

3.0 PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action and nine potential alternatives to the Proposed Action. Two of these alternatives were carried forward for detailed evaluation and comparison to the Proposed Action in the EIS, and seven were not evaluated for reasons explained in Section 3.4, Alternatives Not Selected for Detailed Evaluation. The analyzed alternatives include the “Proposed Action,” a “No Action alternative,” and an “HCP for CTS Only alternative.” A comparison of the features of the alternatives selected for detailed evaluation is included in this section (Section 3.3, Comparison of the Primary Features of the Alternatives Retained for Consideration).

3.1 PROPOSED ACTION (PREFERRED ALTERNATIVE)

The USFWS and NMFS are considering the issuance of ITPs for take of federally listed species at Stanford University associated with the operation, maintenance, and a specified amount of future development on Stanford-owned lands. Two permits would be issued, one from each Federal agency. The permits would each have a 50-year term.

The Covered Species are the California tiger salamander, California red-legged frog, Central California Coast (CCC) steelhead, San Francisco garter snake and western pond turtle. The permit from NMFS would authorize the incidental take of steelhead, while a permit from the USFWS would cover the other ESA-listed species. The pond turtle is not currently listed as threatened or endangered, but may become federally listed within the proposed 50-year term of the permits. Take authorization for the turtle would not become effective unless the turtle were listed.

An HCP was submitted with the ITP applications, as required. The complete HCP is attached to the FEIS in Appendix B. The HCP describes the activities that would be covered by the ITPs, the species for which take would be authorized by the ITPs, measures that would avoid or minimize the adverse effects of the covered activities, and measures to mitigate the effects of the permitted take through the preservation, enhancement and management of habitat for the Covered Species. The Covered Activities and proposed Conservation Program are described below.

3.1.1 Covered Activities

The Covered Activities include ongoing maintenance and operations, a specified amount of future development where these activities could result in take of the Covered Species, and implementation of the Conservation Program. Searsville-related activities have been removed from Stanford’s section 10(a)(1)(B) permit application and removed from the Final HCP². Therefore, Searsville-related actions are not Covered Activities and are not described below.

² Searsville-related activities not included as Covered Activities are operation, upgrade, and maintenance of Searsville Dam, Searsville Reservoir, Searsville water diversion intake structure, the Searsville 16-inch water conveyance pipeline extending downstream of Searsville Reservoir to the booster pumping station, Searsville 16-inch pipeline and gate valve used for pipeline maintenance (*i.e.* flushing), and the in-line booster pumping station constructed in 2004 on the Searsville pipeline approximately 2 miles below Searsville Reservoir. Repairs and upgrades to valves, pipelines, flashboards and appurtenances at the above facilities are also excluded from Covered Activities.

3.1.1.1 Ongoing Maintenance and Operations

Stanford engages in certain ongoing activities that could result in the take of the Covered Species. The ITPs would authorize take that occurs incidental to carrying out these otherwise lawful activities. These ongoing activities are described in detail in Section 3.0 of the HCP (Appendix B of Vol. I of the FEIS), and are listed below:

- *Water management*, including water diversions on Los Trancos Creek and San Francisquito Creek (the Los Trancos Creek Diversion Facility and the San Francisquito Creek Pump Station), Felt Reservoir storage facility, distribution infrastructure, creek monitoring, potable water distribution, and water wells;
- *Creek maintenance*, including bank stabilization activities and removal of flood hazards;
- *Academic activities*, including invasive and non-invasive field studies and research, teaching, monitoring and observation, and operation/maintenance of academic buildings;
- *Utility Installation and Maintenance*, including existing utilities and installation of new utilities;
- *General infrastructure*, including utilities, roads, bridges, fences, storm water detention, and other general improvements;
- *Recreation and athletic uses*, including Stanford golf course and driving range, reservoir-related recreation, and recreational routes;
- *Grounds and vegetation*, including fire control and public safety, and grounds maintenance;
- *Agricultural and equestrian leaseholds*, including horse boarding, pasturing, and trail riding, agricultural facilities (nurseries and croplands), and grazing;
- *Commercial and institutional leaseholds*, including commercial and institutional facilities and similar urbanized facilities. However, operations at the SLAC National Accelerator Laboratory³ are not a Covered Activity.

3.1.1.2 Future Development

The HCP anticipates that Stanford will need to build new academic facilities and housing over the next 50 years that could result in take of the Covered Species. Up to 180 acres of future development is included in the HCP as a Covered Activity; it includes 30 acres of development approved under a General Use Permit (GUP) approved by Santa Clara County in 2000, and up to 150 additional acres of development anticipated to be needed during the life of the HCP to accommodate Stanford's operational needs (Table 3-1).

In 2000, Santa Clara County approved a certain amount of new development of academic and residential facilities on Stanford's lands, through issuance of a GUP and approval of an accompanying Environmental Impact Report. The development approved by the GUP will likely be completed within 10 to 20 years of its approval (by 2020). Under the GUP, Stanford could develop a maximum of 30 acres of land that is occupied by the Covered Species or that provides potential habitat for the Covered Species. The remainder of the allowed academic,

³ Formerly known as Stanford Linear Accelerator Center (SLAC)

academic support, and residential development allowed under the GUP would occur in the urbanized central campus, which does not contain any Covered Species habitat.

The HCP also includes, as a Covered Activity, potential future development over the 50-year term of the HCP of not more than 150 additional acres that is beyond that already approved by the GUP. No specific future development of the 150 acres beyond the GUP development has been identified, defined, or received local land use approval.

The HCP divides the project area into four Management Zones according to habitat value (Figure 3-1, Management Zones). The land in Zones 1, 2, and 3 is then divided into three “Basins” that relate to habitat management (Figure 3-2, San Francisquito/Los Trancos Creek Basin; Figure 3-3, Matadero/Deer Creek Basin; and Figure 3-4, CTS Basin). The HCP projects how the future development would likely be distributed between Zones 1, 2 and 3, which have habitat value. Zone 4 is fully developed and does not have habitat value; it is covered in the event the Covered Species wander into this area. Approximately 15 acres of undefined future development would occur in Zone 1, 30 acres in Zone 2, and 105 acres in Zone 3 (Figure 3-5 Possible Location of Assumed Development and Table 3-1 Summary of Future Development in Management Zones 1, 2 and 3). The total amount of estimated future development in Zones 1 through 3 during the 50-year permit term of the HCP is summarized in the HCP as follows:

Based on current planning principles of density and building efficiency, as well as economic and research uncertainties, the HCP forecasts that Stanford could develop 1-3 acres per year of land that provides habitat for, or is occupied by, the Covered Species. Development at this rate would result in the development of 50-150 acres over the 50-year life of the HCP, in addition to the 30 acres of development that has already been approved by the County of Santa Clara as part of the GUP. Future development likely would not occur in regular increments annually, but will more likely occur as a 30-acre project every decade or a 15-acre project every 5 years, at a maximum. It could also occur as small operational projects (such as a new recreational route) that result in a permanent conversion of habitat.

Assuming a typical suburban campus development density of 0.25 Ground Area Coverage and two-story buildings, 1-3 acres would support 20,000 to 60,000 gross square feet (gsf) of academic development. Assuming a housing density of 4-5 single-family units per acre, 1-3 acres would support 4-15 housing units each year. Thus, during the life of the HCP, approximately 1,000,000 to 3,000,000 gross square feet of academic development, or 200-750 single-family housing units, or some combination of the two (e.g., 1,000,000 gross square feet of academic development and 400-500 housing units) could occur (HCP Section 3).

The incidental take associated with the future development described above would be covered by the ITPs, but any new development will still require local approvals, and any applicable state or other Federal approvals. Issuance of the ITPs does not mean that the development is approved for construction.

Table 3-1. Summary of Future Development in Management Zones 1, 2 and 3				
	Zone 1 (acres)	Zone 2 (acres)	Zone 3 (acres)	Total (acres)
Development under GUP	15	15	0	30
Development beyond GUP	5 to 15	10 to 30	35 to 105	50 to 150
Total Development	20 to 30	25 to 45	35 to 105	80 to 180
Total acres in Habitat Zone	1,295	1,260	2,446	5,001
Percent Developed	2%	2-4%	1-4%	2-4%

3.1.1.3 Conservation Program Activities

The Conservation Program describes the actions that will be taken to meet the biological goals and objectives of the HCP. It includes permanent preservation of habitat important to the survival of the Covered Species, long-term management and monitoring of habitat, habitat enhancements, and a commitment to future habitat preservation and management, all intended to increase the likelihood of persistence of the Covered Species at Stanford. The Conservation Program provides a significant contribution to the overall conservation of the Covered Species. Under the Conservation Program, at least 770 acres of habitat for the Covered Species will be actively managed, monitored, and enhanced, and a comprehensive set of “Minimization Measures” will be used to reduce the potential effects of the Covered Activities on the Covered Species. Specific avoidance/minimization measures, as well as management and monitoring activities that will benefit the Covered Species are summarized below. The Conservation Program includes the protection of 360 acres along the creek zones in conservation easements that will preserve the habitat in perpetuity. The conservation easements will be established within one year of issuance of the ITPs.

Section 4 of the HCP (see Appendix B of Vol. I of the FEIS) provides a detailed description of the Conservation Program, which is summarized here. The Conservation Program includes six primary components:

- creation of Management Zones;
- implementation of measures to avoid or minimize the potentially adverse effects of the Covered Activities on the Covered Species;
- preservation, monitoring, and management of biologically sensitive areas;
- use of a Mitigation Account system;
- use of Adaptive Management to adjust management techniques as needed; and
- implementation of a comprehensive monitoring program that will generate data regarding the Covered Species, measure the HCP’s success in achieving its biological goals and objectives, and promote adaptive management by providing an important feedback loop.

A university staff position will be created and funded for a Conservation Program Manager (CPM). The CPM will be responsible for the day-to-day implementation of the HCP, review activities that could result in the take of Covered Species, and recommend modifications that will reduce or prevent take.

3.1.2 Creation of Management Zones

The HCP divides the 8,180 acres of Stanford land at and around the university campus into four zones according to their relative habitat value for the Covered Species (Figure 3-1, Management Zones). Zone 1 (approximately 1,295 acres) supports, or provides critical resources for, one or more of the Covered Species. Zone 2 (approximately 1,260 acres) is occasionally occupied by, or occasionally provides some of the resources used by, one or more of the Covered Species. Zone 3 (approximately 2,446 acres) consists of generally undeveloped open space that has some biological value, but provides only limited and indirect benefit to the Covered Species. Zone 4 (approximately 3,187 acres) consists of urbanized areas that do not provide any habitat value for any of the Covered Species. The ITPs authorize the take of Covered Species in Zone 4, primarily in authorizing Stanford to relocate any species that wander into the urbanized areas to an appropriate habitat area in Zone 1. However, there is no habitat in Zone 4, so development and ongoing urban activities in Zone 4 are not Covered Activities. As such, the EIS does not analyze the impacts of development or ongoing maintenance and operations in Zone 4.

The land in Zones 1, 2, and 3 is then divided into three “Basins” that relate to habitat management: San Francisquito/Los Trancos Creek Basin (Figure 3-2, San Francisquito/Los Trancos Creek Basin); Matadero/Deer Creek Basin (Figure 3-3, Matadero/Deer Creek Basin); and CTS Basin (Figure 3-4, CTS Basin). The San Francisquito/Los Trancos Creek Basin contains potential habitat for steelhead, red-legged frog, garter snakes and pond turtle. The Matadero/Deer Creek Basin contains potential habitat for the red-legged frog and garter snakes, and the CTS Basin contains potential habitat for the tiger salamander and garter snakes.

3.1.3 Measures to Minimize the Potentially Adverse Effects of the Covered Activities

The HCP requires implementation of a wide range of conservation measures that will minimize the potential adverse effects of operating Stanford on the Covered Species, including both ongoing operations and maintenance, as well as future development. These specific measures are called Minimization Measures in the HCP and they apply to the activities that occur in Management Zones 1 and 2, and sometimes when they occur in Zones 3 and 4.

The Minimization Measures are included in Section 4 of the HCP (see Appendix B of Vol. I of the FEIS). There are measures specified for the Covered Activities, including water management, creek maintenance activities, academic activities, general infrastructure, recreation and athletics, grounds and vegetation maintenance, equestrian and agricultural leaseholds, commercial and institutional leaseholds, and future development.

In general, the Minimization Measures that apply to ongoing operations and maintenance direct how and when the operations will occur to prevent or reduce take. For example, the Minimization Measures for several activities related to water management and creek maintenance activities require regular worker education regarding the possible presence of Covered Species, the use of bio-engineered bank stabilization and other environmentally responsible methods for conducting in-stream work, pre-construction surveys, and performing related repair and maintenance during the dry season. Minimization Measures direct academic activities away from biologically sensitive areas and when academic resources are studied in biologically sensitive areas, the Minimization Measures provide for the use of barriers to exclude Covered Species. The Minimization Measures included in the HCP also limit the expansion of facilities in biologically sensitive areas, and recommend moving facilities further from the creeks to reduce existing effects. Other measures, applicable to the golf course and agricultural tenants, prohibit landscaping with plants that are considered invasive species, and provide buffers

between the creeks and new ornamental plantings. Minimization measures are also included for activities that result in ground disturbance. Some activities will also be reviewed by the CPM before they are started to further reduce the potential for take of the Covered Species.

For water diversion operations at the Los Trancos Creek Diversion Facility and the San Francisquito Creek Pump Station, the HCP includes the fisheries bypass flows and other operational protocols developed for Stanford's SHEP as Covered Activities. The SHEP measures limit the season of water diversions to the winter and spring months in order to avoid impacts on stream flows during the driest months of the year. The operational protocols also limit the maximum rate of diversion and specify flows that must be bypassed at the water intakes to protect aquatic species and habitat downstream. The fisheries bypass flows for the Los Trancos Creek Diversion Facility are shown in Table 3-2, and the fisheries bypass flows for the San Francisquito Creek Pump Station are shown in Table 3-3. These measures have been in place since 2009 following Stanford's construction of a new fish screen and ladder at the Los Trancos Creek Diversion Facility, and Stanford's construction of a new fish screen at the San Francisquito Creek Pump Station. Appendix A of the HCP contains the April 21, 2008, biological opinion issued by NMFS to U.S. Army Corps of Engineers (USACE) for Stanford's construction and operation of the SHEP facilities.

The HCP also establishes general Minimization Measures applicable to future development. These direct development away from biologically sensitive habitat in Zones 1 and 2 and generally protect the Covered Species during any future development with measures such as conducting pre-construction surveys, having biological monitors present, restricting vehicle speed, and requiring that excess asphalt used during construction be removed at the end of construction.

In addition to the Minimization Measures, all permanent loss of habitat in Zones 1, 2, and 3 will be addressed through the mitigation accounts system described below.

Table 3-2. Diversion Rates and Minimum Bypass Flow Requirements for the Los Trancos Creek Diversion Facility

December 1- December 31 ^a			January 1- April 30		
Q_{LT} ^b cfs	Diversion cfs	Bypass cfs	Q_{LT} cfs	Diversion cfs	Bypass cfs
0-2	0	0-2	0-5	0	0-5
3	1	2	6	1	5
4	2	2	7	2	5
5	3	2	8	0	8
6	4	2	9	1	8
7	5	2	10	2	8
≥8	see January 1- April 30 schedule		11	3	8
			12	4	8
			13	5	8
			14	6	8
			15	7	8
			16	8	8
			17+	$Q_{LT} - 8^c$	8

^a Diversion must follow the January-April schedule after a “trigger” event occurs between October 1 and December 31. The “trigger” event occurs when the mean daily flow in Los Trancos Creek above the Diversion Facility equals or exceeds 8 cfs.

^b Q_{LT} represents flow, in cubic feet per second (cfs), in Los Trancos Creek above the diversion facility

^c The maximum diversion rate is limited to 40 cfs, less the simultaneous rate of flow diverted at the San Franciscquito Creek Pump Station.

Table 3-3. Diversion Rates and Minimum Bypass Flow Requirements for the San Francisquito Creek Pump Station

December 1 - June 30		
Q _{SF} ^a cfs	Diversion cfs	Bypass cfs
0-5	0	0-5
6	1	5
7	2	5
8	3	5
9	4	5
10	5	5
11	6	5
12-16	0	12-16
17	1	16
18	2	16
19	3	16
20	4	16
21	5	16
22	6	16
23	7	16
24-33	8	16-25
34-40	0 ^b	34-40
41-46	4 ^b	37-42
47+	8	39

^a Q_{SF} represents flow, in cubic feet per second (cfs), in San Francisquito Creek above the pumping plant.

^b Max diversion rate could be increased to 8 cfs over the range of flow if the Bonde Weir is modified to successfully and efficiently pass adult steelhead at flows of 16-100 cfs.

3.1.4 Establishment of Mitigation Accounts

Under the HCP, the permanent loss of habitat will be mitigated by recording permanent conservation easements over biologically sensitive habitat, managing the preserved habitat, and enhancing or creating habitat for the Covered Species. The accounts will be established and funded by credits earned by conservation easements or when habitat is enhanced or created. Credits would be withdrawn whenever Zone 1 or 2 habitat or land in Zone 3 is permanently converted to other uses or becomes unsuitable as habitat for the Covered Species as a result of the Covered Activities. The permanent loss of habitat will most often be associated with future development; however, ongoing Covered Activities, such as bridge repairs, may also result in the conversion of habitat that requires a withdrawal of credits. The HCP includes the establishment of conservation easements that will protect approximately 360 acres of creek channels, banks and adjacent riparian areas within 1 year of the Services' issuing ITPs (HCP sections 4.3.1.1 and 4.3.2.1). Therefore, habitat will be preserved, and an active management plan implemented before any habitat is permanently lost. The HCP includes a mitigation account system that will

(1) track mitigation lands (and associated mitigation credits) that are preserved at the outset of HCP implementation; (2) track credits earned by future preservation, habitat enhancement or creation; and (3) continuously track the utilization of the mitigation credits over time.

To track the mitigation for the permanent loss of habitat for the Covered Species, the HCP creates two “Riparian Accounts”: the San Francisquito/Los Trancos Riparian Account, and the Matadero/Deer Riparian Account. Each of the Riparian Accounts will initially be established by recording permanent conservation easements over large areas of Covered Species habitat. Each acre of habitat preserved in these conservation easements will count as one “credit” in the corresponding mitigation account. The Accounts are not synonymous with the easements; rather the credits created by recording the conservation easements will stock the Accounts.

3.1.4.1 General Information about the Conservation Easements

As part of the Stanford’s implementation of the HCP, conservation easements will be created pursuant to Section 815 of the California Civil Code, and Stanford would form a qualified non-profit land trust to hold the San Francisquito/Los Trancos Easement, Matadero/Deer Easement and any subsequent conservation easements granted in accordance with Section 4.3 of the HCP. Under the Civil Code, only tax exempt non-profit entities whose primary purpose is the preservation, protection, or enhancement of land are eligible to hold conservation easements. The USFWS and NMFS will be third-party beneficiaries of the conservation easements with the right to enforce the terms of the conservation easements.

Stanford will relinquish any future rights to develop the conservation easement areas and alterations to the topography of the easement areas are generally restricted unless it is for the benefit of the Covered Species. Stanford will be allowed to continue to access existing improvements through the easement areas or to operate and maintain any utilities or other improvements that are within the conservation easements, but new improvements will generally be prohibited.

The conservation easements will require active management and monitoring of the conserved areas for the benefit of the Covered Species in accordance with easement area specific management plans (HCP sections 4.3.1.2 and 4.3.2.2). This includes, but is not limited to, regular surveys for the Covered Species, habitat surveys, water quality monitoring, invasive species control, and habitat improvements. Habitat improvements include the creation of new off-channel red-legged frog breeding ponds, revegetating eroded channels, anchored basking platforms for pond turtles, installing new water quality monitoring stations, and other habitat improvements (HCP sections 4.3.1.2 and 4.3.2.2). Areas that have been preserved through a conservation easement will remain protected and managed in perpetuity.

3.1.4.2 CTS Account

Under the HCP, the permanent loss of tiger salamander and garter snake non-riparian habitat will be mitigated through permanent conservation easements in the foothills. The CTS Account will be used to track the mitigation for the permanent loss of tiger salamander and garter snake habitat and the preservation and enhancement of tiger salamander and garter snake habitat. The HCP requires that a “CTS Reserve” area be established within a year of the issuance of USFWS’ ITP. The “CTS Reserve” area covers approximately 315 acres of currently occupied and potential tiger salamander habitat, including eight new breeding ponds that were built during the preparation of the HCP. To date, tiger salamander reproduction has been documented in three of the eight new breeding ponds. The ponds, presence of amphibian prey, and grasslands in the

CTS Reserve also provide high quality garter snake habitat. The CTS Reserve is located in the foothills, south of Junipero Serra Boulevard (JSB).

Although activities, such as development, will be restricted within the CTS Reserve under the HCP, easements will not be initially recorded over the CTS Reserve, but would be recorded as impacts to tiger salamander and non-riparian garter snake habitat occur. Similar to the riparian easement areas, the CTS Reserve will be actively monitored and managed before there is any loss of habitat, under a CTS Reserve Monitoring and Management Plan. The CTS Reserve will be used to mitigate for any future losses of Zone 1, 2 and 3 habitat caused by Stanford within the CTS Basin.

Activities in the CTS Reserve Monitoring and Management Plan are described in Section 4.3.3.2 of the HCP, and include regular monitoring for tiger salamanders and garter snakes and their habitat, building debris piles to attract ground squirrels as their burrows provide refugia, implementing a mowing regime to enhance grassland habitat, maintenance of three existing amphibian tunnels and possible construction of new tunnels to facilitate tiger salamander dispersal across JSB, and other management actions. The CTS Reserve serves two purposes in the HCP. The first is to achieve the biological goal of establishing primary, sustainable tiger salamander breeding habitat away from the urban part of the campus that currently acts as a population sink. The other is to provide a means for mitigating the permanent loss of tiger salamander and garter snake habitat.

In addition, 95 acres of land located around Lagunita will be managed in accordance with a “Central Campus CTS Management Plan” (see HCP section 4.3.3.4). Tiger salamanders currently reproduce in Lagunita, and managing the central campus area will benefit the existing tiger salamander population and further reduce the possible take of the existing tiger salamander population while a new population is established in the CTS Reserve. Garter snakes are sometimes found around Lagunita, although the habitat is heavily impacted by human use. Garter snakes are also addressed in the Central Campus CTS Management Plan. The area that is subject to the Central Campus CTS Management Plan is called the Central Campus CTS Management Area. The Central Campus CTS Management Plan is described in Section 4.3.3.4 of the HCP, and includes surveys to monitor the status of tiger salamander and garter snakes and their habitat, the removal of non-native species that are harming tiger salamander or garter snakes, restrictions on the use of biocides, and on mechanical control of vegetation, retrofitting of ill-fitting utility box covers that could result in entrapment, prohibition of feral cat feeding stations, prohibition of off-road vehicle use, and a worker education program. Implementation of the Central Campus CTS Management Plan does not earn any credits in the CTS Account.

3.1.4.3 Enhancement Activities

Credits can also be earned by enhancing existing habitat or creating new habitat for the Covered Species. Several potential enhancements are described in the HCP (Table 4-2), and are included in Table 3-4. The credits earned by the creation or enhancement of habitat will be deposited into the Mitigation Accounts. The number of credits earned and the Mitigation Account the credits are deposited into depend upon several factors, including the Covered Species that will be benefited, the benefit to the species, and the cost of creating or enhancing the habitat. Plans showing the specific enhancement and anticipated level of credits for the enhancement generally must be approved by the Services (see HCP Section 4.3). Table 3-2 provides examples of potential enhancements and the level of credit that would be awarded.

Table 3-4. Examples of Preservation or Enhancement Activities that could earn Additional Mitigation Credits		
Preservation or Enhancement	Credits Earned	Account Credited
Record conservation easement over additional habitat within the Matadero/Deer Creek Basin	1 credit for each acre of habitat.	Matadero/Deer Riparian Account
Record conservation easement over additional habitat within the San Francisquito/Los Trancos Creek Basin	1 credit for each acre of habitat.	San Francisquito/Los Trancos Riparian Account
Record conservation easement over habitat within the CTS Reserve	1 credit for each acre of upland habitat. 25 credits for each acre of breeding habitat	CTS Account
Improve steelhead habitat by increasing the minimum bypass flow rates in Los Trancos Creek (above SHEP standards) by permanent changes to diversion operations	5-50 credits per cubic feet per second increase depending on the benefits (e.g., higher credit amount for increasing bypass after the attraction flow)	San Francisquito/Los Trancos Riparian Account
Improve steelhead habitat by increasing the minimum bypass flow rates in San Francisquito Creek (above SHEP standards) by permanent changes to diversion operations	5-50 credits per cubic feet per second increase depending on the benefits (e.g., higher credit amount for increasing bypass after the attraction flow)	San Francisquito/Los Trancos Riparian Account
Expand riparian areas around the creeks by removing existing structures and planting riparian vegetation	3 credits for each restored acre	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creeks Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks
Remove partial in-stream barriers that have a net adverse affect on steelhead, such as preventing dispersal, outside of Stanford's lands	5 credits for removals downstream of Stanford and 1 credit for upstream removals	San Francisquito/Los Trancos Riparian Account if enhancement is to off-site portions of Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creeks Matadero/Deer Riparian Account if enhancement is to off-site portion of Matadero or Deer creeks

Table 3-4. Examples of Preservation or Enhancement Activities that could earn Additional Mitigation Credits		
Preservation or Enhancement	Credits Earned	Account Credited
Repair and stabilize the creek banks using bio-engineered stabilization ⁴ methods to pro-actively remediate erosion and bank stabilization problems that are not associated with a new project or is not conducted to protect existing Stanford infrastructure	1 credit per 200 feet of fixed bank	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creeks Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks
Restore the natural geomorphology of stream channels through replacement of existing hardscape with bio-engineered stabilization methods	1 credit per 200 feet of fixed bank	San Francisquito/Los Trancos Riparian Account if enhancement is to Los Trancos, San Francisquito, Corte Madera, Sausal or Bear creeks Matadero/Deer Riparian Account if enhancement is to Matadero or Deer creeks

3.1.4.4 Use of Mitigation Account Credits

In order to provide mitigation where it will best off-set the loss of habitat, the HCP also divides all Zone 1, 2 and 3 land into three basins: the (1) San Francisquito/Los Trancos Creek Basin; (2) Matadero/Deer Creek Basin; and (3) California Tiger Salamander (CTS) Basin. The Basins are shown on Figures 3-2, 3-3, and 3-4, respectively. The conservation easements that fund the Riparian Accounts are also shown on Figures 3-2 and 3-3. The area of the CTS Reserve and the Central Campus CTS Management Area are shown on Figure 3-4.

Any project that permanently converts Zone 1, 2 or 3 land within the San Francisquito/Los Trancos Creek Basin will withdraw credits from the San Francisquito/Los Trancos Riparian Account. Similarly, credits will be withdrawn from the Matadero/Deer Riparian Account for the permanent loss of Zone 1, 2, or 3 land within the Matadero/Deer Creek Basin, and credits will be withdrawn from the CTS Account for any permanent loss of Zone 1, 2, or 3 land within the CTS Basin.

The number of credits withdrawn for any particular project will depend on the size of the project and in which Zone it occurs. For example, development in Zone 1 will require 3 credits for every acre that is developed and development in Zone 2 will require 2 credits for every acre developed. Development in Zone 3 will require 0.5 of credit for every acre developed. As mentioned earlier, the Zones are defined according to the habitat value for the Covered Species, with Zone 1 having the highest value.

⁴ Bioengineering techniques emphasize the use of natural and local building materials, e.g. stone, gravel, sand, soil, wood, branched logs, and native plants. Typical bioengineering practices include: brush layering, brush mattresses, brush walls/bundles, hand seeding or hydro-seeding, incorporation of large woody debris, and live staking. Riprap, rock, and other hardscape materials will only be used where required (e.g., areas of high scour).

3.1.5 Covered Species Monitoring Program

Section 4.6 of the HCP includes a detailed monitoring program to assess the status of the Covered Species and their habitat in the HCP area, and contribute to the body of knowledge about these species. Red-legged frogs, tiger salamanders, steelhead and pond turtles have been monitored for many years at Stanford. The monitoring program was developed based in part on techniques that have proven effective in monitoring these species, prior survey results, historical records, and the presence of potentially suitable habitat. The HCP describes specific areas that will be monitored, which includes areas that currently do or may support the Covered Species, and specific monitoring methods. For example, the population of the Covered Species will be assessed by visual surveys, trapping, electrofishing, and fish monitoring/counting devices. Habitat conditions will be assessed by evaluating a number of factors, including the presence of sufficient prey, cover, and water conditions. The methods proposed are the currently accepted scientific protocol for monitoring of these species and their habitat, and through the adaptive management program, Stanford may modify the monitoring techniques in response to new scientific information or technologies during the term of the ITPs.

Garter snakes at Stanford are not as well understood as the other Covered Species (see HCP Section 4.6.5). Garter snake surveys have been conducted infrequently, and there are some historical data indicating potential habitat areas. As such, baseline distribution surveys will be conducted for the garter snake, and based on those data, a final monitoring plan will be prepared and implemented.

The HCP includes a section on Adaptive Management (described further below) that allows for modification of the monitoring program's methodologies in response to new scientific information or technologies.

3.1.6 Adaptive Management

The adaptive management provision in the HCP provides flexibility in implementing the HCP in response to changing conditions or new scientific knowledge (see HCP Section 4.5). The adaptive management section of the HCP describes the rules for what measures can be taken, and when Stanford must consult with the Services.

Key features of the HCP's adaptive management are:

- Iterative decision-making (evaluating results and adjusting actions on the basis of what has been learned through monitoring);
- Feedback between monitoring and decisions (learning); and
- Measuring the success of the Conservation Program in light of the HCP's Biological Goals and Objectives.

The adaptive management section of the HCP addresses the following scenarios:

- The need to modify the Conservation Program to reflect new scientific or technical information or due to minor changes or additions to Covered Activities that do not result in significant impacts;
- revisions to the conservation measures (including the Monitoring and Management Plans, the species monitoring methods, and the Minimization Measures) in response to new scientific or technical information and/or population declines and in consultation with the Services;

- testing new management techniques for improving the survival of the Covered Species; and
- the re-introduction of Threatened or Endangered species.

3.2 ALTERNATIVES

Two alternatives were retained for analysis in addition to the Proposed Action (Preferred Alternative) described in Section 3.1: the No Action Alternative, and the HCP for CTS Only Alternative. Other alternatives that were evaluated but rejected from further consideration are described in Section 3.4, Alternatives Not Selected for Detailed Evaluation.

3.2.1 No Action Alternative

The No Action alternative for this project means that the Services would not issue ITPs and the HCP would not be implemented. Ongoing activities or future development that would result in the take of federally listed species could be permitted on a project-by-project basis through either section 7 or section 10 of the Federal Endangered Species Act. Additional project-specific environmental analysis may be required for those actions and would be completed as necessary.

In general, incidental take authorization would only be required for development projects or activities in Zones 1 and 2, which are known to support listed species or their habitat. Zone 3 and Zone 4 do not support the Covered Species or contain suitable habitat for the species. Because these areas do not support the Covered Species, an incidental take permit for future development and activities that occur solely in these zones would not be required.

Any projects or activities in Zones 1 or 2 that require a Federal permit or involve Federal funding must request incidental take authorization through the section 7 consultation process. It is anticipated that only a small percentage of Stanford's activities that may affect listed species have a Federal nexus, mostly relating to obtaining USACE permits (e.g., creek bank maintenance work, sediment removal, and levee and berm repair). A USACE permit that would require a section 7 consultation with the Services would likely apply to any activities that affect streams, creeks, and other jurisdictional waters, such as wetlands.⁵ A section 7 consultation would not be required for any projects or ongoing activities that occur solely in upland areas unless a Federal nexus (such as grant funding) exists.

Under the No Action alternative, project-specific permits would only be issued for take of federally listed species. Impacts on the pond turtle could be addressed on a project-by-project basis through the process of environmental review required by the California Environmental Quality Act (CEQA). Many of the ongoing operations and maintenance activities do not require review under CEQA, and therefore effects on the pond turtle from those ongoing activities would generally not be regulated.

⁵ An example of a project with a Federal nexus is the Steelhead Habitat Enhancement Project (SHEP). The habitat enhancement activities required a permit from the USACE, and because these activities and current diversions affect steelhead, the USACE consulted with NMFS under Section 7 of the ESA. The permit issued by the USACE incorporates a biological opinion prepared by NMFS that authorizes the incidental take of steelhead provided certain operational and minimization measures are implemented.

For the No Action alternative, the total anticipated future development would be equivalent to the Proposed Action (see Table 3-1). Under the No Action alternative, the ongoing activities and future development that occurred in Zones 1 and 2, and which could not avoid take, and thus require a permit, would likely be subject to minimization measures and mitigation.

Minimization measures could be similar to the measures identified in the HCP (e.g., pre-construction surveys). Consistent with current permitting practices, the Services would also likely require Stanford to record conservation easements to offset any permanent losses of habitat, and to monitor and manage easement areas in accordance with a long-term habitat management and monitoring plan. Reasonably expected preservation ratios for the permanent loss of habitat in Zones 1 and 2 are 3:1 and 2:1, respectively. Based on typical mitigation ratios and anticipated future loss of habitat in Zones 1 and 2 over the next 50 years, future permits would likely result in the preservation of 165 to 235 acres. Future development in Zone 3 is anticipated to affect 35 to 105 acres, but no incidental take permits and accompanying mitigation would be required since Zone 3 does not currently support or provide suitable habitat for any federally listed species. Future development would also be subject to review under CEQA.

Under the No Action alternative where each project that affects federally listed species is permitted individually, several minimization measures similar to those in the HCP would likely be required through site-specific permits under the ESA and environmental review under CEQA. Minimization measures could apply to both the ongoing Covered Activities and specific development proposed in the future that affects federally listed species and requires a permit or environmental review. The measures may include:

- appropriate protocol and pre-construction surveys for Covered Species in the area affected by the project;
- minimizing the area of disturbance that could affect federally listed species (e.g., Zones 1 and 2 on the project site) through design and with construction practices such as staging heavy equipment away from riparian vegetation and tiger salamander breeding habitat, maintaining equipment offsite to avoid oil and fuel spills, requiring double containment for fuels, restricting vehicle speed to 10 mph, removing excess construction materials at completion, and worker education regarding sensitive habitat, species and the pertinent laws;
- minimizing disturbance could entail limiting maintenance work and installation of new facilities (such as utilities) to already disturbed areas or corridors when possible;
- site-specific identification and avoidance of sensitive habitat whenever feasible in construction, academic activities, and recreational uses;
- use of on-site biological monitors during construction when impacts to federally listed species could occur (i.e., Zones 1 and 2);
- installing drift or plywood fences prior to construction in areas occupied by tiger salamander, red-legged frog, or garter snake in order to prevent dispersal into the construction site;
- salvage of individual Covered Species from construction zones;
- use of low impact work measures such as hand tools rather than heavy equipment where tiger salamander, garter snake, and red-legged frog occur and where practical for the task;

- timing maintenance/construction to periods when the Covered Species are least likely to be affected, such as during low-flow or dry periods;
- restoration of areas of temporary disturbance caused by the project using native plant species;
- erosion control in areas disturbed by grading for the project to prevent adverse effects on aquatic habitats for red-legged frog, garter snake, and steelhead;
- restricting new curbs and streetlights where they may adversely affect tiger salamander;
- limiting vegetation trimming in riparian zones at the project site to minimize adverse effects on steelhead, garter snake, and red-legged frog;
- prohibiting feeding of feral cats;
- limiting ground animal control programs within open space areas that are part of specific project sites; and
- limiting the use of discing for vegetation control if the discing could result in take of tiger salamander or other federally listed species.

Under the No Action alternative, each ongoing Covered Activity or future development project would be addressed individually and would not benefit from a cohesive conservation effort or the oversight of a Conservation Program Manager. The mitigation would occur when the individual permits are issued, rather than in advance of impacts to listed species, as planned under the Proposed Action, and the mitigation likely would be site-specific rather than area-wide. Therefore, under the No Action alternative, conservation easements would not be recorded over San Francisquito, Los Trancos, Deer, and Matadero creeks in advance of any future development. Adaptive management may be included in future project-specific HCPs (under section 10 of the ESA), but would not be included in take authorization granted through section 7 of the ESA. However, some project-related habitat enhancement may be required through section 7 to prevent or minimize project specific impacts on Covered Species.

Under this alternative, the Services would have to find that project implementation would not jeopardize the continued existence of the federally listed species before issuing a project specific ITP or section 7 incidental take statement. The contribution of this alternative to overall recovery of the species is unknown.

3.2.2 HCP for CTS Only

Under this alternative, the USFWS would issue an ITP for take of the tiger salamander, and Stanford would prepare an HCP for CTS Only in support of the permit application. Steelhead, garter snake, and red-legged frog would be addressed on a project-by-project basis through section 7 or section 10 of the ESA. The pond turtle is not a currently listed species and could be addressed on a project-by-project basis through environmental review required by CEQA.

This alternative would apply to a more limited scope of activities and geographic area than the Proposed Action. The geographic area would include the CTS Basin, which includes lands around Lagunita, the golf course/driving range and portions of the foothills south of JSB, in the area that is designated as the CTS Reserve in the HCP (see Figure 3-4).

Under this alternative, the Covered Activities would be limited to those that occur in the CTS Basin, which include the following:

- *Water management*, including filling/draining protocols for Lagunita, Lagunita drain maintenance, minor and major repairs of the Lagunita berm (dam), and operation/repair of wells (if any) in the CTS Basin;
- *Academic activities*, including field studies, teaching, and research;
- *Urban infrastructure*, including repair and maintenance of irrigation facilities, installation of new irrigation facilities, utilities maintenance and upgrade activities in the CTS Basin;
- *Recreation and athletic uses*, including Stanford Golf Course and Driving Range maintenance (mowing, fertilization), periodic redesign of golf course holes within the existing footprint, golf ball collection, Lagunita-related recreation, and recreational routes in the CTS Basin;
- *General management and maintenance* in the CTS Basin, including planting, weeding, mulching, mowing/vegetation control, and animal pest control (such as ground squirrel control on the Lagunita berm);
- *Leaseholds* including activities associated with independent research institutions such as exterior building maintenance, repair and modification, landscaping, and utility repair and maintenance; and
- *Future development* under the 2000 GUP and beyond, where development within the CTS Basin would be a Covered Activity under this alternative, but development outside of the CTS Basin would be addressed separately.

The HCP for CTS Only alternative would contain all of the conservation measures contemplated under the proposed HCP that pertain to tiger salamander and its habitat including the establishment of the CTS Reserve south of JSB and implementation of the CTS Reserve Monitoring and Management Plan, and implementation of the Central Campus CTS Management Plan for lands around Lagunita, as described in Section 4 of the HCP. These plans are described below.

Under the CTS Reserve Monitoring and Management Plan, Stanford would preserve and enhance the quality of potential and existing tiger salamander habitat within a CTS Reserve (south of JSB). The CTS Reserve includes 315 acres and contains eight newly constructed tiger salamander breeding ponds, three of which have had documented reproduction of tiger salamander. The Monitoring and Management Plan activities would include surveys to monitor the status of the tiger salamander and its habitat, controlling non-native species that are adversely affecting tiger salamander, sharing monitoring results with the USFWS and other interested agencies, modifying the tiger salamander ponds as necessary to benefit the species, providing supplemental water during drought, enhancing surrounding habitat by mowing and encouraging ground squirrels as their burrows provide refugia, maintaining suitable habitat within 150 feet of the ponds, maintaining at least three amphibian tunnels under JSB, limiting recreational access in the CTS Reserve, prohibiting dogs and feral cat feeding stations in the CTS Reserve, discontinuing all ground animal control in the CTS Reserve, prohibiting development (buildings) in the CTS Reserve, providing a worker education program about tiger salamander, and preparing a plan for the perpetual monitoring and management of all habitat that is permanently preserved in the CTS Reserve.

The CTS Reserve would be used to mitigate for any future losses of Zone 1, 2 or 3 habitat caused by Stanford in the CTS Basin. As with the Proposed Action, under the HCP for CTS Only

alternative, credits to the CTS Account will not be earned until lands in the CTS Reserve are permanently preserved under conservation easement(s).

To address ongoing operations and maintenance around Lagunita (i.e., north of JSB), Stanford would implement the requirements of the Central Campus CTS Management Plan, which is described in Section 4.3.3.4 of the HCP and above under “CTS Account”. The Central Campus CTS Management Plan will govern the management of the approximately 95 acres of Zones 1 and 2 tiger salamander habitat north of JSB, including Lagunita (i.e., the “Central Campus CTS Management Area”, see Figure 3-4).

Under the HCP for CTS Only alternative there would be a Conservation Program Manager, and the Take Minimization Measures from the HCP (adapted for tiger salamander) would apply to Stanford’s ongoing operations and maintenance in the CTS Basin, including such measures as conducting routine maintenance of Lagunita Reservoir during the dry season in consultation with the Conservation Program Manager, educating workers about tiger salamander and garter snakes, securing open pits at the end of the work day, and restoring any areas disturbed by work associated with infrastructure, among others (HCP Section 4.2). These Minimization Measures apply only in Zones 1 and 2 within the CTS Basin unless the Measure specifically states that it applies in Zones 3 or 4 of the CTS Basin. Outside of the CTS Basin, Minimization Measures would be applied on a project-specific basis and there would not be a coordinated minimization and avoidance strategy for riparian species.

Under the HCP for CTS Only alternative, the tiger salamander population would be monitored the same way as the Proposed Action, including rainy season night surveys of salamander dispersal routes, egg mass surveys, larval surveys, and general wetland and upland surveys (HCP Section 4.6.4).

Future development in the CTS Basin would be mitigated the same way as described in the Proposed Action. To mitigate for the permanent loss of Zone 1, 2 or 3 habitat within the CTS Basin, Stanford would either withdraw credits from the CTS Account (if credits have been accrued), or would record a conservation easement over habitat within the CTS Reserve south of JSB to earn credits.

The mitigation ratios would depend on the Management Zone that is affected by the permanent development. Every acre of Zone 1 habitat that is permanently converted would require three mitigation credits, every acre of Zone 2 habitat would require two mitigation credits, and every acre within Zone 3 would require 0.5 mitigation credits. Development in Zone 4 would not adversely affect the tiger salamander, because Zone 4 does not provide suitable habitat. Therefore, no mitigation credits would be required for development in Zone 4.

The total anticipated future development in the CTS Basin under this alternative would be the same as under the Proposed Action (see Table 3-1). Future development and other land conversions within the CTS Basin would be permitted through the HCP for CTS Only. Projects in Zones 1 and 2 that would result in the take of other federally listed species would be permitted separately on a project-specific basis. Similarly, ongoing operations and maintenance activities in Zones 1 and 2, that could take other listed species, would be permitted on a project-specific basis, as described under the No Action alternative.

As noted in the discussion of the No Action alternative, permits issued for take of other listed species on a project-by-project basis would likely only be obtained for activities occurring in Zones 1 and 2 that are anticipated to result in take. Those permits could require mitigation similar to that described in the Proposed Action for Zones 1 and 2.

Under the HCP for CTS Only alternative, the HCP process would be streamlined because there would only be one Federal agency (the USFWS) and one ITP. However, this alternative would not provide a comprehensive program that addresses all of the listed species or provide assurances that Stanford is complying with the ESA for all listed species. While there would be a Conservation Program Manager for activities affecting tiger salamander, there would not be a similar coordinated review of projects affecting steelhead, red-legged frog, pond turtle, or garter snakes. Similar to the No Action alternative, projects affecting other listed species would be mitigated when the individual permits are issued, rather than in advance of impacts to listed species, as planned under the Proposed Action. Individual take authorization would not be required for the pond turtle unless it is listed in the future.

The HCP for CTS Only alternative would include an adaptive management provision, which means that the tiger salamander minimization measures and monitoring could evolve. Similar to the No Action alternative, adaptive management may be included in future project-specific HCPs for the other listed species, but would not be included in any project-specific take authorization permitted through section 7 of the ESA. Tiger salamander enhancements implemented as part of this alternative would benefit garter snakes located in the foothills and Lagunita area, but this alternative would not enhance habitat for riparian species.

Under the HCP for CTS Only alternative, conservation easements would not be recorded over San Francisquito, Los Trancos, Deer, and Matadero creeks in advance of any future development. Conservation easements may be required to mitigate for future development that affects creek zones through project-by-project approvals, but they would likely be smaller than those in the proposed HCP, and would be implemented piecemeal as development that results in take occurs. The amount of riparian habitat preserved and managed would depend upon the amount of habitat lost.

Under this alternative, the USFWS would have to find that an HCP for tiger salamander complied with section 10 and it's implementing regulations before issuing an ITP. This alternative would provide conservation benefits to tiger salamander, but little or no contribution to the recovery of any other listed species.

3.3 COMPARISON OF THE PRIMARY FEATURES OF THE ALTERNATIVES RETAINED FOR CONSIDERATION

The primary features of the alternatives retained for consideration are compared in Table 3-5. For example, under the Proposed Action, the ITPs would cover approximately 8,000 acres of Stanford's land whereas under the No Action alternative incidental take authorization would be issued project-by-project. A comparison of the environmental effects of these alternatives is provided in Section 5.

Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
Incidental Take Permit	Stanford-wide ITPs issued by USFWS and NMFS	Incidental take authorization may be granted on a project-specific basis through sections 7 or 10 of the	ITP issued by USFWS for take of tiger salamander; individual incidental take authorization may be granted on a project-specific basis by NMFS/USFWS for activities resulting in take

Table 3-5. Comparison of the Primary Features of the Alternatives Retained for Consideration			
Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
		ESA.	of other listed species.
Covered Species habitat preservation and management	Stanford would actively manage a minimum of 770 acres of Zone 1 habitat with 360 of the 770 acres permanently conserved within 1 year of issuance of the ITPs	Future avoidance, minimization and/or mitigation could be required by Services through individual section 7 and section 10 authorizations. Based on typical mitigation ratios and anticipated future loss of habitat in Zones 1 and 2 over the next 50 years, future permits would likely result in the preservation of 165 to 235 acres.	Stanford would place 315 acres in a CTS Reserve and monitor and manage 95 acres under a Central Campus CTS Management Plan; future riparian avoidance, minimization, and/or mitigation could be required by the Services through individual section 7 and section 10 authorizations and the amount of riparian habitat preserved and managed would depend upon amount of habitat lost.
Permanent loss of Zone 1 habitat through future development	Anticipated 20-30 acres	Anticipated 20-30 acres	Anticipated 20-30 acres
Permanent loss of Zone 2 habitat through future development	Anticipated 25-45 acres	Anticipated 25-45 acres	Anticipated 25-45 acres
Future development of Zone 3 land	Anticipated 35-105 acres; mitigation required	Anticipated 35-105 acres but no incidental take authorization (and accompanying mitigation) likely required.	Anticipated 35-105 acres but no incidental take authorization (and accompanying mitigation) likely required.
Adaptive management	Adaptive management applied through a comprehensive Conservation Strategy, with commitments to monitoring and changes to management practices if needed	Adaptive management may be included in future project-specific HCPs; take authorizations granted through section 7 do not include adaptive management.	Adaptive management for tiger salamander applied through a tiger salamander only conservation strategy, with commitments to monitoring and management and changes to management practices if needed, which may also benefit garter snakes. Adaptive management for riparian habitats/species may be included in future project-specific HCPs; take authorizations granted through section 7 do not include adaptive management.
Guidelines/ protocols to minimize impacts from ongoing activities	Comprehensive Conservation Strategy that includes feasible Minimization Measures for all of the Covered	Some avoidance measures would be implemented to avoid unauthorized take; Minimization Measures applied on a project-by-project basis through individual take	Conservation strategy for tiger salamander only that includes feasible Minimization Measures for Covered Activities within tiger salamander habitat (that will also benefit garter snakes); some avoidance measures would be implemented to avoid

Table 3-5. Comparison of the Primary Features of the Alternatives Retained for Consideration			
Feature	Proposed Action Alternative	No Action Alternative	HCP for CTS Only Alternative
	Activities	authorizations; no coordinated minimization and avoidance strategy.	unauthorized take; and Minimization Measures applied on a project-by-project basis through individual take authorizations; no coordinated minimization and avoidance strategy for riparian species.
Contribution to Covered Species persistence at Stanford	Conservation Strategy includes permanent preservation of highly sensitive habitat, long-term management and monitoring of habitat, habitat enhancements, and commitment to future habitat preservation and management on-site; increased likelihood of persistence of the Covered Species at Stanford.	As part of any future section 7 or section 10 take authorizations, the Services must find that the proposed action would not jeopardize the continued existence of listed species. Future mitigation implemented as part of individual take authorizations may result in piecemeal preservation and management of habitat that is loosely coordinated, if at all. It is unknown how much mitigation associated with individual take authorizations will contribute to the persistence of the Covered Species at Stanford, but it is likely to be less than the comprehensive Conservation Program under the Proposed Action.	Will contribute to tiger salamander persistence at Stanford, and benefit garter snake that may contribute to garter snake persistence at Stanford. As part of any future section 7 or section 10 take authorizations, the Services must find that the proposed action would not jeopardize the continued existence of listed species, but authorization would not necessarily contribute to the Covered Species persistence at Stanford. Future mitigation implemented as part of individual take authorizations for other listed species may result in piecemeal preservation and management of habitat that is loosely coordinated, if at all. It is unknown how much mitigation associated with individual take authorizations will contribute to the persistence of riparian listed species at Stanford, but it is likely to be the same as the No Action alternative and less than the Proposed Action.
Enhancement of Covered Species habitat at Stanford	Comprehensive Conservation Strategy that includes a variety of long-term enhancement activities.	Unknown; some habitat enhancement may be required pursuant to individual take authorizations.	Enhancement of habitat in the CTS Basin to the benefit of tiger salamander (and potentially benefit garter snakes); unknown habitat enhancement for riparian species but some enhancement may be required pursuant to individual take authorizations.
Contribution to the recovery of the Covered Species	Contributes to recovery of steelhead, garter snake, red-legged frog, tiger salamander and pond turtle.	Unknown	Provides a conservation benefit to tiger salamander; little or no conservation benefit to steelhead, garter snake, red-legged frog, or pond turtle.

3.4 ALTERNATIVES NOT SELECTED FOR DETAILED EVALUATION

The following alternatives were considered but were not brought forward for detailed analysis because they were found to be very similar to another alternative selected for detailed analysis, did not meet the purpose and need for the Proposed Action, were not feasible, or they did not meet the ITP issuance criteria.

3.4.1 No Take Alternative

A “No Take” alternative would restrict or prevent Stanford’s activities in Zones 1 and 2 related to the following:

- academic activities including field studies in biology, geology, archeology, engineering, photography and arts;
- maintenance of the urban infrastructure, including utilities, private roads and bridges, fences and buildings;
- recreation and athletics, including the golf course and driving range, trail use;
- grounds maintenance, including brush and weed control for fire hazard;
- activities related to leaseholds on Stanford land; and
- future campus development.

The restriction or prohibition of these activities would result in adverse health, safety, and public service effects on Stanford and the surrounding communities, making a No Take alternative impractical. For example, without an incidental take permit Stanford’s ability to conduct dam safety repairs at Lagunita could be compromised. If maintenance is prevented, public safety could be at risk from unmaintained roads, dams, utilities, fences, and fire and pest control. The restrictions could also prevent Stanford from engaging in the ordinary academic activities associated with the operation of a university. For these reasons a strict “no take” alternative was not selected for further evaluation.

3.4.2 Take from Existing Operations Only

Under this alternative, an HCP would be developed and ITPs issued for existing operations and maintenance activities only. The HCP would not cover any future development. The amount of future development would be the same under this alternative as for the Proposed Action. Future development that results in take of the Covered Species would be addressed through project-specific permitting under sections 7 or 10 of the ESA.

Under this alternative, no land would be set aside at the outset of the term of the permit. Specific ratios for loss of habitat may still apply, but only to that habitat permanently removed for operations and maintenance (a service road, for example). For other activities not covered by the HCP, Stanford would consult with the wildlife agencies on a project-by-project basis and mitigate separately for each project. The Take Minimization Measures in the HCP that apply to operations and maintenance may also be applied on a project-by-project basis as part of permit requirements.

This alternative was not retained for analysis because it is similar to the No Action alternative that is considered in detail. This alternative postpones mitigation for future development, and provides less certainty for Stanford University planning because the future mitigation is uncertain and therefore does not meet the project purpose and need.

3.4.3 Ongoing Operations and GUP Development Only

Under this alternative, an HCP would be developed and ITPs issued only for ongoing operations and maintenance activities and future development that was already approved by Santa Clara County under the 2000 GUP. Future development under the GUP could result in the loss of 30 acres of tiger salamander and garter snake habitat, but would not affect red-legged frog or steelhead habitat (See Figure 3-5, Possible Location of Assumed Development). Based on current planning principles of density and building efficiency, the HCP anticipates that Stanford will need to develop up to 45 acres of land beyond the GUP that provides habitat for the tiger salamander, garter snake, red-legged frog, and steelhead. Under this alternative, any future development beyond the GUP that resulted in the take of these species would not be covered by the HCP and would require project-specific permitting under sections 7 or 10 of the ESA.

No land would be set aside at the outset of the term of the permit, but an approximately 100-acre CTS Reserve would be created that could be used to mitigate for the GUP development. Permanent conservation easements would be recorded within the CTS Reserve as the GUP development occurred. Because this alternative would not cover any permanent loss of riparian habitat, no riparian land would be set aside at the outset. Specific ratios for loss of habitat may still apply to ongoing operations and maintenance activities that permanently remove habitat, such as the construction of a service road. However, any future development beyond the GUP that affects the listed species would not be covered by this alternative and would require a project-specific permit and mitigation. Stanford would consult with the wildlife agencies on a project-by-project basis and mitigate separately for each project.

As described in the Proposed Action, ongoing operations and maintenance activities may temporarily affect the tiger salamander, red-legged frog, garter snake and steelhead. Therefore, this alternative would include the take Minimization Measures described for the Proposed Action. In addition, this alternative would include a Central Campus CTS Management Plan to mitigate for the impacts of the ongoing activities on the tiger salamander.

This alternative also postpones mitigation for much of the future development projected in the HCP, and provides less certainty for Stanford University planning because the amount of future mitigation is unknown. This alternative also would not support Stanford's need to meet future growth and accomplish its long-term academic mission. It was therefore not selected for further evaluation.

3.4.4 Participation in Santa Clara Valley Habitat Plan HCP/NCCP

Under this alternative, the Services would not consider ITP applications from Stanford, and activities on Stanford's lands that result in take of listed species would be authorized by permits issued to Santa Clara County as part of the Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP). Santa Clara County is preparing an HCP/NCCP for several thousand acres of land within the County and plans to submit ITP applications to the Services authorizing the take of red-legged frog, tiger salamander, and pond turtle. Steelhead and garter snakes are not covered species in the Santa Clara County HCP/NCCP. The boundaries of the County's proposed HCP/NCCP do not include Stanford. In order to cover Stanford's lands and Stanford's activities, the boundary of the proposed HCP/NCCP would have to be extended to include Stanford's lands in Santa Clara County and San Mateo County and the scope of the HCP/NCCP would have to be expanded to include Stanford's specific activities, steelhead and garter snake as Covered Species.

The County's proposed HCP/NCCP will address site-specific impacts, and provides site-specific minimization measures for a variety of activities. If the geographic boundary and scope of the County's HCP/NCCP were extended to include Stanford, and Stanford was covered under the HCP/NCCP rather than its own, it is likely that the minimization and mitigation for Stanford's activities would be the same or very similar to those in the Proposed Action, particularly since Stanford lies at the northern end of the Santa Clara valley and local mitigation that addresses local physical conditions is biologically important.

This alternative was not retained for detailed analysis because it would likely not meet the applicant's time schedule. In addition, this alternative may not be feasible because the geographic scope of the County HCP/NCCP would need to be changed in order to include Stanford, including Stanford's lands located in another county, San Mateo County.

3.4.5 HCP Using All Off-site Mitigation

Under this alternative conservation program, the effects of Stanford's ongoing Covered Activities on the Covered Species would be reduced by implementation of the Minimization Measures described in the proposed HCP (see Section 4 of the HCP), while the permanent loss of habitat would be mitigated off-site. Instead of placing conservation easements over Stanford's lands, Stanford would either: 1) purchase credits in an approved mitigation bank; 2) acquire, preserve and manage habitat in the region; or 3) contribute funds to another entity for the purpose of acquiring, enhancing, or managing habitat for the Covered Species. Off-site mitigation would occur as Stanford's lands are developed. Mitigation in advance would not occur unless it made sense logistically to secure mitigation bank options or larger areas of habitat for future use.

The mitigation accounting system would differ from the Proposed Action because this alternative would not include the onsite conservation easements or enhancements used to fund the mitigation accounts. The Monitoring and Management Plans for San Francisquito/Los Trancos creeks, Matadero/Deer creeks, and the CTS Basin would not be implemented. Conservation easements would not be recorded. Instead, all mitigation for the permanent loss of habitat would occur off-site, and the mitigation accounting system would need to be negotiated with the USFWS and NMFS based on the suitability of off-site mitigation.

For this alternative, the Covered Activities would be the same as for the Proposed Action. Hence, the projections of future development and the ongoing operations and maintenance activities would be the same as the Proposed Action.

This alternative was rejected from consideration because Stanford supports the only remaining tiger salamander population on the Peninsula. The USFWS believes there are significant conservation benefits to tiger salamanders in preserving this population. Not conserving this population would not meet Stanford's needs and goals of conserving the species and securing an ITP, or the USFWS' need and goals to conserve the species.

3.4.6 HCP That Covers Modifications to Searsville Dam and Reservoir for Flood Control

The Services considered an alternative that addresses regional flood control, through the modification of Searsville, because members of the San Francisquito Creek Joint Powers Authority (JPA) suggested an alternative that addresses regional flood control during the scoping process for the EIS. Under this alternative, the Services would consider issuing ITPs that included modification of Searsville Dam and Reservoir for regional flood control purposes as one of the Covered Activities.

San Francisquito Creek has had a history of flooding below Searsville Reservoir and Dam and adjacent communities have expressed concern about future flooding of the creek. In order to address the community concerns regarding flooding as well as environmental preservation along San Francisquito Creek, local land use agencies created the JPA, which is comprised of the cities of Palo Alto, Menlo Park, East Palo Alto, the Santa Clara Valley Water District, and the San Mateo County Flood Control District. Stanford University and the San Francisquito Watershed Council are non-voting members of the JPA.

In 2002, Congress authorized the San Francisquito Creek Study (the "Feasibility Study") to be conducted under the direction of the USACE. The Feasibility Study is a joint effort by the USACE and the JPA to address flooding problems on San Francisquito Creek. The Feasibility Study is intended to identify and evaluate potential plans to help alleviate flooding problems, as well as address environmental degradation of the watershed and potential ecosystem-compatible recreational opportunities. The April 11, 2006 Notice of Intent (NOI) to conduct a scoping meeting on the Feasibility Study identified dozens of potential alternative actions, though no specific improvements were identified.

The alternatives identified in the NOI included: a non-structural alternative (warnings, evacuation, relocation); downstream fluvial flooding actions near the creek mouth; tidal flooding actions at the creek mouth; downstream ecosystem restoration actions; upstream fluvial flooding actions (including possible upland detention basins or modifications to existing reservoirs); and upstream ecosystem restoration actions (including the possible removal of steelhead migration barriers). Some of these alternatives could be applied on Stanford's lands. For example, the Feasibility Study could evaluate the removal of Searsville Dam, modification of Searsville Dam and Reservoir by excavating the basin and converting the Dam to a flood control facility, likely as a "check dam," widening the channel of San Francisquito Creek, or the construction of an upland off-stream detention basin on Stanford's lands. The Feasibility Study will involve detailed studies of the viable alternatives and an assessment of the potential environmental effects of each alternative.

In 2005, the USACE anticipated that the Feasibility Study would take from 3 to 5 years to complete, provided that funds are available on an annual basis to continue a "fast pace" of work. However, due to lack of Federal funds, the pace has been slower. Under new planning guidance, USACE and the San Francisquito JPA are currently developing a planning strategy to complete the study within three years.

In the meantime, at the November 2008 JPA Management Team meeting, a subgroup recommended that the JPA hire a consultant to explore and refine options for flood protection through various alternatives including downstream capacity increase and upland retention/detention. The subgroup recommended that the consultant engaged for the initial technical analysis of an implementation project downstream of Highway 101 also provide an analysis of the upper watershed topography suitable for water storage during a major storm. The "upstream" task performed by the consultant would provide information to the JPA on the following:

- The feasibility of upland detention and identification of the largest potential retention/detention locations, based on topography and diversion constraints;
- Conceptual drawings of the proposed project;
- Retention/detention capacity and relative protection benefits; and

- Preliminary estimates for the costs of planning, design, environmental review and construction.

To date, no specific flood control options have been conceptually engineered, much less analyzed for feasibility. As such, the solutions to regional flood control in the San Francisquito Creek watershed are still speculative, and involve numerous stakeholders who are not currently applying for an ITP.

Flood control is a regional issue that is currently being addressed by the USACE and all of the stakeholders (not just Stanford) through a comprehensive and long-term planning process. The range of measures (all of which are still conceptual at this point) that will be considered and evaluated for feasibility through that process is extensive. Future regional flood control actions that are undertaken, funded, or permitted by the USACE will be subject to a section 7 consultation between the USACE and the USFWS, NMFS, or both. At that time, the Services can evaluate the effect that specific proposed regional flood control activities will have on listed species.

This alternative was rejected from further consideration because the potential for future modifications of Searsville Dam and Reservoir for flood control purposes is speculative. No specific possible modifications have even been evaluated for their feasibility. Also, such hypothetical modifications are simply one of a large array of flood control concepts which the USACE and JPA will be analyzing and considering in the future. That analysis is complicated, and may take a decade to complete by various technical experts. As a result, it is not practical at this time to evaluate any flood control modifications at Searsville in this EIS. Moreover, any flood control modifications to Searsville Dam and Reservoir that the Services selected to study as part of this EIS could conflict with other flood control measures that the USACE and the stakeholders will evaluate.

3.4.7 HCP That Covers Removal or Modifications to Searsville Dam for Fish Passage

The Services considered an alternative that addresses removal or modifications to Searsville Dam for fish passage, because members of the public and environmental groups suggested including this during scoping and public review of the DEIS. Under this alternative, the Services would consider issuing ITPs that included removal or modifications to Searsville Dam for fish passage as a Covered Activity.

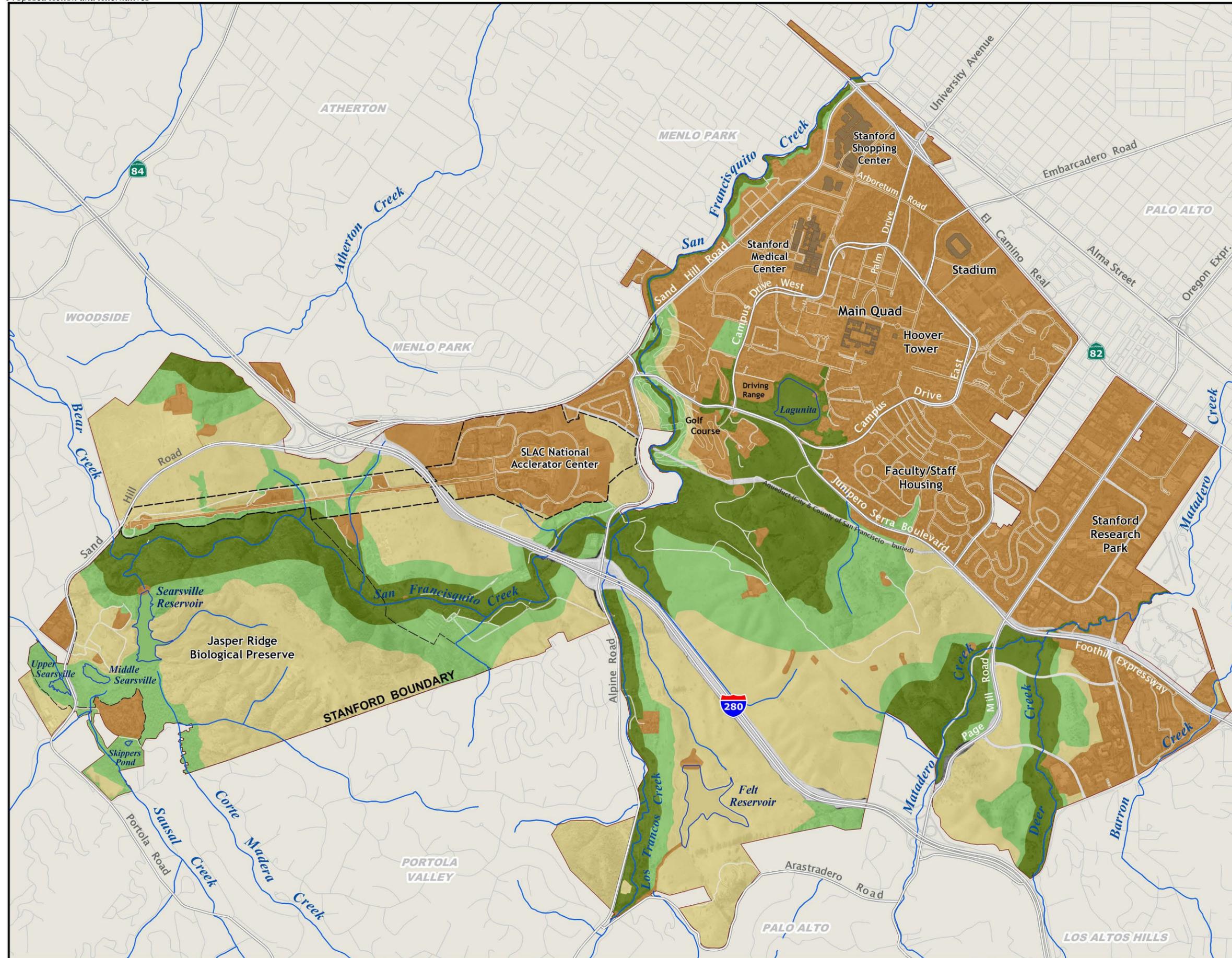
CCC steelhead would likely benefit from access to stream habitat upstream of Searsville Dam. According to the USGS National Hydrography Dataset (2004) there is a total 25.7 miles of blue-line stream above Searsville Reservoir. The major tributaries located upstream of Searsville Reservoir are Corte Madera, Dennis Martin, Alambique, Sausal, and Westridge creeks. Together these creeks and their tributaries make up 32 percent (14 square miles) of the San Francisquito Creek watershed (Freyberg and Cohen 2001). NMFS estimates that approximately 9 miles of habitat upstream of the Searsville Reservoir exhibits the physical parameters that are necessary for steelhead summer rearing (Bjorkstedt et al. 2005; Spence et al. 2012). Streams in the Corte Madera Creek watershed likely provide good to high quality spawning and juvenile rearing habitat for CCC steelhead, but Searsville Dam currently blocks steelhead from access to this upstream area. Removal of the dam or modifications that include a fish ladder could restore upstream passage at Searsville Reservoir and allow CCC steelhead to re-populate the Corte Madera Creek portion of the watershed.

In early 2011, Stanford initiated a process to study the long-term future of Searsville Dam and Reservoir. The goal of this study by Stanford is to develop a plan that addresses the long-term

future of Searsville Dam and Reservoir. A multidisciplinary team of Stanford staff and faculty has been convened to assess the functional objectives of the dam and reservoir in light of the needs of Stanford, the surrounding community, and the environment. Stanford's recently created Searsville Study Steering Committee will oversee an evaluation of alternatives and identify an approach that best achieves the objectives and minimizes tradeoffs. Stanford anticipates completing a conceptual alternatives study in two years, to be followed by a collaborative review process with various agencies and stakeholders, leading ultimately to project implementation. Appendix E of the EIS contains Stanford's January 6, 2011 document which provides additional details regarding the process for addressing Searsville issues.

For reasons similar to the regional flood control issues discussed above, this alternative was rejected from further consideration because future removal or modifications to Searsville Dam is uncertain and speculative at this time. Numerous environmental, safety, and permitting issues are associated with the future of Searsville Dam, including Stanford's water supply, upstream and downstream flood risk, sediment removal and disposal, the Jasper Ridge Biological Preserve (JRBP) academic program, and biological diversity in wetland areas created by the reservoir. Stanford has initiated a process to resolve these issues, but at this time there are no actions or alternatives identified.

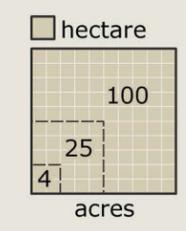
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Stanford University HCP Environmental Impact Statement

Management Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4



Sources:
 HCP Zones: Stanford University Campus Biologist, 2006
 Aerial photos: Aerotopia, 1999
 Creeks: US Geological Survey, 1991

Disclaimer:
 This map was produced by the SU Planning Office. While generally accurate, this map may not be completely free of error. The information is derived from a variety of sources deemed reliable, but subject to recurrent change and Stanford does not warrant the accuracy and completeness of these data.

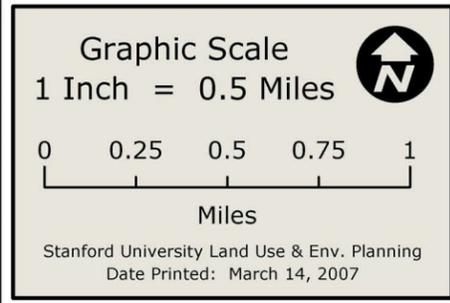
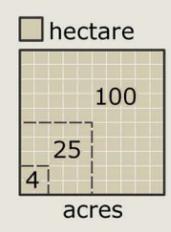


Figure 3-1

Stanford University HCP Environmental Impact Statement

San Francisquito/ Los Trancos Creek Basin

-  San Francisquito / Los Trancos Creek Easement
-  Boundary of Mitigation Basin



Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
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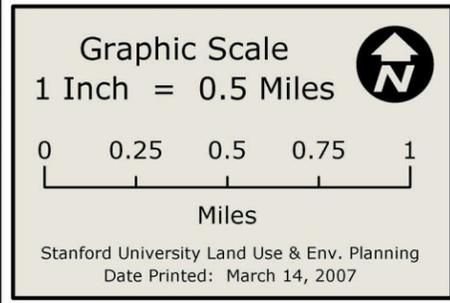
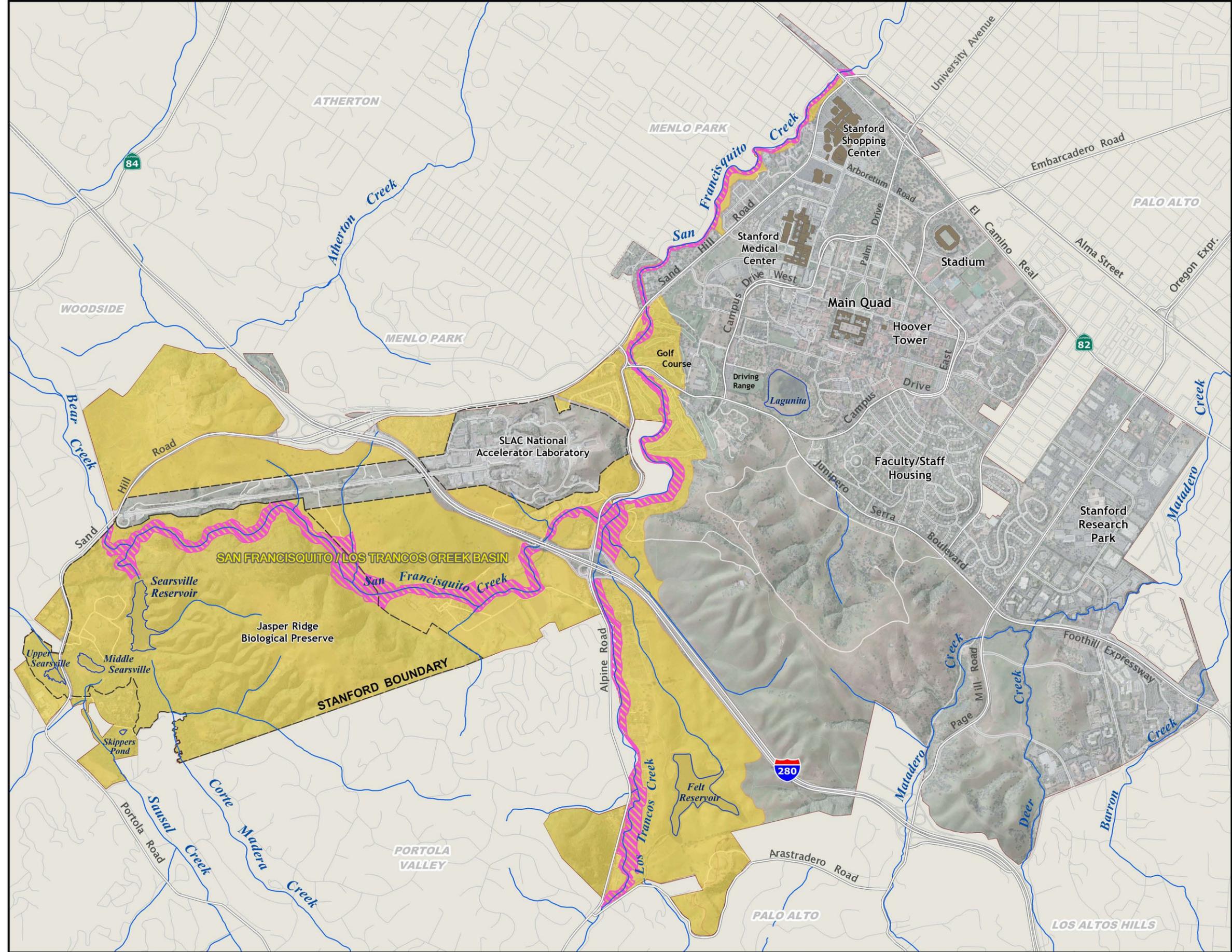
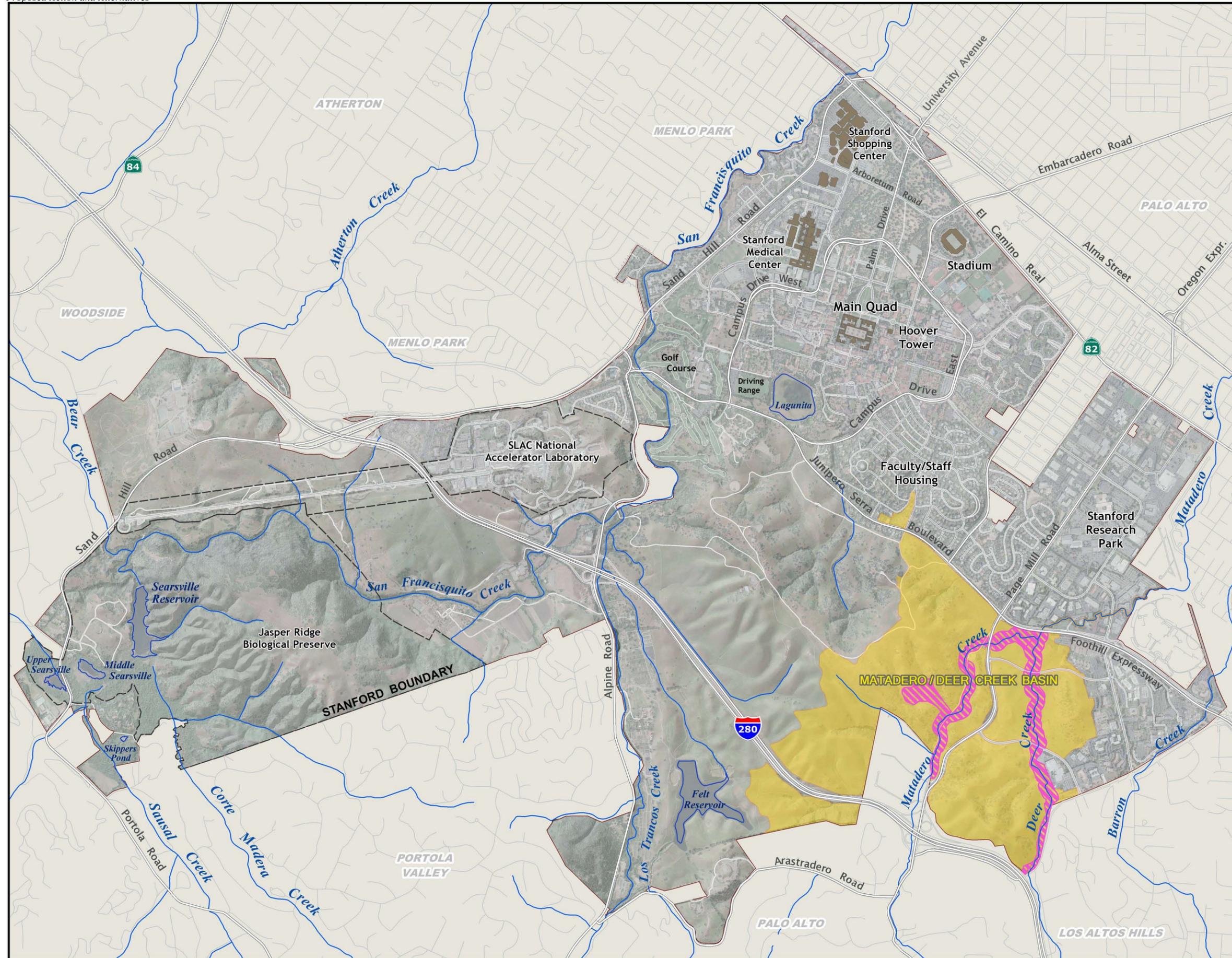


Figure 3-2

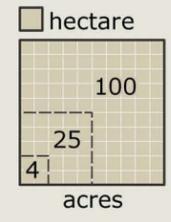




**Stanford University HCP
Environmental
Impact
Statement**

**Matadero / Deer
Creek Basin**

-  Matadero/Deer Creek Easement
-  Boundary of Mitigation Basin



Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
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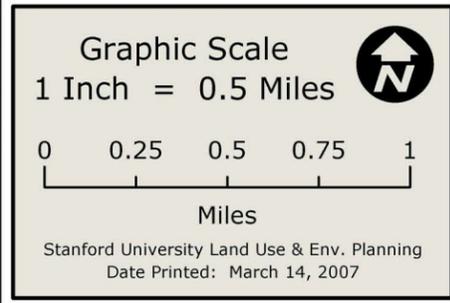
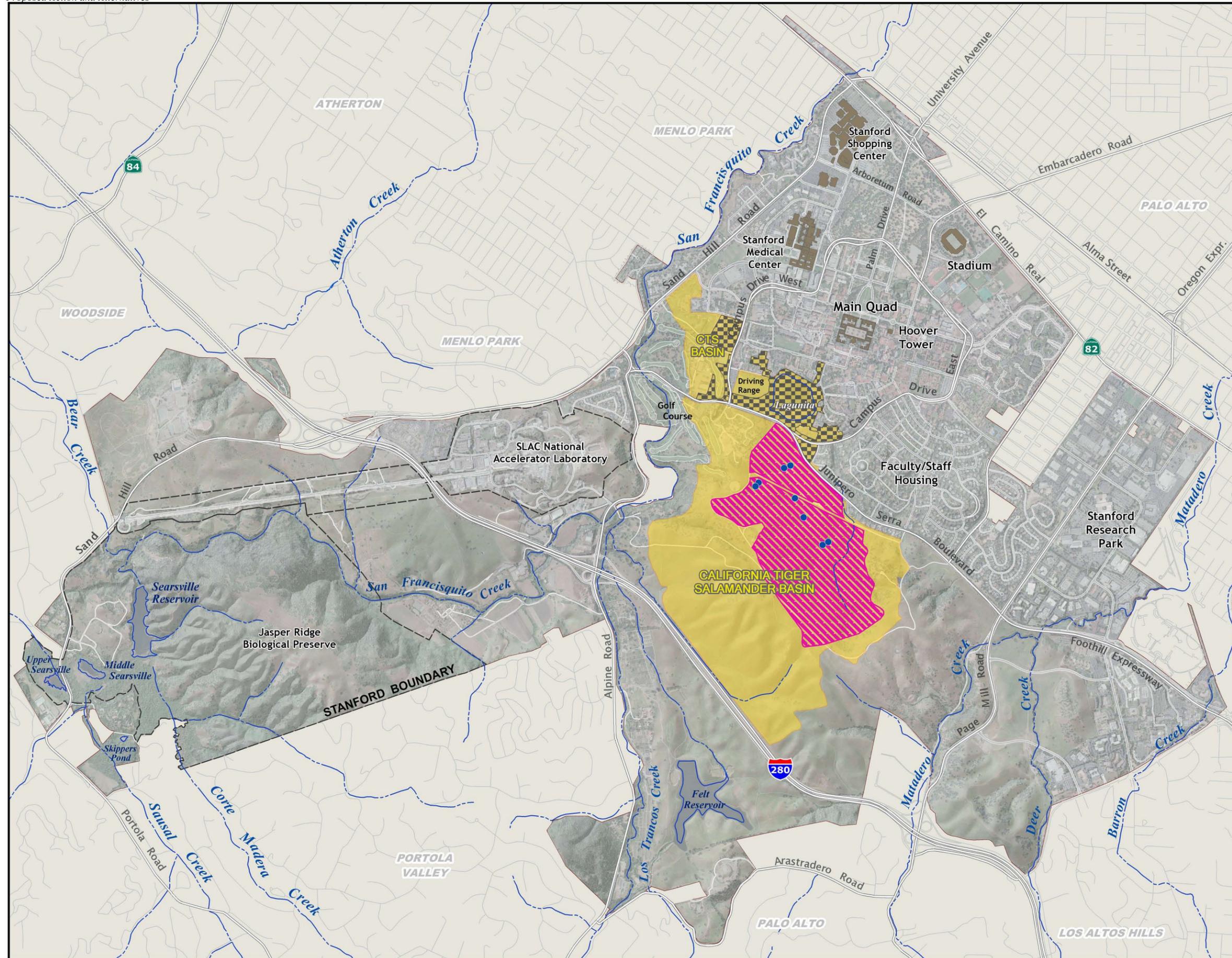


Figure 3-3



Stanford University HCP Environmental Impact Statement

CTS Basin

- California Tiger Salamander (CTS) Reserve
- Central Campus CTS Management Area
- Boundary of Mitigation Basin
- Recently Established Pond

100
25
4

hectare
acres

Sources:
Reserves: Stanford University Campus Biologist, 2006
Aerial photos: Aerotopia, 1999
Creeks: US Geological Survey, 1991

Disclaimer:
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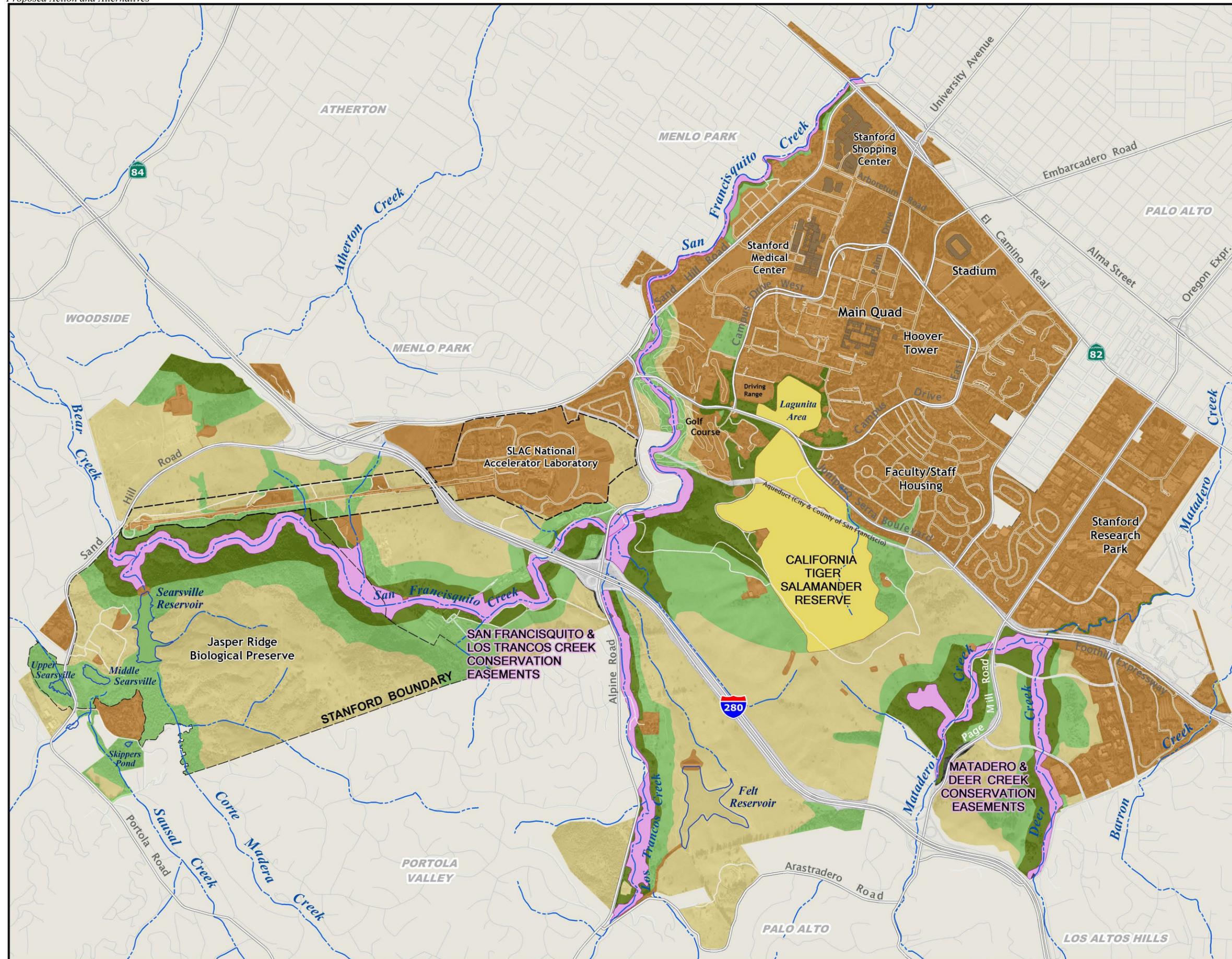
Graphic Scale

1 Inch = 0.5 Miles

Miles

Stanford University Land Use & Env. Planning
Date Printed: March 14, 2007

Figure 3-4

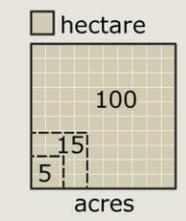


Stanford University HCP Environmental Impact Statement

Possible Location of Assumed Development

- Zone 1, 20-30 acres could be developed within zone
- Zone 2, 25-45 acres could be developed within zone
- Zone 3, 35-105 acres could be developed within zone

- No Build Areas
- CTS No Build areas for term of HCP
 - Conservation Easement
- Note: Assumed development cannot occur in either the CTS No Build areas or the Conservation Easements



Sources:
 HCP Zones: Stanford University Campus Biologist, 2006
 Aerial photos: Aerotopia, 1999
 Creeks: US Geological Survey, 1991

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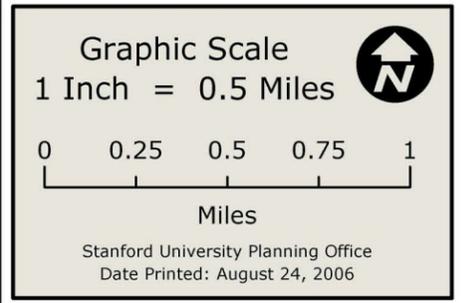


Figure 3-5