddy Duck: C-w: R-s: *	** Whimbrel: U-m
Common Merganser: C-r: *	** Willet: C-w: U-s
Turkey Vulture: C-s: R-w: *	** Greater Yellowlegs: C-w
White-tailed Kite: U-r: *	** Lesser Yellowlegs: U-f: Ac-sp
Goshawk: R-r	** Knot: U-w
Sharp-shinned Hawk: C-w: R-s: *	** Pectoral Sandpiper: R-f
Cooper's Hawk: U-r	Least Sandpiper: C-w
Red-tailed Hawk: C-r: *	Dunlin: A-w: R-s
Red-shouldered Hawk: U-w: R-s	** Short-billed Dowitcher: A-m: U-w
Rough-legged Hawk: U-w	** Long-billed Dowitcher: C-m: U-w
Golden Eagle (?): U-r: *	** Stilt Sandpiper: Cas-f
Marsh Hawk: C-w: R-s: *	Western Sandpiper: A-w: R-s
Osprey: C-s: R-w: *	** Buff-breasted Sandpiper (?)
** Prairie Falcon: Cas-w	** Marbled Godwit: C-w: U-s
** Peregrine Falcon: R-w	** American Avocet: C-w
** Merlin: U-w	** Northern Phalarope: A-m
Kestrel: C-r: *	** Pomarine Jaeger: U-f

** Glaucous-winged Gull: C-W: R-s	Vaux's Swift: C-m,s
** Western Gull: C-r: *	Anna's Hummingbird: U-r
** Herring Gull: R-w	Rufous Hummingbird: C-m: U-s
** California Gull: C-w	Allen's Hummingbird: C-m, s
Ring-billed Gull: C-w	Belted Kingfisher: C-r
** Mew Gull: C-w	Red-shafted Flicker: C-r
** Franklin's Gull: R-f, s	Pileated Woodpecker: U-r *
** Bonaparte's Gull: C-m: R-s, w	Acorn Woodpecker: C-r
** Forster's Tern: U-m, s	Red-breasted Sapsucker: U-r
** Common Tern: U-f	Hairy Woodpecker: U-r
** Least Tern: Ac-f	Downy Woodpecker: U-r
** Elegant Tern: Cas-f	Ash-throated Flycatcher: U-s
** Caspian Tern: C-s: *	Black Phoebe: C-r
** Black Tern: Cas-f	Western Flycatcher: C-s
** Black-headed Gull (?)	Western Wood Pewee: C-s
Band-tailed Pigeon: C-m,s: R-w	Olive-sided Flycatcher: C-s
Rock Pigeon: R-r	Violet-green Swallow: C-s *
Mourning Dove: U-s: R-w	Tree Swallow: C-s
Barn Owl: C-r	Bank Swallow: Cas-m
Screech Owl: C-r	Rough-winged Swallow: C-s
Great-horned Owl: U-r	Barn Swallow: C-s: A-f *
Pygmy Owl: U-r	Cliff Swallow: C-s *
Spotted Owl: R-r	Gray Jay: R-r
Saw-whet Owl: U-r	Steller's Jay: C-r
Snowy Owl: Ac-w	Scrub Jay: C-r
Black Swift: R-m	Common Raven: C-r

Common Crow: C-r	Orange-crowned Warbler: C-s: Cas-w
Chestnut-backed Chickadee: C-r	Nashville Warbler: C-s: Cas-w
Common Bushtit: U-r	Yellow Warbler: U-s
Red-breasted Nuthatch: U-s: C-w	Myrtle Warbler: C-w
Brown Creeper: U-r	Audubon's Warbler: C-w: U-s
Wrentit: C-r	Black-throated Grey Warbler: C-s
Dipper: U-r	Townsend's Warbler: U-m,w
House Wren: U-s	Hermit Warbler: C-s
Winter Wren: C-r *	Blackpoll Warbler: Cas-f
Bewick's Wren: C-r	Macgillivray's Warbler: U-s
Long-billed Marsh Wren: C-r	Yellowthroat: R-s,m
Robin: C-s: A-w *	Yellow-breasted Chat: U-s: Ac-w
Varied Thrush: C-r *	Wilson's Warbler: C-s: R-w
Hermit Thrush: C-r	American Redstart: Cas-s
Swainson's Thrush: C-s *	House Sparrow: C-r
Western Bluebird: U-r	Western Meadowlark: C-r
Blue-gray Gnatcatcher: Cas	Red-winged Blackbird: C-r
Golden-crowned Kinglet: C-r	Bullock's Oriole: C-s
Ruby-crowned Kinglet: C-w: R-s	Brewer's Blackbird: C-r
Water Pipit: C-w	Brown-headed Cowbird: C-s: U-w
Bohemian Waxwing: Cas-w	Western Tanager: C-s
Cedar Waxwing: C-m,s: R-w	Black-headed Grosbeak: C-s: *
Starling: A-w: C-s	Lazuli Bunting: C-s: *
Hutton's Vireo: C-s: U-w	Evening Grosbeak: R-v: *
Warbling Vireo: C-s	Purple Finch: C-r: *
Black and White Warbler: Cas-m,w	House Finch: C-r: *

Pine Siskin: C-r: *
 American Goldfinch: C-r: *
 Lesser Goldfinch: C-s: U-w: *
 Rufous-sided Towhee: C-r: *
 Savannah Sparrow: C-r: *
 Black-throated Sparrow: Ac-sp
 Dark-eyed Junco: C-r *
 Chipping Sparrow: C-s: *
 White-crowned Sparrow: C-r: *
 Golden-crowned Sparrow: C-w
 White-throated Sparrow: R-w
 Fox Sparrow: C-w: R-s: *
 Song Sparrow: C-r: *

Mammals

Opposum	?	Mexican Free Tail	?
Trowbridge Shrew	?	Silver-haired Bat	?
Vagrant Shrew	?	Black Bear	R
Pacific Shrew	?	Raccoon	U
Water Shrew	?	Ringtail Cat	U
Shrew-mole	?	Marten	?
Townsend's Mole	?	Fisher	?
California Myotis	?	Mink	?
Red Bat	?	Shorttail Weasel	X
Fringed Myotis	?	Longtail Weasel	X
Hoary Bat	?	River Otter	X
Long-legged Myotis	?	Striped Skunk	C

Coyote	R
Gray Fox	X
Mountain Lion	R
Bobcat	U
Mountain Beaver	U
Golden-mantled Ground Squirrel	X
California Ground Squirrel	X
Douglas Squirrel	?
Western Gray Squirrel	C
Chickaree	?
Gopher	X
Harvest Mouse	?
Deer Mouse	C
Dusky-footed Woodrat	C
Tree Phenacomys	X
Pacific Phenacomys	?
White-footed Vole	?
California Red-backed Vole	X
Red Tree Mouse	?
House Mouse	X
Pacific Jumping Mouse	X
Pinyon Mouse	?
Porcupine	U
Black-tailed Jack Rabbit	X
Brush Rabbit	X
Black-tailed Deer	R

The history of Jacoby Creek and the land use Jacoby Creek Watershed is best described in the document, *A Study of the Jacoby Creek Watershed* by Alison Murray and Robert Wunner in November of 1980. There description of the land use of Jacoby Creek is seen below:

The Wiyot People

The Jacoby Creek watershed was within the territory of the Wiyot people for a very long time - at least 2,000 years and probably longer (Hedlund, 1978). The Wiyots were related to the Yuroks; both spoke languages of the Algonquin family. Other languages of this family include Arapho, Blackfoot and Cheyenne (Loud, 1918).

Wiyot was the southern extension of a distinctive northwest coast culture which ranged from Yakutat in southern Alaska along the Pacific Ocean frontage to Cape Mendocino. This non-planting (except for tobacco) and non-animal breeding culture was perhaps the most elaborate in the world (Kroeber, 1962).

The Wiyots were bordered on the north by the Yurok at Little River, and to the east and south by Athapascan tribes; Chilula, Whilkut, Nongatl, Sinkyone, and Mattole. While relations were friendly with the Yuroks, there were hostilities between the Wiyots and the Athapascans (Loud, 1918). For example, conflicts were reported over Kneeland prairie, as both Wiyot and Whilkut used this area for hunting and gathering.

The Wiyots, estimated to number 1,000 before contact with the whites (Kroeber, 1953), occupied the Mad and Eel River floodplains and the drainages of Humboldt Bay. Every settlement was close to water; the majority at tidewater (Kroeber, 1918). The trail between Wiyot camps skirting the marshy lowlands later became Old Arcata Road (Hedlund, 1978). The area between the Bayside Cutoff and Anvick Road was particularly densely populated. The Wiyot name for Jacoby Creek was CIRUKTOMI -- i as in bit, c as in cell or say (Northwest Indian Cemetery Protective Association in Hedlund, 1978).

Archaeologists studying the potential impacts of the proposed widening of the Old Arcata Road have expressed concern about the potential damage to historical artifacts and burial grounds in this area. Another village site was near the South Quarry Road bridge.

The tribe lived on the edges of a forest so dense, it was comparable only to the rainforests of the tropics (Loud, 1918). They were fine trappers. With iris-rope snares they caught elk, bear and deer. The bow was used for targets under 50 yards (Loud, 1918). Birds were an important part of their diet, including ducks, geese, pelicans, gulls and cormorants. However, their mainstay, salmon and steelhead, surf fish, clams and seals was from the sea, the bay, and streams such as Jacoby Creek.

Huckleberry was the most important berry. Seeds of grasses and members of the sunflower family were ground into flour or parched and eaten dry. The blossoms and leaves of clover (Trifolium sp.) were eaten raw. Sweet anise (Perideridia kelloggii and P. gairdneri) stalks were eaten after the skin was removed; its tuberous roots were eaten also. A medicinal tea was made from roots of the nettle plant (Urtica lyalli); the stem fibers were used for twine.

Houses were made by splitting redwood with elk horn wedges into planks 10' to 16' long and 2' to 5' wide. The houses were often nearly square with sides 10' to 16' long. Several small plank houses were in the vicinity of the old Jacoby Creek School in 1857 (Loud, 1918). Redwood was also used in making dug-out canoes. Vessels commonly 18' long and 4' wide were made from a log hollowed out by fire.

The California Gold Rush marked the beginning of the end of the Wiyot Indians as it did many other tribes in the state. The Wiyots had little contact with

western civilization before white men began arriving in large numbers in the 1850's (Loud, 1918).

The promise of easy money drew from the world at large the wildest, most savage and dangerous men ever collected in a likesized area anywhere in the world (Loud, 1918). Law was essentially absent. The Wiyots were at the mercy of the whites and their guns.

From the beginning, the Wiyots were evicted from their lands. The introduction of domestic animals and plants and the clearing of land interfered with the life the Wiyots had evolved. The Athapascans, who were more dependent on land-based resources were first affected. Market hunters and cattle herds depleted wild game and habitat. For self-preservation, Athapascans started preying on cattle. As a matter of course, "punitive expeditions" followed. These forays usually meted out punishment to the closest group, without due process or consideration of tribal affiliation.

In the fall of 1858, a few months after the killing of two whites (one of whom was Paul Boynton at Boynton Prairie) the state commissioned a 90 man militia. In a short time this militia had killed 100 persons and had taken 320 captives from tribes neighboring the Wiyots; Chilulas, Whilkuts and Nongatls.

In 1859, J.R. Browne, a Special Agent for the U.S. Treasury Dept., wrote that many Indians had been killed by private companies the previous winter and spring, and that the Wiyots were being starved, hunted and slaughtered without regard to age or sex (Hedlund, 1978).

The scene was then set for a series of raids, including a terrible massacre on Indian Island in 1860. Here 50 or 60 persons, mostly women and children and mostly from the Mad River area (Loud, 1918), were hacked to death with knives and axes by persons from the Eel and Van Duzen River areas (most

likely Larabee and Seaman Wright's group). Murders from this attack and others coordinated with it on the south spit and Eel River resulted in about 150 Wiyots killed. The perpetrators of these killings were never brought to justice. At first newspaper accounts tried to minimize these events, but eye-witness accounts reaching the San Francisco newspapers presented more complete stories.

The Wiyots were then taken to the Klamath, Smith River, and Seiad Valley Reservations for their own safety. This same reservation policy was applied disastrously to other native American groups during this time period (Navahos). While in confinement a large number died of starvation or disease. Reports of the Superintendent of Indian Affairs in 1862 and 1863 are concerned with the conditions on local reservations and the inadequate provisions for feeding and shelter (Loud, 1918).

It took only 10 years for the Wiyots to be displaced from the land. The 1910 census listed only 152 Wiyots, 58 of whom were fullblooded (Loud, 1918).

Colonization Period

In 1853 Elizabeth and Augustus Jacoby built a house on their 240 acre claim near the present Bayside Post Office. He was from Prussia, and she was from Nova Scotia. Jacoby established a rock quarry from which the original fireproof bottom of the Jacoby Storehouse was constructed. After Elizabeth died in 1861, Augustus moved to San Francisco. In 1868 he sold the property to Austin Wiley (Hedlund, 1978). Wiley, as editor of a Eureka newspaper, wrote a justification of the Wiyot massacre on Indian Island in rebuttal to Bret Harte's account.

In the 1860's the Jacoby Creek bottom land was covered with dense underbrush of alder, willow, pepperwood and cottonwood. Elk, deer, and bear were still common, and the stream was filled with salmon and "speckled beauties" (Arcata Union, Nov. 5, 1887).

Many of the early residents of the Jacoby Creek area were from eastern Canada and the northeastern U.S. This was especially true of those who worked in the lumber camps. The 1860 census shows that out of 114 men listed as having an occupation in the timber industry, 46 were from New Brunswick and 31 were from Maine. Most immigrants continued in the lumber occupation with which they were familiar in their country of origin. The censuses of 1870 and 1880 show immigration following this same pattern (Hedlund, 1978).

During the first 30 years of the timber industry most of the logs had been cut near tidewater or along river banks and floated to the mill (Melendy in Carranco, 1971). When this accessible resource was used up, oxen and horses were used to skid logs to water access. Railroads came into the picture in the 1870's and 1880's and the mill's range was extended. Railheads then became depleted of timber, and the problem was how to get the logs to the railheads profitably. In 1881, the Dolbeer Steam Logging Donkey revolutionized the industry by replacing oxen.

Operations of the Dolbeer and Carson Lumber Co. began in 1875 in the Washington Gulch area. Logs were taken to the bay by means of a railroad line along what is now the Bayside Cutoff and then rafted to Eureka (Thornburg, 1969). Log cars came downhill on their own momentum and horses pulled the empty cars back uphill. Bolts for shingles were taken to a mill near the Old Arcata Road. In 1876, forty men were employed in this area. The company's operation closed in 1898 (Fountain, Vol. 23).

Another company important to the history of Jacoby Creek is Flanigan and Brosnan. This company was formed in 1876. It was a partnership of Flanigan, Brosnan, Harpst and Gannon. In 1882 the firm built a regular gauge logging railroad 1-1/2 miles up Jacoby Creek (Humboldt Times, Dec. 24, 1881). The firm's shingle mill, cookhouse, store, four stall train shed, warehouse and several cabins for workers were located across the street from the present Bayside Post Office. The company continued under the name of Bayside Mill and Lumber Co. until timber was exhausted in 1913 (Fountain, Vol. 23).

The road beside the railroad tracks going up Jacoby Creek on the north bank was first called Railroad Drive. Eventually the tracks extended to the headwaters region, about 10 miles. Johnson and Son and a Mr. Thompson had shingle mills up the creek. Rail loads consisted mostly of shingle bolts, logs, and rock and brush used for building the north and south jetties of Humboldt Bay. Material to be rafted to Eureka was taken to Gannon's Slough. The remains of this railroad bed through the marsh can be seen at the corner of Old Arcata and Jacoby Creek Roads. It is reported that a 50 ton Shay locomotive followed by a road engine once ran off a trestle into Jacoby Creek (Thornburg, 1969). The railroad was taken apart in 1926 (Johnson, 1972).

The standard logging practice in the redwood forest in the middle 1890's was to fell and cut the trees into logs, and then set a fire to burn away the debris, leaving the fire resistant logs (Melendy in Carranco, 1971).

The first mail carried to the Bayside Post Office, established in 1886, was by horse stage. Later a train carried mail between Arcata and Eureka across the marshlands. Mail was unloaded at the junction of Bayside Cutoff and the railroad tracks, then carried by wheelbarrow to the post office (then located near the Old Arcata Rd. Jacoby Creek bridge) over a three plank boardwalk (Thornburg, 1969).

By 1887, most of the houses in the watershed were owned by men who worked in the woods in the summer and fixed up their homesteads during the rainy season.

In 1896, the newly constructed Bayside Presbyterian Church was dedicated; the site was donated by the Flanigan and Brosnan Company; the lumber by Wm. Carson (Thornburg, 1969). In 1902 the second Jacoby Creek School was built at the Bayside Corners. The first School Board had purchased the site for \$50 in 1875 (Thornburg, 1969).

Near the end of the first logging around 1910, the land ownership and use pattern was similar to that of today. A few owners, mostly companies, held most of the heavily vegetated timber lands, while on the flat lands of the lower part of the watershed and open prairies along the Kneeland and Fickle Hill ridges, family ownerships prevailed.

Swamp and overflow lands, the former marshlands, were "reclaimed" for pasturage. Parcels along traveled ways became more valuable and smaller. Access often determined the shape of the parcel. For example, short property widths along access and deep long sides allowed a maximization of property value.

The ownership history of the Arcata Forest parcel provides an illustration of land use and transactions, from its withdrawal from the public domain in 1880 to the present time.

History of Arcata's Jacoby Creek Forest

The City of Arcata owns 561.9 acres of land in the upper part of the watershed through which Jacoby Creek runs. The parcel is located in Section 30, Township 5N, Range 2E Humboldt Base Meridian. The following information on property ownership is from deeds in the Humboldt Co. Recorder's Office.

Frank McPhee filed on 160 acres of public domain Dec. 30, 1880 and sold his rights a week later on Jan 6, 1881 to O. H. Spring for \$50 "gold coin in hand."

Twenty years later, the 160 acres was purchased by John Harpst. Upon his death, ownership of the land passed to Kate Harpst on May 11, 1907. The property was sold to Bayside Lumber Co. on Jan. 21, 1911. It was most likely logged by 1913. On May 26, 1916 the parcel was placed under the name of Ambia Benjamin and combined with 200 adjacent acres. The resulting 360 acre parcel was sold the same day to J. N. Lentell.

Lentell bought another 160 acres in Section 30 on July 29, 1916 from Edward and Eleanor Putnam, who had purchased the property from the estate of Truman Collins on June 19, 1916. In July 1923 Lentell applied to the State Dept. of Public Works for water rights on Mad River and Jacoby Creek on behalf of the Eureka water supply. In September 1934, Lentell acquired ten more acres, bringing his ownership to a total of 530 acres.

On July 2, 1943, a right of way to be used for hauling logs and timber products was acquired from Lentell by Charles R. Barnum. This right of way states that it is "exclusive to Grantee or assigns and is to connect with the existing County Road..." The deed also specifies that the right of way shall not be in excess of 40 feet in width and shall follow generally the east bank of Jacoby Creek. Prior to this time extensive commercial use of Douglas fir had not taken place.

At an informal meeting of the Arcata City Council on July 27, 1943 it was agreed that the City should acquire Lentell's Jacoby Creek property for \$10,000 cash "as a future supply of water for municipal purposes." The Council decided the matter should be put on the April, 1944 ballot.

On March 7, 1944, the Council passed a resolution to let the voters decide whether or not to buy the Lentell property and water rights for \$12,500 "for the purpose of future development as an additional water supply for the City of Arcata..." On April 7, 1944, the Council received an estimate by the City

Engineer of \$262,430 to carry water from the Lentell property to Jolly Giant Reservoir.

In the estimate, the amount of \$50,000 was set aside for the "road from quarry to dam." The City Engineer noted "this piece of road is in very rough country and would be very expensive to build." On July 17, 1944, the City Council voted to purchase the property for \$12,500. The transaction was completed on Aug. 4, 1944.

In August, 1944, Charles and Helen Barnum sold rights to build a road for \$10. The road was to run from the north line of Section 31, northwesterly over Barnum rights of way in Sections 13, 14, 24, and 25 (T. 5N., R1E.) and Section 19 (T. 5N., R2E.). A 40' right of way was specified, except at such points where greater width is required to construct road without excessive grad

Barnum reserved the right to use the road and assumed no responsibility for maintenance--"it will be done by the grantee, his heirs or assigns." Where the right of way passes over lands of other owners, the right of way is exclusive to grantee for timber and timber products from lands now owned.

City Council minutes of Sept. 1, 1944, show that N. Lucchesi had asked the City if they would be interested in sharing the expense of building a road to timber holdings he had recently acquired beyond the City's property.

On Sept. 25, 1944, the City Council passed a resolution accepting deeds to certain parcels of land and water rights from N. N. Lentell. The title reserved, however, oil and precious metal rights to other parties according to 1916 deed and Charles Barnum's 1943 right of way. In 1977, adjacent landowners maintained that the City can grant access to its parcel only to City officials.

The Arcata electorate in 1948 rejected a proposal to dam Jacoby Creek in three places in the City's forest.

In 1977 the City hired Natural Resources Management Corporation (NRM) to determine the worth of timber on the property. The NRM Inventory, costing \$28,000 was completed on Feb. 20, 1978. The results were presented to the Council study session on April 4, 1978 by John Miles. The report includes options for obtaining income from the property which range from immediate patch clearcutting and sale of the land, to retention of the property with a series of "sustained yield" timber harvests.

Careful consideration of the data presented in the informative NRM Inventory suggests a need for further investigation to ensure the protection of watershed resources for recreational, scientific and educational use. The contribution of this part of the watershed to the year-long flow of Jacoby Creek and its aquatic life and to the water budget of the Arcata Bay should be assessed.

Other information which should be gathered prior to a decision on the management of the property includes:

1. Assessment of the impact of the timber harvest which occurred from 1911 -- 1913, as well as the impacts of recent timber harvests on adjacent lands with the same soil types and corresponding degree of slope. The assessment should include any changes in the distribution of plant communities and species.
2. Survey the condition of the Jacoby Creek channel and its tributaries throughout the forest to identify aquatic resources and areas needing bank stabilization, logjam removal or erosion control.
3. Reestablishment of the former USGS gauging station owned by Humboldt State University to resume measurements of flow patterns in the uppermost 6 square miles of the watershed.
4. Investigate the City's right to access to the property.

Color aerial photographs that reflect current conditions proposed Bank Property and surrounding properties.

Jacoby Creek Proposed Mitigation Bank Sites



Description of how the mitigation bank will be established and operated, including the proposed ownership arrangements and long-term management strategy, and any phases planned [include description of phases, boundaries, target habitat/species, and the number of credits associated with each phase];

The Jacoby Creek Land Trust is a community-based organization in Humboldt County, specifically on the Jacoby Creek in Bayside. Dedicated to the protection of land

with conservation values in this area, JCLT does extensive work in Jacoby Creek Valley and northern Humboldt Bay. It was founded in 1992 and the mission is based around the benefit of scientific, historic, agricultural, cultural, educational, recreational, scenic and open space values here in Humboldt. Activities include: conservation, education, policy, resource management, restoration and passive recreation. The target audience is the general public as well as teachers with educational resources such as, field trips, guided walks, nature trails and programs taught on site. Today, the Jacoby Creek Land Trust has almost 300 acres conserved, 295 total, 250 owned, and 45 under easement (Natural Resources Services RCAA, 2005). The sites that have the highest potential for profit will be selected to mitigate. These areas will then be restored to their fullest potential. This will ensure maximum accreditation is awarded to Jacoby Creek Mitigation Bank and therefore a more valuable asset to Humboldt County.

The activities we will conduct are: an assessment of both creeks using USACE guidelines, write a restoration plan, design the restoration, recruit volunteers for several days of work in the field, post assess for several months, credit, sell the acres we restored and give the money to Jacoby Creek Land Trust for further restoration projects on both creeks.

The target population for this project is the communities of Sunny Brae, Arcata and Eureka. The communities are historically known for and well renowned for their environmentally forward thinking. The city of Arcata in 1935 became the first city in the country to own its own municipal forest. A mitigation bank would be another first in United States brought to the world by communities of Humboldt County. These communities would benefit the most from educational outreach opportunities that

Jacoby Creek land trust provides. A mitigation bank would be one of a kind teaching aid for HSU students and unique opportunity to apply their knowledge and skills to a real world on future restoration efforts.

Preliminary Biological Resources Survey(s) -

Decades of logging, has altered the morphology and composition of the streams in the area, and Jacoby creek is Humboldt Bay's last remain un-diverted/alterd tributary stream. The Jacoby Creek Land Trust holds 65 acres of the Jacoby Creek watershed in trust. Their mission is to conserve the unique habitat and ecosystem that is Jacoby Creek. They accomplish this by restoring degraded sites and maintaining them as conservation easement sites, selling credits to purchase further tracts of land. The Jacoby Creek Mitigation Banking Team hopes to add another source of revenue to their organization through a creation of a mitigation bank. A mitigation bank evaluates the effectiveness of restoration projects by calculating the amount of lift generated by restoration. Credits are then created based off the type of land that restored and sold on acre to acre basis. The goal of the project is to create a mitigation bank that is capable of doubling the amount of money invested into each acre of restoration, enabling Jacoby Creek Land Trust to fund further restoration projects. This project would benefit the environmental forward thinking communities of Arcata, Eureka and Sunny Brae. In an area known for its revolutionary environmental policies and municipalities, a community mitigation bank would be another first for the United States brought to the world by the communities of Humboldt County.

JCLT accomplishes this goal through the acquisition of parcels of land and with responsible land management practices such as small grazing leases, and seeks to

conserve these properties while generating a source of capital. Much of that capital is used to purchase additional parcels, adding to their collection of 65 acres. What capital doesn't get used for the acquisition of land is used for restoration projects on parcels that have extensive degradation from either logging or grazing. These restored parcels then become teaching aids for both HSU students and community groups on the importance of native vegetation, salmonid life cycles and restoration practices. (See attached USACE WAM Assessments for complete details)

Map of the proposed mitigation bank service area(s), description of the general need for the mitigation bank and basis for such determination;

Jacoby Creek Mitigation Site: Wetland Delineations

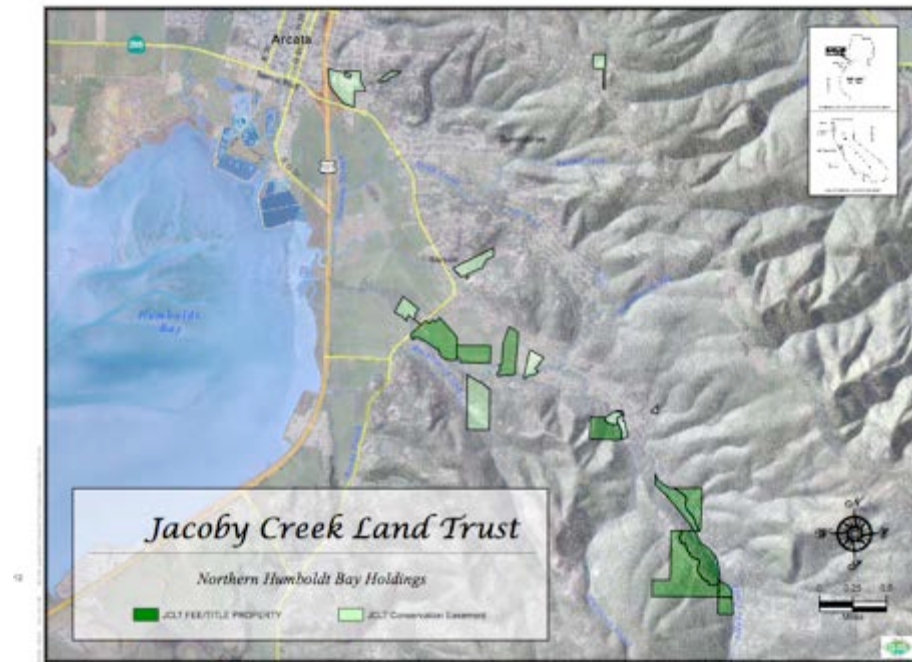


In the United States today there is an estimated 110.1 million acres of wetlands, an area the size of California (USEPA, 2013). From Mendocino to Humboldt County there are estimated 31,300 acres of wetlands (Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone, 1994). The Humboldt Bay is home to

several hundred of those acres and is fed by four tributaries. Jacoby Creek is one of the four tributaries and the only remaining tributary to not be altered by logging. During the 1870's the streams running from the hills into the bay were altered or straightened in order to transport huge old growth logs to awaiting trains and ships (Natural Resources Services RCAA, 2005). Jacoby Creek today is under the management of the Jacoby Creek Land Trust. This organization is community based and dedicated to the protection of land with conservation ideology for scientific, historic, cultural, educational, recreational, scenic values of the Jacoby creek watershed. The area protected in by the land trust is open to the public and is used by Humboldt State University environmental science students to perform experiments and practice the tools of their trade. As well as public education the land is home to several small restoration projects that are used for conservation easements. Between 2004 and 2009 an estimated 62,300 acres were lost or filled in (USEPA, 2013). With an average of 12,460 acres a year lost, it is important that this historic watershed be restored and conserved for future generations. The creation of a mitigation bank would fund future restoration projects, conserve culturally and ecologically important wetlands, and provide a excellent study aid to HSU Students.

The problem we are trying to solve is the destruction of vital wetlands. There is a severe lack of funding for restoration projects and the upkeep of educational sites. Jacoby creek has had some minor restoration done previously, but without further funding, a completion date does not exist. We have USACE wetland assessments and delineations to show the level of degradation that remains on the site.

A map depicting other conserved lands in the vicinity of the proposed Bank



Bank Objectives/Conceptual Plan

This mitigation bank would set a perfect example for future investments in Humboldt's natural resources to follow. The crediting of this site would prove that similar areas can be productive socioeconomically as well as ecologically. This will surely become a more prevalent concept over time and this avant-garde restoration method would make any organization attain that cutting edge status. Thus, this mitigation bank would increase the structural integrity of fragile ecologies in Humboldt and at the same time providing needed value to existing lands. The Jacoby Creek Land Trust also provides an excellent learning opportunity for students and the entire community. Joining forces with Humboldt State University, the mitigation bank will be monitored and run by students who are in need of experience before apply for a job in their field. Internships could also be provided through the approval of this grant, which are lacking in the environmental science fields. These are just few of the positive outcomes that will

come from the implementation of the mitigation bank. Humboldt has always been at the forefront of the green agenda. Crediting healthy sites such as Jacoby Creek as a mitigation bank will strengthen the community as a whole, as well as the surrounding ecosystems.

Through the aid of grants, funding for this project will prove to be extremely cost effective and cheap. Due to the fact that volunteers will be doing all of the work needed, the required budget will be 1000\$. This will cover the cost for purchasing native plants needed for full restoration of the site. The forestry department at Humboldt State University will provide donations of tools, time and other needed equipment. This will ensure that costs for the project are kept to a minimum by fully utilizing the community for help in restoring this precious commodity. The local newspapers have donated columns to the Jacoby Creek Land Trust for weekly updates concerning the community. This tool is paramount in spreading local awareness about the land trust and the surrounding areas well-being. Education through this weekly newsletter empowers locals to volunteer and be involved in this great program right in their backyard. Humboldt State will play a big part in disseminating the goals and objectives set forth by the JCLT. This symbiotic relationship between the land trust and the university will prove to be the deciding factor in this program's success.

The goal of the project is to provide Jacoby Creek Land Trust with a method of generating capital to fund future restoration projects and meet their organizations goals. One of the objectives of the project is to be able to produce double the amount capital invested into each credit. We recommend that if the lift generated from our suggested restoration plan do not generate enough lift to create 1.5 to 2 times the investment for

each credit to discontinue the project. If this goal is not met, we believe the cost benefit is not significant enough to justify future mitigation sites.

Furthermore, the mitigation bank will prove a successful model for future endeavors serving as a guide for other mitigation banks taking root in Humboldt County. The Jacoby Creek mitigation bank will explicitly show this lucrative advantage of natural resources and how to properly make them most productive. Furthermore, this will increase socioeconomic gains as well as protect the wide variety of species that call this area their home.

Connectivity and Ecosystem Function

The mitigation bank in question would vastly expand the connectivity throughout this expansive watershed. Jacoby Creek is home to a variety of threatened fish, amphibian and plant species making it a premiere location for a mitigation bank. The restoration of the site would include increasing the amount of habitat that these threatened species need to survive. In particular, many salmon species frequent these corridors due to declining habitat in surrounding areas. We hope to increase the salmonid habitat by 50% through the creation of backwater channels and decrease sedimentation caused by years of logging and grazing. The restoration plan would include deepening these channels and creating more of them so that these populations prosper in the Jacoby Creek watershed. Without doing so, the area could suffer from disconnects in the watershed that could result in decreased site productivity. The Jacoby Creek is one of the paramount spawning sites for salmon in Humboldt Bay. The continued motorization of this site will help strengthen that role and help promote

salmonid population growth. With the site already thriving with wildlife, restoring connectivity would further enhance productivity overall.

The riparian zone of the watershed was not disturbed significantly, although the restoration plan would include improving vegetation connectivity throughout. This prevents the risk of edge effect, which can hinder the productivity of a site due to lacking connectivity between niches. In ecology edge effect is the phenomenon of changes in the population or community structure that takes place at the apex where two different kinds of habitats converge. These effects are more prominent in smaller habitat fragments where the effect permeates through the patch. These smaller ecosystems house certain species that require the rare conditions provided to live. Edge effect is a huge concern when restoring a site thoroughly, yet the Jacoby Creek exhibits extensive existing intertwined pathways. Thus, the concerns of reinforcing connectivity will be addressed with ease in regard to Jacoby Creek, especially after applied restoration.

Appendix



Figure 1. Site 1: Meander Scar



Figure 2. Site 2: Pond



Figure 4: Wetland Delineation Day 1



Figure5. David Zwick Using a Sharpshooter to Look at Soil Profile



Figure 6. Soil pit

“see appendix for link”

http://training.fws.gov/CSP/Resources/wetland_reg/Written_summaries_of_404_program/MitigationBanking.doc

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