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Effective Date:
June 7, 2002

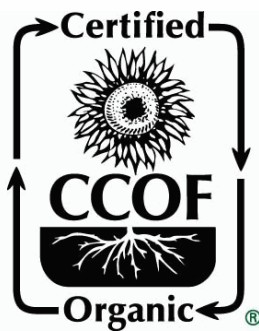
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Client Code: yo213

CCOF certified since: 06/07/2002

Issue Date: 11/18/2022



April Crittenden
Chief Certification Officer

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IPM Plan for Campus Landscape

Statement of Purpose

The purpose of this integrated pest management (IPM) plan is to guide the use of environmentally sensitive pest management strategies and least-toxic control methods at University of California Davis to enhance the health and safety of campus landscape users, and protect the environment.

Goals

The goals of the IPM program at UC Davis are:

1. Protect human health and the surrounding environment by employing a range of preventative strategies and using least-toxic products for pest control and eradication.
2. Inspect and monitor pest populations to enhance control strategies.
3. Minimize the quantity and toxicity of chemicals used for pest management.
4. Minimize environmental impacts by using species-specific pesticides and targeting application areas carefully.
5. Establish clear criteria for acceptable circumstances in which using a pesticide other than a least-toxic pesticide is necessary; toxic pesticides shall only be used when there is a threat to public health and safety, or to prevent economic or environmental damage, and only after other alternatives have been implemented and are shown to be ineffective.
6. Provide campus landscape users with advanced notice of IPM activities involving use of a pesticide other than a least-toxic pesticide.

IPM Response Plan

One of the characteristics of an IPM approach that makes it so effective is that the basic decision making process is the same for any pest problem in any location. The strategies and tactics may change, but the steps taken to decide if and when treatment is needed and which methods to use are the same each time. The UC Davis IPM program is built around the following components:

- Monitoring the pest populations and other relevant factors
- Accurate identification of the pest
- Determining injury and action levels that trigger treatments
- Timing treatments to the best advantage
- Spot treating the pest (to minimize human and other non-target organism exposure to pesticides)
- Selecting least disruptive tactics
- Evaluating the effectiveness of treatments to fine tune future actions

Pest Name:	Actions taken to control the problem						
Pest Location:							
This pest is a (circle all that apply):	Monitor Pest Population	Determine Injury & Action Level	Remove Pests' Food & Water	Reduce Pest Shelter	Monitor for Pests	Treat the Problem	Follow- Up
Health Concern							
Safety Issue							
Nuisance							
Other:							

Setting Injury and Action Levels

Before any course of action can be determined, it is first important to determine the injury level. The injury level is the level of damage or the level of pest population that causes unacceptable injury. Once the injury level has been determined, an action level must be set. The injury level will always be higher than the action level, meaning that action should occur before the situation progresses the point of unacceptable injury (see Fig. 1). The action level is the level of pest damage or number of pests that triggers treatment to prevent pest numbers from reaching the injury level.

Aesthetic injury applies mainly to the damage of plants. This is injury that affects the appearance without affecting the health of the plant.

Economic injury refers to pest damage that causes monetary loss.

Medical injury relates to human health problems caused by pests.

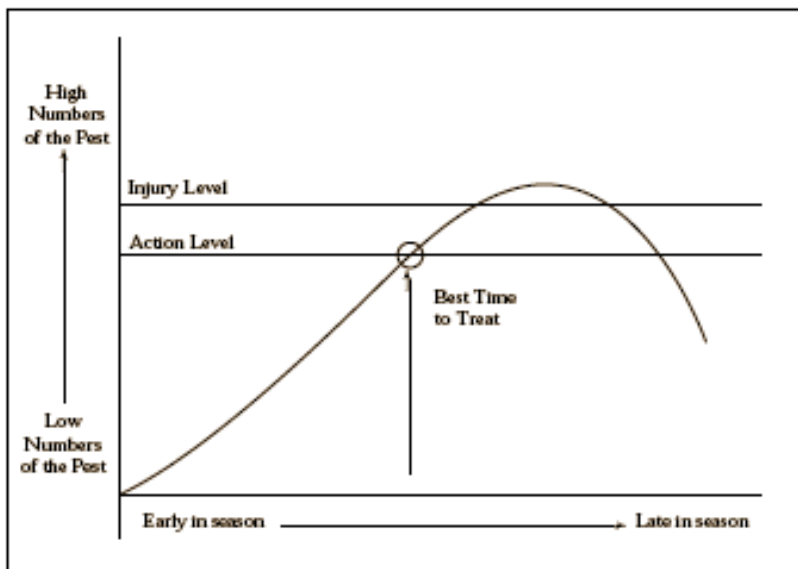


Figure 1. Injury & Action Level

Criteria for Selecting Treatment Strategies

Once the IPM decision making process is in place and monitoring indicates that pest treatment is needed, the choice of specific strategies can be made. Choose strategies that are:

- Least hazardous to human health
- Least disruptive of natural controls in landscape situations
- Least toxic to non-target organisms other than natural controls
- Most likely to be permanent and prevent recurrence of the pest problem
- Easiest to carry out safely and effectively
- Most cost effective in the short and long term
- Appropriate to the site and maintenance system

Treatment Options

Education. Education is a cost effective pest management strategy. Information that will help change people's behaviors, including planting pest-resistant landscape plants, will play a part in managing certain pests.

Habitat modification. Pests need food, water and shelter to survive. If the pest manager can eliminate or reduce the resources pests need to flourish, the environment will support fewer pests. Examples of habitat modification include: design or redesign of structures and landscape plantings; improved sanitation; eliminating water sources for pests; and eliminating the pest habitat.

Physical controls. Methods of physical control (or direct removal of pests from an environment) include trapping and removing pests by hand.

Biological controls. A biological control uses a pest's natural enemies to attack and control the pest. Biological control strategies include conservation (conserving the biological control application), augmentation (artificially increasing the number of biological controls in a given area) and importation (importing foreign controls).

Least toxic chemical controls. Least toxic pesticides are those with all or most of the following characteristics: they are effective against the target pest, have a low acute and chronic toxicity to mammals, biodegrade rapidly, kill a narrow range of target pests and have little or no impact on non-target organisms. These include materials such as the following:

- Pheromones and other attractants
- Insect growth regulators
- Repellents
- Desiccating dusts
- Pesticidal soaps and oils
- Some botanical pesticides

The following criteria should be used when selecting a pesticide:

- Safety
- Species specificity
- Effectiveness
- Endurance
- Speed
- Repellency
- Cost

Definitions

Emergency – A pest outbreak that poses an immediate threat to public health or will cause significant economic or environmental damage.

Least-toxic pesticide – Any pesticide product that meets UCD’s Tier 3 hazard criteria is low hazard, and considered a least-toxic pesticide. Tier 3 products are the next line of defense against pests after preventative measures are exhausted.

Pesticide – Any substance, or mixture of substances, used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may be detrimental to vegetation, humans, or animals.

Tiered Materials – UCD’s pesticide classification system based on hazard potential. Products are evaluated against comprehensive list of hazard criteria including carcinogenicity, reproductive toxicity, endocrine disruption, acute toxicity, hazard to birds/fish/bees/wildlife, persistence, and soil mobility, and are placed within the Tier structure based on the evaluation results.

Tier 1: Highest concern

Tier 2: Moderate concern

Tier 3: Lowest concern

Tier 4: Insufficient information available to assign to above tiers

Record Keeping

Monitoring the effectiveness of the IPM plan over time requires diligent tracking of several items: pest populations and locations; management strategies employed; quantities and types of chemicals and products used; and the outcome of pest management activities. The pest control applicator is responsible for maintaining records that include the information below. See the appendix for the Record Keeping form that shall be used at UC Davis to standardize all record keeping activities.

1. Target pest
2. Prevention and other non-chemical methods of control used
3. Type and quantity of pesticide used
4. Location of the pesticide application
5. Date of pesticide application
6. Name of the pesticide applicator
7. Application equipment used
8. Summary of results

Campus Landscape User Notification

Notifying campus landscape users of pesticide applications other than a least-toxic pesticide is a critical component of the IPM plan. Providing users with the appropriate information at the appropriate time enables individuals to take precautions as they see necessary to protect their personal health. At UC Davis, a 24-hour advance notice to campus users is required for the application of any pesticide other than a least-toxic pesticide. Advance notice procedures shall take the following form:

1. Post signs at least 24 hours before application of the pesticide product, and leave signs in place for at least 3 business days after application.
2. Signs must be standardized and easily recognizable. See the appendix for the approved notification sign template.
3. Each sign must contain the following information:
 - a. The name and active ingredient of the pesticide product
 - b. The targeted pest
 - c. The application date
 - d. The signal word indicating the toxicity category of the pesticide product
 - e. The name and contact information of an individual that is responsible for fielding questions regarding the application.
4. Each sign must be in both English and Spanish.
5. Copies of posted signs shall be retained for record keeping purposes for one year.

General Preventative Practices

General preventative practices are simple landscaping procedures that eliminate sources of food, water and shelter that attract pests to the building grounds. UC Davis shall use the following methods as the first and primary means for controlling pests and preventing outbreaks:

1. Use mulch and other landscaping best practices to promote soil and plant health.
2. Use weed-free soil amendments.
3. Maintain and plan landscape features to eliminate safe havens for pests and rodents.
4. Clean up plant debris, especially from fruit-bearing trees.
5. Remove invasive plants that are known to harbor or provide food for pests.

Materials for Use – Least Toxic Pesticides

Chemical pesticides are considered a last resort under the tenets of IPM. This control strategy is to be used at UC Davis only after general preventative practices and non-chemical options are exhausted. Pesticides that meet the requirements of Tier 3 are considered least-toxic and may be applied without campus user notification when chemical product use is required. To qualify as a Tier 3 material, all of the following statements must be true:

1. Product contains no known, likely, or probable carcinogens
2. Product contains no reproductive toxicants (CA Prop 65 list)
3. Product contains no ingredients listed by CA DTSC as known, probable, or suspect endocrine disrupters
4. Active ingredients has soil half-life of thirty days or less
5. Product is labeled as not toxic to fish, birds, bees, wildlife, or domestic animals

Which Pesticides are the Least Toxic?

The term “least toxic” refers to pesticides that have low or no acute or chronic toxicity to humans, affect a narrow range of species and are formulated to be applied in a manner that limits or eliminates exposure of humans and other non target organisms. Fortunately, there are an increasing number of pesticides that fit within this least toxic definition. Examples include products formulated as baits, pastes or gels that do not volatilize in the air and that utilize very small amounts of the active ingredient pesticide and microbial pesticides formulated from fungi, bacteria or viruses that are toxic only to specific pest species but harmless to humans.

Least toxic pesticides include:

- (a) Boric acid and disodium octobrate tetrahydrate

- (b) Silica gels
- (c) Diatomaceous earth
- (d) Nonvolatile insect and rodent baits in tamper resistant containers
- (e) Microbe based pesticides
- (f) Pesticides made with essential oils (not including synthetic pyrethroids) without toxic synergists and
- (g) Materials for which the inert ingredients are nontoxic and disclosed.

The term least toxic pesticides does not include a pesticide that is:

- (a) Determined by the U.S. EPA to be a possible, probable or known carcinogen, mutagen, teratogen, reproductive toxin, developmental neurotoxin, endocrine disrupter or immune system toxin
- (b) A pesticide in U.S. EPA's toxicity category I or II
- (c) Any application of the pesticide using a broadcast spray, dust, tenting, or fogging application.

Responsible Parties

Director of Grounds & Landscape Services is responsible for overseeing the implementation of the IPM plan and ensuring compliance.

All pest control vendors contracted to work at UC Davis are responsible for adhering to this policy.

All pesticide storage, transportation, and application will be conducted in accordance with the requirement of the Federal Insecticide, Fungicide, and Rodenticide Act (7 United States Code 136 et seq.), Environmental Protection Agency regulations in 40 CFR, Occupational Safety and Health Administration regulations, UC Davis policies and procedures, and local ordinances.

No person shall apply, store, or dispose of any pesticide on UC Davis managed property without an appropriate pesticide applicator license.

APPENDIX

NOTICE OF PESTICIDE APPLICATION

For further information regarding this notice please contact the Director of Grounds & Landscape Services: (530) 752-4206

The following pesticide will be used at University of California Davis:

<i>Pesticide Common Name</i>	<i>Pesticide Trade Name</i>	<i>EPA Registration Number</i>
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The Office of Pesticide Programs of the United States Environmental Protection Agency has stated: "Where possible, persons who potentially are sensitive, such as pregnant women, infants, and children, should avoid any unnecessary pesticide exposure."

Location of the pesticide application:

Reason for the pesticide application:

Date of pesticide applications:

Description of the possible adverse effects of the pesticides as per the Material Safety Data Sheets for the pesticides to be used, if available:

Pesticide(s) product-label instructions and precautions related to Public Safety:

UC Davis Arboretum
Integrated Pest Management (IPM) & Best Management Practices (BPM)
2/1/19

Integrated Pest Management is an ecosystem based strategy utilized to make decisions regarding the control of pests that prioritizes the health and safety of people, nontarget organisms, and the environment. There are many different techniques employed to this end termed biological, cultural, mechanical and chemical. In the Arboretum, our aim is for long-term prevention of pest problems as well as safe and effective interventions.

Weed management

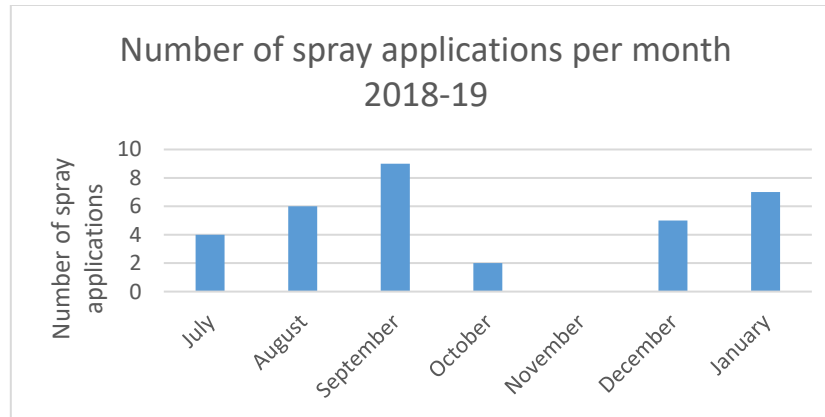
Weeds are our primary pest in the Arboretum and as such, there are a number of ways in which we attempt to control them. The primary means of biological control for weeds is by competition from plants and from other weeds.

Cultural controls employed for weed management primarily consist of reducing reproduction. This requires knowledge of each particular weed species and its life cycle to prevent and/or minimize seed or plant propagule production and dispersal by exploiting key stages in their development. We also alter our irrigation programs and application zones whenever feasible to decrease the production of weeds. Plantings are designed to mitigate future weed problems and planted with weed-free planting stock whenever possible.

Mechanical and physical controls for weeds consist of hand pulling, hula-hoeing, strategically timed mowing, and weed eating. All of our lawns' weeds are kept in control with mowing. Whenever feasible, mulch is applied to our planting beds to suppress weed germination and to aid in weed removal. GATEways Gardening Specialists pull weeds by hand each and every day and teams of gardening volunteers routinely pull weeds during their scheduled workdays and. Weeds are collected and composted off site to minimize reinfestation.

In terms of the chemical control of weeds in the Arboretum, the application protocols were developed by the Grounds Department. These guidelines require that all spraying is completed before 7:30am and conducted done in pairs to allow for greater monitoring of visitor proximity to spray locations and to allow for more effective oral notification. Due to the limited number of daylight hours and environmental conditions during which GATEways Gardening Specialists can spray, Specialists report spraying every opportunity that they can to stay on top of the weeds. Given the limitations and despite their ongoing efforts, they find that it is not enough time to get it all done.

In order to optimize product effectiveness and efficiency, the Arboretum makes every effort to target weeds when they are younger. Application during the active growing stage also tends to increase product effectiveness.



The average number of spray applications in the Arboretum was 4.7 per month over the last seven months. In general, applications are directed in more open areas of the garden in woody plant collections with no understory plantings. However, targeted spot spraying in densely planted collections is also routine, particularly for pernicious perennial weeds such as bindweed, Johnson grass, nutsedge, and Bermuda grass.

The two main herbicides utilized in the Arboretum are Glyphosate (brand name: Round-up) and Triclopyr (brand name: Turflon Ester), both of which are post-emergent caution products. Signal words are found on pesticide product labels, and they refer to the toxicity of the product. The signal word can be either danger, warning or caution with danger being the most toxic and caution, the least. In the last seven months, just under five gallons of Roundup and .9 gallons of Turflon have been utilized in the landscape. In the past, GATEways Horticulturists have also employed the use of a granular pre-emergent called Dimension, also a caution product. However, as those applications haven't been done recently, we don't have any current application information.

There has also been specialty weed management from our larger team conducted by Miles DaPrato on a few key projects. One of those projects was the aimed at rejuvenating the meadow adjacent to the Oak Grove. This project utilized selective broadleaf herbicides (Transline, Garlon 4, both of which have warning signal words) to control non-native herbaceous vegetation and Bermuda grass during the first year establishment phase of the native grasses and was completed with both a quad and boom sprayer and spot treatment with a backpack sprayer. Miles also applied non-selective herbicide (Round-Up) to prep the seeding area for additional native grass installation for a total of seven spray events between March and September. He also spot brush cut and mowed the grassland/understory to control non-native annual grass and broadleaf weeds on five occasions.

For the Arboretum Waterway project, Miles also conducted an annual flush spray with non-selective herbicide to prep for native grass seeding twice in December and in the Arboretum GATEway Garden, he spot brush cutting throughout the site to control non-native annual grasses and broadleaf weeds, once in the spring and another application in the summer.

Rodent control

The Arboretum struggles with ground squirrels and gophers. The ground squirrels were actively managed for years by Cary's team. Cary worked with an outside contractor that would bring a machine that channeled carbon monoxide into their tunnels. While that service is effective, it is slow going and costly as Cary reported that it cost ~\$1,000/day and required ongoing treatments to keep the population in check. More recently, however, our new GATEways Gardening Specialist Matt Lechmaier

has been live trapping ground squirrels and in coordination with Mile DaPrato, depositing them at the Putah Creek Reserve in an effort to reestablish a healthy ground squirrel population that in turn, provides habitat for burrowing owls with their abandoned tunnels. Matt has reported relocating 16 squirrels to the Reserve in the time that he has worked here (since July of 2018).

Matt has also been actively trapping gophers in the Arboretum, particularly in the Oak Grove and the adjacent lawn areas but also a couple in the Good Life Garden, as well. He utilizes mechanical traps called Macabee gopher traps and has trapped 52 gophers to date.

Conclusion

In summary, the Arboretum strives to prevent pest problems whenever possible, and in other instances, tolerates them to the extent that the problem doesn't significantly compound itself in the future. We routinely utilize many different techniques in our operations with the health and safety of our staff, the environment, and the public always in the forefront of our decision making.

Putah Creek Riparian Reserve

Russell Ranch Mitigation Area management strategy

Andrew Fulks

6/09/2010

Background

The 2000 Russell Ranch Concept Plan and the Environmental Impact Report (EIR) for the 2003 Long Range Development Plan (LRDP) call for creation of restored native grassland at Russell Ranch. The grassland is mitigation for potential loss of Swainson's Hawk foraging and Burrowing Owl nesting and foraging habitat due to implementation of the LRDP (LRDP, 2003).

The 2000 Russell Ranch Concept plan outlines the implementation of the grassland mitigation, but did not address the final management of the grassland after establishment (Russell Ranch Mitigation Area Design Concept Committee, 2002).

To develop a management program for the implemented grassland, Putah Creek Riparian Reserve staff met with a group of faculty, researchers, and wildlife and grassland experts to develop this plan. Three meetings, including one field visit, were held to garner input on the proposed management strategy.

Target species requirements

The mitigation requirements for management of the Russell Ranch grasslands include management of the grassland for Swainson's Hawk foraging habitat and Burrowing owl nesting and foraging habitat.

Requirements for Swainson's Hawk

Swainson's Hawk prefer short-stature grasses for capture of prey, though they will hunt in grassland with a mosaic of heights (Estep, 2009a). Hawks are present during March through September, when they are in the region nesting and raising young (Estep, 2009b). All 380 acres of grassland are part of the mitigation area to be managed for the hawk, though not all of the grassland needs to be or should be short at the same time. The grassland will have areas shortened on an annual, rotational basis, to provide optimal prey accessibility to foraging Swainson's hawks. This will also allow the non-shortened sections of the grassland to rest and re-seed, as well as provide optimal habitat to maintain stable microtine rodent prey populations.

Requirements for Burrowing Owls

Burrowing Owls can be resident year-round, so a portion of the grassland will be maintained short all year to allow for breeding and non-breeding season use. 195 acres within the grassland are required to be maintained as foraging habitat for the owl, per the mitigation program. The owl's foraging requirements overlap with the hawk's, so foraging areas managed in a rotational-shortening program will meet the mitigation requirements for both species. 65 acres must be maintained as year-round short areas for Owl nesting, to meet the mitigation requirement to replace 6.5 acres of burrowing area for 10 nesting pairs (LRDP EIR 2003). Structure (such as concrete blocks or logs on slightly elevated mounds) will also be strategically placed within the 65 acres of nesting area to encourage California ground squirrel use and creation of ground squirrel burrows. Burrowing owls use abandoned ground squirrel burrows as nesting and wintering sites (Estep, 2009a). Alternatively, artificial burrowing owl burrows can be installed; however, these are considered to be potentially less effective than natural burrows created by ground squirrels.

Management requirements

Requirements for grassland

An occasional removal of thatch helps stimulate new grass growth and prevent senescence (Menke 1992). This can be accomplished mowing, (w/ or w/o bailing), grazing, or burning. Experience at Russell Ranch has shown that burning can take place at intervals of 4 to 5 years. Research has found that disturbance at this interval is beneficial to native grasslands (Menke 1992). Between those periods, there should be at least one year of rest with no action taken to allow the native grasses to re-seed. While bailing is good for removal of biomass, it leaves managers with bales to store. If the bales are relatively free of weeds, they can be spread as straw mulch in other parts of the Reserve. Like bailing, mowing also requires fossil fuels and costs about the same. Grazing is an alternative to mowing or bailing, but requires infrastructure such as fencing and a water supply. Regardless of the method used, the grasses need to be monitored for infestation of annual grasses, and the appropriate management strategy chosen to manage the grasses. The use of timed mowing, burning, or grazing can impact annual weed growth both positively and negatively depending on conditions at the time. Decisions about which method to use will need to be made adaptively.

Requirements for forbs

Installation of forbs will benefit from (and perhaps require) disturbance of the soil and existing grassland cover. Disturbance will allow for contact of the forb seed with the soil and penetration of light to allow for survival after germination. The disturbance could involve a light disking to work the grass cover into the soil, or killing patches of grass, then planting the seed into the soil with a no-till drill. Implementation of the forb component of the project will focus on installing forbs as strips within the burrowing owl nesting acreage. This approach has two advantages over seeding the entire 380 acres.

First, seeding can occur at a higher rate over multiple years, within the shortened owl-nesting areas. Ayzik Solomesheh's research over the last 3 years on test plots within the Russell Ranch grassland has shown that multiple years of seeding may be required to guard against negative year-effects and to replenish the seed bank. In addition, there is greater linear edge distance of the intensively-planted strips, offering the opportunity for the forb seed to spread to other parts of the fields (as well as the potential for planted or weedy species from other parts of the field to invade the forb strips).. Forbs will also do better in areas where grasses are kept short, as this will reduce competition during establishment. The forbs selected are also shorter at maturity, making them compatible with the owl's requirements for short-stature vegetation.

One of the biggest constraints in the forb areas will be the inability to use broadleaf herbicide for weed control. By concentrating the forbs in a few areas that are heavily and repeatedly seeded, the approach is to generate significant enough cover that weeds will not be able to establish in significant quantities. In the event of a broad-leaf infestation that is not treatable by spot herbicide application or hand-pulling, it will need to be evaluated if the forb area needs to be sprayed and re-seeded. It is still not clear whether it is even possible to create a self-sustaining forb-dominated community in the highly invaded Central Valley, but forb planting is an essential step toward understanding what is possible.

Management Approach

Management of the Russell ranch grasslands will emphasize rotation of treatments within the grassland, centered on core 'nesting areas'. To meet the requirements for burrowing owl nesting habitat, a total of 65 acres of grassland must be kept short year-round when owls are present or during the fall and spring when owls may disperse into the site. The 65 acres will be located in 5 separate nesting areas, ranging from 6.5 acres to 26 acres. Each nesting area will be maintained short using a combination of mowing, burning, and grazing. Adjacent to each nesting area, a section of the remaining field will be shortened, creating a larger short-grass block for use by the hawk and owl (Figure 1). How each area is shortened will be determined by field conditions. Over the long term, the nesting areas may change if yearly-shortened areas develop nesting populations of owls.

The yearly-shortened areas will rotate, with the determination of which area of grassland to be shortened each year, depending on the field conditions within the grassland. One area may be shortened two years in a row, for example, or another may be shortened every other year, depending on the weeds present, the amount of thatch, ability to access the field due to soil moisture, or other management factors. Figure 1 displays the concept, based on a 4-year rotation cycle, with each sub-field given a year-number.

Forbs will be introduced into the entirety of each of the owl nesting areas, as well as in strips within the grassland south of Willow Canal. The strips will be 20-feet by 350-feet. These areas will be maintained to be permanently short, which should be compatible with forb establishment, so long as the mowing or grazing is adjusted to allow the forbs to re-seed. Forbs species will be selected that tend to be shorter in

stature. Forbs will be established in these core areas, and then allowed to spread into adjacent fields. Forbs will be re-seeded over a 3-year period to re-establish the seedbank and to decrease possible negative year-effects.

Grazing considerations

Grazing will be used as one of the tools to manage the stature of the grasses. Using cows to keep the grasses short will require additional fencing to be installed. Perimeter fencing will be installed around the mitigation area fields shown in Figure 1. The fences will need to encompass the perimeter of the overall field area and exclude areas where animals are not desired. Fencing will be designed to allow for moving cattle across Road 95A, as well as create animal loading and unloading areas. Water sources are needed in fairly central locations to each set of fields east and west of Road 95A. The existing well east of 95A has been capped but not cemented, and the well west of 95A still has a pump but is not currently used due to inadequate volume for row crops. These wells will need to be inspected to determine if use of a submersible pump would be feasible for water delivery to stock troughs. Cattle would potentially be available March through September, so their timing coincides with the foraging period of the Swainson's Hawk.

The fields south of Willow Canal, adjacent to Putah Creek, present logistical hurdles related to movement of cattle across Willow Canal. Cattle fences would impede the future use of the top of the creek bank for Valley Elderberry Longhorn Beetle mitigation. The area south of Willow Canal will be shortened by a rotation of mowing, bailing, and burning, rather than grazing.

Because of the rotational nature of the grazing operation and the rapid reproduction rates of rodents, it is doubtful that rotational grazing will impact rodent populations overall within the grassland mitigation area. However, stocking rates will be evaluated to determine if grazing is impacting rodent prey populations, by checking for evidence of rodent use within the grazed and un-grazed portions of the grasslands.

Mowing/Bailing considerations

Mowing and/or bailing the grasslands is another tools used to manage grassland height. Mowing costs more than grazing, but can usually be timed more precisely and implemented uniformly over a larger area. It does create thatch build-up after repeated mowing events, which may suppress some forbs or grasses. Bailing can remove the thatch, but creates quantities of bales of which must be disposed. Mowing may not be possible when the soil is too wet and soft, and if wind rows of cut grass are not bailed shortly after cutting, they can suppress re-growth of the underlying grass.

Burning considerations

Burning is another method to remove thatch and allow for renewed grass growth. Burning is the least expensive of the management tools, but also the most difficult to initiate as burning can only take place during a 'burn day', as mandated by the Yolo-Solano Air Quality Management District. Burn days are

most common during the fall, which is good timing for thatch removal. For weed control, spring burns are most effective, but more difficult to schedule due to air quality constraints. After a burn, the open ground can allow for forb seeding and establishment, but can also lead to establishment of broadleaf weeds.

Determining which method to employ to shorten the grasses within an area will be based on a qualitative assessment of the grassland, the availability of staff, equipment, and animals. If the preferred method at the time cannot be used to shorten the grass, Reserve staff will determine which method can be used that will still meet the objectives.

Implementation

Implementation steps for the management strategy will be as follows:

1. Identify and locate Burrowing Owl core areas with GPS,
2. Burn, or mow and lightly disk/harrow each area,
3. Seed forbs in each core area,
4. Install log or other structures to encourage squirrel burrowing,
5. Mow the first-year cycle of foraging areas adjacent to each core area,
6. Check on status of the two wells within the grassland area and depending on the availability of water,
7. If the wells are viable, begin perimeter fence installation for grazing animal containment, starting at fields west of Road 95A.

Success criteria

Health of the grassland will be determined by observation of the density of native grasses and forbs versus annual grasses and broadleaf weeds, and by a trend that is stable or decreasing in the amount of broadleaf weeds and annual grasses. The administrative goal in relation to the native grassland is to maintain the grassland using the outlined management approach, with the minimum amount of maintenance and cost. The qualitative goal is to maintain the mitigation grasslands with the least amount of annual grasses and broadleaf weeds as feasible, while maximizing native forb and native grass cover. There is a lack of quantitative criteria for what constitutes a 'successful' native grassland restoration, due to the lack of data regarding Central Valley grassland pre-invasion by annual exotic grasses (Bartolome et al. 2007). Less than 1% of Central Valley native grassland is remaining (Olson et al. 2001).

Success of the mitigation effort for the purposes of this plan will be based on two premises; success of attracting the target species, and success in creation and maintenance of the appropriate habitat for the species.

Success of the mitigation in attracting foraging Swainson's Hawk will be based on visual observation of Swainson's Hawk foraging within the mitigation area.

Success in developing Burrowing Owl habitat will be based on two factors. The first will be the presence of ground squirrel burrows, coupled with management of perennially-short grassland. Habitat for 10 nesting-pairs of owls would require a minimum of 10 burrows. If the management strategy attracts enough ground squirrels such that 10 burrows are created, the project will be considered successful under the LRDP. The second criteria for success will be the inhabitation of the mitigation area by Burrowing Owls. While this definition is beyond the legal requirement of the LRDP mitigation and is not binding, it is the intent of the mitigation to attract nesting owls. If Burrowing Owls nest at the mitigation area after implementation of the management strategy, the mitigation area will be considered successful from a biological standpoint.

Cost estimate

Use of grazing will require fencing be placed along the perimeter of the main fields. This will include approximately 28,600 linear feet of fencing, at a material cost of approximately \$1.50/lf. Total fencing cost is estimated to be approximately \$43,000 for materials. Reserve staff would install the fence to keep labor costs at a minimum.

Forbs will be seeded over the course of 3 years throughout the permanently short owl areas and strips within the oak grassland south of Willow Canal. The estimated cost of forb seed is \$100,000 over 3 years.

Annual mowing costs will fluctuate, based on the success of grazing in maintaining short-stature grasses. If approximately 135 acres are mowed each year, this will cost approximately \$3,000, annually.

Total cost for implementation of forbs and perimeter fencing is estimated to be \$143,000. Costs may go up or down depending on the success of the seeding effort.

Management Plan Advisors

This plan was prepared in consultation with the following individuals:

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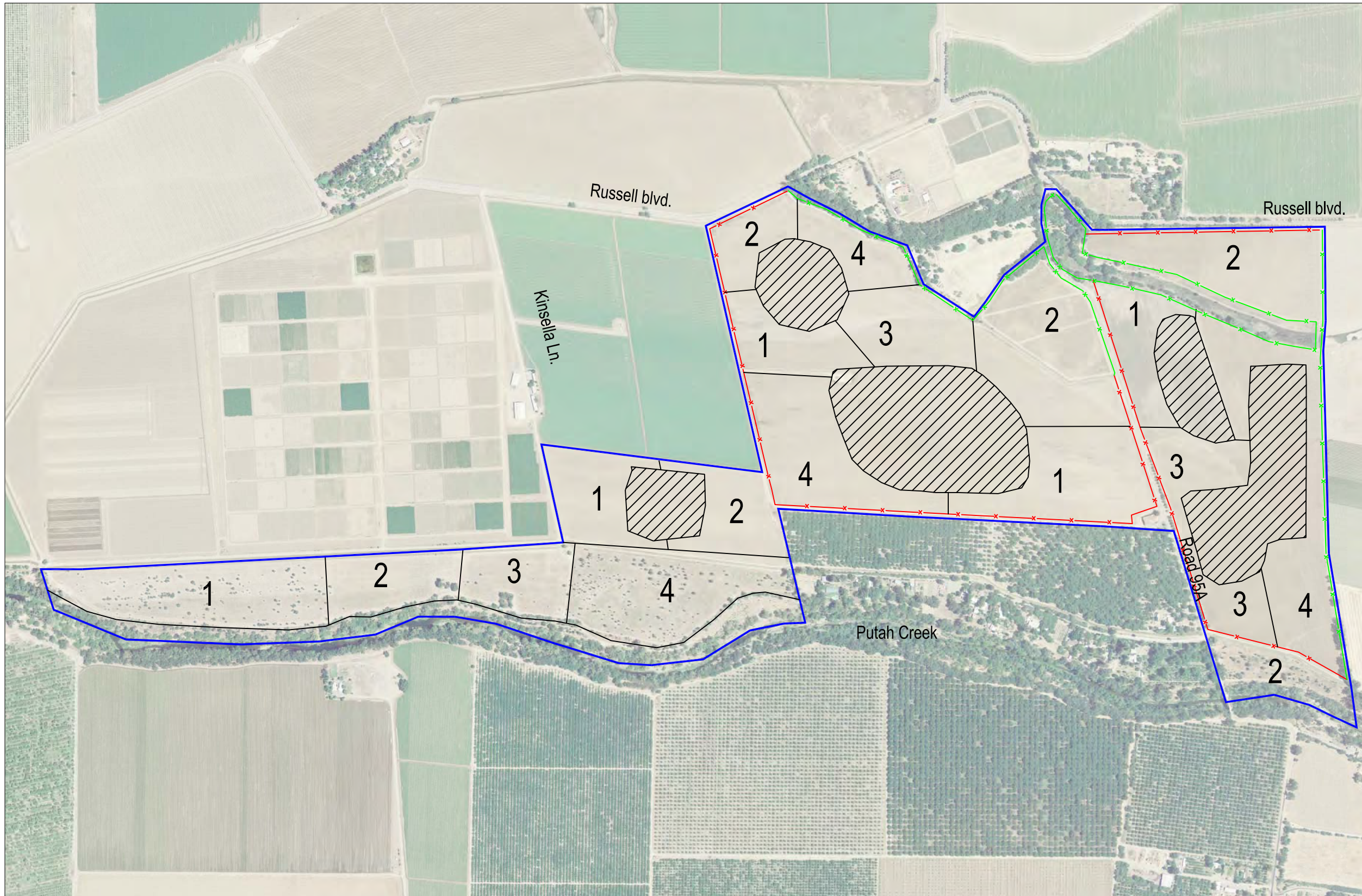
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

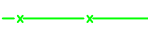
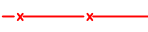
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Legend

-  Initial Perennially-short Burrowing Owl nesting areas
-  Mitigation boundary
-  Existing fence
-  New fence
- 1** Rotationally-shortened foraging areas

4/7/2010

Figure 1
 Russell Ranch Grassland Management Plan

Putah Creek
**PUTAH CREEK
RIPARIAN RESERVE**



Management Plan

August 2005

UC DAVIS
Office of Resource Management and Planning

Putah Creek Riparian Reserve Management Plan

Prepared by:

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August, 2005

University of California, Davis. 2005. Putah Creek Riparian Reserve Management Plan. August, 2005. Davis, CA. Office of Resource Management and Planning, University of California, Davis.

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Appendix A - Russell Ranch Mitigation Area Concept Plan

Appendix B - Species Lists from the 1986 Putah Creek Riparian Reserve Management Plan

Appendix C - List of Fish in Putah Creek

Appendix D - Solano Project Releases and Instream Flows for Lower Putah Creek

Appendix E - Management Plan Implementation Timeline

Appendix F - Reserve Use Applications and Waiver

Introduction

Reserve Overview

The Putah Creek Riparian Reserve is located on University of California, Davis (UC Davis), owned and managed lands along the active channel and old north fork of Putah Creek (Figure 1). The Reserve is managed as a teaching and research area, consistent with the mission of the University of California.

The Reserve is approximately 550 acres, along 6 miles of Putah Creek. University ownership of the Reserve is generally limited to the north bank of the active stream. The University owns the entire North Fork Cutoff, which is the historic channel of the creek (Figure 2).

The Reserve is a natural haven for wildlife in an urbanized and agricultural landscape. Beaver, ground squirrels, deer, snakes, lizards, and a variety of fish and other aquatic organisms inhabit the creek and its riparian corridor. Though seldom seen, bear and mountain lion have been reported on the creek corridor. The Reserve presents a unique opportunity to conduct field research on a riparian system within close proximity to the central campus.

The Reserve also serves as a nearby passive recreation area for residents of the cities of Davis and Dixon. The City of Davis runs an environmental summer camp called Camp Putah, and the Putah Creek Council stages several creek cleanups each year along the creek.

Need for an Management Plan

In 1986, a Management Plan Proposal was prepared by Kerry Dawson, Associate Professor with the Environmental Design Department, with assistance from graduate student, Greg Sutter. The 1986 plan outlined the proposed future direction of the Reserve.

The 1986 Management Plan Proposal was never formally adopted as the management plan for the Reserve. It contained policy and implementation

actions which were never fully implemented in subsequent years. This proposed plan is now out of date.

This document is a new Management Plan, and was prepared by the Reserve Manager with review and comment by the Putah Creek Reserve Advisory Committee. It will guide the future direction of the Reserve, and incorporates some elements and guiding principles from the 1986 plan. However, this plan will take into account recent changes within the Reserve, including recent property acquisitions and land use assignments, the increased use of the Reserve as a research area, increased impacts from human use due to population increases, and other factors which have changed since 1986.

Definition of Terms

A ‘goal’ is a broad, generalized expression of a desired end toward which effort is directed. For example, a goal might be ‘protection and enhancement of ecosystem health.’

An ‘objective’ is something toward which an effort is to be directed. An objective is similar to a goal, but more narrowly focused. Related to the example above, an objective might be: ‘removal of invasive species from the Reserve.’ A goal may imply numerous objectives.

A ‘planning issue’ is recognition of current or projected conditions which are at variance with stated goals and objectives. Planning issues reflect goals and objectives. For example, if vegetation removal due to floodway management is seen as an issue due to subsequent habitat loss, certain natural resource goals and objectives are implied.

A ‘policy’ is a high-level overall plan embracing the general goals and objectives of this document. For example, a policy related to the above goals and objectives might be: ‘allow for removal of invasive vegetation along the creek, especially where it can benefit flood flow carrying capacity.’

An ‘implementation action’ is a specific measure with measurable results. Implementation actions are concerned with the specific actions necessary to carry out policy within a definite time period. For example, an implementation action might be: ‘remove all Tamarisk from the north bank of the creek between County Road 98 and the Fire Ring, by spring 2006.’

Plan Organization and Use

This plan is organized to present a logical process by which management policies and actions are implemented. Goals and objectives are identified, planning issues are identified, and specific policies and implementation actions are presented.

Policies listed in the report outline the management program for the Reserve. These policies were generated utilizing background information summarized in the introductory sections of this report and are responsive to the plan goals and objectives.

Implementation actions outline specific measures to implement the proposed policies. These are listed at the end of the document and are the realization of the policies.

The goals, objectives, issues, policies and implementation actions in the plan are the result of planning meetings held by the Reserve Advisory Committee, and observations by the Reserve Manager.

The Reserve property is organized into reaches, numbered west to east (Figure 2). Each reach is a distinct segment of stream, usually defined by a property boundary or physical feature such as a bridge. Dividing the stream into reaches will allow specific management implementation items to be discussed at a finer scale.

Reach 1 (Figures 2 and 3)

- Includes the entire UC Davis creek frontage and Reserve lands on the Russell Ranch.
- Entire reach is used for campus mitigation related to the Long Range Development Plan.
- Includes Willow Canal, a water delivery canal managed by the Yolo County Flood Control and Water Conservation District.

Reach 2 (Figures 2 and 4)

- Begins at the upstream end of the UC Davis west campus property and ends at County Road 98.
- Adjacent to Wildlife, Fish, and Conservation Biology Ecosystem research area.

Reach 3 (Figures 2 and 4)

- Starts at County Road 98 and ends at the beginning of the North Fork Cutoff (former Putah Creek main channel).
- Marks the transition to the South Fork of Putah Creek.
- Includes the Fire Ring public access area.

Reach 4 (Figures 2 and 5)

- From the North Fork Cutoff to I-80.
- Start of the levees along Putah Creek.

Reach 5 (Figures 2 and 6)

- From I-80 to Old Davis Road.
- Reach 5 contains the broadest floodplain area along the Reserve.

Reach 6 (Figures 2 and 5)

- From Old Davis Road to the downstream end of the University property.
- Includes floodplain property on the south bank of creek.

Reach 7 (Figures 2 and 5)

- Includes the entire North Fork Cutoff, from the South Fork to State Route 113.
- Jameson Pond is located within this Reach.
- Section of former Willow Canal is located within the southern end of the reach.
- Sheep and Cattle pens are located within part of the former channel.

This management plan is a living document. The plan will be reviewed annually by the Reserve Manager and Reserve Steward to determine if the outlined actions are successful, or need modification and adaptation to new situations or circumstances. It is intended to serve as a roadmap for the future ecological health of the Reserve and should be used as guidance toward that end.

Background Information

Site Conditions

Reserve boundaries and ownership

The Reserve is located along University-owned land along Putah Creek. Approximately 380-acres of Russell Ranch and 170-acres of the Main Campus are within the Reserve. The Reserve also includes the old North Fork of the creek, which is no longer part of the active channel.

Existing uses around the Reserve range from private agricultural lands to University research lands. North of the Reserve, University research lands comprise all of the adjacent property. South of the Reserve the land use is predominantly agricultural. On upstream portions of the Reserve, the southern lands are rural residential, with an agricultural component.

Projected future boundaries

Implementation of the 2003 UC Davis Long Range Development Plan (LRDP) eventually will increase Reserve boundaries to include new lands within Reach 7 (Figures 2 and 7). This extension will create corridors of wild lands along the south boundary of the campus and the central part of west campus. The sheep and goat pens currently housed in the creek channel will be moved out of the historic stream channel. This future expansion adjustment will bring an additional 15 acres under Reserve administration.

With the projected placement of housing in the West Campus area south of Russell Boulevard and west of Highway 113, the Reserve will be even closer to urban areas. This will undoubtedly lead to increased pressure for public use, the potential for introduced species, and increased feral cat populations.

The greatest potential for development along the south bank is from rural residential properties. Nearer to I-80, there is the potential for freeway commercial or light industrial development. Both of these types of developments have the potential to impact the creek corridor through urban runoff, increased numbers of household pets, and increased human access to the creek, and impacts from night lighting.

Topography

The creek drains to the east, toward the Yolo bypass. Along the flowing portion of the stream (Reaches 1 through 6) the Reserve has steep creek banks, floodplains of various elevations and widths, and the creek channel itself.

Reach 1 includes not only the creek channel, but adjacent agricultural lands and a remnant slough channel. The adjacent agricultural lands within the Reserve boundaries are being converted to native perennial grassland as part of the Russell Ranch Mitigation Area Concept Plan (Appendix A).

Reach 7 has much shallower banks, and broad flat areas of former floodplain. The land around Jameson pond is the largest remnant floodplain area on Reach 7, and features a permanent pond with island. This pond is filled with water from the Center for Aquatic Biology and Aquaculture – Aquatic Center facility, drains out of the pond into a lined channel, then underground to be discharged into Putah Creek (Figure 9).

Nearer to Highway 113, Reach 7 houses animal pens within the former channel. At the eastern end of the former creek channel, a standpipe delivers storm flows to the channel on the east side of 113, to be pumped south to Putah Creek in Reach 5.

There is a remnant section of Willow canal across from the HC-2 building. This canal formerly brought water to the agricultural fields on what is now west and central campus. At present, it is a dry ditch with no inflow other than from immediately adjacent slopes.

Geology/Soils

The USDA/NRCS soil classifications for the Putah Creek corridor are primarily classified as Riverwash and Yolo (Figures 3 through 6). Reach 1 includes Yolo Sandy Loam, Rincon Gravelly Loam, Myers Clay, and Corning soils. Portions of Reach 6 contain Reiff Fine Sandy Loam and Yolo Loam.

These soil classifications are very broad. Site specific conditions within the Reserve can vary greatly, especially in the Riverwash soil classification. After an October 2002 fire in Reach 5, several soil test pits were excavated to check for soil moisture. As part of that excavation, sand and clay lenses were observed within the Riverwash-classification soil strata. Local conditions will need to be evaluated before restoration activities.

The entire creek channel within Reaches 5 and 6 has been influenced by human activity. The South Fork of Putah Creek is a constructed channel built in the 1870's, and the upper terraces of the floodplain have all been manipulated. In Reach 5, soil has been excavated for use offsite, and in the 1960's earth berms had been constructed for an Off Highway Vehicle track. In reach 6, the upper terraces have been farmed extensively. Levee construction has mixed the soil types found on the perimeter of the Reserve.

Reach 7 includes the former North Fork of Putah Creek. The segment of this reach, outside of the sheep pens and cattle pasture, has had minimal disturbance within the channel itself. The soil classification is Reiff Fine Sandy Loam, and is well suited to establishment of riparian trees, shrubs, and grassland. The elevation of the remnant channel is up to 15 feet higher than the incised South Fork.

Biological resources

Native vegetation

Vegetation on the Reserve is comprised mostly of central valley mixed riparian woodland (Figures 3 through 6, Appendix B). Arroyo willow (*Salix lasiolepis*) and narrow-leaved willow (*Salix exigua*) are found on the stream banks closest to the water, and within the annual flood zone. Box elder (*Acer negundo*) and small pockets of white alder (*Alnus rhombifolia*) can be found near the water and on some of the lower terraces. Valley oaks (*Quercus lobata*) and northern California black walnut (*Juglans hindsii*) dominate the canopy of the upper slopes and terraces at the top of the creek bank.

Reach 1 has areas currently being restored to native grasses as part of the Russell Ranch Mitigation Concept Plan. A remnant slough, located near Russell Boulevard, contains valley oaks and willows. It also contains a single California buckeye (*Aesculus californica*), which is more common in the upper watershed. The remainder of Reach 1 vegetation along Putah Creek is the same as the

downstream reaches, with the exception of a greater quantity of invasive species such as tamarisk (*Tamarix spp.*) and giant reed (*Arundo donax*).

On Reach 7, valley oak and northern California black walnut are the predominant species, as water is no longer present in the channel to support willows and box elder. California rose (*Rosa californica*), blue elderberry (*Sambucus mexicana*), mule fat (*Baccharis salicifolia*), and some Oregon ash (*Fraxinus latifolia*) are also found near the water's edge. Refer to Appendix B, page 27, for a list of species found on the Reserve.

The vegetation along the creek ranges from unbroken stands of forest to grassy areas. Reaches 5 and 6 have the least amount of native riparian canopy and the narrowest riparian corridor.

Small patches of native grass and forbs can still be found on the Reserve. Reaches 4 and 5 have pockets of creeping wildrye (*Leymus triticoides*). Wild licorice (*Glycyrrhiza lepidota*) is present in Reaches 5 and 6. Miniature lupine (*Lupinus bicolor*) and California poppy (*Eschscholzia californica*) are frequently found in all sections of the Reserve.

Invasive vegetation

Reaches 1 through 6 contain non-native eucalyptus (*Eucalyptus spp.*), tamarisk (*Tamarix spp.*), giant reed (*Arundo donax*), and invasive annual grasses. Eucalyptus is present throughout the stream and generally follows a linear pattern that is concentrated at the high water mark. Recruitment of new eucalyptus is beginning to occur near these established stands. Tamarisk and giant reed grow in clumps along these reaches of the creek, but do not form continuous stands of vegetation. The predominant invasive annual weeds include star thistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), and wild oats (*Avena fatua*). Bermuda grass (*Cynodon dactylon*) grows along the banks near the water.

Because of its lack of water, Reach 7 does not receive the upstream seed sources for tamarisk and arundo. The lack of water hinders potential for riparian vegetation recruitment. Tree of heaven (*Ailanthus altissima*) is the predominant invasive species of concern in this reach, forming large, dense stands. Feral almond (*Prunus dulcis*) trees are also found in this reach. Invasive annual weeds dominate the understory, with star thistle, Italian and milk thistle, and brome (*Bromus spp.*) as the predominant species.

Terrestrial wildlife

The Reserve is home to numerous species of terrestrial wildlife, including several somewhat unexpected species that use the regional movement corridor. A bear (*Ursus americanus*) has been seen upstream of County Road 98 and a mountain lion (*Felis concolor*) kill of deer (*Odocoileus hemionus*) in the Wildlife, Fisheries, and Conservation Biology Ecosystem project (located north of the Reserve, upstream of County Road 98) has been reported in the last 15 years. Smaller wildlife, such as raccoons (*Procyon lotor*) and squirrels (*Spermophilus spp.*), abound. Beaver (*Castor canadensis*) are abundant along the creek, and the Reserve has several beaver dams along its length. Appendix B lists native and introduced mammals of the Sacramento River Valley Riparian Communities. This species list was originally presented in the 1986 Reserve Management Plan.

Non-native wildlife, including feral cats (*Felis catus*) and black and Norway rats (*Rattus spp.*), has the potential to cause significant damage to native bird populations. Efforts must be made to assess the potential impact from these species and determine appropriate measures to control their populations.

Birds

The 1986 Reserve Management Plan species lists (Appendix B) identified 129 existing or potential bird species within the Reserve. Of those species, 38 are very commonly found within the Reserve. Maintaining a mosaic of habitat types within the reserve will help with sustaining the bird populations.

Fisheries

There are 33 known species of fish within Putah Creek (Appendix C). Native fish known to frequent the waters of the Reserve include Sacramento sucker (*Catostomus occidentalis*) and Sacramento pikeminnow (*Ptychocheilus grandis*). Other native fish, such as salmon (*Oncorhynchus tshawytscha*), have passed through the Reserve to be observed upstream.

Water Resources

In 2000, a settlement was reached in the lawsuit between the Solano Project water users in Solano County and the City of Davis, UC Davis, and the Putah Creek Council, regarding minimum flows in the creek. The currently-required instream flows for Putah Creek are listed in Appendix D.

The new flow regime marks a substantial change from previous operations. The creek now will not cease flowing in the summer on the Reserve. A guaranteed supply of water in the creek will stabilize the fishery and enhance the potential survival of riparian restoration projects. Potential instream habitat enhancements are also possible, such as creation of gravel bars for spawning.

The Reserve also contains the Jameson Pond in Reach 7. This pond has potential for establishment of a small native fishery because of its colder waters, isolation from potential human predators, and potential for exclusion of non-native predator fish.

Infrastructure

The Reserve contains numerous structures, cables, and other infrastructure (Figures 7 through 10). Reach 1 includes Stevenson Road Bridge, Willow Canal, County Road 95A, and water pumps along the creek. Reaches 2 and 3 include the County Road 98 Bridge. Reaches 4, 5, and 6 contain the I-80/State Highway 113 interchange, the Railroad Bridge, and Old Davis Road Bridge. A natural gas line crosses the Reserve underground before the Railroad Bridge in Reach 5.

Reach 7 has the most infrastructure within and adjacent to the Reserve. This infrastructure includes a pond and canal, buildings, old water tanks, squirrel pens, a fence around the majority of the perimeter, and several dirt roads that cross the North Fork Cutoff.

There is a dirt or paved road along most of the length of the Reserve. Reach 3 is currently accessible to vehicles along its entire length.

The entire Reserve contains storm water and waste water outfalls, as well as clusters of broken concrete along the creek and levee slopes. Reach 1 has several small pumps along the bank; one which is no longer operational. Reach 1 is located within a gaining reach of the creek, meaning that perennial creek flow exists due to groundwater flowing directly into the creek.

Research activities

The Reserve provides a nearby natural area for University research. Existing research activities on the Reserve are varied. Each type of research takes advantage of the natural resources found within the Reserve boundaries. Current and past research activities include:

- The 'Restoria' restoration site and associated community group involvement
- Squirrel movement studies

- Fisheries research lead predominantly by Dr. Peter Moyle
- Star thistle/insect interaction studies
- Star thistle colonization and competition with native plants
- Visitor use surveys
- Control of invasive trees using herbicide injectors
- Studies on wild radishes
- Vole studies
- Nesting bird studies
- Invasive annual grass studies within grassland restoration areas

The potential for future use of the Reserve as a teaching and research resource is very high. Studies could be conducted in most natural resource science fields.

Educational Use

University classes use the reserve as the focus of ongoing class projects as well as field trips. Campus conservation organizations also use the reserve as the focus of their projects. Current and past educational activities include:

- Society for Conservation Biology oak tree planting projects
- Class trips for plant ecology courses
- University Extension courses on hydraulic modeling
- Poetry and prose writing workshops

Recreational use

The Reserve is first and foremost a teaching and research natural area. However, the Reserve provides the largest stretch of publicly-owned land along the creek. It is the nearest site to Davis and Dixon where individuals can go to find unstructured recreation opportunities in a semi-wild setting. The Putah Creek Riparian Reserve is the closest natural area to the City of Davis. It is a significant open space corridor linking the Coast Range to the Yolo bypass. The majority of the waterway downstream of the Solano Diversion dam is private property. Existing public access is at Old Davis Road, the upstream beginning of the levee road, and County Road 98.

The only part of the Reserve with specific recreation development is the fire ring area. The fire ring is located in Reach 3 at the intersection of Hopkins and Levee roads. It is the center of organized recreation and day use along the Reserve.

The City of Davis Camp Putah summer camp uses the Fire Ring area during the summer months. The site has several picnic tables. There are no restroom facilities, and trash facilities are minimal. Two storage lockers are located onsite and are used by Camp Putah. A drinking fountain provides potable water for users of the fire ring picnic area. Creek access in this area is via a dirt track leading down to the water.

Fishing occurs along the length of the Reserve. Most anglers have been observed at areas with the easiest access to the water, which includes Pedrick and Old Davis Road bridges. The deep pools next to the fire ring and Old Davis Road attract fly fishers using float tubes.

Many different types of recreational use had been observed and reported in the previous management plan. Current observations have shown that the uses reported in 1986 are still present today.

Observed legal recreation activities include:

- Hiking/Walking/Jogging
- Picnicking
- Fishing
- Dog walking (on the levee road)
- Boating (canoes and kayaks)
- Bicycling (on the levee road)

Observed illegal or non-permitted recreational activities include:

- Off-highway vehicle use
- Paintball
- Firearms/air rifle use
- Dog walking (off of the levee road)
- Bicycling (off of the levee road)

No recent studies have been done to formally document user types and locations. A future study would be helpful in determining concentrations of activities, and could be a potential student-conducted research project.

Historical Setting

Historical use and management

Prior to placing the Reserve administration to the Office of Resource Management and Planning, the Reserve had been under the stewardship of the University of California Natural Reserve System.

Lacking sufficient financial and staff resources, management of the Reserve was largely weed control and occasional invasive tree removal by community groups. Some tree planting activities took place within the Reserve, including the Dana Abel memorial grove (Figure 12) near the fire ring, as well as projects downstream of the I-80 Bridge.

Both of these projects had varying levels of success. The oak and native grass planting at the Dana Abel grove has yielded many oaks that are surviving without irrigation. The native grass plantings have established reasonably well, with some exotic grasses mixed within. The former Restoria site was a much more aggressive undertaking. Numerous plants were installed, with a drip system providing water via gravity feed. The site did not receive any preparation other than mowing, and annual exotic weeds have been a continual problem. In October, 2002, the Restoria site was burned in a wildfire.

Mowing was done sporadically along the levees by both the Natural Reserve System (NRS) and Department of Water Resources (DWR). DWR has a vegetation maintenance program along the creek that they implement at approximately 5-year intervals. This includes clearing of vegetation approximately 100-feet upstream and downstream of the bridges. DWR clearing is supposed to be confined to the 100-foot zones; however, recent clearing efforts have extended much further.

Recreational access immediately adjacent to the creek has been largely confined to informal footpaths along the edge of the creek, from the western levee gate to

Old Davis Road. A short footpath extends upstream from the fire ring, but terminates when the banks of the creek become too steep.

In 2002, a Reserve Manager was hired to oversee administration of the Reserve properties and the Russell Ranch mitigation lands. In 2004, a Reserve Steward was hired to provide on-the-ground stewardship of the natural resources along the Campus Reserve.

The Russell Ranch mitigation projects began in 2003, with the removal of 66 acres of kiwi orchards and associated windbreaks. In addition, 6.5 acres of land adjacent to the creek was converted from an abandoned orchard to an elderberry mitigation project. Approximately 190 acres of land at Russell Ranch was restored to native grassland in 2004.

Issues

Management issues

Vandalism and Dumping.

Vandalism of Reserve property is a common occurrence. Since most of the Reserve is undeveloped, this vandalism is confined to manmade features. Vandalism and dumping activities include:

- Removal of the wood benches at the fire ring,
- Breaking of wood slats on picnic tables,
- Breaking existing wooden bollards,
- Dumping of trash near bridges,
- Graffiti on Reserve signs,
- Graffiti on bridge pilings and supports, and
- Dumping of crushed asphalt within Reserve boundaries.

Unclear access areas.

While the Reserve is publicly owned, public access is not clearly defined or controlled. Unclear access areas have lead to makeshift trails created near the edge of the water, creek access points located on steep and eroding slopes, and trespass onto adjacent private property. Reach 7 has a fence around its entirety, which prevents much human use.

Motor vehicle use and off trail/levee use.

Leveed sections of the Reserve have gates that are only sporadically closed and locked. Gates left open allow vehicles onto dirt roads at the top of the bank. Occasionally vehicles will leave the roads, especially near bridges with maintenance roads. Most observed off-road vehicles consist of motorcycles, with trucks concentrated near bridge areas.

In addition, the dirt road from County Road 98 to Hopkins Road is frequently used as a 'backdoor' route for campus facilities maintenance. The road receives get a fair amount of campus-affiliated traffic. Such traffic could pose a threat to Reserve visitors, as well as impact wildlife. Such vehicle use occurs in Reaches 3 through 6.

Shooting

Many rural residents use the wild areas within the county for shooting and hunting. Hunting, discharging, or carrying a firearm is not allowed on University property. Shooting within the Reserve creates a potentially dangerous environment for other users.

Human use of the creek corridor

Use of the Reserve by humans, even fairly benign activities such as jogging and hiking, can potentially disturb the environment. The fact that the Reserve land is in close proximity to Davis, Dixon, and Winters, makes it an attractive open space area for recreation. Lack of defined trails and access has led to the creation of informal paths that are not always in the best location. Human use of the creek corridor could potentially impact research activities.

The UC Davis Military Science ROTC program also uses the creek area for training. While there has not been a formal study done to assess impacts of ROTC training on the Reserve, there have been concerns expressed about the potential impacts to vegetation and wildlife, as well as potential for erosion. ROTC members attending training park along Old Davis Road, causing a potential hazard for traffic and training participants.

Floodway management

Putah Creek is a conveyance for floodwaters draining from the upper watershed and surrounding agricultural lands. As such, any impacts to the ability to

transport floodwater safely down the stream need to be identified and mitigated. However, the amount of additional riparian vegetation that can be maintained without impacting design flows is unknown.

DWR manages the stream corridor under the bridges within the levee stretch of the creek. (Reaches 4 through 6.) DWR policy is to clear most vegetation within 100 feet of the bridges, both upstream and downstream. Their current management strategy is to clear all vegetation within 15-feet of the low-flow channel, every 5 years. This clearing creates openings in the riparian habitat, creates suitable disturbance areas for invasive plants to establish, creates breaks in potential animal migration corridors, and ruins the scenic and habitat value of the creek. It is also unknown if recent bridge replacements have created hydrologic conditions where vegetation clearing is no longer necessary.

Planning issues

Research

The Reserve provides research opportunities nearest to campus for investigations of natural systems. Multiple research activities currently take place on the Reserve. Research activities are not presently coordinated to ensure that various research activities do not conflict. Without a management plan, research is also not reviewed to ensure that the research does not have a negative impact on the Reserve ecosystem. Other research activities have lead to infrastructure placement within the Reserve. Some of this infrastructure is abandoned after the research is completed, leading to further site degradation.

Education

The Reserve provides a nearby area for natural resource science education. However, the Reserve could be utilized more as an outdoor education area. Issues related to use of the Reserve for educational purposes include lack of understanding of the boundaries and ownership of the Reserve, lack of knowledge of the Reserve's existence, or perceptions related to the quality of the habitat for potential research. The 1986 management plan identified vandalism, lack of awareness of the Reserve, and research-incompatible recreational uses as reasons why the Reserve is not used for more research.

Outreach

Prior to placing the Reserve in the Office of Resource Management and Planning, the Reserve was managed informally by the Natural Reserve System. The movement of the Reserve to the Planning & Budget Office and the hiring of a Reserve Manager will allow more of a focus to be placed on this campus resource. However, the Reserve will need to continue to establish its own identity, similar to the UC Davis Arboretum. Public outreach will allow for elevated public awareness of the Reserve.

Habitat and ecosystem management

Effectively managing the habitat and ecosystem within the Reserve will require identification of the primary species and habitat types that are desired. Enhancement or creation of one habitat type must also not negatively affect another (e.g., irrigating planted oak trees which then introduce invasive ant species). Activities such as widening the riparian corridor, creating off-channel or back-channel wetlands, or increasing fish spawning habitat by creating gravel bars, will all require permitting and approval from numerous agencies.

Recreation

Due to its proximity to Davis and Dixon, the Reserve has become a de-facto recreation area for people seeking a 'natural area' experience. Visible effects of recreation include vandalism, illegal activities such as shooting and dumping, and occasional OHV use. Effects that are not immediately visible include disturbance of wildlife.

Existing recreation amenities such as trails and picnic areas are not regularly maintained or officially identified. Recreation use is haphazard, picnicking takes place where people find an opportunity to access the water, and trails are blazed in locations that may not be appropriate.

The city of Davis leads Camp Putah each summer. Leaders of this outdoor environmental summer camp have expressed a desire for permanent restroom facilities, more and better seating at the fire ring, better picnic facilities, and better maintenance of the weeds around the site.

Mitigation requirements

The Russell Ranch portion of the Reserve is designated for mitigation implementation for impacts associated with campus growth. The Russell Ranch Concept Plan (Appendix A) addresses the mitigation and habitat development projects on Reach 1 of the Reserve.

Potential development impacts on the south bank

The majority of the Reserve is located on the north bank of Putah Creek. The south bank of the creek lies within Solano County along Reaches 1 through 3, and Reach 7. Reaches 4 through 6 are entirely within Solano County. The privately-owned parcels along Solano County are generally of a smaller size than those found in Yolo County. Many have houses on them. As development continues in Dixon, these small parcels will become more desirable for lot splits and rural residential estates. The 20-acre parcel subdivision east of Stevenson road in Solano County has a significant number of houses along the creek banks. The potential for additional houses being built along the southern creek banks is relatively high. Continued development at the edge of the riparian area and subsequent vegetation manipulation could potentially affect the wildlife habitat along the creek.

Constraints

The size and complexity of the Reserve, as well as the diverse user groups and applicable regulations, will present challenges in management and restoration. Such constraints include:

- **Environmental constraints.** Actions within the stream channel could potentially be regulated by DWR, DFG, the Corps of Engineers, the Regional Water Quality Control Board, and others. Regulations governing activities within stream corridors and floodways may limit the types of habitat restoration that can be implemented.
- **Existing Research.** Several areas within the Reserve are the sites of long-term research projects. These projects require significant acreage to remain undisturbed, and contain primarily star thistle and other invasive grasses. Eradication of invasive species in these areas would impact ongoing research activities.
- **Financial limitations.** Managing the ecosystem of such a large area will cost substantial amounts of money over its lifetime. Managing fire risk through mowing, exotic species control and managing public use will require

significant funds, or creative partnerships to realize the goals outlined in this document.

- **Invasive species from offsite and upstream.** Despite future efforts to remove exotic species from the Reserve, there is a tremendous quantity of seed material upstream of the Reserve. In addition, the surrounding fields provide seed source for such exotics as star thistle and feral almonds. Efforts are underway on a watershed level, via the Lower Putah Creek Coordinating Committee, to remove Tamarisk and Arundo from the creek.
- **Topography.** Manipulated landforms, especially on the South Fork, mean earthwork would be required to increase the width of the riparian corridor. Earth moving could be prohibitively expensive.
- **Water quality.** Storm and wastewater outfalls are located along the Reserve. Continued compliance with discharge regulations is required to prevent impacts to wildlife and to allow human contact with the water.
- **Limited creek corridor ownership.** With the exception of land immediately downstream of Old Davis road, the University does not own the south bank of the creek. Any proposed management actions on either bank could impact the University or private property owners. Coordinated invasive species removal is also more difficult only owning one bank of the stream.

Opportunities

The size of the Reserve, its proximity to the core campus, and its natural resources present a wealth of opportunities for teaching, research, and environmental stewardship. Such opportunities include:

- **Large stream-based research areas.** The active channel presents opportunities to do research on aquatic ecosystems, and geomorphology.
- **Large restoration and habitat enhancement area.** The large areas of degraded habitat along the creek present an opportunity to implement a large-scale habitat enhancement project.
- **Grassland research near campus.** Reaches 4 through 7 have broad expanses of invasive grasses that provide sample opportunities to research alternative grassland reestablishment methods and weed control.
- **Education programs.** The Reserve could become an environmental education area, leading nature walks, tours, and natural history programs related to Putah Creek.

- **Land acquisition.** Willing landowners on the South bank of Putah Creek could be amenable to conservation easements, or sale of the creekside lands for either inclusion into the Reserve or management by a land conservation entity. This would allow portions of the creek to have both banks managed in the same fashion, instead of only the north bank.
- **Environmental leadership/sustainability.** The Reserve could lead the way in setting an example of environmental leadership and sustainability. Focusing on low-input restoration methods, solar powered facilities, and integrated pest management would demonstrate cost-effective techniques of environmental stewardship.
- **Valley Oak woodland/grassland restoration.** With most of the historic valley oak woodland/grassland community removed from the Central Valley, there is opportunity within the Reserve to recreate a Valley Oak woodland/grassland landscape. Significant oak regeneration is occurring on portions of the Reserve, especially in Reaches 3 and 4. Proper management and restoration of the grassland, along with removal of the invasive Tree of Heaven in Reach 5, may encourage more recruitment.
- **Native plant nursery.** With large-scale revegetation and mitigation projects likely to happen on the Reserve, there is the opportunity to create a native plant nursery. This would also allow interns to gain experience propagating native plants that would then be used on the Reserve.
- **Reserve headquarters and visitors center.** Creation of a headquarters for the Reserve could house a visitor's center, Reserve operations, the nursery, equipment, researchers, and provide a central focus for the Campus and Davis community.
- **Invasive species eradication.** Opportunities exist to research and perform invasive species eradication efforts on a variety of noxious weeds and trees.
- **Internship programs.** Providing a place for UC and high school students to learn and practice land management and restoration techniques, within biking distance from Davis and the main campus, will give valuable knowledge and experience to students. Such a program could also bring in disciplines ranging from Art, English, and other Humanities programs.

Management Plan Vision, Goals, and Objectives

Vision

The Reserve will serve as a nexus for Campus environmental research, a model for developing and applying new and innovative landscape restoration techniques, a community focal point, and a source of pride and recognition for UC Davis. Invasive species will be brought under control or eradicated and replaced with indigenous riparian, oak woodland, and grassland species. Species diversity will increase and additional habitat areas will be created. Improvements to instream aquatic habitat will increase the available spawning areas for anadromous fish, with resulting increases in populations. Research within the Reserve will make use of the existing natural resources, and will be coordinated such that the in addition to an increased body of knowledge resulting from the research, the act of the research itself will help improve the creek environment.

Goals

G-1: The Reserve will maintain and enhance the health of the ecosystem within and adjacent to Putah Creek, within the Reserve boundaries.

G-2: The Reserve will serve as a place for campus and other research activities.

G-3: The Reserve will provide areas for teaching and education about the environment.

G-4: The Reserve will involve the campus and regional community in its stewardship, as the key element of its public service mission.

Objectives

O-1: Removal and control of invasive species within the Reserve.

O-2: Expand teaching use of Reserve.

O-3: Expand research use of Reserve.

O-4: Expand community awareness and appreciation of Reserve and Putah Creek Watershed.

O-5: Allow for passive recreation, so long as it is done safely and does not conflict with above objectives.

Reserve Use Guidelines

General Guidelines

The Putah Creek Riparian Reserve has been established to support the University of California's research and teaching mission and, where appropriate, public service programs. Use of the reserve will be allowed if the proposed activity and level of use, after review by the reserve manager (or other designated University official), is lawful and is consistent with:

- Management Plan vision, goals and objectives,
- Reserve Use Guidelines,
- Management policies,
- Management and restoration actions, and
- Education and outreach actions.

Activities that will or are highly likely to irreversibly harm the natural values, ecosystem functions, and native biodiversity of the reserve, or preclude its possible future use for University-level research or instruction will not be allowed. Thus, the number and duration of stay by visiting researchers, classes, and members of the public will necessarily be limited as necessary. Similarly, research infrastructure development at the reserve may be allowed only in certain areas on a case-by-case basis and may be limited in size so that natural and cultural values are not adversely affected.

Process

The reserve manager has primary responsibility for approving proposed uses under the Reserve Use Guidelines, and will coordinate management and all other uses of the reserve. In difficult cases, the reserve manager will consult the Putah Creek Reserve Advisory Committee or faculty with appropriate areas of expertise before approving or rejecting an application. If a user fails to comply with any of the requirements, the reserve manager, after proper consultation, could restrict or

terminate ongoing reserve use, and the users subsequent use applications may be rejected. This appeals process will consist of dispute resolution by the Putah Creek Riparian Reserve Advisory Committee.

Reserve Use

Research Use

All researchers using the reserve must have valid academic qualifications and any necessary permits. Research in any subject area may be allowed if the researcher can demonstrate that the natural resources available at the reserve are reasonably necessary for the proposed research project. The reserve will not function simply as a place to set up infrastructure to conduct research unrelated to the natural resources within the reserve.

Research Application

All researchers should discuss their proposed research project with the reserve manager before formally applying for permission to conduct their studies. All researchers must complete a Research Application (Appendix F) and agree to comply with all reserve-specific regulations. The applicant must specify the proposed project duration, dates of reserve use, contract and grant information, and provide a statement of purpose describing prospective research site(s), and animal and plant populations that may be affected by the proposed research. Applicants desiring the use of housing or facilities must include estimated arrival and departure dates, whereas day-use applicants should provide approximate dates of use. Any potential disturbances to the reserve's ecosystem or cultural resources must be clearly described. Any equipment, flags and markers, or other related research infrastructure must be removed by the researcher upon completion of use of the reserve.

Class use

The reserve may be available for class use by K-12, college, University extension, or other instructional users. Classes in any subject may be allowed on site if the instructor can adequately demonstrate that unique resources at the reserve are reasonably necessary for the class.

Class Use Application

All instructors should discuss their proposed class visit with the reserve manager before formally applying for permission to visit the reserve. All instructors must complete a Class Use Application (Appendix F) and agree to comply with all reserve specific regulations. The instructor must specify the requested arrival and departure dates, the number of class participants, and a statement of purpose describing prospective teaching site(s), animal and plant populations that may be affected by the proposed class visit, and housing and other resources that will be needed during the visit. Any potential disturbances to the reserve's ecosystem or cultural resources must be clearly described. If applicable, the instructor must provide an approved animal care and use protocol from his/her home institution and all required state and federal permits.

Public Use

Where appropriate, reserves may be used to support research and education activities by K-12 classes, community groups, and non-profit organizations.

Public Use Application

All group leaders should discuss their proposed reserve visit with the reserve manager before formally applying for permission to visit the reserve. All group leaders must complete a Public Use Application (Appendix F) and agree to comply with all reserve-specific regulations. The group leader must specify the requested arrival and departure dates, the number of group participants, and a statement of purpose describing prospective teaching site(s), animal and plant populations that may be affected by the proposed group visit and other resources that will be needed during the visit. Any potential disturbances to the reserve's ecosystem or cultural resources must be clearly described and discussed in advance with the reserve manager.

Waiver Form

All groups not affiliated with the University must have activity participants complete a Waiver of Liability, Assumption of Risk, and Indemnity Agreement (Appendix F). These forms must be completed prior to commencement of any use of the reserve.

Management Policies

Management Policies

Reserve administration

MP-1: Reserve will be open from dawn to dusk unless specifically approved in a research or Reserve use application.

MP-2: The Reserve will serve as a model, developing and implementing environmentally sensitive design and operation techniques, using recycled products, solar power, minimal infrastructure, and minimal energy consumption to the extent feasible.

MP-3: Prohibited activities are as follows:

- Dogs shall be on a leash and remain on the levee road.
- Unauthorized motor vehicles use.
- Dumping.
- Wood cutting.
- No plant or animal gathering, unless permission is granted by the Reserve Manager and all required permits have been obtained.
- Horses are not allowed off of the levee road.
- Paintball.

Reserve security

MP-4: Reserve gates shall be locked at all times, with the exception of group events and official work requiring access to the Reserve.

MP-5: Firearms and other weapons are already not allowed on University property except as permitted by the UC Davis Police Department, and the Reserve shall be no exception.

Research, habitat protection, enhancement, and restoration

MP-6: No infrastructure shall be placed in the Reserve by departments or individual researchers unless the infrastructure is related to research and the Reserve is specific to the research. At the conclusion of any research activity, all infrastructure shall be removed by the researcher, at their cost, unless otherwise directed by the Reserve manager. Exceptions to this policy include utilities such as stormwater outfalls and other Campus municipal infrastructure.

MP-7: Reserve use and management will promote the stability of endangered, threatened, or species of special concern.

MP-8: The Reserve headquarters will serve as a repository of scientific and cultural information about Putah creek.

MP-9: The Reserve staff will facilitate researchers, private individuals, and groups which seek to increase the habitat value of the Reserve, within the policies and guidelines of this plan.

MP-10: Research projects which require introduction of invasive species into the Reserve will not be allowed; unless it can be shown the introduced species shall not spread beyond the research area and will be completely removed at the conclusion of the research.

MP-11: Reserve use and management will promote ecosystem health rather than focus on single-species management of natural resources. The Reserve will seek to stabilize and increase native plant and animal communities.

Education and Outreach

MP-12: Reserve lands will provide an environmental education and research area for university and surrounding K-12 schools.

MP-13: Reserve staff will utilize the latest technologies to inform the public and researchers about the value and mission of the Reserve.

MP-14: The Reserve will provide a high-quality learning environment for students and interns.

Recreation

MP-15: Passive recreation will be allowed on portions of the Reserve, so long as it does not impact resource values or teaching and research uses.

MP-16: Allowed recreation shall be limited to those activities that are dependent on the Reserve, such as hiking, fishing, geocaching, jogging. Active recreation, such as organized sports, shall not be allowed.

MP-17: Motor vehicles will not be allowed on the Reserve, unless authorized as part of Reserve management and maintenance or specifically approved in a reserve or research use application.

MP-18: Recreation access points will be located in the least environmentally sensitive areas, where safety and security are highest.

MP-19: ROTC use of the Reserve for training exercises shall be allowed, so long as the exercises do not alter or damage the natural landscape. The Reserve Manager will work with ROTC to coordinate their use with research and restoration activities.

Management and Restoration Actions

Plan implementation

The following sections include a list of actions to ensure policies are reflected on the ground. Implementation of the plan will take place according to the timeline shown in Appendix E.

Management and restoration – all reaches

The following are management and restoration actions that are common to all reaches of the creek.

Administration

MR-1: Develop a Reserve Headquarters

Creation of a Reserve Headquarters will allow greater visibility of the Reserve as a campus and regional resource, will provide a place for interns and researchers to work, serve as the storage area for equipment, staging area for the nursery, and place for elementary schools to visit. The HC-2 building is one possibility that should be analyzed as a potential building for the Reserve headquarters.

MR-2: Develop Reserve maintenance/equipment area.

A maintenance and equipment storage area will be developed. The area will be designed and situated to have minimal visual, environmental, and aesthetic impacts on the Reserve. The maintenance and equipment storage area will be used to house all Reserve hand and power tools, signs, herbicides, and other items used in the day-to-day management of the Reserve.

MR-3: Create a native plant nursery for use by the Reserve.

A native plant nursery will be used for revegetation projects on the main campus section of the Reserve, and for elderberry mitigation on the Russell Ranch.

MR-4: Install signs at all potential creek access points.

Signs at each access point will be labeled with the appropriate California Vehicle Code or University policy language identifying the area as closed to motor vehicles. Other regulations will also be posted so enforcement will be allowed.

MR-5: Develop uniform appearance for all infrastructure placed in the Reserve.

Currently the Reserve has a variety of fencing types, signs, and other improvements, such as picnic tables. Future infrastructure will be coordinated to give the Reserve both a visual identity, but also decrease maintenance costs associated with having many different types of structures.

Fencing and access controlling devices (Figures 11 through 14) will be chosen from among the following types:

- Wood or metal post-and-chain fencing.
- Metal gates of a consistent design.
- Post fencing using pressure treated posts.
- Single and dual-log vehicle barriers using wooden logs laid on existing grades.
- Wire fencing, when used, should be black-vinyl covered to blend in with the surrounding environment.

MR-6: Seek to use renewable-energy technologies and methods in management of the Reserve, wherever feasible. As projects are designed, each project will be reviewed by the Reserve Manager and Reserve Steward to determine if renewable energy technologies and principles can be incorporated. Such methods could include:

- Use of solar and wind power to provide electricity for the Reserve Headquarters.
- Use of native grass straw as mulch around plantings, to reduce potential need for irrigation.
- Specific and limited use of herbicides by a certified applicator.

- Explore the potential for use of an electric vehicle for Reserve management activities.
- Use of electric tools versus gas-powered tools.

Habitat Restoration and Floodway Management

MR-7: Removal and management of invasive species within the Reserve.

Wherever possible, invasive grasses and weeds will be managed, removed, or replaced with native species. Removal and control methods may include herbicide, mowing, disking, hand-pulling, or burning.

MR-8: Preserve and establish native grasses within the Reserve.

Existing stands of native grasses will be preserved, and new stands of native grasses will be established as part of the weed control program.

MR-9: Removal and management of invasive trees within the Reserve.

Invasive trees such as Tree of Heaven, Eucalyptus, and Tamarisk, shall be removed and controlled to prevent re-establishment or stump-sprouting.

MR-10: Preserve and establish native trees and shrubs within the Reserve.

Native trees and shrubs within the Reserve will be preserved from disturbance. Areas that have been cleared of invasive trees and shrubs will be planted with native trees and shrubs as appropriate.

MR-11: Work with DWR and Corps of Engineers to re-visit and develop appropriate bridge and stream corridor vegetation management plan.

The Putah Creek Reserve Manager will work with DWR to evaluate and revise the current bridge-vegetation management scheme. A result of the coordination with DWR and the Corps will be a written Memorandum of Understanding that formalizes the University's role in decisions about floodway vegetation maintenance. In addition, a revised study will be undertaken to evaluate the amount of vegetation allowed in the channel. This study will look at reach-specific management of the vegetation.

MR-12: Improve aquatic habitat.

The Putah Creek Reserve will be evaluated for potential aquatic habitat improvement zones. Such improvements may include: enhancement or creation of gravel bars for fish spawning, placement of instream woody debris for fish cover and rearing habitats, planting of riparian species at the low-water mark to

increase shaded riverine aquatic habitat, or other modifications as recommended by aquatic habitat specialists or geomorphologists.

Recreation

MR-13: Develop a trail system to focus recreation away from sensitive areas and allow for a managed use.

A trail system will be developed to allow for passive use of the Reserve property. The trail system (Figures 12 through 14) will be designed to maximize enjoyment of the Reserve's open spaces while minimizing disturbance of the natural resources. It will be designed to use existing routes, where applicable, but will close those routes that are currently causing resource damage.

MR-14: Parking areas will be developed to reduce illegal parking and erosion. Figures 12 through 14 outline the location of parking areas at access points. Parking areas will be minimal, with gravel parking and vehicle barriers.

MR-15: Work with ROTC to develop a suitable location for use either on or off of the Reserve, and work to limit their use of other areas.

The Reserve Manager will meet with ROTC representatives to determine ROTC training needs. Based on those needs, the Reserve Manager will work with the Reserve Advisory Committee to determine the appropriate location for ROTC use, and restrictions and control procedures.

Community involvement

MR-16: Work with campus organizations, the Putah Creek Council and other citizen's groups to implement volunteer restoration projects.

Working with volunteer groups, the Reserve will implement small-scale restoration, habitat enhancement, and weed management projects. These projects will add to the enhancement of the Reserve ecosystem, but will be primarily for education and outreach to the larger on and off-campus community about the benefits of riparian ecosystems.

MR-17: Hold community cleanups and planting days twice a year.

The Reserve will coordinate with Putah Creek Council and other groups to hold 2 workdays a year. The workdays will take place in the fall and spring.

Reach-specific actions

Reach 1. Russell Ranch lands

R1-A1: Implement final Russell Ranch Concept Plan.

In 2002, the Russell Ranch Concept Plan was completed. This plan outlines the restoration and mitigation activities to take place on the University's Russell Ranch. This plan will be implemented over 3 years, beginning in 2003. The Russell Ranch Concept Plan addresses specific actions to take place within the Reserve boundaries. In 2004, the demolition of the existing kiwi orchard was completed, and 190 acres of native grassland was seeded.

Reach 2. Upstream of County Road 98/Pedrick Road Bridge

R2-A1: Develop access plan for County Road 98 parking, while leaving remainder of Reach 2 closed to general access.

A detailed design for the upstream parking area will be developed. Presently this area is a gravel and dirt area with no formal use. Development of an access plan, gates, and sign locations will prevent unauthorized access to the upstream section of the Reserve. The remainder of Reach 2, along the creek, upstream of the existing access gate, will remain off-limits to the general public. Keeping this area closed will allow for research use within a controlled setting that minimizes potential disturbance from public use.

R2-A2: Coordinate habitat restoration projects between the Reserve and the WFCB Ecosystem.

The Reserve manager and steward will coordinate with the WFCB Ecosystem project when designing habitat improvements within this reach. The goal of this action is to increase the amount of habitat in this reach by developing similar or complementary habitat types on the adjacent properties.

R2-A3: Develop plan for berm revegetation.

A site-specific plan will be developed for the large berm located on this reach. The berm is presently covered by invasive grasses and has the potential for oak woodland creation and native grassland restoration.

Reach 3. County Road 98 to North Fork

General

This area presently receives both walking and biking use along the existing dirt road, as well as unauthorized vehicle access downstream of the bridge to the paved levee road.

R3-A1: Install gates to control motor vehicle access to levee road.

A gate will be designed and installed on the dirt road west of the Hopkins road/levee road intersection. The gate will control motor vehicle access to the creek banks and reduce dumping problems along the creek.

Fire Ring area

The Fire Ring area has been long used as a public access area. The existing picnic tables, fire ring, and benches provide limited visitor amenities. This area has the potential to be the main public use area on the Reserve, as well as provide a better meeting area for classes and camps.

This area is also best for active public use, as it is next to an existing paved road, easily visible for police patrols, contains a water connection, and is above the flood zone. The area also has ample parking off of the road.

R3-A2: Redesign and improve fire ring area.

The fire ring area receives the highest use of any area on the Reserve. This public access area needs to be upgraded to improve compliance with the Americans with Disabilities Act, sanitation, and safety requirements. The design for improvements in this area will respect the natural setting and passive use of the area. Materials will be selected which blend in with the natural environment and are durable and low maintenance. Several community groups and UC professors have suggested the creation of an amphitheater-type gathering area for use as an outdoor classroom.

R3-A3: Plant native vegetation on the fire ring terrace as part of the redesign.

The fire ring terrace is comprised of mostly geriatric cottonwoods, with one large hackberry and several small oak trees. Valley oaks would be planted on the upper terrace, and native grasses planted along the levee banks and on the terrace itself.

R3-A4: Develop ADA accessible areas at fire ring.

The fire ring is not currently ADA accessible. As a public area, it needs to be brought up to current codes requiring access. ADA compliance activities will most likely include redesign of the steps leading down the levee, re-grading ramps leading to the terrace, redesign of the drinking fountain, and installation of ADA accessible picnic tables.

R3-A5: Coordinate with Camp Putah to determine environmental education area needs.

The Reserve Manager will coordinate with Camp Putah to develop a list of improvements to the fire ring area that will assist in Camp Putah's environmental education program.

R3-A6: Determine the potential for portable restroom to be installed at fire ring area.

The Reserve manager will explore the potential for placement of a permanently-located, portable restroom facility on the north side of the levee road. Such a structure would most likely be a concrete block structure housing the portable restroom.

R3-A7: Develop formal parking area north of Levee Road.

A design will be prepared which converts the dirt and asphalt area north of the levee road into a more formal parking area. Trees would be planted where allowed with regard to airport flight-path restrictions. Creating more formal parking north of the levee road would direct parking away from south of the levee road, preventing bank erosion, and removing the parking from areas adjacent to elderberry shrubs.

Reach 4. North Fork to I-80

General

R4-A1: Remove concrete debris from banks of levee.

Concrete and other debris that have been dumped onto the creek-side of the levee will be removed and the banks rehabilitated.

R4-A2: Stabilize eroding banks at outfalls.

Areas that are eroding beneath outfall structures will be stabilized and revegetated. Willow wattles and cuttings, as well as other biotechnical methods, will be used to slow down water from the outfalls, and will help hold the banks in place.

R4-A3: Develop oak woodlands and native grassland on upper terraces.

Vegetation on the upper terraces of this Reach is predominantly invasive weeds and trees. Weed control would be implemented and native oaks and grasses will be established on these terraces.

Levee Steps access point

R4-A4: Improve existing parking area at levee gate.

The open area before the levee gate has long been used as a parking and access area. The parking area requires regrading to prevent ponding and to repair tire ruts.

R4-A5: Redesign levee steps at parking area.

The existing steps leading from the parking area to the creek were created using round posts. Square railroad ties would provide a larger surface on which to walk, and would better retain the soil behind each step.

Reach 5. I-80 to Old Davis Road Bridge

R5-A1: Create restored grassland on upland terraces.

Channel incision has lead to these former floodplain terraces to convert from riparian vegetation to grassland. The grassland on the upper terraces is predominantly star thistle, with some smaller stands of creeping wild-rye. The invasive grass areas will be controlled through burning, disking, and mowing, and native grasses reestablished.

R5-A2: Expand riparian corridor where possible.

This Reach has an incised channel, which has lead to a narrow riparian corridor. In certain areas of the reach a seasonal side channel is forming.

R5-A3: Control off-road access off of levee.

The gentle slopes in portions of this reach have led to off-road access. Through measures such as rock placement and bollards, prevent vehicle access off of the levee road. Coordination will occur between bridge maintenance entities to ensure reasonable maintenance access is preserved.

R5-A4: Avoid disturbance in star thistle research areas.

Areas presently being used for star thistle research and invasive grassland research should not be disturbed or modified, to allow for continuous research of the site until the research is concluded. Then actions R5-A1 and R5-A2 would be implemented on the sites.

Reach 6. Old Davis Road Bridge, Downstream

R6-A1: Develop restoration plan for the floodplain on south side of creek.

The Bertagnolli parcel was recently acquired by UC Davis and is now part of the Reserve. This parcel is a floodplain terrace that floods at a more frequent interval than any other part of the Reserve. This unique combination of elevation and location provide several potential restoration opportunities. Native grassland could be established, as could a floodplain oak woodland community. The area also has potential for the site of a constructed back-channel wetland. The final use of this area will be determined after hydraulic studies are completed and public input has been sought.

R6-A2: Develop and implement a site plan for southern floodplain terrace.

Once a use has been determined for the Bertagnolli parcel, a detailed site plan will be developed. Any site plan should incorporate teaching use of the wildlife enhancements.

R6-A3: Control off-road access off of levee.

Gates, fencing, rock, or other barricades will be installed to prevent vehicle access off the levees. After an initial evaluation of the illegal access points, a site plan will be prepared to implement the controls.

R6-A4: Develop access plan for Old Davis Road parking.

A detailed design for the Old Davis Road parking area will be developed. There is insufficient parking along the edge of the road for the amount of visitors. Parking would be placed on the north side of the creek, on the upper terrace, adjacent to the levee road, downstream from the bridge. The parking would accommodate up to 10 cars, with controlled access to an overflow area. The

overflow area and the remainder of the terrace would be planted in native grasses.

Reach 7. North Fork Cutoff

The 2003 LRDP identifies the addition of the east end of the North Fork as part of the Reserve. Before this land can be added to the Putah Creek Reserve, existing land users will need to be relocated.

R7-A1: Work with the Office of Resource Management and Planning (ORMP), facilities services, agricultural services, and the Department of Animal Science to relocate sheep pens out of the old north fork.

The Reserve Manager will work with ORMP on removal of the sheep pens and cattle pasture from the future Reserve addition.

R7-A2: Restore old sheep pens and cattle pasture into oak grassland savannah.

Once the pens and pasture are removed from the North Fork begin implementing revegetation projects. The former channel of the creek is no longer an active watercourse, and lack of water is now a limiting factor in plant establishment. As such, the best restoration of the site should be as valley oak savannah. This savannah would include native grasses and oak trees, but could also serve as an elderberry mitigation area.

R7-A3: Attempt to prevent the spread of Argentine ants within the Reserve.

The extent of spread of Argentine ants into the North fork area will be identified. Once the spread areas have been identified, pesticide control will be used to eradicate and control the ant populations. Quarterly monitoring will be done to identify if eradication measures are working, and adaptive management will be used as necessary.

R7-A4: Attempt to enhance populations of native ant colonies.

Native ant populations will be preserved by minimizing disturbance to existing colonies, ensuring any plants brought onto the Reserve are not infested with Argentine ants, and keeping water sources out of existing dry areas. Areas near existing native ant colonies that are overgrown with invasive grasses will have patches cleared to allow for native ant colony establishment.

R7-A5: Remove and manage stands of Tree of Heaven.

Large stands of Tree of Heaven shall be removed and treated with herbicide to prevent resprouts.

R7-A6: Remove abandoned research infrastructure.

Research infrastructure that is no longer being used shall be removed from the Reserve. This includes dilapidated squirrel pens, water tanks, and holding pens.

R7-A7: Repair fences, gates, and install locks.

Fences and gates along this reach will be repaired. Locks will be installed to prevent unauthorized access.

R7-A8: Develop research access/wildlife viewing areas at Jameson Pond.

Wildlife viewing areas and a research access point will be developed at the pond. The wildlife viewing area will be used for research and during public outreach, but would not be open to the general public without a docent present.

R7-A9: Evaluate potential for eradication of exotic fish from Jameson Pond, and replacement with native species.

The Reserve will work closely with the wildlife and fisheries biology department to determine if this project could have long term research value. If there is support from WFCB, the Reserve will coordinate with facilities services to determine if the pond can be drained and at what cost. If it is economical and feasible, the Reserve will work with WFCB on implementation of a native fish replacement program.

R7-A10: Remove sections of chain-link fence.

The placement of chain-link fencing around Reach 7 detracts from both the aesthetics of the Reserve, as well as mammal movement into this habitat area. However, in some areas such fencing may be desirable to for safety and access control reasons.

The fencing along Brooks Road will be replaced. The new fencing will be either metal post-and-chain or will be black vinyl-coated chain link. If chain link fencing is used, it will be set back from the road.

The fencing along Garrod Drive will remain. Fencing between the Reserve, airport, and aquaculture facility, would also be retained.

Education and Outreach Actions

Education

Website

EO-1: Develop a Reserve website.

A website will be developed that will serve as a single point of inquiry for research application forms, maps of the Reserve, GIS data sets, downloadable nature guides, rules and regulations and other information pertaining to the Reserve.

Brochures

EO-2: Brochure development.

A series of downloadable brochures will be developed for the Reserve. A nature trail guide will be developed that corresponds to numbered signs on the Reserve.

Brochures will also be prepared to cover a wide variety of topics, including: native and invasive grassland species, native trees and shrubs, wildlife, history of the creek, fisheries, restoration efforts, and native riparian plant propagation.

Data

EO-3: Develop a data repository.

The Reserve will house all available information regarding the Reserve, and will make this information available via check-out, and on the internet through the Reserve webpage. This central data library will make available all research completed on the Reserve, as well as all spatial data for use on GIS systems.

Docent Programs

EO-4: Develop a docent program.

Similar to the docent program at the University Arboretum, this program will utilize volunteer docents to lead hikes along the Reserve, help at the native plant nursery, and assist in coordination of volunteer days.

It is anticipated that development of this program would be done in close coordination with the Putah Creek Council.

Research Coordination

EO-5: Coordinate with researchers.

The Reserve Manager will coordinate with Campus researchers to identify and coordinate research opportunities within the Reserve.

Outreach

Service organizations

EO-6: Give presentations to other conservation organizations.

A series of presentations will be developed which can be given to other on and off campus conservation and service organizations and groups. The presentations will cover the resource values of the Reserve, and opportunities to become involved in the Reserve volunteer program.

Schools

EO-7: Take classes out to Reserve.

The Reserve Manager and volunteers will lead tours of the Reserve for K-12 and College-level classes. These tours will focus on the management of the Reserve lands, native and invasive plant and animal species, and ongoing research.

Internship program

EO-8: Develop an internship program.

An internship program will be developed to give students experience and education as it relates to natural resource management. Interns could collect environmental data, design and implement outreach and education programs, lead nature walks, staff the native plant nursery, and assist in monitoring the Reserve and mitigation lands at Russell Ranch.

EO-9: Develop an outreach program to bring more research and classroom attention to the Reserve.

An outreach program will be developed, in conjunction with the website, to alert more researchers to the potential of the Reserve. The Reserve Manager will work with News Services to make the Reserve a regular feature in Dateline, to inform the faculty and staff of activities on the Reserve.

Volunteer coordination with other groups

EO-10: Coordinate education and outreach actions with the Putah Creek Council, LPCCC, and the City of Davis.

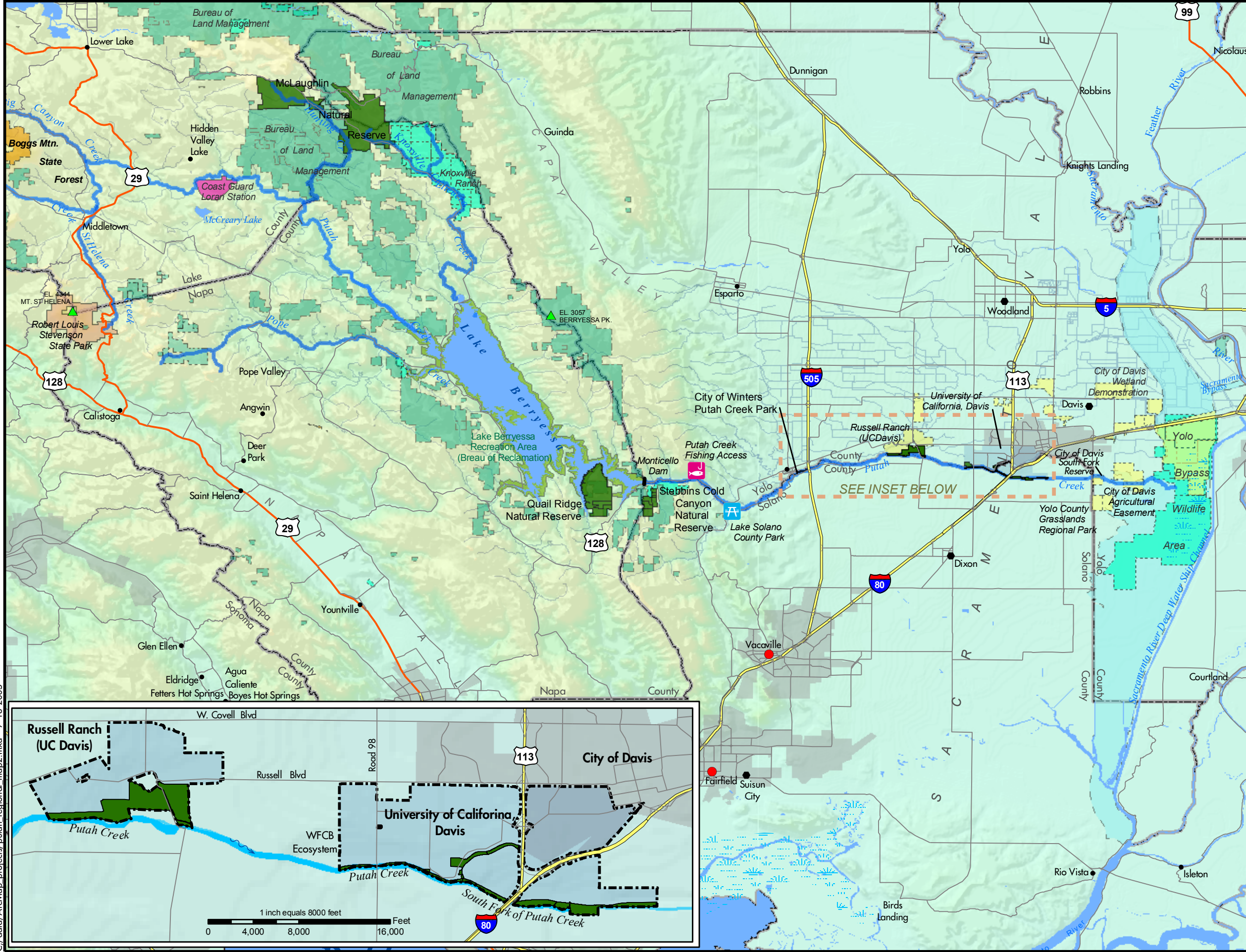
The Reserve Manager will coordinate with the above organizations to integrate the Reserve's outreach activities with existing outside efforts. The Reserve will more actively work with the City of Davis' Camp Putah program, to identify areas where the Reserve can assist in developing educational materials as part of the Camp.

EO-11: Coordinate volunteer programs with private and public conservation groups.

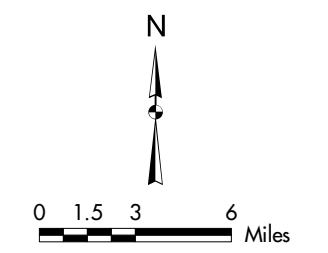
The Reserve manager will coordinate programs such as the Putah Creek Council's 'Adopt-a-Reach' volunteer program. This will allow private conservation groups a chance to educate more people about the Creek, and for the Reserve to receive labor and enhancement projects.

Figures

Figure 1
Putah Creek Riparian Reserve
Regional Location Map



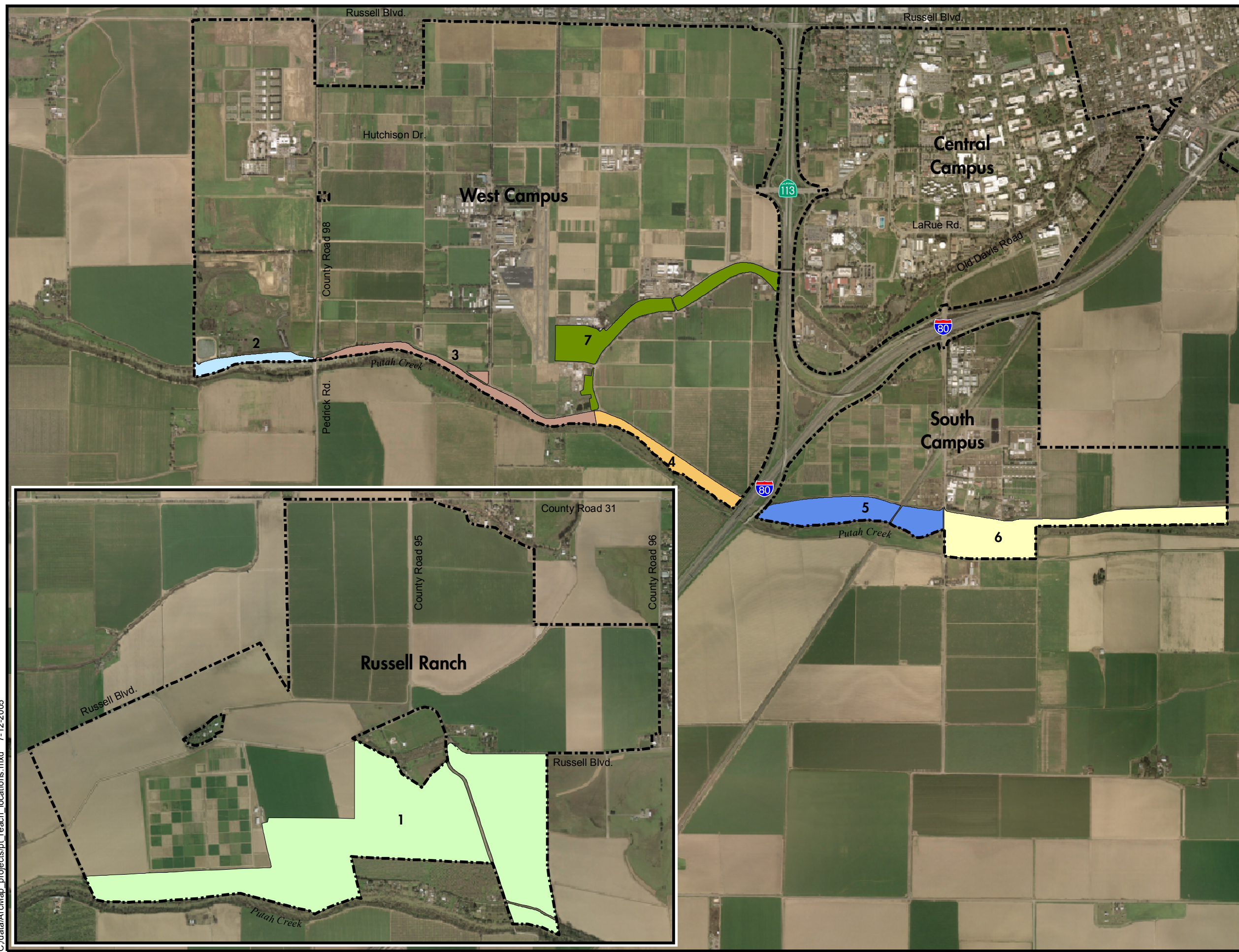
- Land Parcels**
- UC Davis Management Areas
 - California Department of Forestry and Fire Protection
 - State and Federal Lands**
 - California Department of Parks and Recreation
 - Military
 - State Lands - State Lands Commission
 - Bureau of Reclamation
 - BLM Land
 - California Department of Fish and Game
 - City of Davis Open Space
- Flood Control**
- Yolo Bypass
- Regional Roads**
- Regional Roads by Type
 - Primary road with limited access
 - Primary road
 - Secondary and connecting road
 - Access ramp
 - Ferry crossing
- Regional Cities**
- Cities by Population Range
- 0 - 9,999
 - 10,000 - 49,999
 - 50,000 - 99,999
 - 100,000 - 249,999
 - 250,000 - 499,999
 - 500,000 - 999,999
 - 1,000,000 - 9,999,999



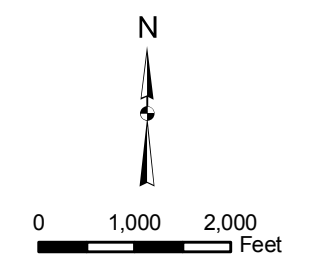
UCDAVIS
Office of Resource Management & Planning

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Figure 2
Putah Creek Riparian Reserve
Reach Locations

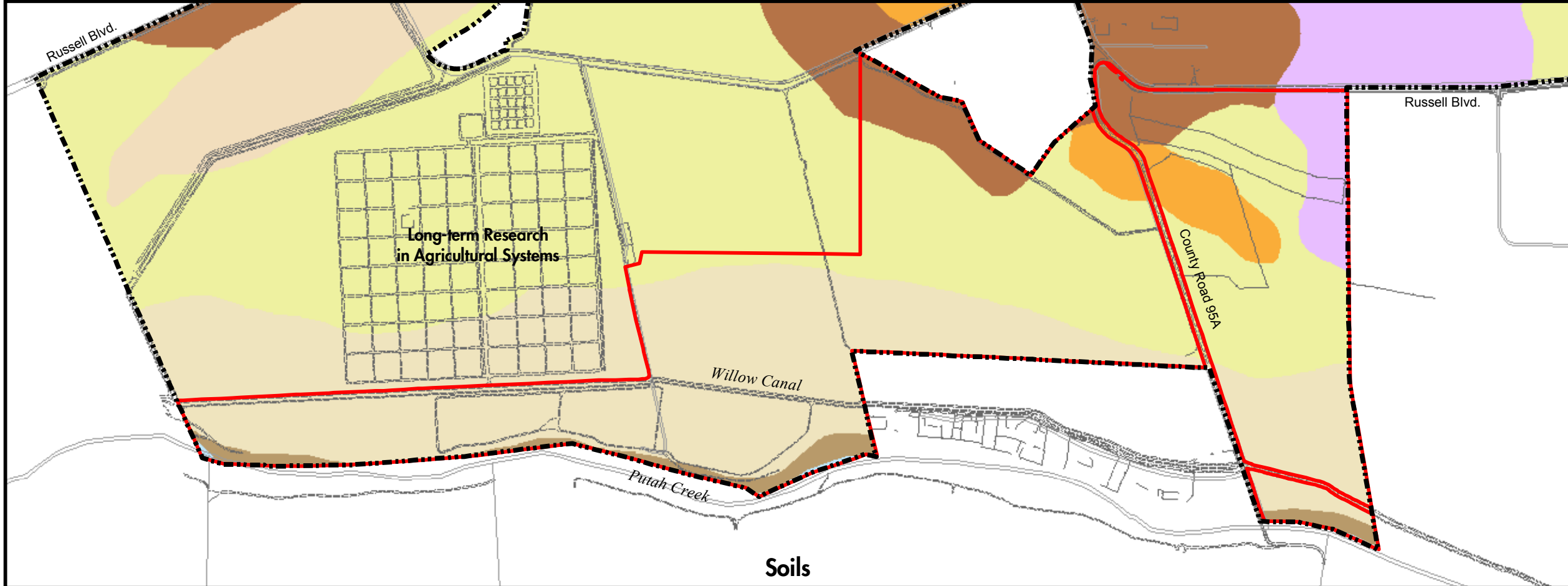


- Legend**
- 1 Reach 1
 - 2 Reach 2
 - 3 Reach 3
 - 4 Reach 4
 - 5 Reach 5
 - 6 Reach 6
 - 7 Reach 7 (North Fork Cutoff)



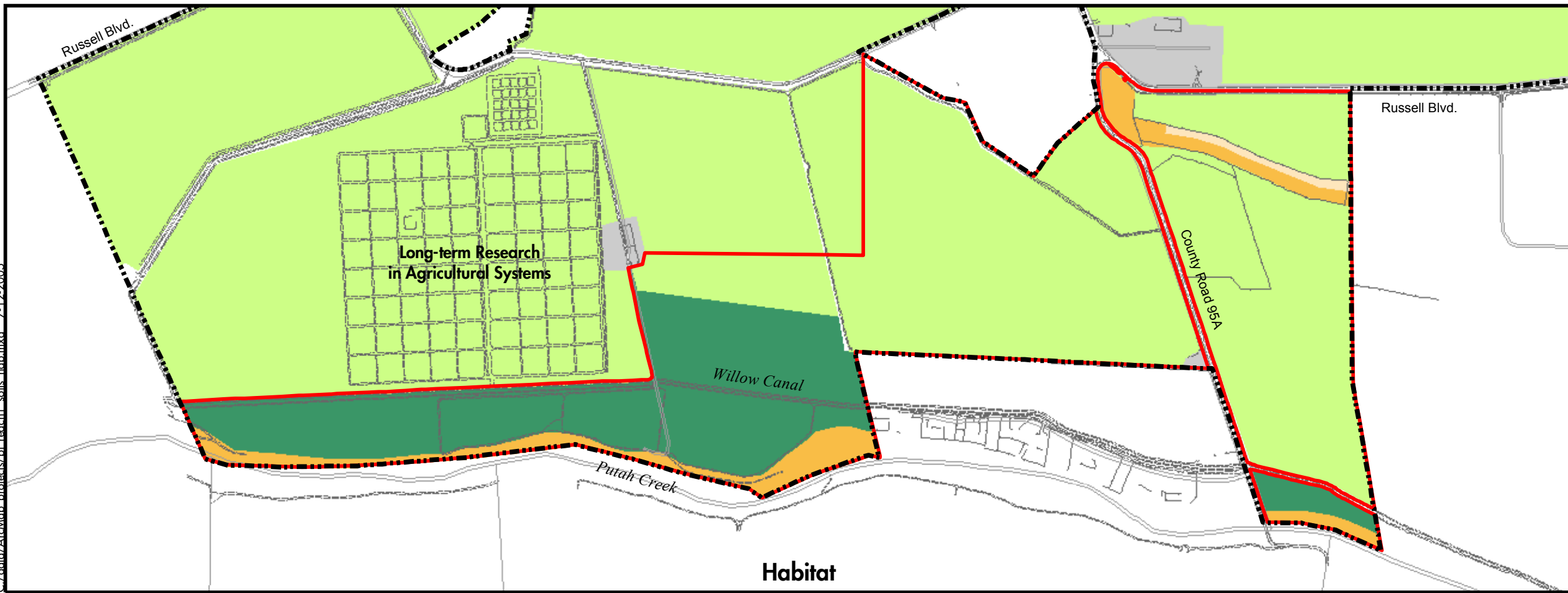
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Figure 3
Putah Creek Riparian Reserve
Soils and Habitat
Reach 1



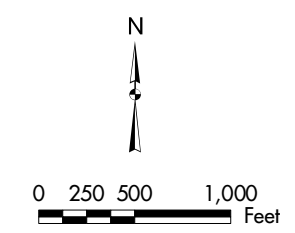
Soils

- Soils Legend**
- Campus Boundary
 - Reach 1
 - Brentwood
 - Capay
 - Corning
 - Hillgate
 - Loamy Alluvial Land
 - Myers
 - Reiff
 - Rincon
 - Riverwash
 - Sycamore
 - Water
 - Yolo
 - Zamora



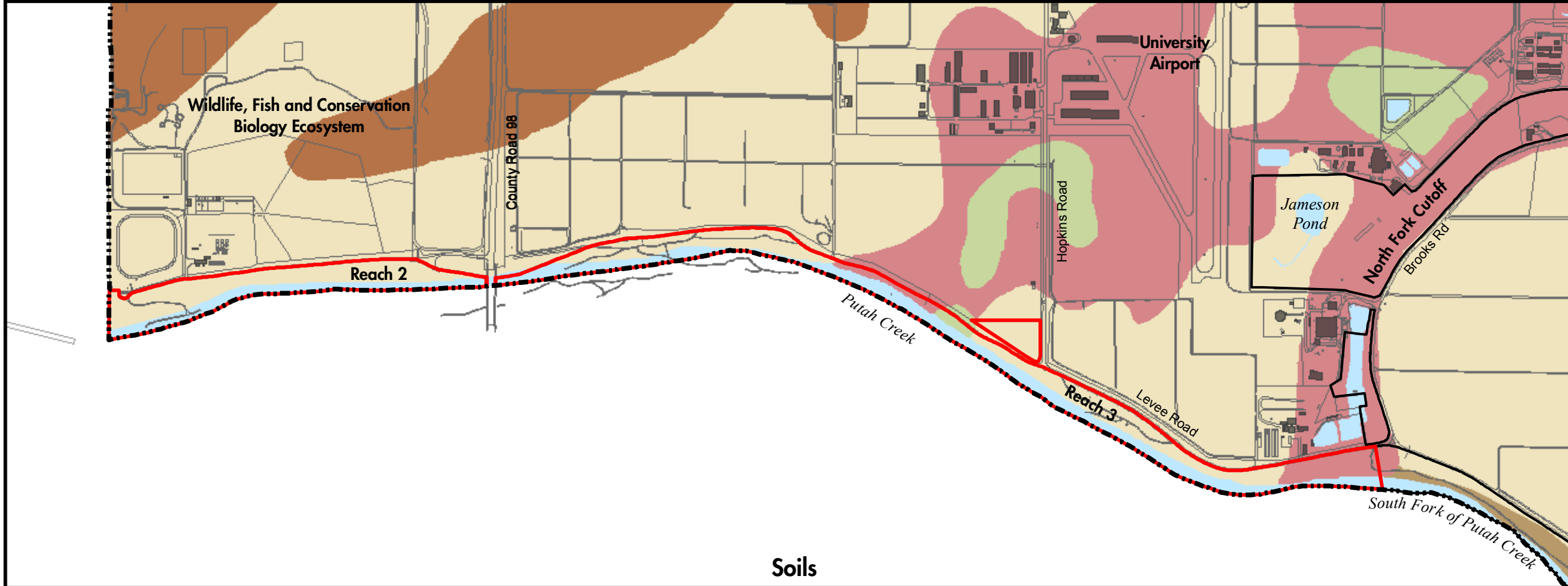
Habitat

- Habitat Legend**
- Campus Boundary
 - Reach 1
 - Open Water Ponds
 - Ruderal Annual Grassland
 - Cropland/Pasture
 - Orchard/Vineyard
 - Riverine
 - Valley-Foothill Riparian Woodland
 - Urban Landscaping/Developed



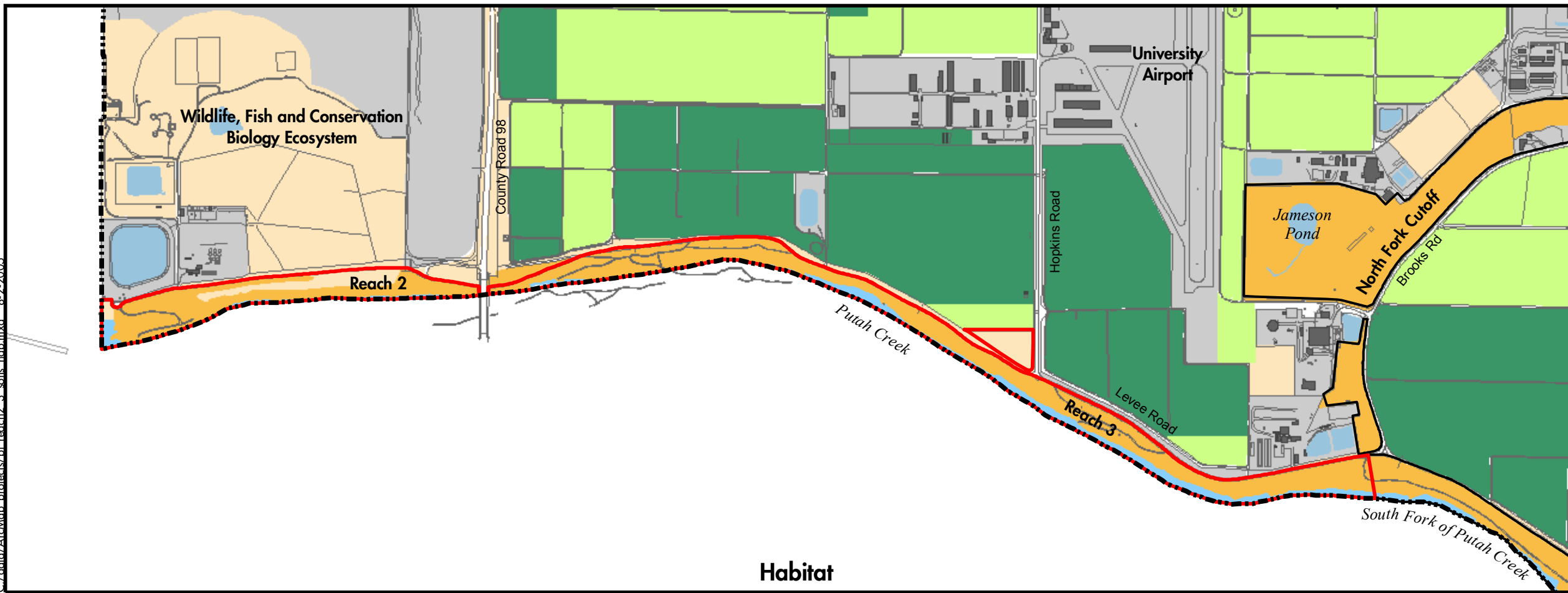
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Figure 4
Putah Creek Riparian Reserve
Soils and Habitat
Reach 2 and 3



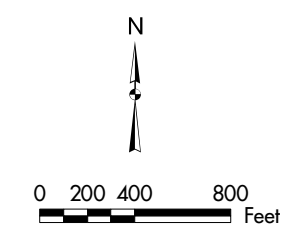
Soils

- Soils Legend**
- Campus_Boundary
 - Reach 2 & 3
 - Brentwood
 - Capay
 - Corning
 - Hillgate
 - Loamy Alluvial Land
 - Myers
 - Reiff
 - Rincon
 - Riverwash
 - Sycamore
 - Water
 - Yolo
 - Zamora



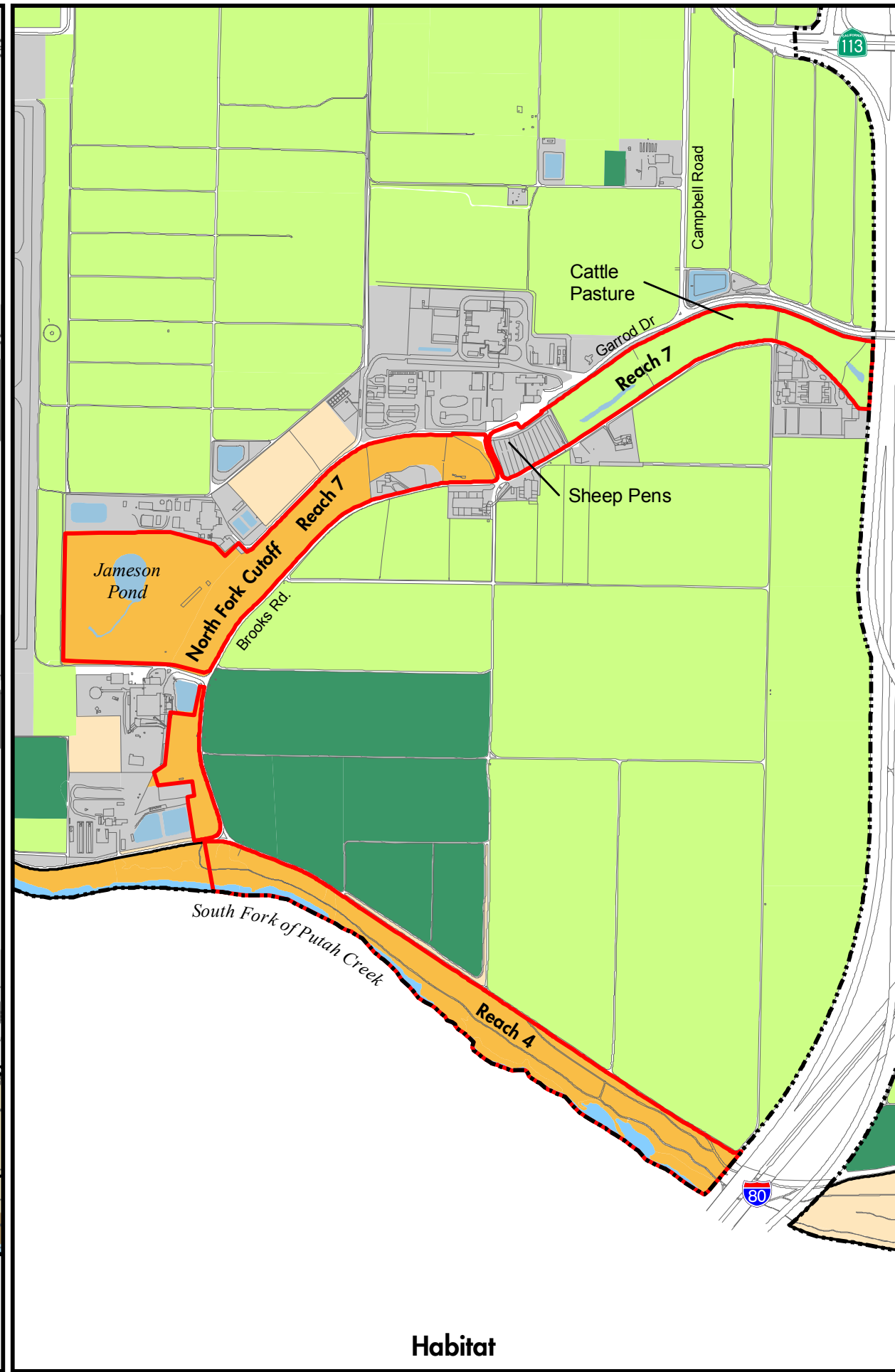
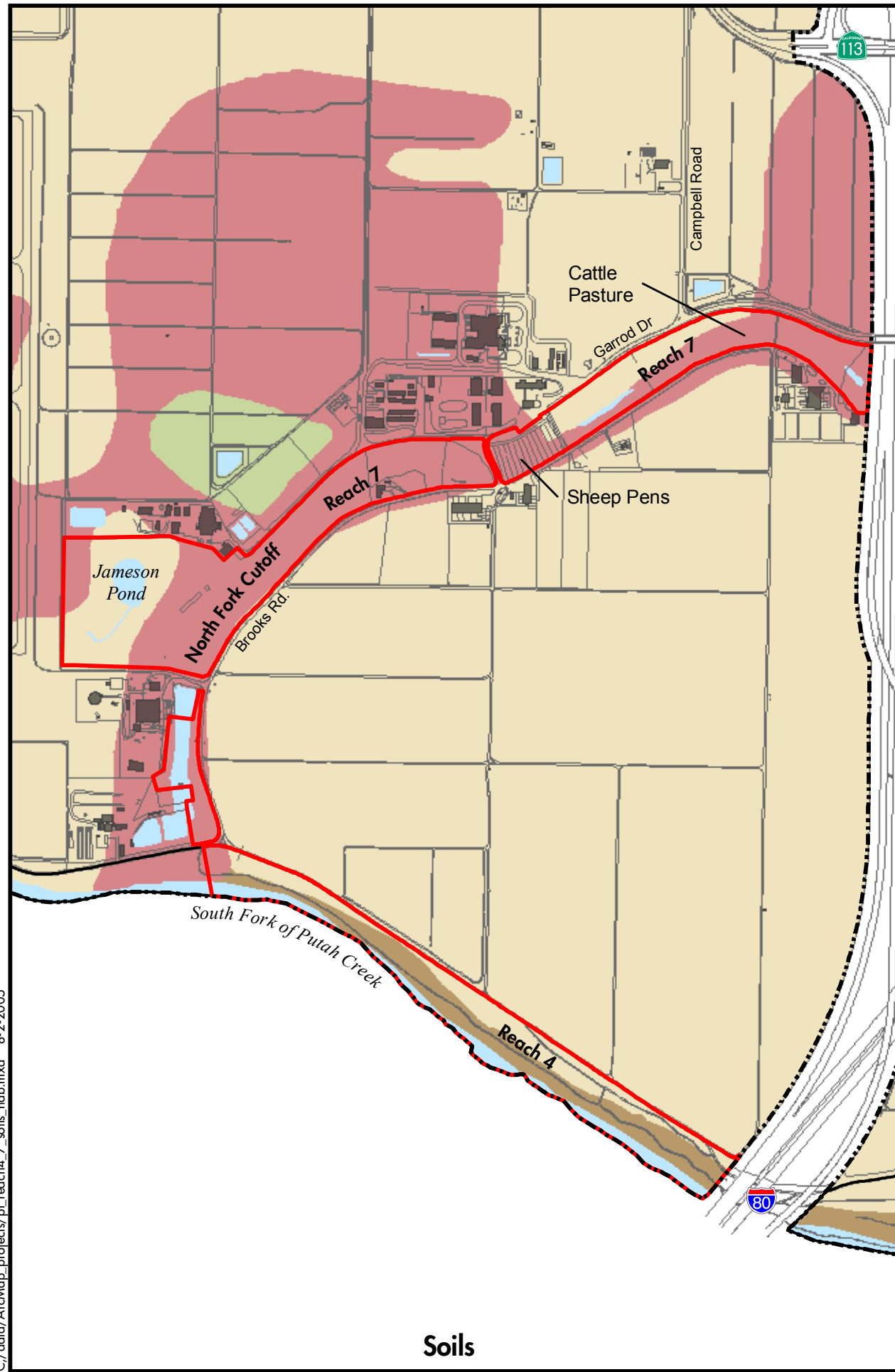
Habitat

- Habitat Legend**
- Campus_Boundary
 - Reach 2 & 3
 - Open Water Ponds
 - Ruderal Annual Grassland
 - Cropland/Pasture
 - Orchard/Vineyard
 - Riverine
 - Valley-Foothill Riparian Woodland
 - Urban Landscaping/Developed

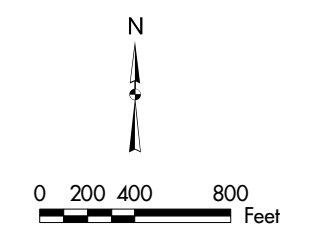


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Figure 5
Putah Creek Riparian Reserve
Soils and Habitat
Reach 4 and 7

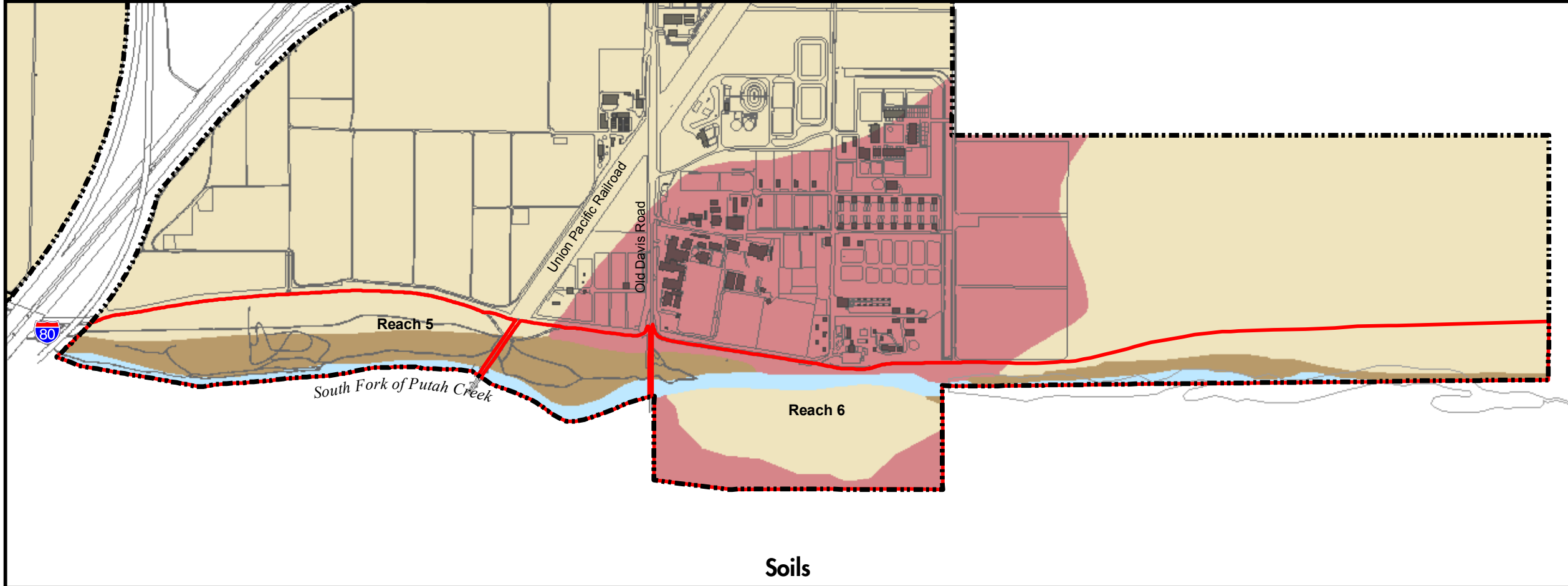


- Soils Legend**
- Campus Boundary
 - Reach 4 & 7
 - Brentwood
 - Capay
 - Corning
 - Hillgate
 - Loamy Alluvial Land
 - Myers
 - Reiff
 - Rincon
 - Riverwash
 - Sycamore
 - Water
 - Yolo
 - Zamora
- Habitat Legend**
- Campus Boundary
 - Reach 4 & 7
 - Open Water Ponds
 - Ruderal Annual Grassland
 - Cropland/Pasture
 - Orchard/Vineyard
 - Riverine
 - Valley-Foothill Riparian Woodland
 - Urban Landscaping/Developed



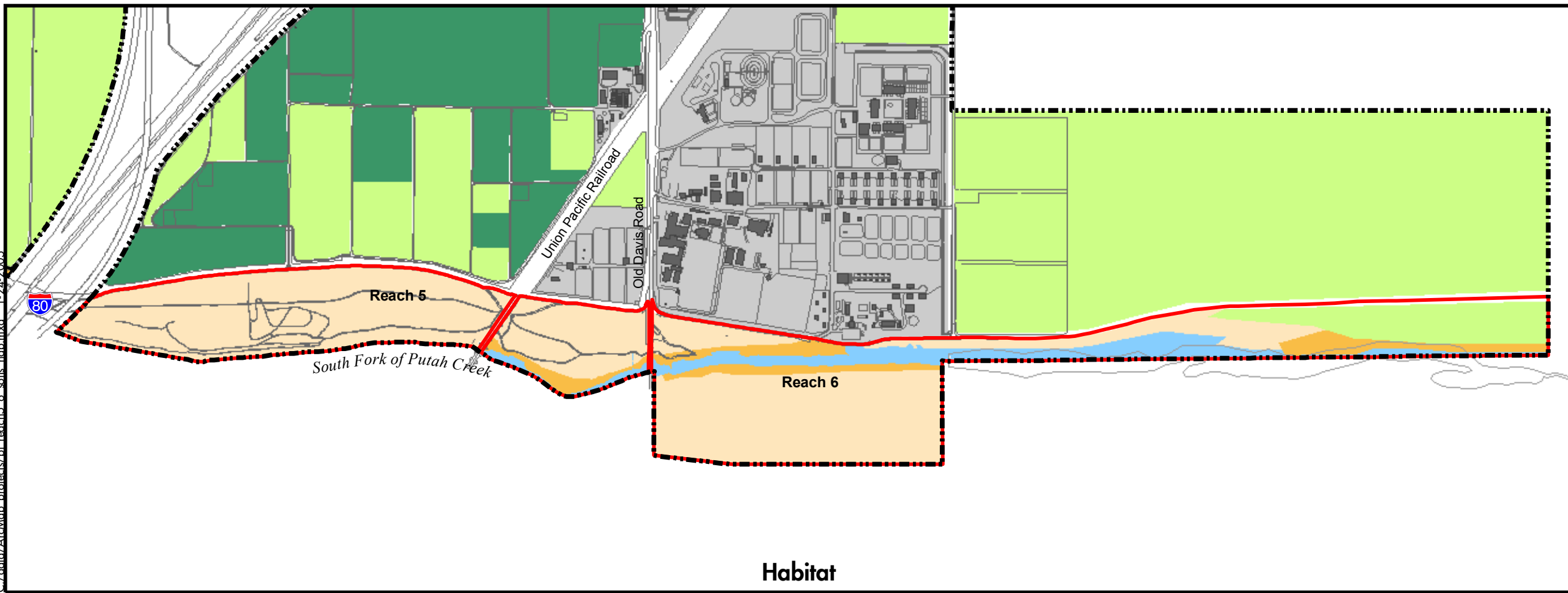
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Figure 6
Putah Creek Riparian Reserve
Soils and Habitat
Reach 5 and 6



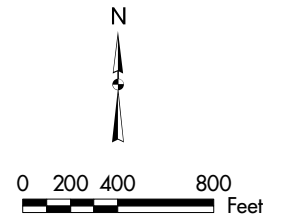
Soils

- Soils Legend**
- Campus Boundary
 - Reach 5 & 6
 - Brentwood
 - Capay
 - Corning
 - Hillgate
 - Loamy Alluvial Land
 - Myers
 - Reiff
 - Rincon
 - Riverwash
 - Sycamore
 - Water
 - Yolo
 - Zamora
 - Whole_feb-20051.dwg Polyline
- Habitat Legend**
- Campus Boundary
 - Reach 5 & 6
 - Open Water Ponds
 - Ruderal Annual Grassland
 - Cropland/Pasture
 - Orchard/Vineyard
 - Riverine
 - Valley-Foothill Riparian Woodland
 - Urban Landscaping/Developed
 - Whole_feb-20051.dwg Polyline



Habitat

- Habitat Legend**
- Campus Boundary
 - Reach 5 & 6
 - Open Water Ponds
 - Ruderal Annual Grassland
 - Cropland/Pasture
 - Orchard/Vineyard
 - Riverine
 - Valley-Foothill Riparian Woodland
 - Urban Landscaping/Developed
 - Whole_feb-20051.dwg Polyline



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Figure 7
 Putah Creek Riparian Reserve
 Infrastructure
 Reach 1






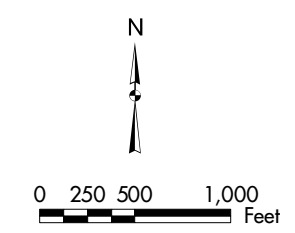
- Soils Legend**
-  Campus Boundary
 -  Reach 1
 -  Ag Irrigation
 -  Domestic Water
 -  Electrical - Overhead
 -  Electrical - Underground
 -  Fire Alarm
 -  Gas
 -  Sewer
 -  Storm
 -  Telecom

Figure illustrates campus utilities within 1000ft of reserve



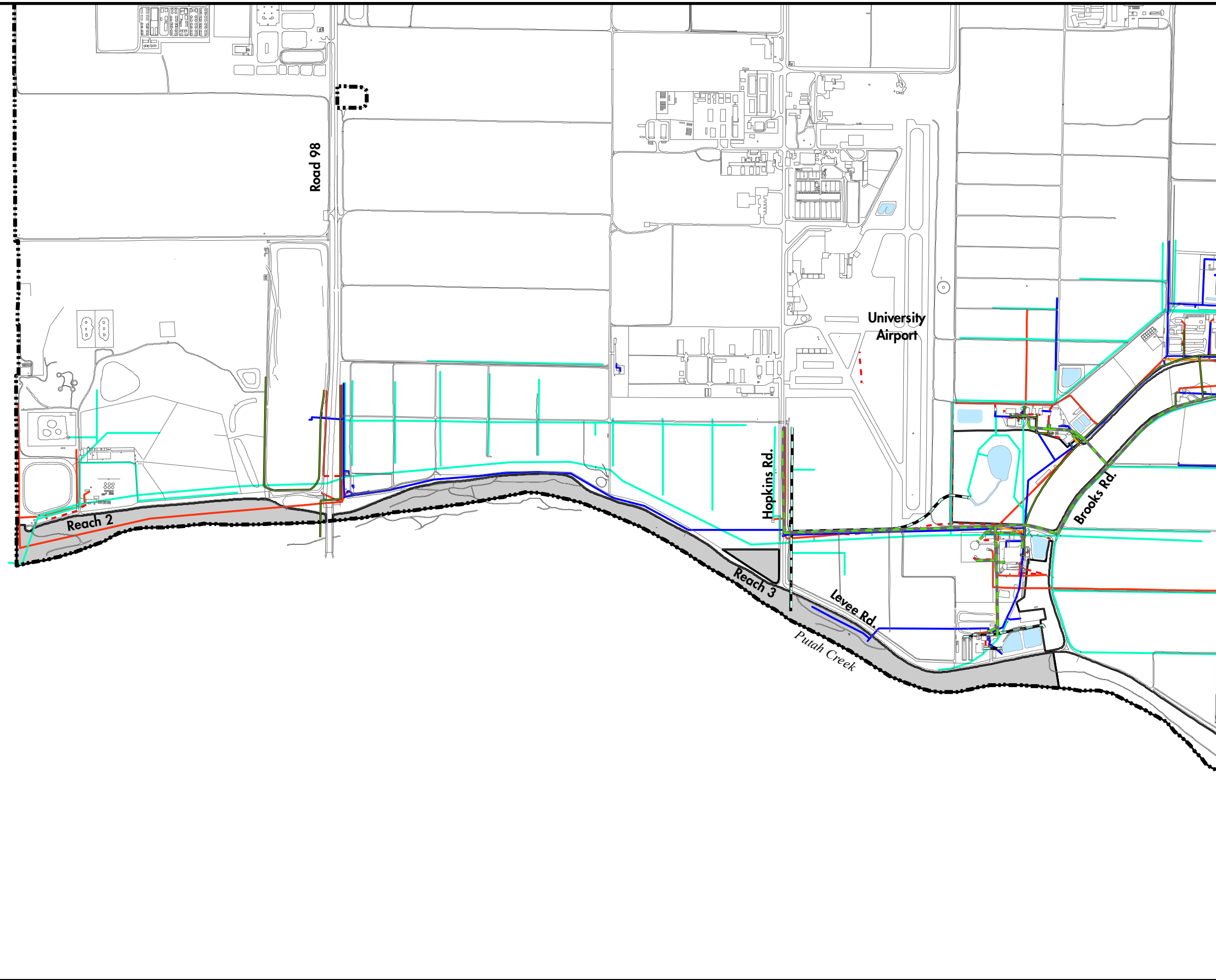


Figure 8
Putah Creek Riparian Reserve
Infrastructure
Reach 2 and 3

- Legend**
- Campus Boundary
 - Reach 2 & 3
 - Ag Irrigation
 - Domestic Water
 - Electrical - Overhead
 - Electrical - Underground
 - Fire Alarm
 - Gas
 - Sewer
 - Storm
 - Telecom

Figure illustrates campus utilities within 1000ft of reserve

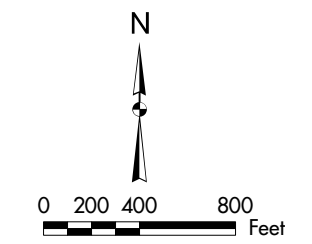
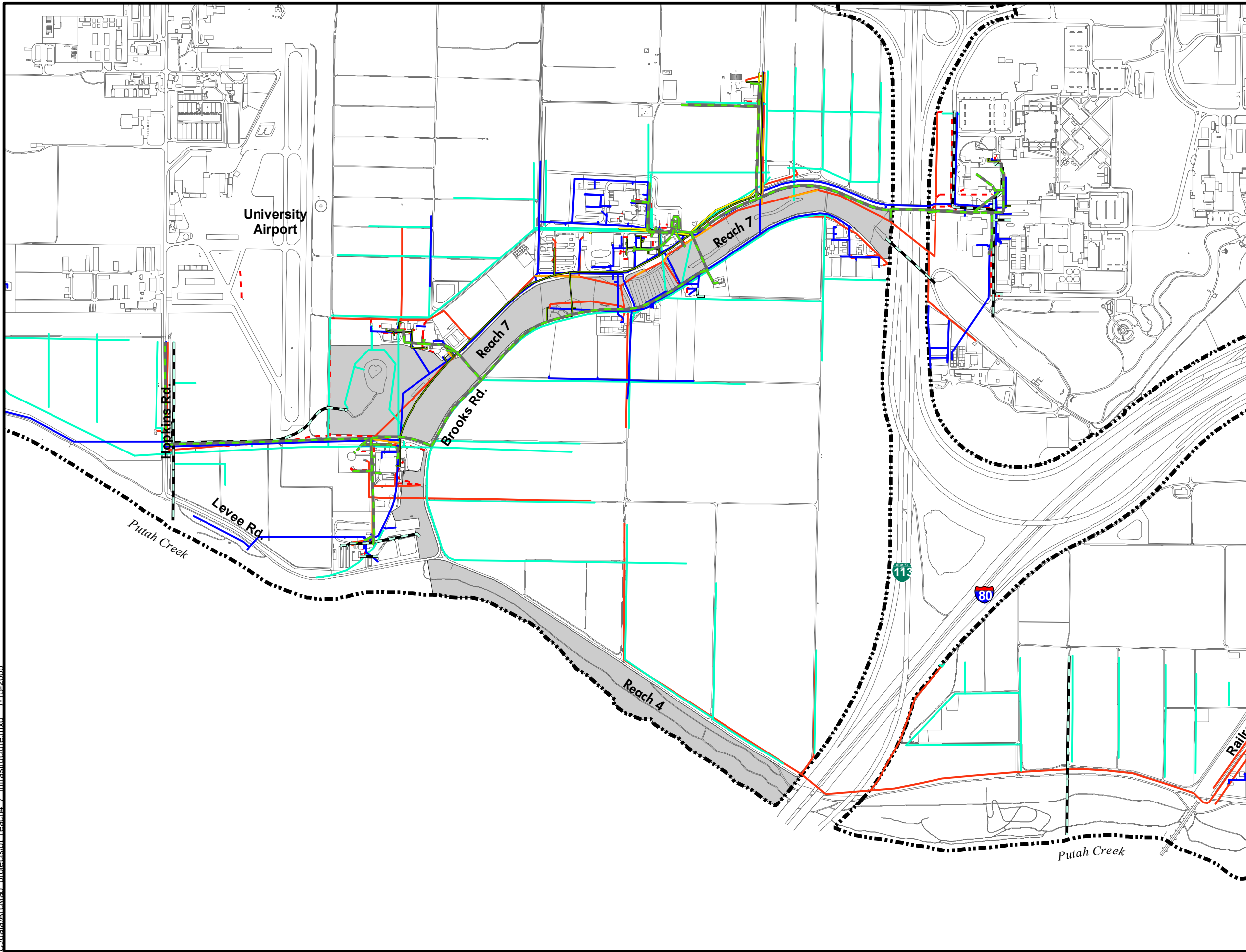


Figure 9
Putah Creek Riparian Reserve
Infrastructure
Reach 4 and 7



- Legend**
- Campus Boundary
 - Reach 4 & 7
 - Ag Irrigation
 - Domestic Water
 - Electrical - Overhead
 - Electrical - Underground
 - Fire Alarm
 - Gas
 - Sewer
 - Storm
 - Telecom

Figure illustrates campus utilities within 1000ft of reserve

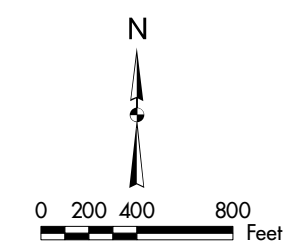


Figure 10
 Putah Creek Riparian Reserve
 Infrastructure
 Reach 5 and 6

Legend












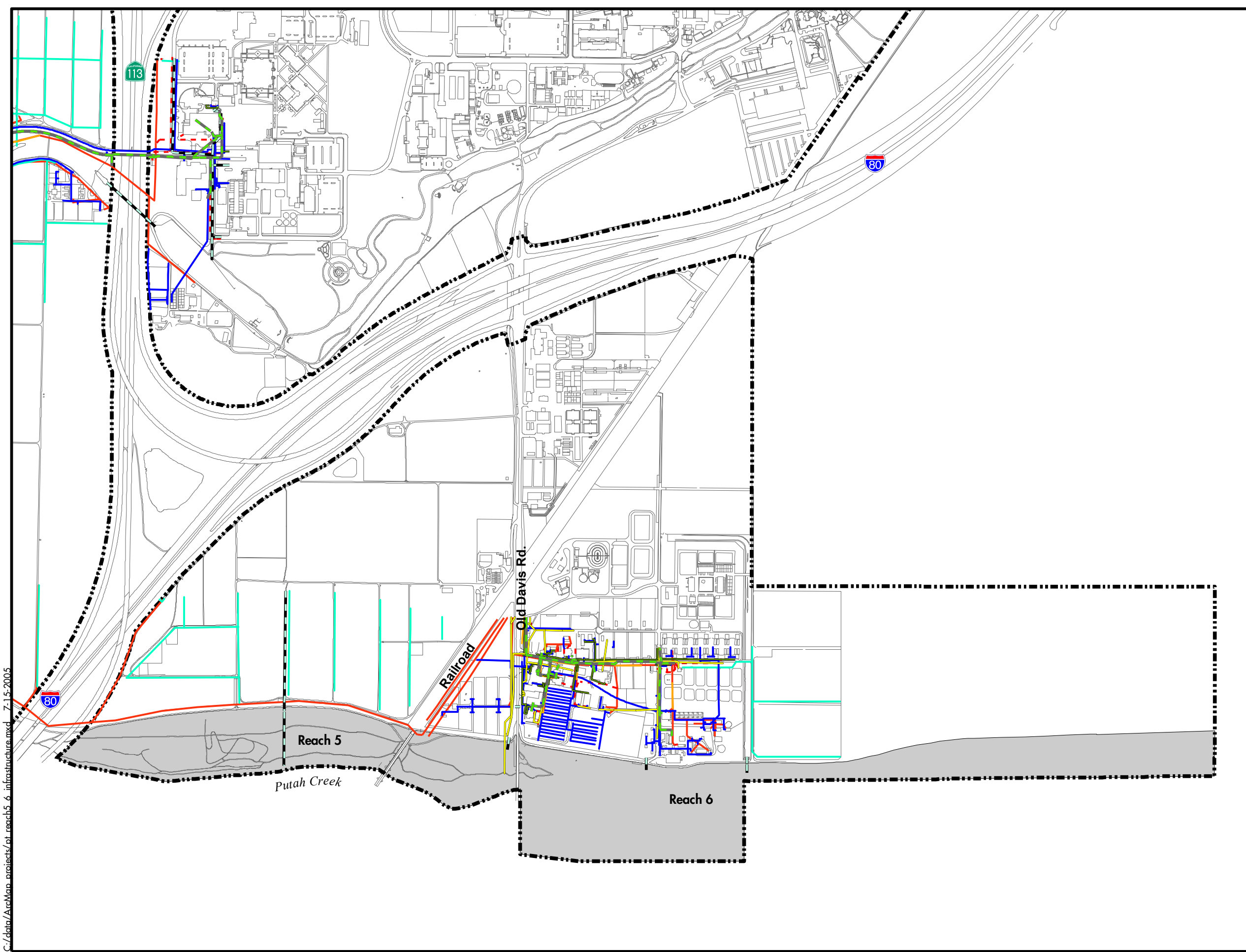
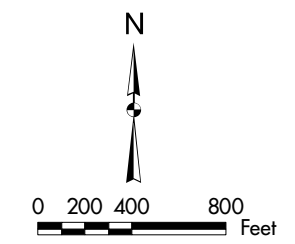
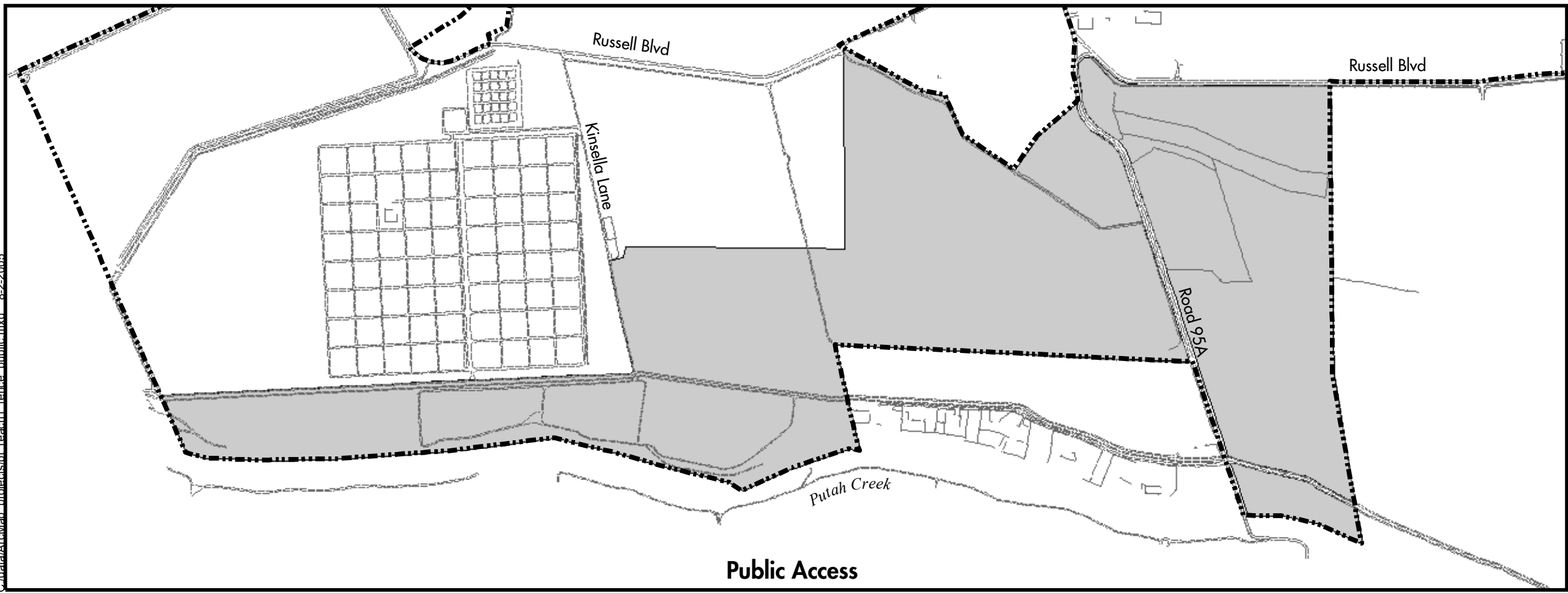
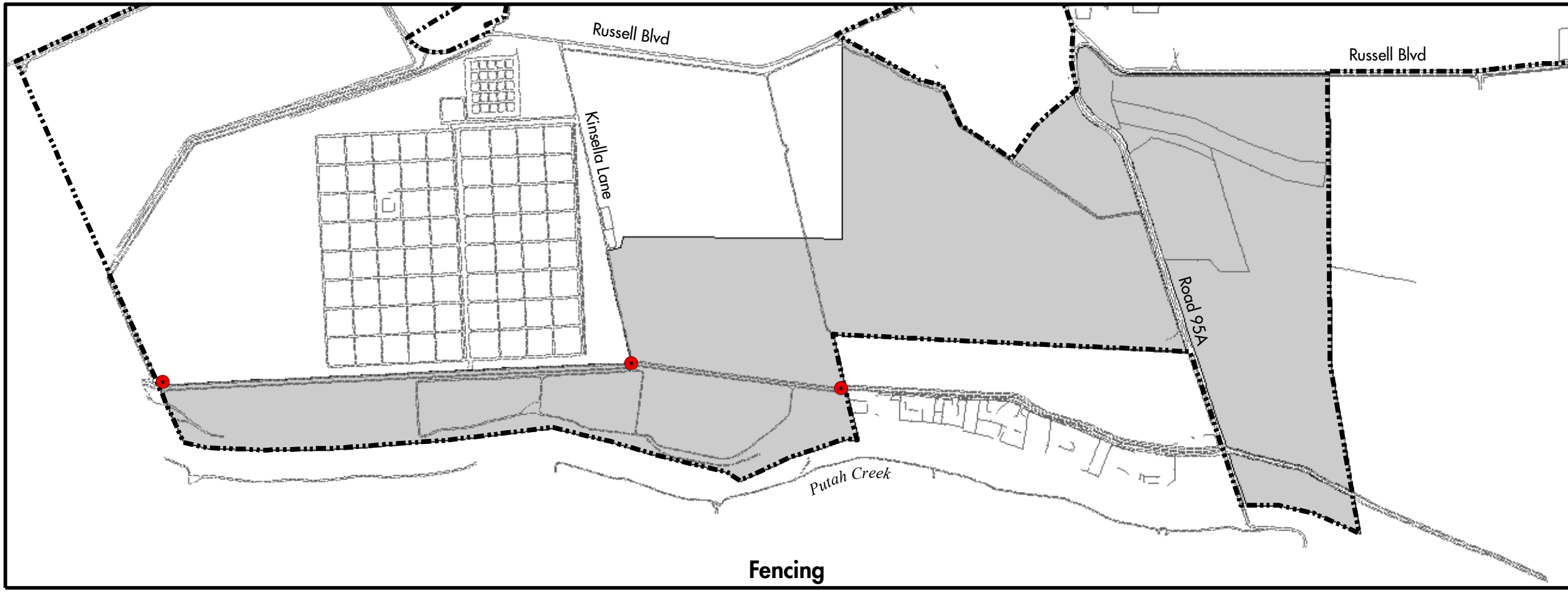
-  Campus Boundary
-  Reach 5 & 6
-  Ag Irrigation
-  Domestic Water
-  Electrical - Overhead
-  Electrical - Underground
-  Fire Alarm
-  Gas
-  Sewer
-  Storm
-  Telecom

Figure illustrates campus utilities within 1000ft of reserve

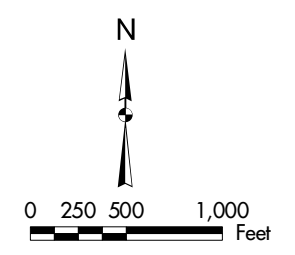


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Figure 11
 Putah Creek Riparian Reserve
 Fencing and Public Access
 Improvements
 Reach 1

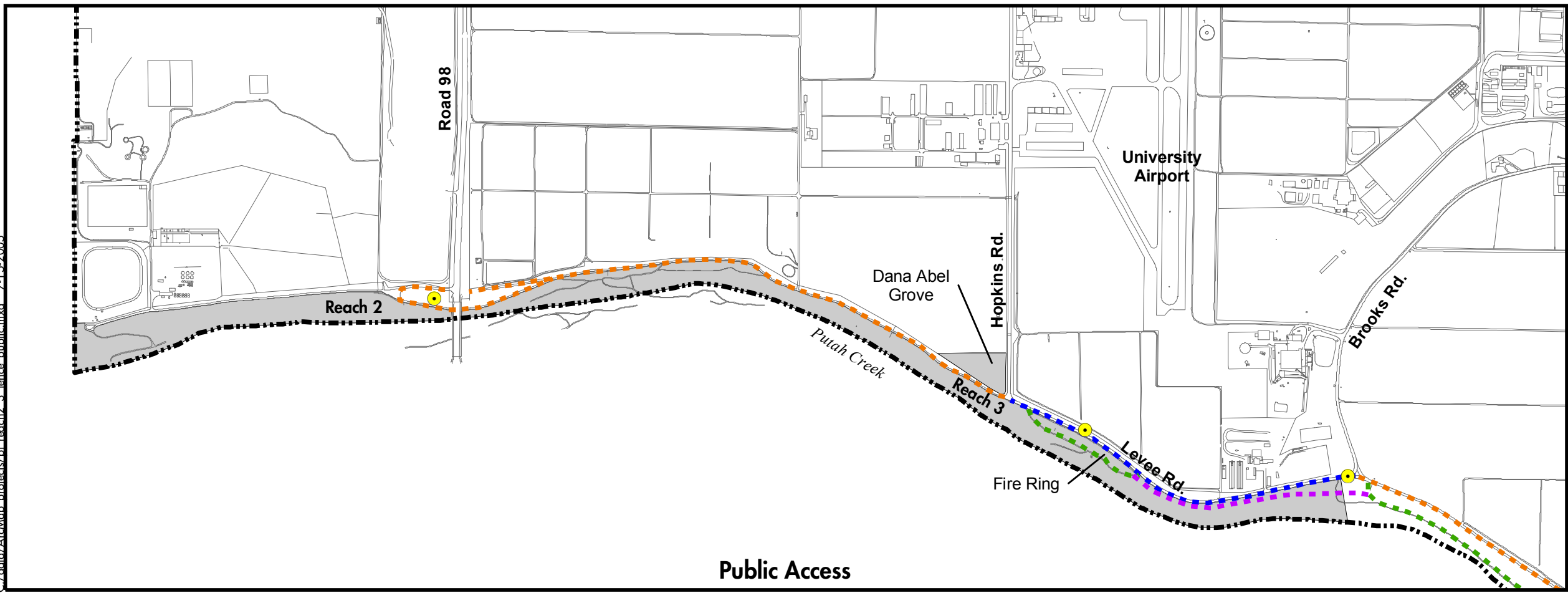
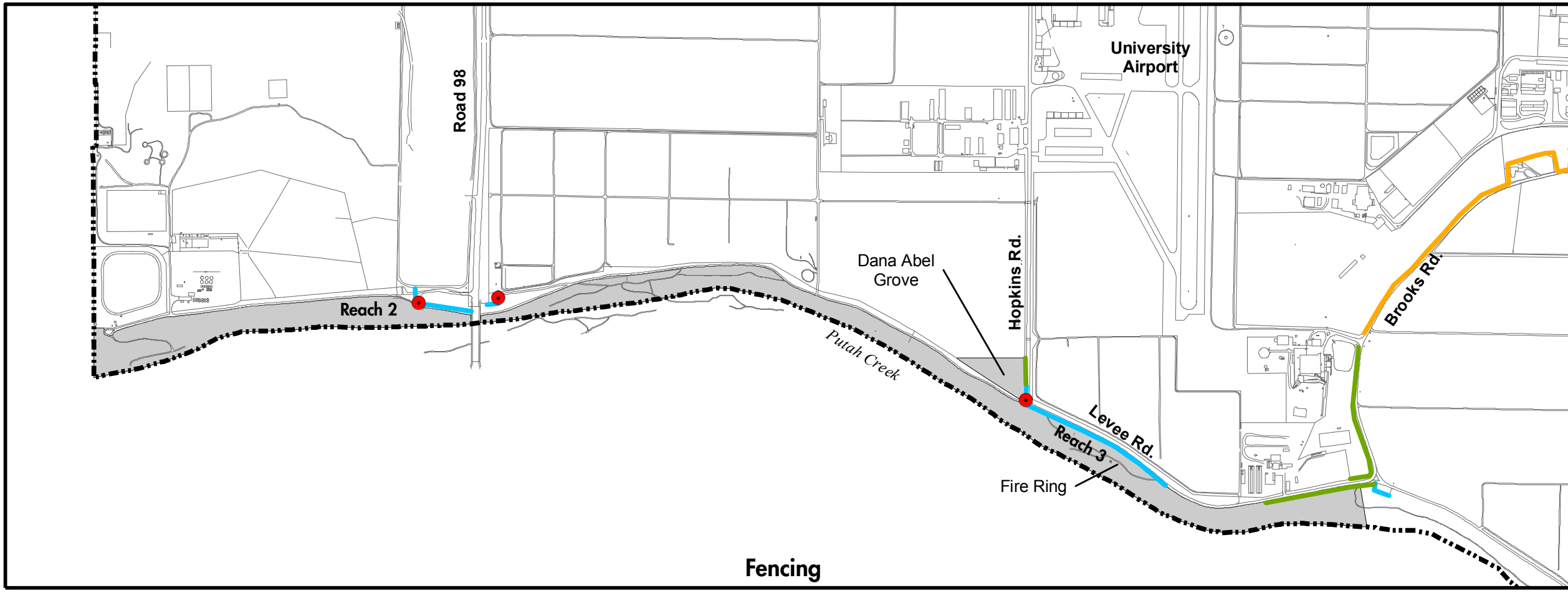


- Fencing Legend**
- Campus_Boundary
 - Reach 1
 - Metal Gate
 - Log Stop
 - Low Chain Link
 - Metal Post and Cable
 - Wood Post
- Public Access Legend**
- Campus_Boundary
 - Reach 1
 - Access Point/Parking Area
- Multi Use**
- Existing Dirt/Gravel Road
 - Existing Paved Road
- Pedestrian Only**
- New/Relocated Native Path
 - Existing Nature Path

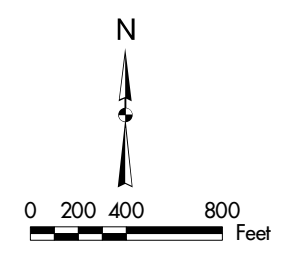


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Figure 12
 Putah Creek Riparian Reserve
 Fencing and Public Access
 Improvements
 Reach 2 and 3

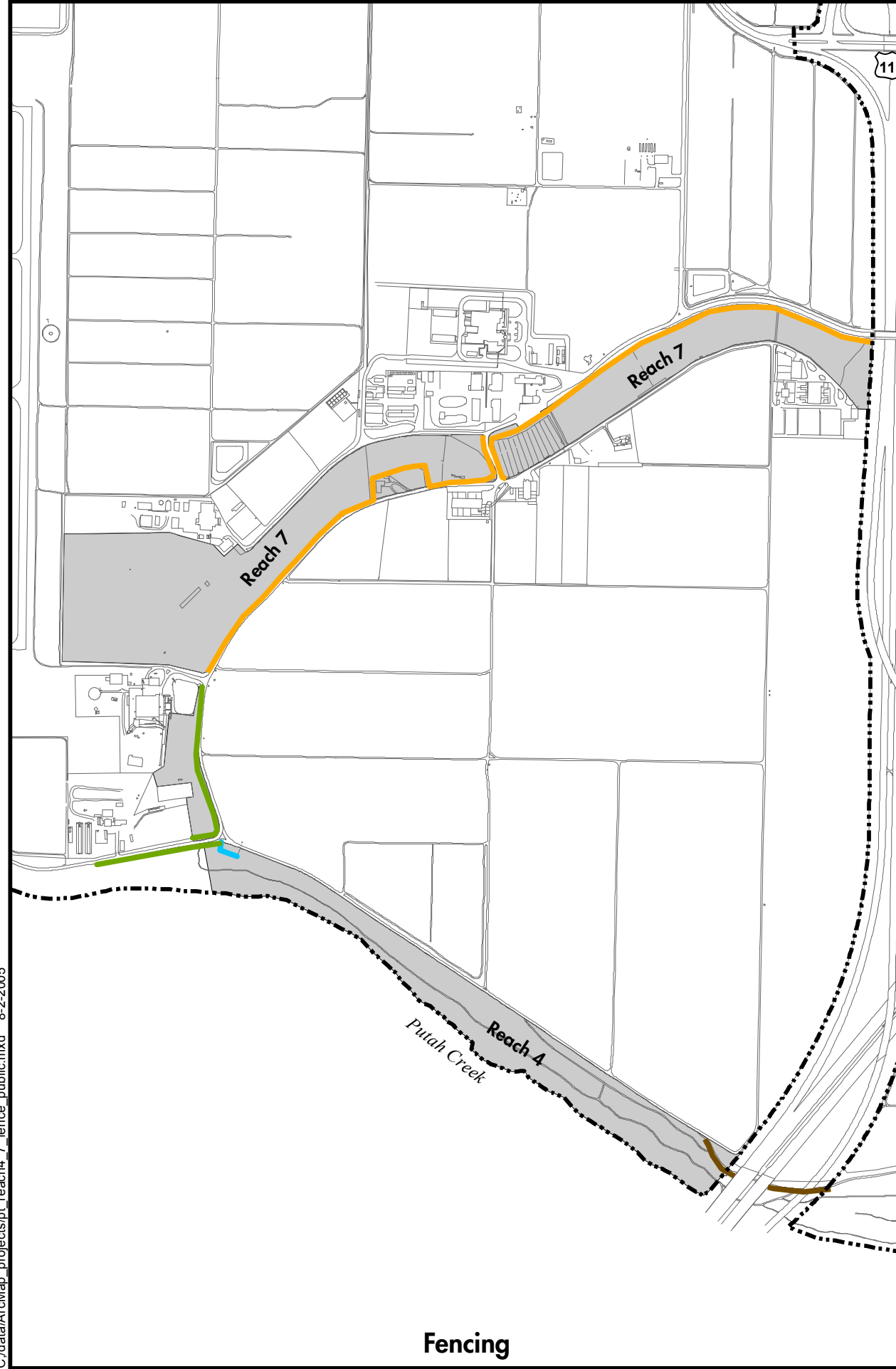


- Fencing Legend**
- Campus_Boundary
 - Reach 2 & 3
 - Metal Gate
 - Log Stop
 - Low Chain Link
 - Metal Post and Cable
 - Wood Post
 - Whole_feb-20051.dwg Polyline
- Public Access Legend**
- Campus_Boundary
 - Reach 2 & 3
 - Access Point/Parking Area
- Multi Use**
- Existing Dirt/Gravel Road
 - Existing Paved Road
- Pedestrian Only**
- New/Relocated Native Path
 - Existing Nature Path
 - Whole_feb-20051.dwg Polyline

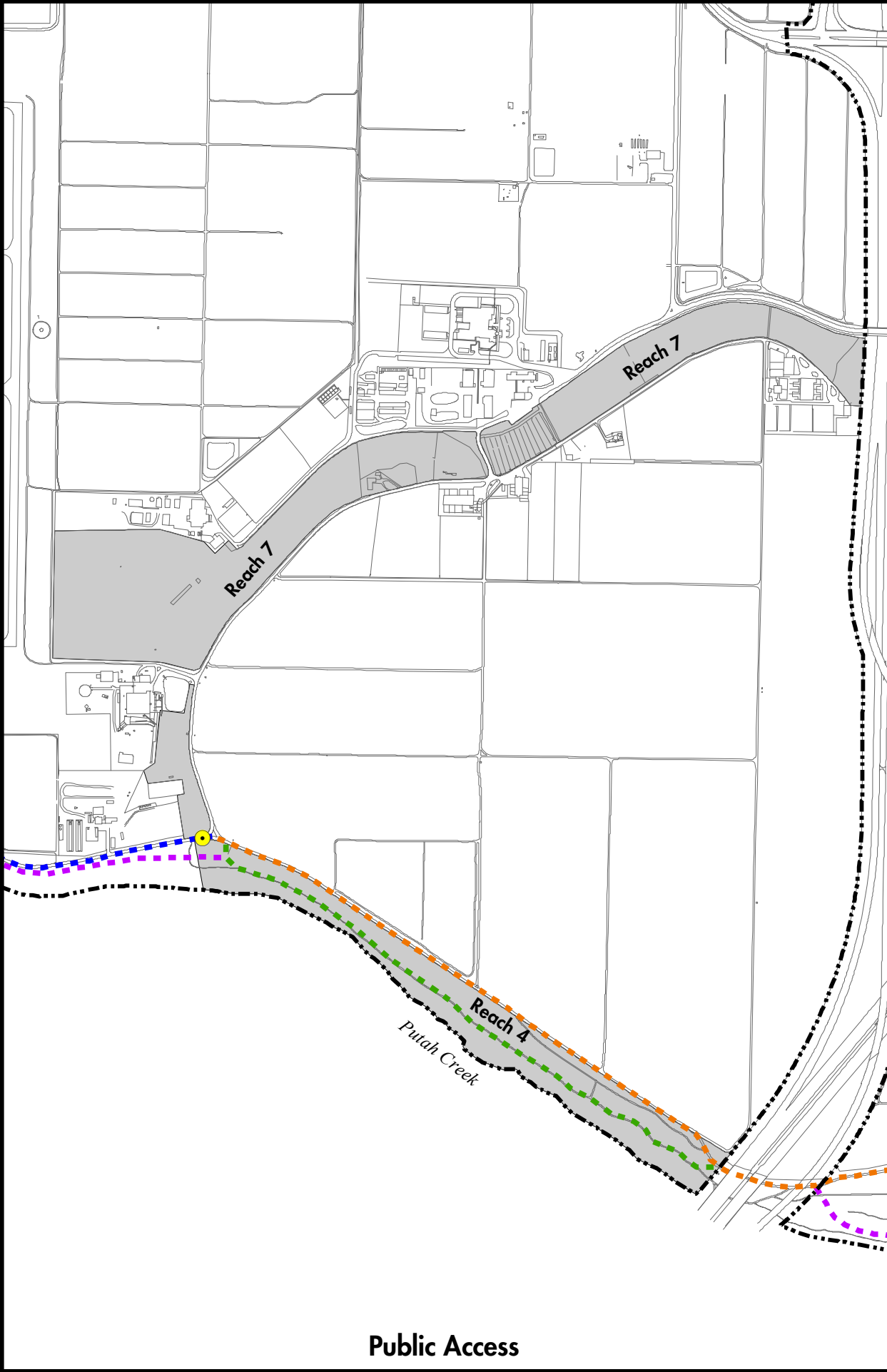


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Figure 13
 Putah Creek Riparian Reserve
 Fencing and Public Access
 Reach 4 and 7

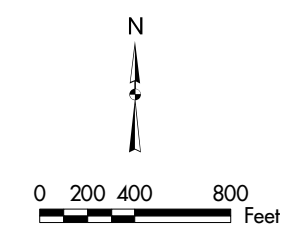


Fencing



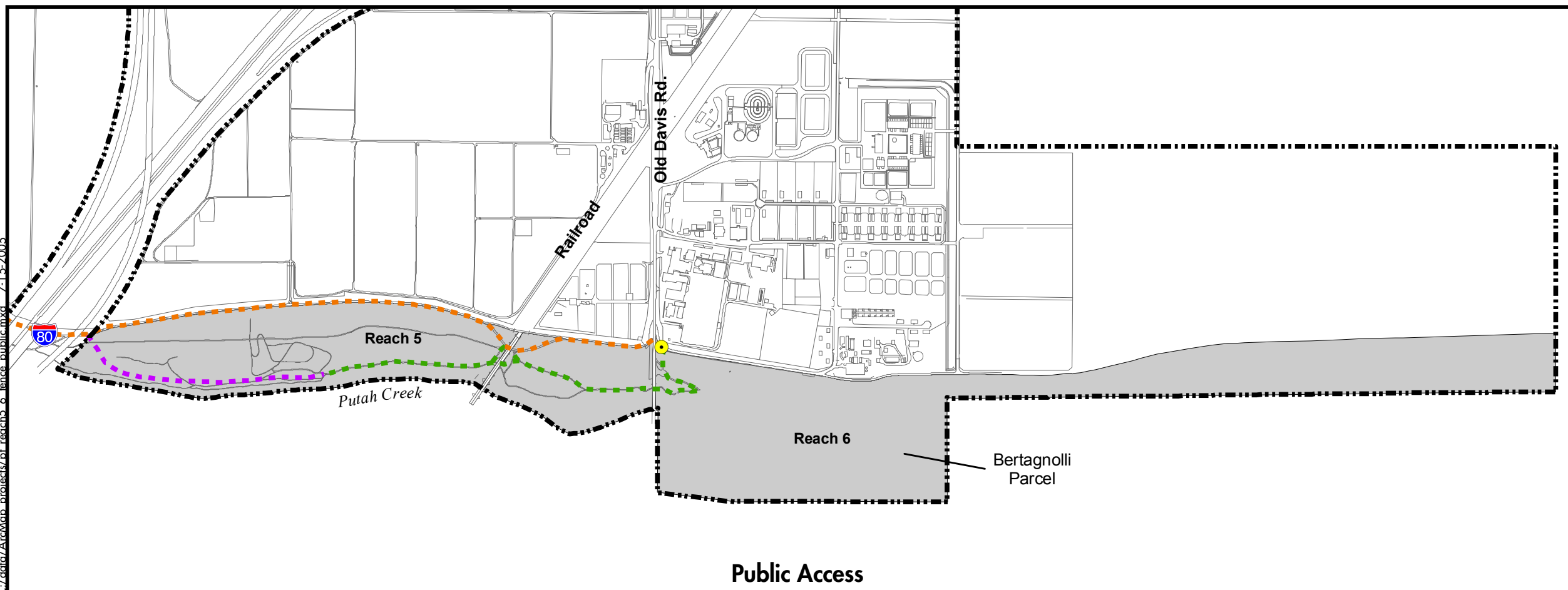
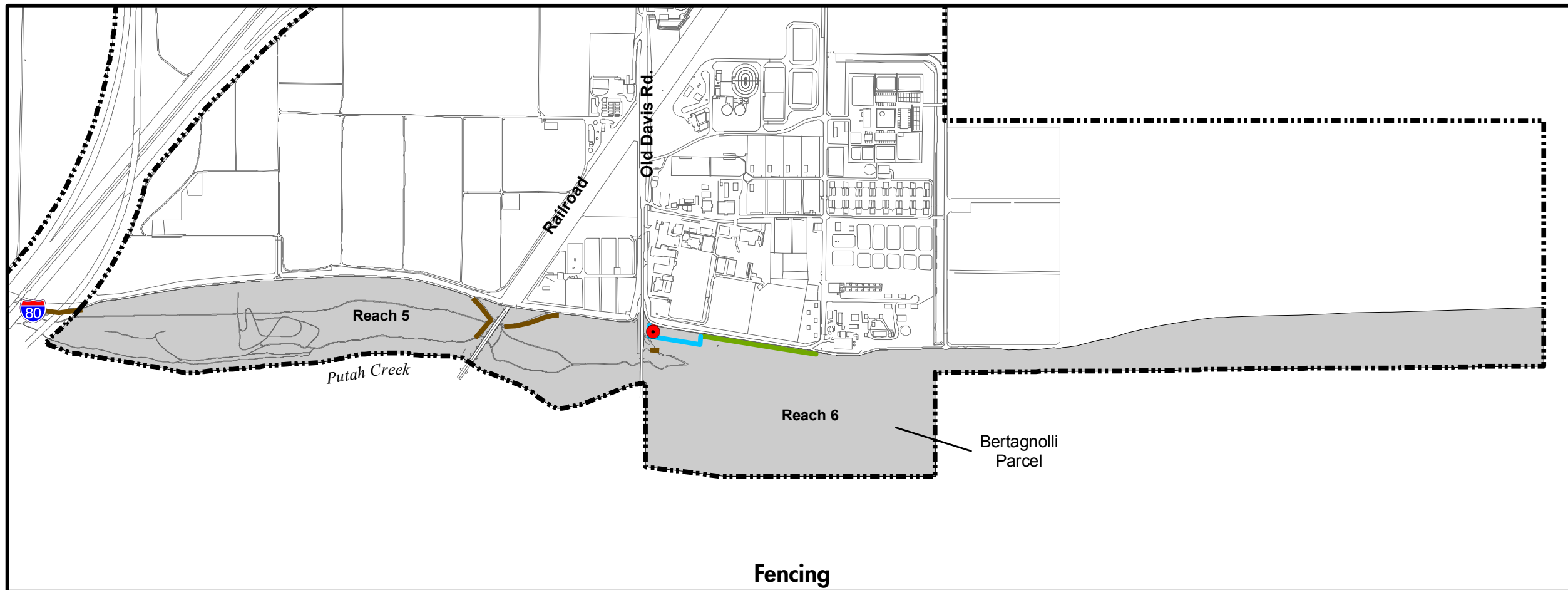
Public Access

- Fencing Legend**
- Campus Boundary
 - Reach 4 & 7
 - Metal Gate
 - Log Stop
 - Low Chain Link
 - Metal Post and Cable
 - Wood Post
- Public Access Legend**
- Campus Boundary
 - Reach 4 & 7
 - Access Point/Parking Area
- Multi Use**
- Existing Dirt/Gravel Road
 - Existing Paved Road
- Pedestrian Only**
- New/Relocated Native Path
 - Existing Nature Path



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Figure 14
 Putah Creek Riparian Reserve
 Fencing and Public Access
 Improvements
 Reach 5 and 6

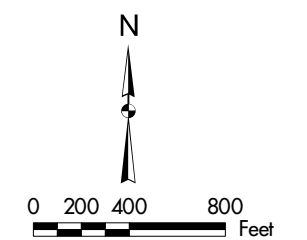


Fencing Legend

- Campus_Boundary
- Reach 5 and 6
- Metal Gate
- Log Stop
- Low Chain Link
- Metal Post and Cable
- Wood Post

Public Access Legend

- Campus_Boundary
- Reach 5 and 6
- Access Point/Parking Area
- Multi Use**
- Existing Dirt/Gravel Road
- Existing Paved Road
- Pedestrian Only**
- New/Relocated Native Path
- Existing Nature Path



Appendices

Appendix A

Russell Ranch Mitigation Area Concept Plan

**RUSSELL RANCH MITIGATION AREA
CONCEPT PLAN**

Prepared by

**Russell Ranch Mitigation Area Design Concept Committee
University of California, Davis**

2002

RUSSELL RANCH MITIGATION AREA CONCEPT PLAN

INTRODUCTION

The 1994 UC Davis Long Range Development Plan¹ (LRDP) identified land use designations on the main campus and the Russell Ranch. The 1994 LRDP Environmental Impact Report (EIR), identified potential impacts to biological values that could occur if lands identified in the 1994 LRDP were fully developed. The 1994 LRDP EIR identified several mitigation measures for impacts to biological resources. The Regents adopted these mitigation measures in October 1994. One of the mitigation measures in the 1994 LRDP EIR was to convert two parcels on the Russell Ranch from agricultural use to habitat managed specifically for three special status species.

In addition to identifying the Russell Ranch mitigation sites in the 1994 LRDP EIR, the campus has publicly stated that it will use campus expertise to design the mitigation areas. The stated intent was to design the areas not only to serve the mitigation goals but to do so in a way that informs and improves future mitigation efforts by the campus and the public at large. Moreover, the campus recognizes the importance of the areas for teaching and research purposes. Consistent with those commitments, the Russell Ranch Mitigation Area Design Concept Committee was appointed in April 1999. The charge to the committee was:

to develop the design concept for the mitigation area. First and foremost, the site must be designed to benefit Swainson's Hawks, Burrowing Owls, and Valley Elderberry Longhorn Beetles. Consistent with the University's mission of teaching, research, and public service, it should also be designed to the extent practical to help inform future mitigation efforts by the University and the public at large. Thus, the design may include monitoring efforts for this purpose. Consistent with the goal of providing habitat for the identified species, it also should be designed to be used by instructors, students, and researchers that may wish to use the site.

The Russell Ranch Mitigation Area Concept Plan reports the recommendations of the Russell Ranch Mitigation Area Design Concept Committee for the development, implementation, and management of the mitigation area. The committee has identified the following goals for the creation and management of the mitigation lands and the Russell Ranch:

- Fulfill the University's legal and regulatory requirements for biological mitigation in response to development contemplated in the 1994 LRDP.

¹ The 1994 LRDP and LRDP EIR have been amended since originally adopted in October 1994. References to these documents in this plan refer to the 1994 LRDP and LRDP EIR as amended.

- Evaluate the efficacy and success of mitigation efforts in order to contribute to the greater body of knowledge about mitigation. That is, mitigation should not be done without evaluation, as is often the case. Important questions that should be addressed are whether mitigation works in the long-term, whether mitigation for a few species is compatible with natural habitat restoration, and how to address conflicts when dealing with multi-species mitigation.
- View implementation of the concept plan as part of a larger effort to improve habitat values on west campus lands, including the Putah Creek Riparian Reserve, Russell Ranch, and field teaching and research lands.
- Design the Russell Ranch mitigation area to be used as an outdoor classroom for use by campus classes, faculty, and students.
- Engage the community in the creation and management of the mitigation area to the extent feasible and consistent with management of the area for wildlife and habitat values,

SPECIAL STATUS SPECIES

The Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) or VELB is listed as a threatened species under the federal Endangered Species Act. The geographic range of the VELB is limited to California's Central Valley, where it is found in association with elderberry shrubs (*Sambucus* species), which are the host plants for the larval stages of this beetle. Elderberry shrubs naturally occur in riparian forests and in elderberry savannas adjacent to riparian vegetation. On the UC Davis campus, elderberry shrubs occur primarily: (1) along Putah Creek in the Putah Creek Riparian Reserve; and (2) as scattered patches or individual shrubs located along fences and beneath telephone wires where birds may have dropped seeds. Elderberry shrubs on campus are potential VELB habitat. However, the presence of VELB on the campus has not been confirmed. Campus development of lands designated in the 1994 LRDP could affect some of these isolated shrubs and several shrubs already have been transplanted to Mitigation Site A (described below).

The Swainson's Hawk (*Buteo swainsoni*) is listed as a threatened species under the California Endangered Species Act. It is a relatively large bird-of-prey that typically nests in large trees in riparian habitat as well as isolated trees remaining in or adjacent to agricultural fields in the Central Valley. On the UC Davis campus and adjoining areas, these hawks also nest in large trees within developed urban areas. Swainson's Hawks forage in open grassland and ruderal habitats and have adapted to foraging in certain types of agricultural lands. Swainson's Hawks routinely nest on and adjacent to the UC Davis campus. Annual nest surveys have routinely located over 20 nests each year on campus lands or within ½-mile of the campus.

The Burrowing Owl (*Speotyto cunicularia*) has been identified as a species of special concern by the California Department of Fish and Game. Burrowing Owls are relatively small birds-of-prey with the unique habits of being active throughout the day and evening, and of nesting underground. They typically use burrow systems formerly occupied by ground squirrels. Burrowing Owls forage in grasslands and some native

scrub habitats, agricultural fields, and ruderal areas with short vegetation. Since the early 1980's, a population has intermittently occupied fields on the central campus in the general vicinity of the Health Sciences complex. During the early 1990s, the population on this part of campus disappeared. A single individual reoccupied the field east of the Health Sciences complex in 1997. One breeding pair was present in the fields east of the Medical School in 1998, and in 1999 and 2000, two breeding pairs were present. A single pair was present there at the start of the breeding season in 2001. Campus development of lands designated in the 1994 LRDP would cause the loss of Burrowing Owl nesting and foraging habitat on the central campus.

RUSSELL RANCH MITIGATION SITES

The two habitat mitigation sites at the Russell Ranch are illustrated in Figure 1. Site A is located along Putah Creek on the southwestern border of the Russell Ranch. It is approximately 65 acres and is predominantly covered by kiwi and Asian pear orchards. A narrow band of riparian vegetation is located below the top of the slope immediately along Putah Creek. A portion of the riparian area has been removed and replaced with a variety of fruit trees. The northern boundary of the site parallels a continuous band of poplar trees along the south side of the Willow Canal. In addition, there are several rows of trees within the parcel.

Site B is located south of Russell Boulevard on the east side of County Road 98A. The southern boundary is Putah Creek and the northern boundary is along the north side of a swale that extends east from the intersection of Russell Boulevard and County Road 98A. It is approximately 93 acres and is used predominately for row crops including alfalfa. A small, area in the northwest portion of the site is unlevelled and is used seasonally for sheep grazing. The swale along the northern edge of the property receives water from local stormwater drainage and agricultural runoff. The bottom of the swale supports wetland vegetation, but the sides of the swale support only forbs and grasses, except at the west end, where a small patch of riparian vegetation is present. The southern portion of Site B borders a well developed strip of riparian vegetation along Putah Creek. The area between Putah Creek and the willow canal is a kiwi orchard that has not been irrigated for several years. The Willow Canal borders the northern edge of the kiwi orchard, and poplars form a continuous line along the southern side of the canal.

RECOMMENDED ACTIONS

1. VELB MANAGEMENT

1.1 *Manage the Russell Ranch mitigation areas consistent with U.S. Fish and Wildlife Service guidelines.*

The U.S. Fish and Wildlife Service (USFWS) has published a set of mitigation guidelines for VELB. Management of VELB mitigation sites at the Russell Ranch must

be consistent with these guidelines and any applicable permits issued by the USFWS. During the permit application process the campus may request certain permit terms that will allow research and teaching uses.

1.2 *Incorporate VELB mitigation at the Russell Ranch into: (a) riparian habitat improvement along Putah Creek in Sites A and B, and along the swale on the north side of Site B; and (b) as a “elderberry savannah” outside the Putah Creek Channel on Site A.*

On Sites A and B, elderberry shrubs should be planted as part of riparian habitat restoration along Putah Creek. The mixture of shrubs in the restoration area should be native species found naturally along the creek, derived from local stocks, and consistent with USFWS guidelines for VELB mitigation areas. Along the creek, the riparian zone could extend a short distance above the top of slope into the adjacent grasslands. In addition, small areas of “elderberry savannah” (i.e., scattered elderberry shrubs on the terrace above the creek) could be established within the grassland to mimic a wider range of landscapes where elderberry shrubs occur.

Along the swale on the north side of Site B, riparian habitat restoration should be concentrated at the east and west ends of the swale where some taller vegetation already exists. Between these areas, initial plantings for habitat restoration should not include tall trees and should generally stay below the top of the bank so that the vegetation does not create perch sites for predators that could take Burrowing Owls from the adjacent fields. However, natural recruitment after initial restoration plantings may result in establishment of trees in this area.

1.3 *Design the VELB mitigation areas to receive shrubs transplanted from campus sites and to serve as a mitigation bank for VELB.*

Due to the presence of elderberry shrubs within the urban and agricultural landscape on campus, future projects will undoubtedly require the relocation of shrubs from these sites. The riparian habitat restoration areas on Sites A and B, should be designed as the receiver site for these shrubs. However, the habitat restoration should proceed in advance of relocating shrubs. Habitat restoration should provide sufficient mitigation for campus needs and can be done in advance of projects that require relocation of shrubs.

1.4 *Use a variety of sources for elderberry shrubs planted at the mitigation site to test the role of source materials in VELB establishment.*

Many VELB mitigation areas rely on healthy appearing shrubs available from commercial nurseries as the source used in restoration efforts. The Russell Ranch mitigation area should use a variety of seed or plant stocks including, but not limited to seeds, seedlings or cuttings from nursery stock of known provenance, shrubs along Putah Creek at the Russell Ranch, shrubs from elsewhere along Putah Creek, and shrubs known to support VELB. Various stocks planted could then be monitored to determine whether VELB has a preference for particular plants and which shrubs do

better. Any necessary permits needed to take cuttings should be obtained from the USFWS.

1.5 *Promote establishment of VELB at the mitigation sites by transplanting shrubs known to support VELB.*

Recent surveys along Putah Creek and on the campus have failed to find VELB. The distance over which VELB can disperse to locate potential host plants is unknown. It is possible that if suitable VELB habitat is created on the Russell Ranch, it may be too far from an existing population to be successfully colonized. The campus should work with the USFWS to find opportunities to transplant shrubs that do support VELB to the site. Inhabited shrubs may then serve as an inoculum to establish a larger population on the Russell Ranch. However, campus willingness to accept shrubs inhabited by VELB should not serve as a reason for moving existing populations of VELB, and the Russell Ranch should not serve as a mitigation site for non-campus projects.

1.6 *Investigate the possible role of introduced Argentine ants (*Linepithema humile*) in the decline of the VELB.*

The Argentine ant is a non-native species that has a profound negative impact on the local insect fauna. Preliminary evidence exists suggests that Argentine ants and VELB do not occur together. These ants may eliminate VELB and prohibit their establishment. Alternative approaches to controlling Argentine ants on the mitigation site should be explored to determine whether or not VELB could be established in their absence.

2. SWAINSON'S HAWK MANAGEMENT

2.1 *Establish and manage low, open vegetation on Sites A and B that will allow foraging throughout the breeding season.*

Swainson's Hawks require low, open vegetation for foraging. Even alfalfa, the preferred foraging habitat in local agricultural landscapes, is not suitable foraging habitat once it becomes too tall and dense for the hawks to detect and capture prey. On campus, most of the potential foraging habitat for this species is generally kept low through grazing, mowing, plowing, harvesting, or some other means. Grassland habitat created on the Russell Ranch for Swainson's Hawk will require management to keep the proper vegetation structure and monitoring to determine the types and structure of native grassland used by foraging Swainson's Hawks. The techniques that appear to be most appropriate include mowing, grazing, and burning. A management regime must be established and maintained to sustain habitat with this structure.

2.2 *Remove existing windbreaks to reconnect the riparian vegetation along Putah Creek to the adjacent landscape.*

Swainson's Hawks forage from the wing and on the ground, and throughout their range forage and nest in areas with only scattered trees. Site A and the southern part of Site B have been isolated visually from the landscape to the north by existing poplar

windbreaks along the south side of the Willow Canal. Several rows of trees also have been planted within Site A. All or a large portion of these trees should be removed to provide open foraging habitat for Swainson's Hawks and to reconnect the mitigation areas to the adjacent landscape.

3. BURROWING OWL MANAGEMENT

3.1 *Focus Burrowing Owl mitigation actions on Site B.*

Active measures such as the installation of artificial burrows should occur primarily at Site B. This location is preferred because much of it is away from large trees serving as perch sites for predators that may prey on Burrowing Owls. Site A may serve as foraging habitat, and Burrowing Owls possibly could become established there but this would not be the site of active recruitment and establishment measures.

3.2 *Establish and manage low, open grassland vegetation on Site B.*

Burrowing Owls, like Swainson's Hawks, require inhabit sites with low, open vegetation. They require these habitat conditions for foraging and for visibility around their burrows. Thus, a management regime must be established and maintained to sustain habitat with this structure. See recommended action 2.1.

3.3 *Promote ground squirrel populations so that burrows will become available to Burrowing Owls.*

Ground squirrels are the source of most natural burrows used by Burrowing Owls. Therefore, management of the mitigation site should be done to promote establishment of ground squirrel populations. Existing literature should be reviewed and experts consulted to identify techniques that could be used to promote and maintain ground squirrel populations.

3.4 *Attempt to passively recruit Burrowing Owls to the site before attempting to relocate owls to the site.*

The preferred method for establishing Burrowing Owls on the mitigation site is by creation of suitable habitat and passive recruitment. Thus, the low, open grassland habitat should be created and the actions to promote ground squirrel populations should be implemented in order to attract naturally dispersing owls to the site. Approximately 6-8 artificial burrow structures should be provided, especially while ground squirrel populations increase. If after five to seven years, owls have not become established on the site at all or in sufficient numbers, then recommended action 3.5 should be implemented.

3.5 *If relocation of Burrowing Owls from other areas is tried, use and improve the latest relocation techniques.*

If relocation of Burrowing Owls is implemented, research on relocation techniques should be reviewed to determine the most successful current methods, then improved to help learn how this last-ditch method of mitigation for impacts to owls might be made more successful. The owls relocated to the mitigation site should come from sites as near as possible to prevent possible mixing of different genetic lineages. However, relocating Burrowing Owls to these sites should not serve as a reason for eliminating existing populations of Burrowing Owls, and the Russell Ranch should not serve as a mitigation site for non-campus projects.

4. RIPARIAN AND GRASSLAND RESTORATION IN MITIGATION AREA A

4.1 *Remove the windbreaks along the south side of the Willow Canal, within the interior of the site, and along the top of the Putah Creek bank.*

This recommended action is consistent with actions 2.1, 2.2, 3.2, and 5.1. These trees should be removed in order to create an open landscape for Swainson's Hawks and Burrowing Owls.

4.2 *Remove the orchard plantings within the Putah Creek banks and establish riparian vegetation with elderberry shrubs as a primary component of the restoration design.*

This recommended action for management of Site A is consistent with action 1.2.

4.3 *Remove the existing agricultural crops and replace with grasslands using native species.*

The low, open habitat type required by Swainson's Hawks and Burrowing Owls should be a grassland habitat that is composed of native species. Due to the relatively small size of the mitigation areas, the same mix of plant species should be established over the two soil types on Sites A and B. Recommended planting mixes are presented in Appendix B.

4.4 *Develop and implement a grassland management plan designed to keep the vegetation low and open.*

This recommended action for management of Site A is consistent with actions 2.1 and 3.2.

5. RIPARIAN AND GRASSLAND RESTORATION IN MITIGATION AREA B

5.1 *Remove the windbreak along the south side of the Willow Canal.*

This recommended action is consistent with actions 2.1, 2.2, 3.2, and 4.1. All or a large portion of these trees should be removed in order to create an open landscape for Swainson's Hawks and Burrowing Owls.

5.2 *Establish riparian vegetation along the swale with elderberry shrubs as a primary component of the restoration design.*

This recommended action is consistent with action 1.2.

5.3 *Remove the existing agricultural crops and replace with grasslands using native species of relatively short stature.*

The low, open habitat type required by Swainson's Hawks and Burrowing Owls should be a grassland habitat that is composed of native species. Due to the relatively small size of the mitigation areas, the same mix of plant species should be established over the two soil types on Sites A and B. Recommended planting mixes are presented in Appendix B.

5.4 *Develop and implement a grassland management plan designed to keep the vegetation low and open.*

This recommended action for management of Site B is consistent with actions 2.1 and 3.2.

6. OTHER RUSSELL RANCH AREAS

6.1 *Add parcel M-3 located between Russell Boulevard and the swale on the north side of Site B to the mitigation area.*

This approximately 20-acre parcel should be added to Site B to extend the mitigation area and minimize negative effects of agricultural activities on the swale and restoration area. Since much of the remainder of the mitigation area will be closed to general use by the public, this parcel should be designed to inform the public about the mitigation project and to be used by larger groups that might be inappropriate for the remainder of the site.

6.2 *Preserve the option to expand the mitigation area to include lands south of Russell Boulevard, east of Kinsella Lane, and west of Road 95A.*

As the campus grows, it likely will need additional mitigation lands to offset the effects of campus growth. Parcels K-4, L-1, L-2, L-3, and M-1 total approximately 230 acres and should be held as the possible site for additional mitigation lands. No permanent land assignments of these parcels should occur until the option of using

them for biodiversity conservation and restoration is considered. Adding these parcels to the mitigation area would have the benefits of linking with Sites A and B and creating one contiguous parcel of approximately 390 acres. Large mitigation areas are more valuable than small, disjunct sites. In addition, the site would provide a much-needed teaching area within close proximity to the campus.

6.3 *Preserve some of the landscaping around the former houses in Site A.*

In recognition of the past uses at the Russell Ranch some of the existing landscaping that surrounded the former ranch buildings on Site A should be preserved as part of the site design. Adventitious, noxious species should not be retained.

7. IMPLEMENTATION AND MONITORING

7.1 *Provide staffing to oversee implementation of the concept plan.*

Staffing must be provided to: (1) implement the management measures described above; (2) ensure that long-term scientific monitoring data are collected as described in Tasks 7.2, 7.3, and Appendix C; (3) allow for adaptive management in response to changed conditions and development of new information; (4) coordinate efforts at the Russell Ranch with habitat enhancement efforts on other west campus lands, and (5) develop an educational and community outreach program including coordinating internships and class involvement. A separate proposal to address the staffing issue has been developed and funded. That proposal included staffing needs for the Putah Creek Riparian Reserve as well as mitigation lands at the Russell Ranch.

7.2 *Conduct baseline studies on the mitigation lands prior to implementing the mitigation measures.*

Baseline data on the mitigation lands would be developed to catalog and describe resources that are currently on the site. These studies would focus on characterization of the existing vegetation and special status species. The results would be used to help finalize and implement the mitigation plan and would serve as a basis for comparison to determine the effectiveness and efficacy of the mitigation efforts.

7.3 *To contribute to knowledge about mitigation, develop and implement a scientific monitoring plan to evaluate the efficacy and success of mitigation efforts.*

As described at the beginning of the concept plan, one of goals for the mitigation area is to evaluate the efficacy and success of mitigation efforts. A sound scientific protocol is needed to measure relevant variables to make these determinations. A preliminary list of criteria for determining mitigation success is included in Appendix C. These criteria should be modified, if appropriate, as more is learned about the site and results of the mitigation actions. Reporting should be done at least annually.

7.4 *Provide annual funding for two research assistantships to create an inventory of resources on the site before implementing habitat restoration and to monitor resources on the site after the restoration measures are implemented.*

These research assistantships would fund students to collect the data needed to implement tasks 7.2 and 7.3; research assistants also will aid the site manager with other data collection efforts.

SCHEDULE

- Recruit and hire manager/steward – Spring 2002
- Conduct pre-project baseline studies – Spring 2003
- Begin implementation of habitat restoration – Fall 2002 through Fall 2003
- Ongoing site management and monitoring studies - indefinite

APPENDIX A

MEMBERS OF THE RUSSELL RANCH MITIGATION AREA DESIGN CONCEPT COMMITTEE

Members:

Associate Professor Ford Denison, *Agronomy and Range Science*
Environmental Planner Sid England, *Co-Chair, Planning and Budget*
Professor Susan Harrison, *Co-Chair, Environmental Science and Policy*
Postdoctoral Researcher Gary Huxel, *Environmental Science and Policy*
Management Services Officer Dave Klippert, *Agricultural Services*
Graduate Student Colleen Lenihan, *Wildlife Fish and Conservation Biology*
Graduate Student Dan Leroy, *John Muir Institute of the Environment*
Professor Maureen Stanton, *Evolution and Ecology*
Senior Animal Technician Bret Stedman, *Animal Resources Service*
Professor David Robertson, *English*
Reserve Steward Dan Tolson, *Natural Reserve System*
Associate Professor Truman Young, *Environmental Horticulture*

Consultants to the Committee:

John Anderson, Hedgerow Farms
Jim Estep, Jones & Stokes Associates
Harry Oakes, Jones & Stokes Associates

Other contributors:

Research Associate Brenda Johnson, Formerly with UC Davis *Center for Ecological Health Research*

APPENDIX B

GRASSLAND SITE PREPARATION, SEEDING AND MANAGEMENT PLAN

- **SITE PREPARATION AND MANAGEMENT RECOMMENDATIONS**

- **Winter 2002/Early Spring 2003**

- Document alien weedy species to assess weed seed bank and future management protocols. Fallow all sites assuming existing vegetation is dominated by exotic weedy species. The goal is to eliminate weed seed production.
- The following treatments can be used for fallowing.
 - Disk all areas before seed has formed. The advantage of disking is that a good seed bed can be established and deep soil moisture will be retained to aid in fall establishment in lieu of dry conditions; or
 - Chemically fallow with herbicides (glyphosate and possibly others depending on weeds). A prescribed fire may be appropriate prior to seeding to reduce thatch.

- **Summer 2003**

- Control late maturing summer weeds with herbicides or disking.

- **Fall 2003 (October-November)**

- Following germinating rains, seed appropriate mixtures with a range drill.
- Assuming a large flush of weedy species, apply glyphosate herbicide approximately 10 days following seeding or before seeded species have germinated. Weeds can be sprayed prior to seeding, but in general more will germinate in the delay window.

- **Spring 2004 (February-April)**

- Control broadleaf weeds with selective herbicides such as 2-4-D, MCPA, Banvyl, Buctil, and/or Transline.
- If grass weeds are a problem, control with mowing, haying, grazing, burning or wick herbicides.

- **RECOMMENDED GRASSLAND SEED MIXTURES**

- **Elderberry savannah on Yolo silt loam soils**

- **Grasses**

Plant Species	Application (lbs/acre)	Live seeds per sq. ft.
Creeping wildrye (<i>Elymus triticoides</i>)	6	15.0
Blue wildrye (<i>Elymus glaucus</i>)	4	10.8
Yolo slender wheatgrass (<i>Elymus trachycaulus</i>)	2	3.6
Meadow barley (<i>Hordeum brachyantherum</i>)	6	9.6
TOTAL	18	39.0

- **Forbs** – In lieu of an extensive broadleaf seed bank, forb species would not be planted the first year due to the necessity to use broadleaf herbicides. Forb species could be planted following a prescribed fire in the third or fourth year of the project. Recommended species include: gum plant (*Grenedia camporum*), yarrow (*Achillea millefolium*), Spanish clover (*Lotus purshianus*), tomcat clover (*Trifolium wildenovii*), bull clover (*Trifolium fucatum*), and arroyo lupine (*Lupinus succulentis*). Seeding rates would be higher than listed.

- **Upland grassland on dryer site Corning gravelly loam and Rincon silty clay loam soils**

- **Grasses**

Plant Species	Application (lbs/acre)	Live seeds per sq. ft.
Purple needlegrass (<i>Nassella pulchra</i>)	8	10.0
Nodding needlegrass (<i>Nassella cernua</i>)	3	10.0
One-sided bluegrass (<i>Poa secunda</i>)	2	27.6
Six weeks fescue (<i>Vulpia mychrostachya</i>)	1	15-20
Squirrel tail (<i>Elymus multisetus</i>)	3	4.5
California oniongrass (<i>Melica californica</i>)	3	13.8
TOTAL	20	80.9-85.9

- **Forbs** – In lieu of an extensive broadleaf seed bank, forb species would not be planted the first year due to the necessity to use broadleaf herbicides. Forb species could be planted following a prescribed fire in the third or fourth year of the project. Recommended species include: California poppy (*Eschscholzia californica*), yarrow (*Achillea millefolium*), red maids (*Calandrinia ciliata*), small-flowered lupine (*Lupinus bicolor*), Turkey mullen (*Eremocarpus setigerus*), vinegar weed (*Trichostema lanceolatum*), spike weed (*Hemizonia pungens*), owl's clover (*Orthocarpus purpurascens*), and tomcat clover (*Trifolium wildenovii*). Seeding rates would be higher than listed.

APPENDIX C

CRITERIA FOR ASSESSING MITIGATION SUCCESS

● GRASSLAND RESTORATION

- Experiments: native grass plantings on 40-50 1-hectare plots, stratified by soil type; two levels of burning (yes/no); three levels of grazing (none/"best practice"/"usual practice")
- Monitor: grassland composition - identity, number, percent cover of native and exotic species
- Criteria: high diversity and cover of native species; low weed cover; and sustainability with low input

● VALLEY ELDERBERRY LONGHORN BEETLE

- Experiments: 2-3 ant control treatments; 2 sources of bushes; 2-3 elderberry clump sizes (for effects on beetles); weed control and bird perches (for effects on elderberry recruitment)
- Monitor: exit holes, ant densities, elderberry recruitment
- Criteria: natural colonization, successful maturation, population increase and stability; densities comparable with known values for natural habitat

● BURROWING OWLS

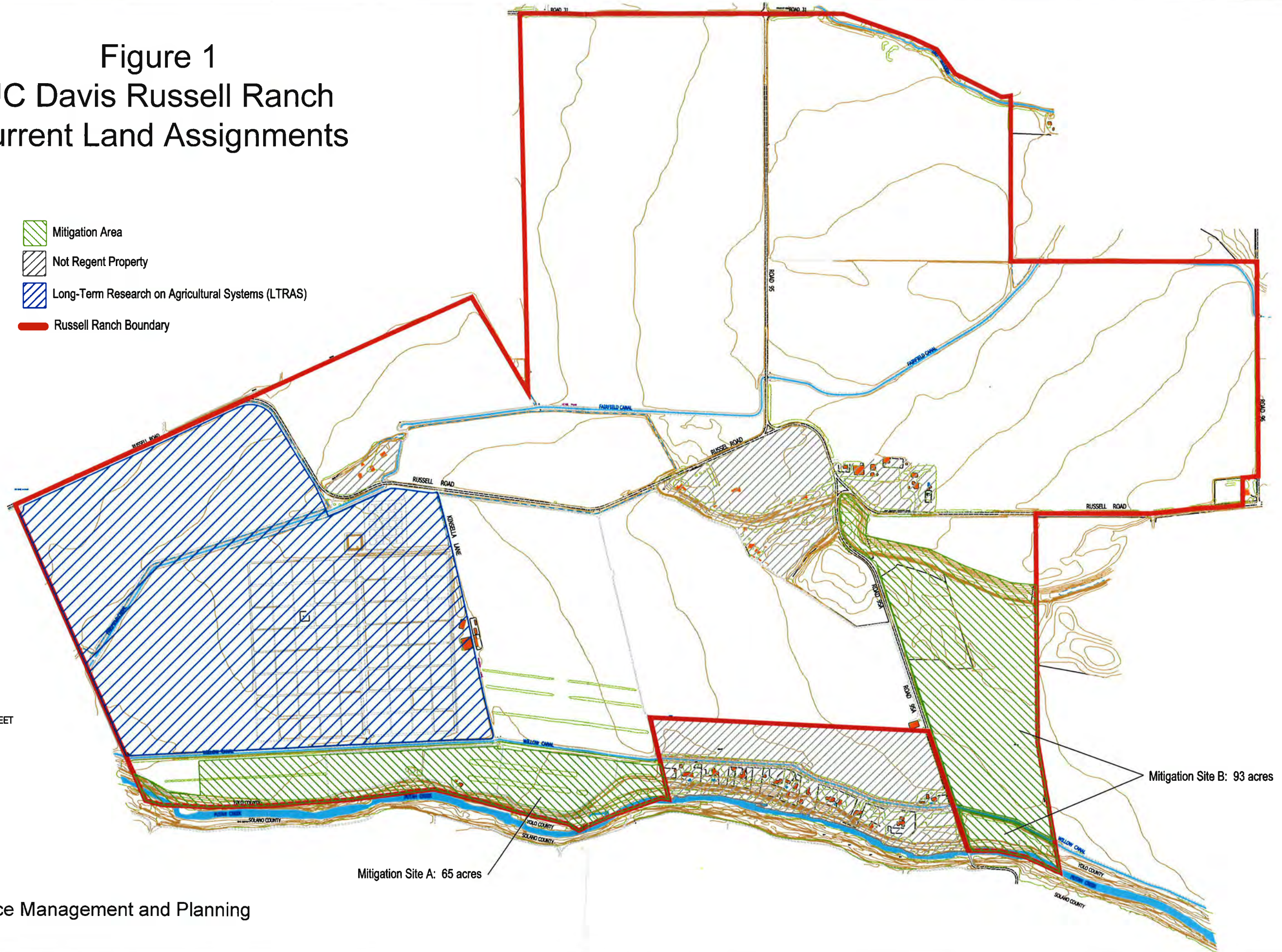
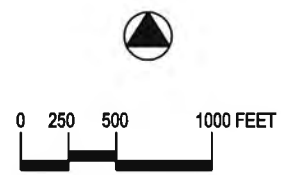
- Experiments: grassland treatments (above)
- Monitor: abundance of ground squirrels; abundance of prey; foraging activity, nesting, and nesting success of owls
- Criteria: stable, sustained burrowing owl population; burrow density and nest success comparable to values from natural habitat

● SWAINSON'S HAWKS

- Experiments: grassland treatments (above)
- Monitor: abundance of prey; foraging activity (compare with LTRAS agricultural plots)
- Criteria: foraging activity at least equal to that on agricultural land; may be able to compare hawk and owl habitat gains at Russell Ranch with losses on the land converted to development

Figure 1 UC Davis Russell Ranch Current Land Assignments

- Mitigation Area
- Not Regent Property
- Long-Term Research on Agricultural Systems (LTRAS)
- Russell Ranch Boundary



Appendix B

**Species Lists from the 1986 Putah Creek
Riparian Reserve Management Plan**

TABLE 4
NATIVE AND INTRODUCED MAMMALS OF SACRAMENTO RIVER VALLEY
RIPARIAN COMMUNITIES

- | | |
|---|---|
| <ul style="list-style-type: none"> <u>Didelphis virginiana</u> Virginia opossum <u>Sorex ornatus</u> ornate shrew • <u>Scapanus latimanus</u> broad-handed mole <u>Myotis yumanensis</u> Yuma myotis <u>Myotis californicus</u> California myotis <u>Pipistrellus hesperus</u> western pipistrella <u>Eptesicus fuscus</u> big brown bat <u>Lasiurus borealis</u> red bat <u>Lasiurus cinereus</u> hoary bat <u>Plecotus townsendii</u> Townsend's big-eared bat <u>Antrozous pallidus</u> pallid bat <u>Tadarida brasiliensis</u> Brazilian free-tailed bat <u>Sylvilagus audubonii</u> desert cottontail <u>Lepus californicus</u> black tailed hare <u>Spermophilus beecheyi</u> California ground squirrel • <u>Sciurus griseus</u> western gray squirrel • <u>Sciurus niger</u> fox squirrel • <u>Glaucomys sabrinus</u> northern flying squirrel <u>Thomomys bottae</u> Botta's pocket gopher <u>Perognathus inornatus</u> San Joaquin pocket mouse • <u>Dipodomys californicus</u> California kangaroo rat <u>Castor canadensis</u> beaver <u>Reithrodontomys megalotus</u> western harvest mouse <u>Peromyscus maniculatus</u> deer mouse | <ul style="list-style-type: none"> • <u>Neotoma fuscipes</u> dusky-footed woodrat <u>Microtus californicus</u> California vole <u>Ondatra zibethicus</u> muskrat <u>Rattus norvegicus</u> Norway rat <u>Rattus rattus</u> black rat <u>Mus musculus</u> house mouse • <u>Erethizon dorsatum</u> porcupine <u>Canis latrans</u> coyote <u>Canis (Vulpes) vulpes</u> red fox <u>Canis (urocyon) cinereoargenteus</u> gray fox • <u>Bassariscus astutus</u> ringtail <u>Procyon lotor</u> raccoon <u>Mustela frenata</u> long-tailed weasel <u>Mustela vison</u> mink • <u>Taxidea texus</u> badger <u>Spilogale gracilis</u> western spotted skunk <u>Mephitis mephitis</u> striped skunk • <u>Lutra canadensis</u> river otter • <u>Felis concolor</u> mountain lion <u>Felis catus</u> feral house cat <u>Felis (Lynx) rufus</u> bobcat • <u>Sus scrofa</u> feral pig • <u>Cervus elaphus</u> wapiti elk <u>Odocoileus hemionus</u> mule deer |
|---|---|

Source: Trapp, Link, and Whister, 1984

- Mammals no longer found on the Putah Creek Riparian Reserve, (personal communication, 9/11/85, Ron Cole, Wildlife and Fisheries Biology, U. C. Davis).

It is unlikely that Putah Creek originally supported salmon or steelhead runs, since it apparently ended in a large wetland without a major single connection to the Sacramento River. However, once this wetland area was drained and dredged the creek became more accessible and small runs of chinook(king) salmon and steelhead apparently appeared (Moyle, 1979). Prior to construction of Shasta Dam more fluctuations in the flow of the Sacramento River occurred and excess water was diverted more frequently to the Yolo By-Pass. During favorable years chinook salmon, striped bass, and american shad migrated into Putah Creek. Historically chinook salmon were found as far up Putah Creek as the old town of Monticello, now flooded by Lake Berryessa (Shapova, 1946).

TABLE 6
PLANTS IDENTIFIED IN PUTAH CREEK RESERVE

Forbs

<u>Botanical Species</u>	<u>Botanical Family</u>	<u>Common Name</u>	<u>Origin</u>
<i>Amaranthus albus</i>	Amaranthaceae	Tumbleweed	trop. Am.
<i>Amaranthus graecizans</i>	Amaranthaceae	Prostrate Pigweed	native
<i>Amaranthus retroflexus</i>	Amaranthaceae	Redroot Pigweed	trop. Am.
<i>Ambrosia psilostachya</i>	Compositae	Western Ragweed	native
<i>Ammannia coccinea</i>	Lythraceae	Purple Ammannia	native
<i>Artemisia douglasiana</i>	Compositae	Ca. Mugwort	native
<i>Atriplex patula</i> var. <i>hastata</i>	Chenopodiaceae	Fat-Hen	Eurasia
<i>Atriplex rosea</i>	Chenopodiaceae	Redscale	Eurasia
<i>Bidens frondosa</i>	Compositae	Stick-Tight	Europe
<i>Brassica geniculata</i>	Cruciferae	Short-pod Mustard	Europe
<i>Candaria draba</i>	Cruciferae	Hairy Cress	Old World
<i>Centaurea solstitialis</i>	Compositae	Yellow Starthistle	Europe
<i>Cichorium intybus</i>	Compositae	Chicory	Europe
<i>Convolvulus arvensis</i>	Convolvulaceae	Field Bindweed	Europe
<i>Coryza canadensis</i>	Compositae	Horseweed	E. U.S.
<i>Cuscuta</i> sp.	Cuscutaceae	Dodder	
<i>Epitobium adenocaulon</i> var. <i>holosericeum</i>	Onagraceae	N. Willow-herb	native
<i>Epilobium peniculatum</i>	Onagraceae	Panicle Willowweed	native
<i>Eremocarpus setigerus</i>	Euphorbiaceae	Turkey Mulllein	native
<i>Glycyrrhiza lepidota</i>	Leguminosae	Wild Licorice	native
<i>Grindelia</i> sp. (<i>G. camporum</i> ?)	Compositae	Gum Plant	native
<i>Helianthus annuus</i>	Compositae	Common Sunflower	Great Plains
<i>Heliotropium curassavicum</i>	Boraginaceae	Seaside Heliotrope	native
<i>Hemizonia fitchii</i>	Compositae	Fitch's Spikeweed	native
<i>Kickxia elantina</i>	Scrophulariaceae	Fluellin	Medit.
<i>Lactuca scariola</i>	Compositae	Prickly Lettuce	Europe
<i>Lippia nodiflora</i>	Verbenaceae	Garden Lippia	S. Am.
<i>Lotus purshianus</i>	Leguminosae	Spanish Clover	native
<i>Ludwigia palustris</i> var. <i>pacifica</i>	Onagraceae	Water Purslane	native
<i>Lycopus americanus</i>	Lamiaceae	Water Horehound	native
<i>Malva parviflora</i> or <i>M. nicaeensis</i>	Malvaceae	Cheeseweed	Eurasia
<i>Marrubium vulgare</i>	Lamiaceae	White Horehound	Europe
<i>Marsilea vestita</i>	Marsileaceae	Hairy Pepperwort	native
<i>Melilotus albus</i> *	Leguminosae	White Sweet Clover	Europe
<i>Plantago</i> sp.	Plantaginaceae	Plantain	-----
<i>Polygonum aviculare</i>	Polygonaceae	Common Knotweed	Eurasia
<i>Polygonum lapathifolium</i>	Polygonaceae	Willow Weed	Europe
<i>Rumex crispus</i>	Polygonaceae	Curly Dock	Eurasia

Scirpus acutus	Cyperaceae	Common Tule	native
Sida gederaceae	Malvaceae	Alkali Sida	native
Silybum marianum *	Compositae	Milk Thistle	Medit.
Solanum americanum	Solanaceae	Nightshade	Old World
Solidago occidentalis	Compositae	Western Goldenrod	native
Urtica holosericea	Urticaceae	Creek Nettle	native
Xanthium strumarium	Compositae	Cocklebur	Old World

Grasses

Avena fatua*	Gramineae	Wild Oat	Old World
Bromus diandrus*	"	Ripgut Brome	Europe
Bromus mollis	"	Soft Chess	Europe
Bromus willdenowii	"	Rescuegrass	S. America
Cynodon dactylon*	"	Bermudagrass	Old World
Cyperus eragrostis	Cyperaceae	Umbrella Sedge	native
Cyperus esculentus	Cyperaceae	Yellow Nutsedge	Old World
Cyperus rotundus	Cyperaceae	Purple Nutsedge	Europe
Cyperis schoenoides	Gramineae	Swampgrass	Europe
Echinochloa crusgalli	"	Barryard Grass	Old World
Elymus triticoides	"	Beardless Wildrye	native
Hordeum leporinum	"	Here Barley	Europe
Leersia oryzoides	"	Rice Cutgrass	Europe
Lolium multiflorum	"	Italian Ryegrass	Europe
Panicum capillare	"	Witchgrass	E. U.S.
Paspalum distichum	"	Knotgrass	native
Phalaris minor	"	Littleseed Canarygrass	Medit.
Polypogon monspeliensis	"	Rabbitfootgrass	Europe
Sorghum halepense	"	Johnsongrass	Old World

Shrubs

<i>Arundo donax *</i>	<i>Gramineae</i>	<i>Giant Reed</i>	<i>Europe</i>
Datura meteloides	Solanaceae	Toiguacha	Mexico?
<i>Heteromeles arbutifolia</i>	<i>Rosaceae</i>	<i>Toyon</i>	<i>native</i>
Nicotiana glauca	Solanaceae	Tree Tobacco	S. America
Rhus diversiloba	Anacardiaceae	Poison Oak	native
Rosa californica	Rosaceae	Ca. Wild Rose	native
Rubus procerus	Rosaceae	Himalaya-berry	Europe
Rubus sp.	Rosaceae	Ca. Blackberry	native
Salix hindsiana	Salicaceae	Sandbar Willow	native
Symphoricarpos rivularis	Caprifoliaceae	Snowberry	native
Tamarix pentandra, T. Tetrandra *	Tamaricaceae	Tamarisk	Medit.
<i>Vitis californica</i>	<i>Vitaceae</i>	<i>Wild Grape</i>	<i>native</i>

Trees

<i>Acer negundo</i>	Aceraceae	Box Elder	native
<i>Aesculus californica</i>	Hippocastanaceae	Calif. Buckeye	native
<i>Ailanthus altissima</i> *	Simarubaceae	Tree of Heaven	Asia
<i>Eucalyptus globulus</i> *	<i>Myrtaceae</i>	<i>Blue Gum</i>	<i>Australia</i>
<i>Eucalytus rudis</i> *	<i>Myrtaceae</i>	<i>Desert gum</i>	<i>Australia</i>
<i>Fraxinus latifolia</i>	<i>Oleaceae</i>	<i>Oregon Ash</i>	<i>native</i>
<i>Juglans hindsii</i>	Juglandaceae	Ca. Black Walnut	native
<i>Platanus racemosa</i>	<i>Platanaceae</i>	<i>Calif. Sycamore</i>	<i>native</i>
<i>Populus fremontii</i>	Salicaceae	Fremont's Cottonwood	native
<i>Quercus lobata</i>	Fagaceae	Valley Oak	native
<i>Robinia pseudo-acacia</i>	Leguminosae	Black Locust	E. U.S.
<i>Salix Gooddingii</i>	Salicaceae	Goodding's Willow	native
<i>Salix laevigata</i>	Salicaceae	Red Willow	native
<i>Sambucus mexicana</i>	Caprifoliaceae	Elderberry	native
<i>Tamarix aphylla</i> *	Tamaricaceae	Athel Tamarisk	Asia, Africa
<i>Prunus Amygdalus</i>	<i>Rosaceae</i>	<i>Almond escapes</i>	<i>cult. var.</i>

* = serious "ecological weeds" in the reserve

- Source:
- Species in regular type face are those identified by Lynda Sparr, graduate student in Environmental Horticulture while surveying the reserve in 1983 using the line transect method.
 - Species in *italics* are additional species identified by Steve Chainey, graduate student in Range and Wildland Science, while mapping the vegetation of the reserve during the summer of 1985.

mammalian species and 60 bird species were recorded. Table 7 lists the mammal species observed in the reserve during the 1983 survey. Based on this limited data, Putah Creek has a low mammalian species diversity and many of the observed species are ones often found associated with human activity and altered habitats. There was a higher level of species diversity found in the sampled bird populations. A more thorough study, covering the complete seasonal timeframe would probably reveal additional species.

TABLE 7
MAMMAL SPECIES IDENTIFIED ALONG PUTAH CREEK*

Common Name	Scientific name	Trapped	Observed
house mouse	<u>Mus musculus</u>	31	-
California vole	<u>Microtus californicus</u>	14	-
Norway rat	<u>Rattus norvegicus</u>	7	-
black rat	<u>Rattus rattus</u>	5	-
Virginia opossum	<u>Didelphis virginiana</u>	11	-
spotted skunk	<u>Spilogale gracilis</u>	1	-
striped skunk	<u>Mephitis mephitis</u>	1	-
muskrat	<u>Ondatra zibethicus</u>	-	4
beaver	<u>Castor canadensis</u>	-	2
deer mouse	<u>Peromyscus maniculatus</u>	1	-
California ground squirrel	<u>Spermophilus beecheyi</u>	2	-




*Source: Kris Timmerman, survey done November 1983

The Davis chapter of the Audubon Society annually does a spring bird count on Putah Creek west of Winters near the intersection of Putah Creek Road and Pleasants Valley Road. The results of their 1985 count are combined with the data collected by Ron Cole, Sidney England, Timmerman, and other sources to provide a list of bird species which have a high probability of occurring on the reserve. Table 8 presents this data.

A few studies of individual species found in Putah Creek have also been done; species include grey fox, Canis [urocyon] cinereoargenteus (Hallberg and Trapp, 1984) the beaver, Castor canadensis subauratus (Bond et al, 1982), and swainson's hawk, Buteo swainsoni (Schlorff and Bloom, 1984).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pied-billed Grebe												
Double-crested Cormorant												
American Bittern												
Great Blue Heron												
Great Egret												
Green-backed Heron												
Black-crowned Night Heron												
Tundra Swan											0	
Wood Duck												
Green-winged Teal *												
Mallard												
Northern Pintail												
Cinnamon Teal *												
Ring-necked Duck												
Turkey Vulture												
Osprey												
Black-shouldered Kite												
Northern Harrier												
Hawk, Sharp-shinned												
Cooper's												
Red-shouldered												
Swainson's												
Red-tailed												

Bars indicate relative abundance and seasonal occurrence in suitable habitat:

 common to abundant
 uncommon to fairly common
 rare

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
American Kestrel												
Prairie Falcon *												
Ring-necked Pheasant												
California Quail												
Sora *												
Common Moorhen												
American Coot												
Killdeer												
Black-necked Stilt *												
American Avocet												
Greater Yellowlegs												
Sandpiper, Spotted												
Least *												
Western *												
Forster's Tern												
Dove, Rock												
Mourning												
Common Barn Owl												
Western Screech Owl												
Great Horned Owl												
Hummingbird, Black-chinned *												
Anna's												
Rufous												

* = species should be found in reserve but presence not verified
 0 = vagrant

TABLE 8 AVIAN SPECIES OF THE PUTAH CREEK RIPARIAN RESERVE

Source: Ronald E. Cole and A. Sidney England, Wildlife and Fisheries Biology, U.C. Davis. Additional information from Kristina Timmerman and John Lovio.

	Is	Re	Ma	Pa	W	Ill	So	Ca	Nv	Ar	De
Vireo, warbling											
Warbler, Nashville											
Orange-crowned											
Yellow											
Yellow-rumped											
Black-throated Gray											
Townsend's											
MacGillivray's											
Common Yellowthroat											
Wilson's Warbler											
Yellow-breasted Chat											
Western Tanager											
Grosbeak, Black-headed											
Blue											
Lazuli Bunting											
Towhee, Rufous-sided											
Brown											
Sparrow, Chipping *											
Lark *											
Savannah											
Fox											
Song											
Lincoln's											

	Is	Re	Ma	Pa	W	Ill	So	Ca	Nv	Ar	De
Sparrow, Golden-crowned											
White-crowned											
Dark-eyed Junco											
Red-winged Blackbird											
Western Meadowlark											
Blackbird, Yellow-headed *											
Brewer's											
Brown-headed Cowbird											
Northern Oriole											
Finch, Purple *											
House											
Goldfinch, Lesser											
American											
House Sparrow											

TABLE 8 (cont.)

Appendix C

List of Fish in Putah Creek

Fish Species found on Putah Creek Riparian Reserve
 Dr. Peter Moyle
 February, 2003

Name	Native?	Abundance(1-4) In preserve	Comments
Pacific lamprey <i>Lampetra tridentata</i>	Y	2	Anadromous, spawning sporadic
American shad	N	1	
Threadfin shad	N	2	Can be abundant in lower creek below reserve
Rainbow trout <i>Oncorhynchus mykiss</i>	Y	1	Common below Putah Diversion Dam; steelhead may be present
Chinook salmon, <i>O. tshawytscha</i>	Y	2	Anadromous, spawn most years
California roach <i>Lavinia symmetricus</i>	Y	1(0)	Not found on reserve yet; rare below Putah Diversion Dam
Hitch	Y	2	
Sacramento blackfish	Y	2	Abundant in Arboretum Waterway
Sacramento pikeminnow <i>Ptychocheilus grandis</i>	Y	3	Abundant at Russell Ranch
Common carp	N	4	Probably most abundant fish in terms of biomass
Goldfish	N	2	
Fathead minnow	N	1	Common in some years
Golden shiner	N	2	
Sacramento sucker	Y	3	Most widespread native fish
Black bullhead	N	2	
Brown bullhead	N	1	
White catfish	N	2	
Channel catfish	N	3	Large individuals present (2-4 kg)
Western mosquitofish	N	4	
Inland silverside	N	2	Varies from year to year
Threespine stickleback	Y	2	Common below PDD, in campus ponds
Striped bass	N	1	Common below Mace Blvd
Bigscale logperch	N	3	
Sacramento perch. <i>Archoplites interruptus</i>	Y	1	Rare, flushed in from campus ponds
White crappie	N	2	Formerly abundant
Black crappie	N	2	
Bluegill	N	4	
Redear sunfish	N	2	Becoming more common
Green sunfish	N	2	
Largemouth bass	N	4	Major predator on native fish
Smallmouth bass	N	3	Common at Russell Ranch
Tule perch <i>Hysterocarpus traski</i>	Y	1	Common below PDD
Prickly sculpin <i>Cottus asper</i>	Y	1	Common below PDD

Appendix D

**Solano Project Releases and Instream Flows for
Lower Putah Creek**

Exhibit “E-1”

Solano Project Releases and Instream Flows for Lower Putah Creek

A. Rearing Flows ((1), (2) & (3) all shall be maintained)

(1) Permittee shall, for each month as set forth below, maintain mean daily releases from the Putah Diversion Dam to Creek downstream of the Putah Diversion Dam (hereinafter “lower Putah Creek”) that are equal to or in excess of the following rates, expressed in cubic feet per second (“cfs”):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Release (cfs)	20	25	25	25	16	26	46	43	43	43	34	20

These mean daily releases shall be measured at the Putah Diversion Dam and made from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam. The instantaneous releases at the Putah Diversion Dam shall at all times equal or exceed ninety percent (90%) of the applicable mean daily release requirement.

(2) Permittee shall, for each month as set forth below, release sufficient water from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam to maintain mean daily flows in lower Putah Creek that are equal to or in excess of the following rates, expressed in cubic feet per second (“cfs”):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Flows (cfs)	5	10	10	15	15	25	30	20	15	15	10	5

These mean daily flows shall be maintained and measured at or in the near vicinity of the Interstate 80 Bridge. The instantaneous flow at the Interstate 80 Bridge shall at all times equal or exceed ninety percent (90%) of the applicable mean daily flow requirement.

(3) Permittee shall at all times of the year release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a continuous flow of surface water in Putah Creek from the Old Davis Road Bridge to the western boundary of the Yolo Bypass, identified as River Mile 0.0 on trial exhibit number 41 in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565.

B. Spawning Flows ((1), (2) & (3) all shall be maintained)

(1) At a time between February 15 and March 31 of every calendar year, Permittee shall release a three-consecutive-day pulse of water from the Putah Diversion Dam into lower Putah Creek equal to or in excess of the following rates:

- (a) 150 cfs for the first 24 hours;
- (b) 100 cfs for the second 24 hours; and
- (c) 80 cfs for the third 24 hours.

Permittee may, in its discretion, time this pulse so as to utilize any uncontrolled flows that may provide some or all of the water needed to comply with this requirement.

(2) In every year, for the 30 days that follow the three-day pulse release described in paragraph B.(1), Permittee shall release sufficient water from the Putah Diversion Dam into lower Putah Creek to maintain a mean daily flow equal to or in excess of 50 cfs at the Interstate 80 Bridge. During this period, the instantaneous flows at the Interstate 80 Bridge shall at all times equal or exceed 45 cfs.

(3) In every year, at the conclusion of the 30th day of the 50 cfs spawning flows described in subsection B.(2), Permittee then shall ramp down the controlled releases from the Putah Diversion Dam gradually over a seven-day period until the flows are in compliance with the applicable requirements set forth in subsections A.(2), A.(3), C.(3) and C.(4) of this Exhibit "E-1".

C. Supplemental Flows ((1), (2), (3) & (4) all shall be maintained

The requirements set forth thus far herein are intended to protect the aquatic and related resources found in lower Putah Creek. In addition to maintaining these resources, Permittee shall provide supplemental flows in an attempt to enhance the aquatic and related resources of lower Putah Creek above that baseline. Accordingly:

(1) Permittee shall, during the period from November 1 through December 15 of each calendar year, release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the Toe Drain on the eastern side of the Yolo Bypass (the "East Toe Drain").

(2) Beginning sometime between November 15 and December 15 of each calendar year, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 50 cfs, and an instantaneous flow of at least 45 cfs, for five consecutive days at the point where Putah Creek discharges into the East Toe Drain. If a flash board dam is present on Putah Creek near the East Toe Drain during that period, and if the flash boards are removed during that period, then to the extent feasible the first day of the 50 cfs pulse flow at the East Toe Drain shall follow the removal of the flash boards. The precise timing of the initiation of the 50 cfs pulse flow shall be set each year by the Lower Putah Creek Coordinating Committee (the "LPCCC") established in accordance with section III of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565. The objective of the LPCCC shall be to time the release so as to maximize the potential for such flows to attract anadromous fish into Putah Creek. If the exact date of releases has not been established or agreed upon by the LPCCC, then the releases dealt with in this subparagraph shall commence on December 1 of the affected calendar year.

(3) Beginning on the sixth day after initiation of the above described 50 cfs pulse flow, and continuing each day thereafter through March 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 19 cfs, and an instantaneous flow of at least 14 cfs, at I-80.

(4) Beginning on April 1 of each calendar year, and continuing each day thereafter through May 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the East Toe Drain.

D. Drought Year Flows

(1) During years when total storage in Lake Berryessa is less than 750,000 acre feet (“af”) as of April 1 (a “Drought Year”), the release and instream flow requirements set forth in sections D.(2), D.(3) and D.(4) below (“Drought Year Requirements”) shall apply instead of the release and instream flow requirements set forth in sections A., B. and C. above (“Non-Drought Year Requirements”). Provided, however, that if after April 1 the total storage in Lake Berryessa rises to 750,000 af or more, then the Non-Drought Year Requirements shall immediately take effect.

(2) During a Drought Year, releases of water from the Putah Diversion Dam into lower Putah Creek shall equal or exceed the following amounts (mean daily values, in cfs, with instantaneous releases always equal to or exceeding 90 % of the listed values):

Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sep
15	25	25	25	16	26	46	33	33	33	26	15

(3) During a Drought Year, Permittee shall release sufficient water from the Putah Diversion Dam to maintain a continuous flow of surface water in Putah Creek from Putah

Diversion Dam to the Interstate 80 Bridge, and further shall release sufficient water from the Putah Diversion Dam to maintain a minimum mean daily instream flow of 2 cfs at the Interstate 80 Bridge, with instantaneous flows always equal to or exceeding 1 cfs. Under these conditions, Permittee shall not be required to maintain a continuous flow of surface water in the reach of Putah Creek below the Interstate 80 Bridge.

(4) Whenever the release and instream flow requirements set forth in sections D.(2) and D.(3) are in effect for two consecutive years, then during the next year thereafter the Non-Drought Year Requirements shall apply and shall remain in effect for an entire period from April 1 through March 31, unless total storage in Lake Berryessa on April 1 is less than 400,000 af. If the Drought Year Requirements are ever in effect for three or more consecutive years, then the Non-Drought Year Requirements shall apply and remain in effect for an entire period from April 1 through March 31 in the first subsequent year during which total storage in Lake Berryessa on April 1 exceeds 400,000 af.

(5) For the purposes of this section D, “total storage in Lake Berryessa” shall be the actual amount of water that physically is stored in Lake Berryessa (including all carryover storage) plus a Storage Adjustment. As of the date of entry of this Amended Judgment, the Storage Adjustment shall be zero. Thereafter, the amount of any controlled release of water from Lake Berryessa that is not for the purpose of (i) Solano Project Diversions, or (ii) maintaining the flows in lower Putah Creek that are required by this Amended Judgment shall be added to the Storage Adjustment. When Lake Berryessa spills, and all carryover storage has been spilled or otherwise eliminated, the Storage Adjustment shall be re-set to zero. The Storage Adjustment shall never be less than zero. “Solano Project Diversions,” for the purpose of this paragraph, means water delivered to Solano Project Participating Agencies and Putah South Canal Conveyance losses (Canal inflows minus deliveries from canals).

(6) If Solano Project Water that is not within the scope of Solano Project Contract Allocations, as is defined in Section IV of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565, ever is stored in an offstream reservoir or reservoirs or underground storage, and, as a result, Lake Berryessa storage levels are reduced below the levels that would occur in the absence of such storage, then the 750,000 af amount in paragraph D.(1) and the 400,000 af amount in paragraph D.(4) shall be adjusted so that Drought Year Requirements will continue to occur at the same frequencies as they would have occurred in the absence of such storage.

E. Illegal Diversion Account

If there is any risk that illegal diversions may take place from lower Putah Creek to a degree that water released by the Solano Project for the purposes of maintaining the minimum flows set forth herein will be significantly depleted, then the procedures set forth in the attached Exhibit "E-2" shall be implemented.

F. Monitoring Requirements ((1), (2), (3) & (4) all shall be satisfied)

(1) Permittee shall continuously measure and record releases from the Putah Diversion Dam to lower Putah Creek, and shall determine and record each day's mean daily release.

(2) Permittee shall forthwith install and maintain flow measurement gauges capable of measuring instream flows on a continuous basis at the Interstate 80 Bridge and near the East Toe Drain. Permittee shall collect and maintain the data recorded by each of these gauges as is necessary to demonstrate their compliance with the flow requirements imposed by this Amended Judgment. In addition, Permittee shall make regular measurements of instream flows at Stevenson Road Bridge, Pedrick Road Bridge and Old Davis Road Bridge. If the instream flow measured at Stevenson Road Bridge, Pedrick Road Bridge, or at Old Davis Road Bridge, is less than the minimum instream flow requirements in section A.(2) above on more than an infrequent basis, then the paragraph A.(2) flow

requirements shall start to apply at such measurement point or points, in addition to still applying at the Interstate 80 Bridge. Permittee shall install, maintain, repair, calibrate and operate gauging equipment at such compliance points as may be necessary to ensure and demonstrate their compliance with the provisions of this Exhibit "A". Gaging equipment shall be installed to provide a range of measurement from 0 cfs to at least 200 cfs.

(3) Permittee shall monitor flows in the entire reach of lower Putah Creek from Old Davis Road Bridge to River Mile 0.0 with sufficient frequency and by sufficient means to ensure compliance with the requirement in part A.(3) of this Amended Judgment that continuous flow of surface water be maintained in this reach at all times of the year. All measurements and observations of this reach made for purposes of compliance with this requirement shall be recorded.

(4) Permittee shall maintain records, in both paper and electronic format, of all release and flow measurements, all calculated mean daily releases and flows, and all observations required by this Judgment. Promptly upon request, these records shall be made available for review and copying by any person during normal business hours at the offices of Permittee or its designee.

Appendix E

Management Plan Implementation Timeline

Management Plan Implementation Timetable

ID	Task Name	2003		2004		2005		2006		2007		2008		2009	
		1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
1	Management and Restoration Actions														
2	Management and restoration – all Reaches														
3	MR-1: Develop a Reserve Headquarters														
4	MR-2: Develop Reserve maintenance/equipment area.														
5	MR-3: Create a native plant nursery for use by the Reserve.														
6	MR-4: Install signs at all potential creek access points.														
7	MR-5: Develop uniform appearance for all infrastructure placed in the Reserve.														
8	MR-6: Seek to use environmentally-friendly technologies and methods in management of the Reserve, wherever possible.														
9	MR-7: Removal and management of invasive species within the reserve.														
10	MR-8: Preserve and establish native grasses within the reserve.														
11	MR-9: Removal and management of invasive trees within the reserve.														
12	MR-10: Preserve and establish native trees and shrubs within the reserve.														
13	MR-11: Work with DWR and Corps of Engineers to re-visit and develop appropriate bridge vegetation management plan.														
14	MR-12: Improve aquatic habitat														
15	MR-13: Develop a trail system to focus recreation away from sensitive areas and allow for a managed use														
16	MR-14: Parking areas will be developed to reduce illegal parking and erosion														
17	MR-15: Work with ROTC to develop a suitable location for use either on or off of the reserve, and work to limit their use of other areas.														
18	MR-16: Work with the Putah Creek Council and other citizen's groups to implement volunteer restoration projects.														
19	MR-17: Hold community cleanups and planting days twice a year.														
20	Reach-specific actions														
21	Reach 1. Russell Ranch lands														
22	R1-A1: Implement final Russell Ranch Concept Plan.														
23	Reach 2. Upstream of Pedrick Road Bridge														
24	R2-A1: Develop access plan for upstream area.														
25	R2-A2: Coordinate border habitat types with those of the Ecosystem project.														
26	R2-A3: Develop plan for berm revegetation														
27	Reach 3. Pedrick Road to North Fork														
28	R3-A1: Install gates to control motor vehicle access to levee road.														
29	R3-A2: Redesign fire ring area.														
30	R3-A3: Plant native vegetation on fire ring terrace.														
31	R3-A4: Develop ADA accessible areas at fire ring.														
32	R3-A5: Coordinate with Camp Putah to determine environmental education area needs.														
33	R3-A6: Determine potential for portable restroom to be installed at fire ring area.														
34	R3-A7: Develop formal parking area north of Levee Road.														
35	Reach 4. North Fork to I-80														
36	R4-A1: Remove concrete debris from banks of levee.														
37	R4-A2: Stabilize eroding banks at outfalls.														
38	R4-A3: Develop oak woodlands and native grassland on upper terraces.														
39	R4-A4: Improve existing parking area at levee gate.														
40	R4-A5: Redesign levee steps at parking area														
41	Reach 5. I-80 to Old Davis Road Bridge														
42	R5-A1: Create restored grassland on upland terraces.														
43	R5-A2: Expand riparian corridor where possible.														
44	R5-A3: Control off-road access off of levee.														
45	R5-A4: Avoid disturbance in star thistle research areas.														
46	Reach 6. Old Davis Road Bridge, Downstream														
47	R6-A1: Develop restoration plan for floodplain on south side of creek.														
48	R6-A2: Develop site plan for southern floodplain terrace.														
49	R6-A3: Control off-road access off of levee.														
50	R6-A4: Develop access plan for Old Davis Road parking														
51	Reach 7. North Fork Cutoff														
52	R7-A1: Relocate sheep pens out of the old north fork.														
53	R7-A2: Restore old sheep and cattle pens into oak grassland savannah.														
54	R7-A3: Attempt to prevent spread of Argentine ant within the Reserve.														
55	R7-A4: Attempt to enhance populations of native ant colonies.														
56	R7-A5: Remove and manage stands of Tree of Heaven.														
57	R7-A6: Remove abandoned research infrastructure.														
58	R7-A7: Repair fences and gates at northfork, install locks.														
59	R7-A8: Develop research access/wildlife viewing areas at Jameson Pond.														
60	R7-A9: Evaluate potential for eradication of exotic fish from Jameson Pond, and replacement with native fish.														
61	R7-A10: Remove sections of chain-link fence.														
62	Education and Outreach Actions														
63	Education														
64	EO-1: Develop a Reserve website.														
65	EO-2: Brochure development.														
66	EO-3: Develop a data repository.														
67	EO-4: Develop a docent program.														
68	EO-5: Coordinate with researchers.														
69	Outreach														
70	EO-6: Give presentations to other conservation organizations.														
71	EO-7: Take classes out to reserve.														
72	EO-8: Develop internship program.														
73	EO-9: Develop an outreach program to bring more research and classroom attention to the Reserve.														
74	EO-10: Coordinate education and outreach actions with the Putah Creek Council, LPCCC, and City of Davis.														
75	EO-11: Coordinate volunteer programs with private and public conservation groups.														

Appendix F

Reserve Use Applications and Waiver



UNIVERSITY OF CALIFORNIA, DAVIS RESEARCH USE APPLICATION

Please check the part of the Reserve you wish to visit. Please call in advance to check for availability, then fill out one application per researcher, per area of the Reserve.

- Main Campus/South Fork Putah Creek
- North Fork Cutoff
- Russell Ranch

Please submit completed application to: Andrew Fulks, Putah Creek Riparian Reserve, c/o Office of Resource Management and Planning, 376 Mrak Hall, University of California, Davis, CA 95616. Phone: (530) 752-0763; Email: amfulks@ucdavis.edu

1. APPLICANT INFORMATION:

APPLICANT: _____

APPLICANT'S TITLE OR ACADEMIC STATUS: _____

ADVISOR (If applicable): _____

INSTITUTION (Do not abbreviate): _____

DEPARTMENT (Do not abbreviate): _____

OFFICE ADDRESS: _____

CITY/STATE/ZIP: _____ OFFICE PHONE: _____

OFFICE FAX: _____ EMAIL: _____

2. PROJECT DURATION DATES (Month/year to month/year): _____

3. REQUESTED ARRIVAL AND DEPARTURE DATES (Exact dates of use. Please sign-in daily at the Reserve.)

4. FULL PROJECT/THESIS TITLE (Do not truncate):

IF FOR DEGREE: BS/BA MS/MA Ph.D. Advisor's Name: _____

5. INTRODUCTION OF NON-NATIVE GENOTYPES

Does your project involve the transfer of animals, plants, and/or microorganisms from outside the Reserve to within the Reserve, or between different parts of the Reserve? Yes No

6. STATEMENT OF PROPOSED RESEARCH PROJECT. (Include location of field areas (GPS points or on a map), animal and plant populations that may be affected by the proposed research. Any potential disturbances to the Reserve's ecosystem or cultural resources, including all experimental manipulations, collections, and the introduction of any species or genotypes, must be clearly described. The application will be evaluated using the following considerations: potential impacts to natural systems; potential impacts to present or future long-term use of Reserve for research or instructional purposes; compliance with state and federal law and any stated Reserve research policies; scientific merit and feasibility; funding constraints; potential conflicts with on-going Reserve research or instructional programs; and availability of alternative sites. Please type or print clearly.)

7. CONTRACT/GRANT INFORMATION (Please check all that apply to your project.)

- PROJECT IS SELF-FUNDED.
- PROJECT IS CURRENTLY BEING SUPPORTED BY A CONTRACT(S) OR GRANT(S)
- A CONTRACT(S) OR GRANT(S) APPLICATION HAS BEEN SUBMITTED BUT HAS NOT YET BEEN APPROVED.
- A CONTRACT(S) OR GRANT(S) APPLICATION WILL BE SUBMITTED IN THE FUTURE.

PLEASE LIST THE ESTIMATED PERCENTAGE OF THIS GRANT THAT WILL GO TOWARD YOUR RESEARCH DONE AT THE RESERVE: _____

If this project is currently being supported by a contract(s) or grant(s), please complete the following for each award received (attach additional sheets, if needed). If you receive funding for your project in the future, please update the Reserve manager.

PRINCIPAL INVESTIGATOR: _____

PI'S AFFILIATION (Do not abbreviate): _____

SPONSOR (Do not abbreviate): _____

AWARD AMOUNT: _____ DATE AWARD GRANTED: _____

PROJECT DURATION DATES (Month/year to month/year): _____

GRANT NUMBER: _____

FULL PROJECT TITLE (Do not truncate): _____

8. PERMIT REQUIREMENTS

Please read and answer the following items carefully. Researchers will not be allowed access to the Reserve until they obtain the appropriate permit(s), or the Reserve has been informed by the agency(ies) involved that no permits are required for the project described in this application. It is the user's responsibility to obtain the appropriate permit(s) and to provide the Reserve manager with a copy. Please discuss permit requirements with the Reserve manager.

- A) Does your project involve vertebrate animals? Yes No
- If "Yes,"
- Indicate all that apply: Reptile Amphibian Fish Bird Mammal
 - Will any animal be captured? Yes No
 - Will any animal be held longer than 12 hours? Yes No
 - Will any animal be held longer than 24 hours? Yes No
 - Will any birds be banded and/or color marked? Yes No
 - Will any animal's skin be broken (needles, tags, surgery, etc.)? Yes No
 - Will any animal's movement in the environment be restricted? Yes No
 - Is there potential for any animal's behavior to be altered? Yes No
 - If this is a renewal, has there been any change in the project? Yes No N/A

Prior to beginning a research project involving the capture, marking, or physical contact with vertebrate animals, you must receive approval from the animal care committee at your home

institution. (This is often the same committee that oversees the care of laboratory animals.) Please append written approval to this application.

- B) Does your project involve the collecting (including banding and/or color marking) of vertebrate wild animals or invertebrates? Yes No
If "Yes," you will need to obtain a scientific collecting permit from the California Department of Fish and Game. Please append permit. A permit is not required to collect freshwater plants.
Does your project involve the collection, banding, and/or color marking of birds? Yes No
If "Yes," you will need a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

Does your project involve working with plants or animals that are California state listed species of special concern, threatened, or endangered species? Yes No
If "Yes," you will need to obtain a memorandum of understanding (MOU) from the California Department of Fish and Game. Please append permit.

Does your project involve taking plants or animals that are Federally listed threatened or endangered species? Yes No
If "Yes," you need to obtain a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

PERMITS CAN TAKE AT LEAST 30-60 DAYS TO BE APPROVED, SO CALL IMMEDIATELY FOR AN APPLICATION.

9. IN CASE OF EMERGENCY:

Contact: _____ Phone: _____

10. PUTAH CREEK RESERVE REGULATIONS

- If the research application is approved, the user must comply with all applicable University regulations, including those that are Reserve-specific, and provide all required state and federal permits.
- **All users, unless exempted, must sign a WAIVER OF LIABILITY, ASSUMPTION OF RISK, AND INDEMNITY AGREEMENT before they will be allowed to enter the Reserve.** It is the responsibility of the group leader to see that each member of the group has signed this agreement BEFORE visiting the Reserve. For visitors under 18 years old, the minor's parent or guardian must sign this agreement. This agreement cannot be altered.
- UC instructors who are sponsoring a UC class trip to the Reserve should note that they are solely responsible for enforcing the University's policies on waiver agreements, and are expected to obtain and maintain signed waivers from every student prior to the class trip.
- All publications resulting from the use of the Putah Creek Reserve must acknowledge the University of California and the Putah Creek Reserve. Please submit two copies of all publications (only one bound copy of a thesis or dissertation is required) to the Reserve manager.
- All researchers must provide on an annual basis, at a minimum, a text file that describes each data set derived from their work on the Reserve and a summary of research results. Minimum required metadata includes the title of each data set, the investigator's name, mailing address, e-mail address, and an abstract. All researchers are strongly encouraged to provide copies of mature data sets derived from work on the Reserve, which will be archived at the Reserve.
- Material(s), including resulting fragments, subunits, progeny, products, genetic material, mutants and derivatives, approved for collection by the Putah Creek Reserve belongs to the University of California. You and your institution/company will use the material(s) only in that scientific research activity described in this application and will not allow the material(s) to be transferred to any other

party or use them for commercial purposes without the express written consent of the University of California.

- Visitors may not bring animals (domestic or wild) to the Reserve, unless they are part of an approved research project or are necessary to help a disabled user. Please notify the Reserve manager if you have a special need.
- Firearms are forbidden at the Reserve, unless the University has granted special permission.
- All users are requested to leave the land and any facilities cleaner than you found them.

I have read and agree to abide by the Putah Creek Reserve use regulations listed above and any Reserve-specific rules appended to this application, and am aware that it is my responsibility to disseminate this information to all members of my party.

Applicant's Signature*

Date

Reserve Manager's Approval

Date

* Receipt of application via email is comparable to applicant's signature.



UNIVERSITY OF CALIFORNIA, DAVIS CLASS USE APPLICATION

Please check the part of the Reserve you wish to visit. Please call in advance to check for availability, then fill out one application per researcher, per area of the Reserve.

- Main Campus/South Fork Putah Creek
- North Fork Cutoff
- Russell Ranch

Please submit completed application to: Andrew Fulks, Putah Creek Riparian Reserve, c/o Office of Resource Management and Planning, 376 Mrak Hall, University of California, Davis, CA 95616. Phone: (530) 752-0763; Email: amfulks@ucdavis.edu

1. APPLICANT INFORMATION:

APPLICANT: _____

APPLICANT'S TITLE OR ACADEMIC STATUS: _____

ADVISOR (If applicable): _____

INSTITUTION (Do not abbreviate): _____

DEPARTMENT (Do not abbreviate): _____

OFFICE ADDRESS: _____

CITY/STATE/ZIP: _____ OFFICE PHONE: _____

OFFICE FAX: _____ EMAIL: _____

2. REQUESTED ARRIVAL AND DEPARTURE DATES (Exact dates of use. Please sign-in daily at the Reserve.)

3. COURSE TITLE AND NUMBER:

4. PLEASE INDICATE THE NUMBER OF PARTICIPANTS IN THE CLASS:

_____ INSTRUCTORS/TEACHING ASSISTANTS _____ GRADUATE STUDENTS
 _____ UNDERGRADUATE STUDENTS _____ OTHER: _____

5. INTRODUCTION OF NON-NATIVE GENOTYPES

Does your project involve the transfer of animals, plants, and/or microorganisms from outside the Reserve to within the Reserve, or between different parts of the Reserve? Yes No

6. STATEMENT OF PROPOSED CLASS PURPOSE. (Include location of field areas (GPS points or on a map), animal and plant populations that may be affected by the proposed visit. Any potential disturbances to the Reserve's ecosystem or cultural resources, including all experimental manipulations, collections, and the introduction of any species or genotypes, must be clearly described. The application will be evaluated using the following considerations: potential impacts to natural systems; potential impacts to present or future long-term use of Reserve for research or instructional purposes; compliance with state and federal law and any stated Reserve research policies; scientific merit and feasibility; funding constraints; potential conflicts with on-going Reserve research or instructional programs; and availability of alternative sites. Please type or print clearly.)

7. PERMIT REQUIREMENTS

Please read and answer the following items carefully. Researchers will not be allowed access to the Reserve until they obtain the appropriate permit(s), or the Reserve has been informed by the agency(ies) involved that no permits are required for the project described in this application. It is the user's responsibility to obtain the appropriate permit(s) and to provide the Reserve manager with a copy. Please discuss permit requirements with the Reserve manager.

- A) Does your project involve vertebrate animals? Yes No
- If "Yes,"
- Indicate all that apply: Reptile Amphibian Fish Bird Mammal
 - Will any animal be captured? Yes No
 - Will any animal be held longer than 12 hours? Yes No
 - Will any animal be held longer than 24 hours? Yes No
 - Will any birds be banded and/or color marked? Yes No
 - Will any animal's skin be broken (needles, tags, surgery, etc.)? Yes No
 - Will any animal's movement in the environment be restricted? Yes No
 - Is there potential for any animal's behavior to be altered? Yes No
 - If this is a renewal, has there been any change in the project? Yes No N/A

Prior to beginning a research project involving the capture, marking, or physical contact with of vertebrate animals, you must receive approval from the animal care committee at your home institution. (This is often the same committee that oversees the care of laboratory animals.) Please append written approval to this application.

- B) Does your project involve the collecting (including banding and/or color marking) of vertebrate wild animals or invertebrates? Yes No
- If "Yes," you will need to obtain a scientific collecting permit from the California Department of Fish and Game. Please append permit. A permit is not required to collect freshwater plants.
- Does your project involve the collection, banding, and/or color marking of birds? Yes No
- If "Yes," you will need a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

Does your project involve working with plants or animals that are California state listed species of special concern, threatened, or endangered species? Yes No

If "Yes," you will need to obtain a memorandum of understanding (MOU) from the California Department of Fish and Game. Please append permit.

Does your project involve taking plants or animals that are Federally listed threatened or endangered species? Yes No

If "Yes," you need to obtain a federal permit from the U.S. Fish and Wildlife Service. Please append permit.

PERMITS CAN TAKE AT LEAST 30-60 DAYS TO BE APPROVED, SO CALL IMMEDIATELY FOR AN APPLICATION.

8. IN CASE OF EMERGENCY:

Contact: _____ Phone: _____

9. PUTAH CREEK RESERVE REGULATIONS

- If the research application is approved, the user must comply with all applicable University regulations, including those that are Reserve-specific, and provide all required state and federal permits.
- **All users, unless exempted, must sign a WAIVER OF LIABILITY, ASSUMPTION OF RISK, AND INDEMNITY AGREEMENT before they will be allowed to enter the Reserve.** It is the responsibility of the group leader to see that each member of the group has signed this agreement BEFORE visiting the Reserve. For visitors under 18 years old, the minor's parent or guardian must sign this agreement. This agreement cannot be altered.
- UC instructors who are sponsoring a UC class trip to the Reserve should note that they are solely responsible for enforcing the University's policies on waiver agreements, and are expected to obtain and maintain signed waivers from every student prior to the class trip.
- All publications resulting from the use of the Putah Creek Reserve must acknowledge the University of California and the Putah Creek Reserve. Please submit two copies of all publications (only one bound copy of a thesis or dissertation is required) to the Reserve manager.
- All researchers must provide on an annual basis, at a minimum, a text file that describes each data set derived from their work on the Reserve and a summary of research results. Minimum required metadata includes the title of each data set, the investigator's name, mailing address, e-mail address, and an abstract. All researchers are strongly encouraged to provide copies of mature data sets derived from work on the Reserve, which will be archived at the Reserve.
- Material(s), including resulting fragments, subunits, progeny, products, genetic material, mutants and derivatives, approved for collection by the Putah Creek Reserve belongs to the University of California. You and your institution/company will use the material(s) only in that scientific research activity described in this application and will not allow the material(s) to be transferred to any other party or use them for commercial purposes without the express written consent of the University of California.
- Visitors may not bring animals (domestic or wild) to the Reserve, unless they are part of an approved research project or are necessary to help a disabled user. Please notify the Reserve manager if you have a special need.
- Firearms are forbidden at the Reserve, unless the University has granted special permission.
- All users are requested to leave the land and any facilities cleaner than you found them.

I have read and agree to abide by the Putah Creek Reserve use regulations listed above and any Reserve-specific rules appended to this application, and am aware that it is my responsibility to disseminate this information to all members of my party.

Applicant's Signature*

Date

Reserve Manager's Approval

Date

* Receipt of application via email is comparable to applicant's signature.



UNIVERSITY OF CALIFORNIA, DAVIS PUBLIC USE APPLICATION

Please check the part of the Reserve you wish to visit. Please call in advance to check for availability, then fill out one application per researcher, per area of the Reserve.

- Main Campus/South Fork Putah Creek
- North Fork Cutoff
- Russell Ranch

Please submit completed application to: Andrew Fulks, Putah Creek Riparian Reserve, c/o Office of Resource Management and Planning, 376 Mrak Hall, University of California, Davis, CA 95616. Phone: (530) 752-0763; Email: amfulks@ucdavis.edu

1. APPLICANT INFORMATION:

APPLICANT: _____

INSTITUTION (Do not abbreviate): _____

TYPE OF INSTITUTION: _____

OFFICE ADDRESS: _____

CITY/STATE/ZIP: _____ OFFICE PHONE: _____

OFFICE FAX: _____ EMAIL: _____

2. REQUESTED ARRIVAL AND DEPARTURE DATES (Exact dates of use.)

3. PLEASE INDICATE THE NUMBER OF PARTICIPANTS IN THE GROUP (Including group leaders):

If this is a school group, please indicate grade level: _____

_____ INSTRUCTORS

_____ OTHER ADULTS

_____ STUDENTS

4. STATEMENT OF PROPOSED PURPOSE FOR VISIT. (Include location of field areas, animal and plant populations that may be affected by the proposed visit, and any other resources needed during the visit. Any potential disturbances to the reserve's ecosystem or cultural resources, including all experimental manipulations, collections, and the introduction of any species or genotypes, must be clearly described. The application will be evaluated using the following considerations: potential impacts to natural systems; potential impacts to present or future long-term use of reserve for research or instructional purposes; potential conflicts with on-going reserve research or instructional programs; and availability of alternative sites. Please type or print clearly.)

5. INTRODUCTION OF NON-NATIVE GENOTYPES

Does your project involve the transfer of animals, plants, and/or microorganisms from outside the reserve to within the reserve, or between different parts of the reserve? Yes No

6. GUIDELINES FOR GROUP VISITS:

- Plan the trip in advance, including logistics, travel, food, emergencies, weather, and clothing needs.
- Designate one person in your group to make arrangements and communicate them to the rest of the group.
- It is the group leader’s responsibility to be sure all participants are aware of restrictions particular to the reserve they are visiting.
- Any disturbance to the ecosystem (sampling or removal of plant parts, collection of rocks, sand, soil, water, animals, etc.) must be approved in advance by the reserve manager.
- Information on the recommended routes and trails can be obtained from the reserve manager. Please be careful not to interfere with ongoing research projects. Travel through the reserve as unobtrusively as possible.
- Take sufficient time to supervise your group. A staff/student ratio of 1:5 to 1:10 is recommended.
- Encourage serious students to undertake a research project of their own on the reserve. Please check with the reserve manager for appropriate research projects.
- Please notify the reserve manager of any special needs or concerns of your group.

7. IN CASE OF EMERGENCY:

Contact: _____ Phone: _____

8. NATURAL RESERVE SYSTEM REGULATIONS

- If the public outreach use application is approved, the user must comply with all applicable University regulations, including those that are reserve-specific, and provide all required state and federal permits.
- **All users, unless exempted, must sign a WAIVER OF LIABILITY, ASSUMPTION OF RISK, AND INDEMNITY AGREEMENT before they will be allowed to enter the reserve.** It is the responsibility of the teacher/group leader to see that each member of the group has signed this agreement BEFORE visiting the reserve. For visitors under 18 years old, the minor’s parent or guardian must sign this agreement. This agreement cannot be altered.
- Visitors may not bring animals (domestic or wild) to the reserve, unless they are part of an approved research project or are necessary to help a disabled user. Please notify the reserve manager if you have a special need.
- Firearms are forbidden at the reserve, unless the University has granted special permission.
- All users are requested to leave the land and any facilities cleaner than you found them.

I have read and agree to abide by the reserve use regulations listed above and any reserve-specific rules appended to this application, and am aware that it is my responsibility to disseminate this information to all members of my party.

Applicant’s Signature*

Date

Reserve Manager’s Approval

Date

* Receipt of application via email is comparable to applicant’s signature.

Participant's Name (Print): _____

UNIVERSITY OF CALIFORNIA, DAVIS
PUTAH CREEK RIPARIAN RESERVE

Waiver of Liability, Assumption of Risk, and Indemnity Agreement

Waiver: In consideration of being permitted to visit or participate in any way in any activity, including transportation, at the above location, I, for myself, my heirs, personal representatives or assigns, **do hereby release, waive, discharge, and covenant not to sue** The Regents of the University of California, its officers, employees, and agents from liability **from any and all claims including the negligence of The Regents of the University of California, its officers, employees, and agents,** resulting in personal injury, accidents or illnesses (including death), and property loss arising from, but not limited to, visitation or participation in any way in any activity, including transportation, at the above location.

Signature of Minor's Parent/Guardian - Date

Signature of Participant - Date

Assumption of Risks: Visitation or participation carries with it certain inherent risks that cannot be eliminated regardless of the care taken to avoid injuries. The specific risks vary from one activity to another, but the risks range from 1) minor injuries such as scratches, bruises, and sprains to 2) major injuries such as eye injury or loss of sight, joint or back injuries, heart attacks, and concussions to 3) catastrophic injuries including paralysis and death.

I have read the previous paragraphs and I know, understand, and appreciate these and other risks that are inherent in visitation or participation. I hereby assert that my visitation or participation is voluntary and that I knowingly assume all such risks.

Indemnification and Hold Harmless: I also agree to INDEMNIFY AND HOLD The Regents of the University of California HARMLESS from any and all claims, actions, suits, procedures, costs, expenses, damages and liabilities, including attorney's fees brought as a result of my involvement in visitation or participation and to reimburse them for any such expenses incurred.

Severability: The undersigned further expressly agrees that the foregoing waiver and assumption of risks agreement is intended to be as broad and inclusive as is permitted by the law of the State of California and that if any portion thereof is held invalid, it is agreed that the balance shall, notwithstanding, continue in full legal force and effect.

Acknowledgment of Understanding: I have read this waiver of liability, assumption of risk, and indemnity agreement, fully understand its terms, and **understand that I am giving up substantial rights, including my right to sue.** I acknowledge that I am signing the agreement freely and voluntarily, and **intend by my signature to be a complete and unconditional release of all liability** to the greatest extent allowed by law.

Signature of Minor's Parent/Guardian - Date

Signature of Participant - Date