

3.0 COVERED ACTIVITIES AND THEIR IMPACTS

As part of the HCP, Stanford is seeking a Section 10(a) incidental take permit from the Service. An incidental take permit can be issued for one-time site-specific activities or projects, or for a broader program of multiple ongoing or annual maintenance activities. Stanford is seeking the latter type of incidental take permit.

This section describes the Covered Activities that Stanford routinely performs, including the construction of new facilities. Activities outside of the portion of Stanford that is covered by this HCP may be described below for context, but only the activities that occur within the 4,372 acres designated “HCP Area” on the HCP’s figures are Covered Activities, **unless the HCP specifically excludes them from coverage**. The Covered Activities include activities related to Lagunita Reservoir, creek maintenance, academic uses, maintenance and construction of urban infrastructure, recreational and athletic uses, general campus management and maintenance, activities that are carried out by Stanford’s tenants, and future development. All of these activities are necessary to keep the University operating, and most of these activities have been ongoing for many years. These activities represent the type of University operations that could affect the Covered Species, and allow the University to analyze the potential effect of its operations on the Covered Species. But, because of the size and diversity of operations, and the changes in technology that are continually occurring, it is not possible to describe all of the University’s actions that are covered by this HCP in complete detail. Therefore, the discussion of impacts on the Covered Species by the Covered Activities is addressed qualitatively in this section. The cumulative effect of these activities, with the implementation of the HCP’s Conservation Program, are then quantitatively assessed in Section 5.3 of the HCP. Section 4.0 of the HCP describes the Conservation Program that will avoid or minimize the take of Covered Species caused by the Covered Activities.

This section describes many activities that individually present a very low chance of causing take of Covered Species. When viewed cumulatively, however, these common activities likely would result in take, and if this take were not minimized or mitigated for, it could, over time, have a potentially significant effect on the Covered Species. The HCP is designed to benefit the Covered Species and increase the likelihood of their persistence at Stanford. If the HCP is successful, the Covered Species populations at Stanford will increase, and, as the Covered Species become more abundant, they will inhabit more areas at Stanford. Although this will provide a significant benefit to the Covered Species, the number of individuals of the Covered Species that are taken, particularly while conducting routine activities could increase when the Covered Species start inhabiting areas that are currently uninhabited. The percentage of the local populations impacted, however, will remain the same or will decrease as the overall population of Covered Species continues to increase.

Therefore, while any one of the Covered Activities, at any given time, may not result in the take of Covered Species, the activities are all considered Covered Activities because, on a cumulative basis, they could result in take.

3.1 LAGUNITA RESERVOIR

Lagunita (DWR #614-003; National ID# CA00671) is an off-channel seasonal reservoir that was created in the late 1870s as a stock pond and water-holding facility for Leland Stanford's Palo Alto Stock Farm and vineyard (Figure 3-1). The earthen berm is 16 feet tall and 2,500 feet in length. It is located in the developed portion of the campus, just to the north of Junipero Serra Boulevard. The University's main campus borders Lagunita on three sides, and Junipero Serra Boulevard separates Lagunita from the lower foothills.

In most years, Lagunita partially fills with rainwater runoff during the winter. The runoff amount varies widely with the amount and intensity of rainfall. The Lagunita lakebed and berm are permeable (losing an estimated 500 gallons a minute to percolation), and in order for Lagunita to hold water for more than a few weeks at a time, and provide suitable California tiger salamander breeding habitat, water needs to be added. Historically, in most years of above average winter rainfall, Stanford added water to Lagunita, usually between mid-March and mid-June. In those wet years that Stanford added supplemental water to Lagunita, the reservoir was filled to the desired water level by late March and water levels were typically maintained through University commencement (mid-June). Managed water levels have varied considerably over the last 100 years, depending on water availability in San Francisquito Creek, projected use of Lagunita, and functioning of the diversion system and storage facility. In years that Lagunita is supplemented with creek water, the reservoir will typically retain water for approximately 1 month after the addition of water ceases and will be dry by late July. Even in years with exceptionally high rainfall, Lagunita dries by late spring or early summer without supplemental water, and in most years it would be dry by May without the addition of supplemental water. During years with below average rainfall (or during years when the timing of storms resulted in a lower than average creek flow), Lagunita is often dry in late January.

Stanford will continue to manage Lagunita water levels to support California tiger salamander reproduction. Specifically, Stanford will operate its water systems to maintain a depth of 3 to 5 feet at the drain during the period of tiger salamander early larval development (generally February to early May), if the monitoring surveys indicate that California tiger salamander breeding has occurred in Lagunita. Starting in mid-May, Stanford will manage the water levels at Lagunita in a manner that mimics natural conditions (e.g., water levels will be gradually reduced to mimic natural drying, with Lagunita becoming dry by the end of June to early July). The newly created ponds in the foothills will be used as one index of natural conditions. Stanford will implement the following operations plan to accomplish this:

1. During years where rains have allowed the accumulated storm water runoff in Lagunita of 3 feet on the staff plate, elevation 122' above Mean Sea Level (MSL) or the presence of CTS eggs or larvae on January 15, Stanford will operate the Lagunita diversion at San Francisquito Creek, or otherwise convey water (i.e., well water or reclaimed water, but Stanford will not use treated domestic, potable water for this use) to Lagunita, at a rate adequate to maintain the water level in Lagunita at an elevation of 124 +/- 1 foot, which places the water surface near the toe of the berm on the northeast side. (Note that late season storm events may cause the reservoir level to temporarily rise above the managed level of 124 feet.) At the managed elevation of 124 feet, the water covers a surface area of approximately 16 acres, 8 acres of which are at a depth of 0 to 2 feet and another 8

acres are at a depth between 2 and 4 feet; a few hundred square feet near the drain will have a depth greater than 4 feet. In years where there is normal or above rain fall, the water level in Lagunita will generally stabilize at 126 foot above MSL. At this level the reservoir covers approximately 20 acres, of which 4 acres are 0 to 2 feet deep, 8 acres are 2 to 4 feet deep, and approximately 8 acres are more than 4 feet deep. If Lagunita has received sufficient rain water by January 15, Stanford will supplement Lagunita with water to facilitate California tiger salamander reproduction provided: 1) there are not overriding public safety and health concerns raised by governmental agencies associated with water in Lagunita,¹ or 2) the Service, CDFW, and Stanford have not reached an agreement concluding that Lagunita is no longer important to the local persistence of the California tiger salamander.

2. The diversion of creek water from San Francisquito Creek to Lagunita will be implemented only if: 1) the Lagunita diversion facilities are safe and operational, and 2) there is sufficient water available in San Francisquito Creek at the point of diversion and water diversions are not in significant conflict with other environmental considerations. If diversions from San Francisquito Creek are not available (or cannot be sustained) Stanford will provide supplemental water from Felt Reservoir, water wells, or other non-potable water sources in addition to or in lieu of creek water diversions. Stanford will continue to provide supplement water until the following two conditions are triggered: On April 1 of each year, the flow of San Francisquito Creek and status of California tiger salamanders in and around Lagunita will be assessed, and Stanford will continue to provide supplemental water to Lagunita if California tiger salamander eggs or larvae are present. If creek water is available (relative to the operating parameters of the diversion system and potentially competing environmental concerns), the diversion rate will not be reduced from what is necessary to maintain the 124+/- 1-foot level unless it is deemed appropriate for California tiger salamander management. A constant inflow of relatively cool creek water can act to retard California tiger salamanders larval development. If California tiger salamanders are present at Lagunita on April 1, but water diversions from San Francisquito Creek cannot provide adequate supplemental water, Stanford will provide supplemental water from Felt Reservoir, water wells, or other non-potable water sources to maintain the 124+/- 1-foot level. It is likely that in some years it will be desirable for the salamanders to lower the water level in mid-spring to 122 ft +/- 1 ft above MSL. This lower level would result in slightly warmer water in Lagunita, which would still cover approximately 8 acres with several feet of water. This controlled

¹ If Stanford is unable to provide supplemental water to Lagunita due a public safety or health concern raised by a governmental agency, Stanford will report the reason why it was unable to provide the supplemental water and the effect that it had on CTS reproduction at Lagunita in the Annual Report required in accordance with Section 6.4 as a “difficulty encountered in implementing the HCP.” If Stanford does not provide supplemental water to Lagunita in accordance with this operations plan due to an overriding public safety or health concern for three consecutive years, or more than 4 times in any 8-year period, Stanford will submit a report to the Service and CDFW that describes how the lack of supplemental water has affected CTS reproduction, and if CTS reproduction at Stanford has declined (based on a comparison of past monitoring reports) by 10% (which reflects a typical fluctuation in breeding) or more due to the lack of supplemental water, Stanford will identify additional mitigation measures that will be implemented to compensate for the lack of supplemental water. Additional mitigation measures may include a commitment to supplement additional ponds in foothills for a guaranteed minimum period, or to modify Lagunita so that it is less likely to require supplemental water in the future, or more proactive measures to relocate the CTS population away from Lagunita.

lowering mimics the drying of natural bodies of water occupied by California tiger salamanders. While not expected, overriding public safety and health concerns raised by governmental agencies associated with water in Lagunita could require the cessation of diversion.

3. In the late spring/early summer, Stanford will cease providing supplemental water to Lagunita, and the water level at Lagunita will be allowed to drop naturally through percolation, evaporation, and transpiration. The provision of supplemental water may be extended if California tiger salamanders development is not sufficiently advanced.

The berm that surrounds Lagunita is maintained with a Bermuda grass cover that is irrigated, fertilized, and mowed so that it maintains a pleasant visual quality throughout the year. In addition, Stanford is required by the California Division of Safety of Dams to control ground squirrel activity on the berm to ensure structural integrity. Ground squirrel abatement takes place as needed using County-approved control methods such as trapping and poison baiting. In the early fall, when Lagunita is dry, the reservoir bottom is mowed for fire control. These activities are all annual maintenance necessities and are Covered Activities, except for the use of poison.

The drain system requires routine maintenance and periodic upgrades. The two drain structures and associated pipes occupy approximately 0.1 percent of Lagunita's surface area. Additionally, the earthen berm occasionally needs minor repair (filling of potholes and removal of dead trees). The berm may need some significant work during the life of the HCP. The amount of permanent land conversion associated with significant berm work would be mitigated in accordance with Section 4.4 of the HCP.

Several maintenance changes have occurred at Lagunita in the last decade in response to the increased concern over California tiger salamanders. Stanford stopped discing the lake bottom in the early fall for fire control because the discing could have adversely affected California tiger salamanders and garter snakes. Instead, Stanford began mowing the reservoir bottom, which has fewer effects on the tiger salamanders and garter snakes. In addition, as discussed in Section 3.6.2 below, two recreational uses of Lagunita were discontinued. Stanford recently modified its diversion facilities to improve their efficiency at various flow levels, which has assisted Stanford in ensuring the availability of water for Lagunita.

3.1.1 Potential Effects of Lagunita on the Covered Species

Lagunita provides breeding habitat for California tiger salamanders and the surrounding areas, including the berm, serve as upland habitat. Stanford manages Lagunita primarily for the benefit of California tiger salamanders. The operation of Lagunita likely has few, if any, significant adverse effects on California tiger salamanders because the management regime was specifically designed to benefit California tiger salamanders. However, the routine maintenance of Lagunita could result in the direct take of a small number of California tiger salamanders, or in habitat modification. Virtually all maintenance activities occur during the dry season and invasive practices, such as drain replacement or repair, are very limited in their extent and time frame.

Garter snakes are also present at Lagunita and vicinity. Operation of the reservoir provides a significant benefit to the species, but mowing in and around Lagunita could adversely affect garter snakes. Since the mid-1990s mowing has been conducted during periods when most, if not all, salamanders and snakes are inactive (during the hottest part of the mid-afternoon) and the mowers are set to cut vegetation no closer than 8 inches from the ground. It is unclear whether the snakes do better, worse, or are indifferent to mowed versus un-mowed vegetation.

Maintenance and operation of Lagunita do not affect California red-legged frogs because this species does not inhabit the seasonal reservoir, and it does not provide suitable habitat for them.

3.2 CREEK MAINTENANCE ACTIVITIES

Stanford conducts both routine and emergency creek maintenance work in and around Deer and Matadero creeks. Routine maintenance consists of debris removal, including compliance with requests from the Santa Clara Valley Water District to remove downed trees and other debris from the creeks. This work is typically conducted during periods of low flow, but if an emergency arises, work in a creek can occur at any time of the year. Tree snags and other debris are removed only if they are disrupting the free flow of water or are causing undo erosion.

Debris removal and bank stabilization regularly occurs in the more urbanized areas of campus, such as areas near the Stanford Research Park along Matadero Creek.

Recent bank stabilization efforts at Stanford have involved sinking pillars into the existing bank, with little structural work done on the surface. In a number of locations, however, gabions, rip-rap, and concrete aprons are present. These older types of bank stabilization methods have a tendency to fail, and future repair work is therefore anticipated. During the life of the HCP, bank stabilization would only occur when needed. Stanford would conduct this bank stabilization using bioengineered structures and would not use gabions. Timing or need for bank stabilization is not known, but based on past experiences, Stanford anticipates constructing up to 10 bank stabilization structures along Matadero and Deer creeks during the life of the HCP, with each structure up to 200 feet in length, with no more than 50 percent of each structure consisting of hardscape materials such as rip-rap and concrete.

In addition to Stanford's creek maintenance activities, public agencies with maintenance easements over Stanford's lands may perform flood control and maintenance. Stanford does not have control over the public agencies' flood control activities, and these activities are therefore not included in the HCP.

3.2.1 Potential Effects of the Creek Maintenance Activities on the Covered Species

Creek maintenance activities in Matadero and Deer creeks will not affect California tiger salamanders because these creeks do not support this species. The hand removal of debris and fallen trees in areas deemed at risk of flooding can cause short-term impacts, but few long-term effects on California red-legged frogs and garter snakes because very few of these species inhabit downstream reaches that would be affected by the removal. In the rare case where the use of heavy equipment is required, this could have a short-term effect on California red-legged frogs and garter snakes

Bank stabilization work would frighten any individual California red-legged frogs or garter snakes that would be in the vicinity of the work. Tiger salamanders would not be affected by bank stabilization efforts because these areas are not occupied by California tiger salamanders.

3.3 FIELD ACADEMIC ACTIVITIES

3.3.1 Creeks

Researchers at Stanford conduct field activities in Matadero and Deer creeks on an annual basis. Much of the research involves monitoring California red-legged frogs and native fishes that live in the creeks. These efforts also monitor the changes in abundance of non-native species such as bullfrog, mitten crab, and crayfish. Geology and engineering researchers also utilize the creeks on a regular basis to perform research and to support teaching. Research in the creeks is primarily observational and typically non-manipulative. Some collection of specimens, both physical and biotic, does occur². Access to creeks is strictly controlled by Stanford, and is limited to trained researchers; introductory classes and large numbers of students are prohibited from the vast majority of creeks. Monitoring devices are occasionally placed in the creeks or in the riparian zone.

3.3.2 Foothills and Alluvial Plain

Faculty and students from many academic departments routinely use undeveloped portions of the Stanford foothills and alluvial plain.³ The activities conducted by these academic groups range from field studies in geology, archaeology, and engineering, to more humanities-oriented exercises in photography and cinematography. The field studies generally do not involve manipulations of biotic variables or significant earth moving. Study test pits and trenches are, however, used annually in the geology, geophysics, and earth systems courses. These range from simple soil borings to hand excavation of a trench up to 10 feet by 2 feet that remain open for up to a week. There are a number of academic facilities situated in the relatively undeveloped portions of the Stanford foothills and alluvial plain, including student observatory, solar observatory, radio telescopes, independent research institutions, and several plant growth facilities. These facilities require ongoing maintenance and are frequently upgraded (and occasionally expanded). Rodent and vegetation control is conducted at the facilities. Buildings in the main campus are discussed in Section 3.5.5.

Some collection of specimens, both physical and biotic does occur. Access to the foothills for academic purposes is controlled by Stanford, and is limited to approved researchers and classes. The biotically sensitive portions of this area are held off-limits to general studies. Monitoring devices are occasionally placed in the foothills.

There are more than 60 prehistoric archaeological sites and a number of historic period archaeological sites on Stanford's lands. Prehistoric sites include prehistoric Ohlone-Costanoan villages, cemeteries, stone tool raw material quarries, bedrock milling stations and petroglyphs. Historic archaeological discoveries at Stanford include Mexican rancho sites, gold rush towns, American ranches, Japanese and Chinese labor camps, 1906 earthquake rubble dumps, and trash

² This collection does not include Covered Species unless permits are obtained from the appropriate agencies.

³ The main academic campus is located on an alluvial plain.

pits associated with early campus housing. Stanford employs a university archaeologist to oversee the protection of the cultural resources, and to facilitate research and teaching activities at these sites. Research focusing on these resources occasionally involves extensive digs and vegetation clearing. These digs are not located within the creeks, but several of the digs have been in locations adjacent to the creeks. Archaeological teaching and research activities are dictated by the size and composition of the archaeological resource. A large-scale archaeological dig might last up to 15 months and consist of a main pit 450 square feet by 6 feet deep, with smaller associated pits. It is roughly estimated that Stanford could undertake up to five large-scale digs near the creeks during the life of the HCP. In addition, it is estimated that Stanford will conduct smaller investigations (e.g., a set of 10 pits, each 18 square feet, 3 feet deep) every few years. Pits are refilled at the end of the archaeological dig.

Additionally, researchers from the University engage in restoration biology throughout the lower foothills. In 2000, the University began funding this restoration work, and the goal is to find cost-effective ways to improve the existing non-native-species-dominated communities. This goal serves the University's desire to conserve its natural resources and the desire to improve the academic value of the lower foothills.

3.3.3 Lagunita

Lagunita is occasionally used by classes and researchers as an outdoor laboratory and study site. Generally, these academic activities are non-invasive and involve walking around Lagunita, making observations, taking water samples, and sometimes using small boats or rafts to collect information.

3.3.4 Potential Effects of the Field Academic Activities on the Covered Species

Academic activities could have direct and indirect effects on the Covered Species, but most of the impacts of Stanford's academic activities would be exceedingly minor and of short duration. Most of the academic activities that could cause take involve students or researchers walking through an area where the Covered Species were found. It is unlikely that an individual of a Covered Species would be stepped on or otherwise directly encountered during such activities. Individuals of the Covered Species found in the immediate vicinity of these academic activities could be disturbed by academic activities and alter their behavior. Additionally, if the number of person-visits to an area occupied by a Covered Species were too high, there could be some habitat degradation, or the behavior of Covered Species could be altered.

More invasive academic pursuits, including such tasks as archaeological digs, digging of geological test pits, and conducting habitat restoration projects, also could have short-term adverse effects on the Covered Species, including short-term habitat degradation. Individuals could become trapped in open pits. Continuous visits (i.e., an on-going archaeological dig) could disturb individuals and/or cause Covered Species to leave the area. It should be noted that many of the research activities (e.g., water quality testing, soil characterizations, population studies) would result in information that provides substantial positive benefits to the Covered Species.

The maintenance of facilities, mainly dirt trails and monitoring stations, associated with field academic activities would have only a minor potential to impact Covered Species. As this work typically would occur during daylight hours and during the dry season, any potential impacts would be short-term and minor.

3.4 UTILITY INSTALLATION AND MAINTENANCE

There are a number of above- and below-ground power, communication, steam, chilled water, potable and non-potable water, sewer, and drainage (e.g., flow-filtering manholes and detention basins) utilities, and related facilities at Stanford.⁴ There also is an extensive steam and chilled water system on the main campus that includes water distribution facilities, such as water meters, pipes, open channels, fire hydrants, manholes, and meters. Storm drains are located throughout campus and include drains into Matadero Creek. A majority of these facilities are located in the main campus. However, essentially all parts of the campus are served, and hence crossed, by utility lines. In addition, existing utilities will have to be improved, and new utilities will be installed during the life of the HCP. Stanford may need to construct additional utility facilities and lines to fully utilize existing utility facilities. Other improvements also might be needed to accommodate new technologies. For ease of operation, and to reduce the potential environmental effects, most new utilities are installed in existing utility corridors.

Many of the existing utilities, including major domestic water supply facilities and power supply utilities, are located in areas that are occupied by the Covered Species. Domestic water system utilities also are located adjacent to, through, and under creeks. Maintenance of existing and new utilities, including utilities located in habitat areas, includes vegetation control around the utility lines and replacement of utilities and associated infrastructure such as power poles. Utilities located in undeveloped areas are generally accessed by designated access roads or by driving through open grasslands. Underground work is typically limited to a defined utility corridor. When work is done away from existing roads, the surface is usually replanted with a mix of native grasses and forbs (for maintenance considerations, shrubs and trees are not typically planted on top of or below utility lines).

3.4.1 Potential Effects of Utilities on the Covered Species

Utilities are located in virtually all areas of Stanford University, and they are maintained and upgraded on a regular basis. New utilities are commonly constructed, in response to changes in the University's needs and to comply with public safety codes. Pipe repairs are performed as needed; however, despite its age, the water distribution pipe system is in good shape. Pipe replacements are also performed on an as-needed basis, and much of the system will need to be replaced over the next few decades.

Maintenance and improvements to existing infrastructure are typically confined to the existing footprint of the structure, and, as such, these activities usually have a minimal and temporary effect on the Covered Species. However, some of the maintenance actions, including ground disturbing activities, new utility installations, and utility line maintenance or replacement, and

⁴ Some of the utilities such as PG&E and SFPUC facilities are not owned by Stanford. These facilities and the maintenance, repair, and other activities associated with these facilities may be covered under this HCP through Certificates of Inclusion, which are described in Chapter 6.

work in, under, or adjacent to creeks (e.g., pipeline repair, temporary use of coffer dams, etc.) can result in the take of Covered Species. In addition, emergency repairs may be required any time of the year.

The presence of underground, and above-ground, utilities do not affect the Covered Species. However, ground disturbance associated with the maintenance, replacement of existing utilities, or installation of new utilities could adversely affect tiger salamanders, red-legged frogs, and garter snakes. The magnitude and duration of the effects depend upon the type of infrastructure that was installed and the location of the new infrastructure. Installation activities near or across the creeks would have greater effects on the Covered Species located in the creeks, and could result in take; whereas, the installation of new utilities in the developed portions of the campus would likely not affect the Covered Species. The installation of new utilities in the foothills also could impact California tiger salamanders and garter snakes, but would not have an effect on the other Covered Species.

Species could become trapped in open trenches or holes if construction sites were not properly fenced or covered. Ground disturbance in the Lagunita area and foothills could harm or kill salamanders (especially if an occupied burrow were destroyed) and ground disturbance in the Lagunita area and foothills also could temporarily disturb small amounts of garter snake habitat and could disturb individual snakes by frightening a snake away from the construction area. Maintenance and installation of utilities near Matadero and Deer creeks could affect California red-legged frogs and garter snakes, including a temporary loss of habitat from vegetation removal and trenching along the utility corridor, which is approximately 10 feet wide. These activities could also result in frogs or snakes being disturbed and frightened. Minor changes in the creek bank or topography of the riparian areas would not have any long-term effects.

Underground utility maintenance and installation in the vicinity of Lagunita and the foothills is anticipated to occur every 3-5 years. Utility maintenance and installation near Matadero and the amount of any permanent land conversion associated with new infrastructure would be mitigated in accordance with Section 4.4 of the HCP.

3.5 GENERAL INFRASTRUCTURE

Urban infrastructure exists in areas that are occupied by or provide habitat for the Covered Species. This infrastructure includes private roads, unpaved service roads, private bridges, fences, detention basins, deep wells, buildings, and private residences. Operation of the University, and much of the surrounding community, depends upon the operation of this infrastructure. Therefore, it is mandatory that these uses be maintained. Also, the addition of new structures at existing facilities or operational changes may be necessary.

3.5.1 Roads and Bridges

There is a broad network of Stanford-controlled roads that provide access to all of Stanford. These private roads range from paved four-lane roads in the main campus, to narrow dirt or gravel service roads in the undeveloped portions of the University. These roads are maintained regularly, both for public safety and in an effort to reduce environmental impacts. The type and frequency of road maintenance depends upon the route; heavily traveled paved roads generally

require more frequent maintenance than rural service roads. As part of Stanford's road maintenance activities, roads are occasionally rerouted. Resurfacing, vegetation control, and other similar maintenance activities are conducted during daylight hours, and during periods of no rain. Roads are occasionally realigned, most often in response to public safety concerns or in an effort to reduce environmental impacts.

New roads are occasionally required for public safety or as land uses change. New roads that were not associated with replacement and restoration of an existing road in a more sensitive location would result in a net loss of habitat. The amount of permanent land conversion associated with a new road would be mitigated in accordance with Section 4.4 of the HCP. In addition to Stanford's system of private roads, several public roads cross Stanford (e.g., Junipero Serra Boulevard, Sand Hill Road, and Stanford Avenue). Activities by Stanford on the public roads located on Stanford's lands are Covered Activities. Stanford sometimes encroaches into these roadways to maintain utilities or construct salamander tunnels, and these activities are covered by the HCP.

There are several bridges crossing Matadero and Deer creeks. . These are maintained and improved on an as-needed basis. Maintenance is generally restricted to resurfacing the structure or to trimming overhanging vegetation, but occasionally more significant structural work is required, including replacing spans or supports or the entire bridge. In some situations, a small portion of the creek, typically less than 200 feet, is temporarily contained in a pipe as the creek channel up and downstream of the bridge is spanned with coffer dams. Major bridge work is fairly infrequent, and it is expected that during the 50-year span of the HCP, coffer dams and bypass pipes will only be needed on three or four occasions. In addition, it is possible during the life of the HCP that Stanford would need to construct new bridges. It is anticipated that any new bridges would span the creeks, with no permanent structures within the creek channel, and that no more than two bridges over creeks where Covered Species are located would be constructed. Construction of new bridges could require temporary falsework in the creek, vegetation removal, and dewatering with coffer dams and bypass pipes.

3.5.1.1 Potential Effects of Roads and Bridges on the Covered Species

Roadway maintenance could disturb habitat for all Covered Species. Indirect take caused by reduced vegetation or minor maintenance-related runoff would also be very limited, and would consist of few individuals of the Covered Species relocating themselves away from inhospitable areas. Likewise, maintenance workers and equipment could temporarily disturb habitat.

Repair or maintenance of existing bridges or bridge construction could also adversely affect California red-legged frogs in Matadero or Deer creeks. These activities could require the use of falsework and coffer dams, resulting in adverse effects to red-legged frog tadpoles and metamorphs. If an area were de-watered, the relocation of these animals could result in mortalities and increased competition for resources at the relocation site. Maintenance workers and equipment on the creek bank may also disturb red-legged frogs and garter snakes.

No disturbance of California tiger salamanders is anticipated during bridge maintenance because tiger salamanders are not found near Matadero and Deer creeks. Many California tiger

salamanders are killed by traffic on roads at Stanford. However, most of the mortalities occur on Junipero Serra Boulevard, a Santa Clara County road that traverses the campus near Lagunita.

3.5.2 Fences

Fences are widespread in the undeveloped portions of campus. Many of the fences are used to control public access, while others define leaseholds. The agricultural tenants also operate a series of fences. In addition, fences are a necessary component of conservation planning at Stanford and are used to protect valuable habitat.

Fences at Stanford are inspected and repaired on a continuous basis. Vandalism, fallen trees, auto accidents, and simple aging all take their toll on the fences. Fence repair work is usually quite simple. A work crew drives as close as possible to the damaged fence and repairs the fence by hand, though power augers are occasionally used for post-hole digging. In addition, Stanford commonly moves existing fences, removes unused fences, and installs new fences. In the case of new fences, shrubby vegetation is sometimes cleared from the fence route.

3.5.2.1 Potential Effects of Fences on the Covered Species

The installation and maintenance of fences at Stanford is a fairly low impact endeavor. It is possible that individual California tiger salamanders, California red-legged frogs, and garter snakes could be disturbed by replacing a fence post or by workcrews accessing the site. The fences do not act as barriers to migration of Covered Species.

3.5.3 Detention Basins

Stanford recently constructed stormwater detention basins within the central campus to intercept increased runoff that may be caused by future campus development. The basins are earthen (unlined), and include subdrains and pipe systems to convey accumulated runoff to the regional storm drain system. The currently existing detention basins in the San Francisquito Creek watershed are just over 1 acre in size and located along Sand Hill Road near Stock Farm Road. Additional detention facilities (basins and/or buried pipe systems) are planned along Sand Hill Road, both north and south of the existing basins, for future development in the west region of campus. The detention basins located in the Matadero Creek watershed are approximately 3 acres in size and are located along El Camino Real near Serra Street. This detention system is designed to accommodate 100-year storm events (i.e., storms of a sufficient magnitude that they have no more than a 1 percent chance of occurring in any given year). The new detention basins will detain the increased runoff and keep it from entering San Francisquito Creek or Matadero Creek until well after the peak creek flow has receded. In the event of a 100-year storm, the basins are designed to drain within approximately 2 days (48 hours). During storm events of lesser magnitude, the basins would hold water for a shorter period of time. The purpose of the basins is to reduce peak flows by detaining a portion of the runoff for a short period of time. The basins do not provide long-term water storage.

3.5.3.1 Potential Effects of the Detention Basins on the Covered Species

While detention basins are temporarily collecting storm water, individual California tiger salamanders may be attracted to them and interrupt their migration to suitable breeding locations. However, while the basins located near Sand Hill Road are within migration distance of the California tiger salamanders, there are significant barriers located between Lagunita and the basins and CTS surveys have not found them in the basins. While California tiger salamanders are not expected to be present, there is a remote possibility that an individual could be found at the detention basin as the population expands. There are no garter snakes or red-legged frogs at the detention basins.

3.5.4 Wells

There are groundwater wells that serve as a backup supply of potable water, but also are used to supplement the supply of irrigation water in the summer and fall. Well water is also occasionally used to maintain the water level in Lagunita. Operation and maintenance activities include mechanical and electrical work on the pumps, motors, valves, and control systems, as well as periodic refurbishment of the wells.

Due to the cost of operating the wells, Stanford minimizes the amount of time that they are in use. Stanford's wells are relatively deep (for the area), averaging 300 to 600 feet below the surface. Several thick clay layers, mostly laterally continuous and ranging from 20 to 80 feet thick, form aquitards above and between the coarse water-bearing units.

3.5.4.1 Potential Effects of the Wells on the Covered Species

Maintenance activities at the surface portions of the wells could impact California tiger salamanders or garter snakes. Such impacts would be confined to disturbing an individual of the Covered Species which might be hiding around the structure. The wells are located out of the current range of the California red-legged frog, and well maintenance will therefore not affect California red-legged frogs. California tiger salamanders and garter snakes are found in the general vicinity of the wells.

3.5.5 Academic Buildings

Stanford's central campus includes approximately 13 million square feet of academic, academic support and housing structures, including student residences, libraries, laboratories, and lecture halls. The central campus also includes faculty/staff housing. These buildings and their associated landscaping are continuously maintained, frequently modified, and occasionally demolished. New buildings are constantly being constructed, and are discussed under "Future Development." Academic buildings located out of the main campus were discussed under "Academic Activities."

3.5.5.1 Potential Effects of Academic Building Maintenance on the Covered Species

Covered Species that enter into the built portions of campus will likely die, due to the number of hazards in the urban environment. Maintenance and modification of these buildings could potentially harm a Covered Species, particularly California tiger salamanders that are occasionally found near buildings adjacent to Lagunita. Additionally, garter snakes are occasionally observed in and around the buildings adjacent to Lagunita. These snakes leave the area as soon as they are encountered by people.

3.6 RECREATION AND ATHLETICS

3.6.1 Stanford Golf Course, Practice Facility, and Driving Range

Stanford University operates an 18-hole golf course north and south of Junipero Serra Boulevard, to the southeast of Sand Hill and Alpine roads (Figure 3-2). There are no pooled water hazards associated with the course. There is a network of golf cart paths that allow players to access the course.

Golf course maintenance practices are focused on mowing and fertilizing the greens, fairways, and roughs; and maintaining the paved golf cart paths. Stanford utilizes an integrated pest management approach for golf course maintenance. Pesticides for weed and insect control are only used as a last resort and in accordance with all State and local pest control regulations. The Stanford golf course has been designated as a “Clean Bay Business” certified by the City of Palo Alto for hazardous materials handling and storage efforts. The pesticide use decreased approximately 75 percent since the mid-1990s. Pests are now spot-treated, as opposed to the previous method of broadcasting those treatments. The “roughs” have been naturalized to provide under-story vegetation for wildlife. Pesticide use will continue to be used in this way, but pesticide use is not a Covered Activity

There is also an approximately 25-acre golf practice facility located adjacent to the main golf course and Sand Hill Road. This facility is operated and managed in a manner similar to the main golf course.

In addition to the 18-hole course, there is a driving range on approximately 13 acres of modified grassland next to Lagunita on its northwest side. The driving range has its own parking lot, service building, strip of tee boxes, putting green, and chipping mound at the northwest end. The range also includes lighting to allow nighttime operation, target greens, and distance markers. Operating hours are from 8:30 a.m. to 10:00 p.m. on weekdays and from 7:00 a.m. to 10:00 p.m. on weekends. The range closes early on rainy nights.

Driving range balls are collected from noon to closing, depending upon the need. Ball collection is done mechanically using a tractor-driven collecting device. A fence is located at the south end of the range to keep balls on the irrigated part of the turf, which makes ball collection easier.

The golf course, practice facility, and driving range are periodically redesigned. These changes typically involve moving tees or green locations. These moves are located within the existing footprint of the highly modified landscape.

3.6.1.1 Potential Effects of the Golf Course, Practice Facility, and Driving Range on the Covered Species

Operation and management of the golf course, practice facility, and driving range may adversely affect California tiger salamanders and garter snakes. California tiger salamanders and garter snakes do not utilize the fairway and green portions of the golf course, practice facility, or the driving range for upland habitat, because it is manicured lawn and burrows are not present. California tiger salamanders and garter snakes will traverse the open areas, the fairways, and the greens, but they seem to avoid them as exceedingly few California tiger salamanders and no garter snakes have been observed in such areas during the last 15 years of monitoring at Stanford. Undeveloped portions of the golf course and driving range that are not surrounded by manicured fairways are occupied by California tiger salamanders and garter snakes. California tiger salamanders and garter snakes could also be impacted through mowing of turf, fairways, and greens, and the maintenance of vegetation in the areas adjacent to fairways and greens.

Ball retrieval at the driving range during rainy nights has the potential to harm or kill California tiger salamanders and garter snakes. However, the driving range typically closes on rainy nights due to lack of use and the balls are generally not retrieved during the rain.

California red-legged frogs have not been observed at the golf course (or in the reaches of San Francisquito Creek adjacent to or areas downstream of the golf course) for several decades.

3.6.2 Lagunita-Related Recreation

Since 2001, Stanford has not used Lagunita for scheduled recreational purposes. In the past, however, numerous community and University activities occurred at Lagunita. During non-drought years, the Stanford Windsurfing Club used Lagunita for windsurfing courses. To support this activity, the Windsurfing Club would bring in storage containers that contained sail boards and small boats. Students could use the sailboards and boats on their own or take lessons throughout the spring quarter during the hours of 9 a.m. to 6 p.m. To facilitate recreational activities, emergent aquatic vegetation was mechanically cleared from part of Lagunita during the late spring and several tons of sand was imported to create a swimming beach. During those periods of formal recreational use, Lagunita was monitored by Stanford for several health-related parameters (Coliform bacteria levels, etc.). Despite the regular outbreaks of “swimmer’s itch”, a generally harmless condition caused by a trematode parasite, Lagunita was a very popular recreational facility.

Formerly, Lagunita was the site of the annual Big Game Bonfire and a mud volleyball fund-raising event. These two popular, traditional events probably had an adverse effect on the California tiger salamanders at Lagunita and were therefore cancelled in the early 1990s.

A partially developed trail system encircles Lagunita. This trail is open and receives heavy public use, including many dogs.

3.6.2.1 Potential Effects of Lagunita-Related Recreation on the Covered Species

The past use of Lagunita for recreational purposes may have adversely affected California tiger salamanders and garter snakes. However, historically the recreational uses prompted the University to fill Lagunita, and likely facilitated California tiger salamander and garter snake breeding at Lagunita and persistence at Stanford. People using the trail around Lagunita may disturb California tiger salamanders and garter snakes. However, it is unlikely that the trail is used on rainy nights when California tiger salamanders are generally migrating.

3.6.3 Recreational Routes

Stanford's 2000 General Use Permit required implementation of the Santa Clara Countywide Trails Master Plan through the construction, operation, and dedication of a trail that is located roughly along Matadero Creek (Figure 3-2).

Stanford also maintains recreational routes in the "Dish" area of the foothills between Junipero Serra Boulevard and I-280. Recreational use to the area began in the mid-1980s, and Stanford posted a clear set of rules and regulations governing the uses of the trail. Prior to 2000, Stanford did not have the resources to enforce the rules and regulation. As a result more than 13 miles of unauthorized footpaths and an array of structures were built (e.g., tree houses, labyrinths, fire rings, and tunnels). There was 24-hour-a-day access, and numerous dogs were not contained on leashes. In 2000, Stanford initiated a foothills management program, and now pedestrian traffic is only allowed on designated trails. Non-designated trails have been closed off and are being restored, dogs are no longer permitted, and there are frequent security patrols. These measures will reduce human impacts on the flora and fauna of the foothills. The recreational routes are part of the University's paved service roads. Maintenance of these roads and potential impacts on Covered Species are discussed in Section 3.5.1.

3.6.3.1 Potential Effects of Recreational Routes on the Covered Species

Recreational use of the foothills by pedestrians is now regulated by the University, and members of the public rarely stray from designated paths and are not allowed on-site after dark. Dogs are not allowed in the Dish area of the foothills. Use and maintenance of these recreational routes could disturb California tiger salamanders and garter snakes.

Recreational use of the trail associated with the 2000 General Use Permit along Matadero creek could affect California red-legged frogs and garter snakes by bringing humans in proximity to the creeks, but use of the trails will be subject to rules and regulations prohibiting entry into the creeks and unauthorized disturbance of riparian vegetation. In addition, the improvement, operation, and ongoing maintenance of the existing trails could affect these Covered Species through bank stabilization activities.

3.7 GROUNDS AND VEGETATION

3.7.1 Fire Control and Public Safety

Stanford engages in several fire control and public safety activities, including the maintenance of fire breaks and vegetation control. Various techniques are used to control weeds so that they do not become fire hazards in the summer and fall months. The primary techniques are flail mowing, discing, and herbicides. Flail mowing is used for weed suppression in open fields with tall grasses. The mower is attached to a tractor and can cut grass down to ground level. Flail mowing of approximately 70 acres is typically done one to three times during the summer in open space areas. Discing and mowing are used to create fire breaks in grassland areas. Discing is typically used along roads and pathways in the foothills and along Junipero Serra Boulevard. The amount of discing that is typically conducted in sensitive California tiger salamanders areas south of Junipero Serra Boulevard is estimated to be 4,500 feet by 20 feet wide, or a total of about 2 acres.

3.7.1.1 Potential Effects of Fire Control Activities on the Covered Species

All of the vegetation control methods used for fire control can result in adverse effects to California tiger salamanders, garter snakes, or California red-legged frogs. Mowing is currently used to manage vegetation and improve areas for California tiger salamanders. Discing during the dry season is unlikely to adversely affect Covered Species, because the depth of the discing is fairly shallow (approximately 6 inches) and the rodent burrows supporting California tiger salamanders (and possibly California red-legged frogs) tend to be much deeper. Discing could harm any garter snakes present on the surface.

3.7.2 Grounds Maintenance

The Stanford Grounds Department maintains the landscaping throughout the campus, including planting and pest control (i.e., weeds and animal pests). The following is the list of activities that Stanford carries out that could affect the Covered Species.

General Maintenance. The Stanford Grounds Department manages formal landscaped areas, including lawns, planters, and road medians. These areas are re-planted, trimmed, irrigated, fertilized, and mowed as needed. Maintenance activities also require substantial infrastructure, including irrigation boxes (e.g., housing valves, timers, etc.).

Animal Pest Control. In some locations on campus, burrowing mammals, including ground squirrels, gophers, and moles, need to be controlled for safety reasons and because they destroy the landscaping. Underground poison bait stations and traps are used to control ground squirrels. The bait stations are placed near parking areas and in open fields. Moles and gophers are controlled using traps and poison bait placed in their tunnels. Rats and mice also are controlled via various methods throughout the developed part of campus. Pesticide use is not a Covered Activity, although the other animal pest control methods are Covered Activities.

Temporary Stockpiling/Staging. Stanford periodically has a need for temporary stockpiling of dirt, compost materials, or construction materials on its lands.

Weed Control. Various techniques are used to control weed growth throughout the campus, including mulch cover (wood chips), flail mowing, discing, and herbicides. Wood chips from oak, eucalyptus, and other hardwood trees, are placed along pathways and roads, and around trees and buildings to suppress weed growth, retain water, and suppress fire, and flail mowing is used for weed suppression in open fields with tall grasses. The discing of broad areas was commonly used to control weeds until the early 1990s, but was discontinued in most of the environmentally sensitive areas in favor of the more environmentally sound mowing.

3.7.2.1 Potential Effects of Grounds Maintenance Activities on the Covered Species

Grounds maintenance and vegetation control activities at Stanford have been modified as a result of the implementation of the California Tiger Salamander Management Agreement in June 1998 to avoid and/or minimize the potential effects of the above described activities on California tiger salamanders. Under most circumstances, activities conducted by the Grounds Department would not result in direct take of the Covered Species.

General Maintenance. Since these activities occur primarily in the built portion of campus or in association with a facility, they would not have direct effects on California red-legged frogs. However, stray California tiger salamanders and garter snakes are found scattered throughout campus and garter snakes and California tiger salamanders could get trapped in irrigation boxes, and landscaping activities could harm individuals.

Animal Pest Control. Control of burrowing mammals can indirectly affect California tiger salamanders by reducing the number of burrows available. It also is possible that the indiscriminate use of rodenticides can cause toxins to enter the local food chain, and affect the Covered Species (primarily California tiger salamanders), and it is also possible that California tiger salamanders can be directly harmed by traps. These pest control efforts do not impact garter snakes.

Temporary Stockpiling/Staging. The placement of stockpiled materials could affect the terrestrial Covered Species. Individuals of these Covered Species could take refuge in stockpiled materials, resulting in possible take when the materials were moved.

Weed Control. The use of wood chips is unlikely to affect the Covered Species. Mowing also is not likely to directly affect the Covered Species because the timing and location of mowing (open grasslands, daytime, and in dry weather) does not coincide with periods when any of the Covered Species would be present. Biocides would be used according to industry standards and applied by well-trained crews, and their use is not a Covered Activity.

3.8 EQUESTRIAN AND GRAZING LEASEHOLDS

3.8.1 Equestrian

Approximately 400 acres in the vicinity of, and immediately adjacent to, Matadero and Deer creeks are leased or licensed for equestrian-related activities, including facility-intensive horse boarding and training, and less intensive open pasture and trails (Figure 3-3). A number of

boarding and training facilities are situated adjacent to riparian areas known to support the Covered Species. Likewise, many of the access roads for the equestrian facilities are located adjacent to creek banks. Manure and other refuse is collected from the equestrian facilities on a regular basis, stored on-site in piles, and removed for disposal every few days. The refuse piles are covered during the rainy season and are located a minimum of 150 feet from the top of any creek bank.

Horse pastures at Stanford are typically fairly flat, although there are a number located on steep hillsides. Grazing intensity varies, but in many years grazing is insufficient and supplemental feed must be provided.

Pastured horses have limited direct access to Deer and Matadero creeks. Equestrian trails are located throughout the undeveloped portions of Stanford. Trails cross creeks via unimproved crossings at several locations in the Matadero/Deer watershed. These crossings tend to be sites where erosion and horse waste impact water quality.

Horse washing facilities are present in all of the equestrian operations. The horse washing facilities are located more than 150 feet from the top of any creek bank.

3.8.1.1 Potential Effects of Equestrian Uses on the Covered Species

Equestrian-related activities could adversely affect California red-legged frogs by contaminating water sources with animal waste. These impacts are particularly problematic in locations that have stables and paddocks adjacent to the top of creek banks, grazing on steep slopes, and horses that have direct access to creeks (in some pastures and where trails cross creeks). In addition, horses could trample Covered Species, especially in locations that the horses cross the creeks.

3.8.2 Grazing

Stanford maintains grazing leases on approximately 540 acres in the foothills (Figure 3-3). Grazing reduces the fuel load and is important for fire hazard reduction. Cattle in individual leaseholds typically free range over several hundred acres. Water troughs and salt licks are scattered throughout the cattle grazing areas and cattle have direct access to several of the minor seasonal creeks. Major creeks are fenced to prevent access by cattle.

3.8.3.1 Potential Effects of Grazing on the Covered Species

Managed grazing generally benefits grassland ecosystems. At Stanford, cattle have not grazed in most of the foothill areas that are occupied by California tiger salamanders and garter snakes since the mid-1980s. The foothill areas that are currently grazed are generally too far from Lagunita to provide upland habitat for California tiger salamanders that breed in Lagunita and garter snakes have not been observed in these areas.

3.9 COMMERCIAL AND INSTITUTIONAL LEASEHOLDS

3.9.1 Independent Research Institutions

A small number of sites located in the “Lathrop” district of the University, in Santa Clara County, south of Junipero Serra Boulevard, are leased to independent research institutions. These sites are within or adjacent to California tiger salamander upland habitat and include improvements typically associated with academic facilities: buildings, roads, paths, parking lots, lighting, etc. Although many of these sites incorporate non-irrigated native plant landscaping, they also include managed landscapes primarily intended for human uses, and include irrigated non-native plants, furnishings, paving, and recreational facilities.

3.9.1.1 Potential Effects of the Independent Research Institutions on the Covered Species

Maintenance and operation of independent research institutions located in the undeveloped portions of campus can result in the take of Covered Species. California tiger salamanders and garter snakes are more vulnerable to impacts from these institutions because they are located in areas that provide upland habitat for these two species. Maintenance of the facilities involves landscaping and utility work, both of which often involve earth moving and vegetation modification. Rodent control also is a necessary part of the management for these institutions, but is limited to the immediate proximity of the buildings. Digging, vegetation removal, and rodent control can take California tiger salamanders. Likewise, unless adequately fenced or covered, short-term trenches can act as traps for dispersing California tiger salamanders, and inappropriately placed structures can act as barriers.

3.9.2 Commercial Leases

There are many urban leases in Palo Alto (Figure 3-4). These leases include the Stanford Research Park, Stanford University Medical Center, Stanford Shopping Center, and other commercial uses. These leases are all located in developed urban areas.

3.9.2.1 Potential Effects of the Commercial Leases on the Covered Species

These leases are for fully developed properties. The ongoing use, maintenance, and re-development of these properties would not have direct effects on the Covered Species. However, stray California tiger salamanders, garter snakes, and California red-legged frogs are occasionally found scattered throughout campus and could be affected by urban activities at these fully developed properties.

3.10 FUTURE CAMPUS DEVELOPMENT

Under the HCP, the future development of Stanford land is a Covered Activity. Potential future development includes new academic, academic support, residential, athletic, and commercial facilities. As discussed in more detail below, the County of Santa Clara granted Stanford a General Use Permit (GUP) that allows Stanford to develop certain lands that are located in unincorporated Santa Clara County. Stanford does not have any specific plans to develop

additional land that supports Covered Species, beyond the development permitted by the GUP. However, the Covered Activities include additional future development that could occur during the life of the HCP. This additional development also will require discretionary permits from state and local agencies, which in turn could trigger compliance with state and local regulations, including environmental review under the California Environmental Quality Act (CEQA).

Future development in areas that are already developed, and which do not provide habitat for or support the Covered Species, would not have direct effects on the Covered Species. However, stray California tiger salamanders, garter snakes, and California red-legged frogs are occasionally found scattered throughout campus and could be harmed by future development even in the developed areas.

3.10.1 Development Associated with Santa Clara County 2000 GUP

The development permitted by the GUP is currently anticipated to be completed in approximately 8 years. Most of the development permitted by the GUP will be infill development. However, development could conceivably occur in areas that provide habitat for the Covered Species, primarily California tiger salamander and garter snake habitat. Under the GUP, Stanford could develop land that is occupied by the Covered Species or that provides potential habitat for the Covered Species. For the purposes of analysis, this HCP anticipates that development under the 2000 GUP could result in the removal of 30 acres of habitat.

The remainder of the allowed academic, academic support, and residential development allowed under the GUP will occur in already developed portions of the campus, which do not provide habitat for, or support, the Covered Species. This infill development generally would not adversely affect the Covered Species; however, stray California tiger salamanders, garter snakes and California red-legged frogs occasionally migrate into these developed areas. Therefore, future in-fill development in the central campus is a Covered Activity.

3.10.1.1 Potential Effects of Development under 2000 GUP on the Covered Species

All of the potential environmental impacts of the GUP were addressed in an Environmental Impact Report (EIR) certified by the County of Santa Clara in December 2000. The EIR contains a detailed analysis of the impacts of the GUP on various resources including biological resources. In summary, the EIR found that the academic and residential development permitted under the GUP would result in a minimal amount of take of California red-legged frogs and steelhead, primarily by way of habitat modification. The approved development would result in a loss of California tiger salamander habitat, as well as potential loss of individuals due to direct mortality or reduction of reproductive success (i.e., inability of adults to reach breeding sites, inability of juveniles to disperse to upland habitat).

The EIR imposed several Conditions of Approval to reduce the impacts on these Covered Species to less than significant. One of these Conditions recognized the potential future Stanford HCP, and this HCP will fulfill GUP Condition J.9 as soon as it is approved by the Service:

“Condition J.9. If the CTS is listed as threatened or endangered under the federal Endangered Species Act or any successor statute with the purpose of protecting

endangered or threatened species, an appropriate permit will be obtained from the USFWS . The conditions of the GUP that address California tiger salamanders shall be superseded by any subsequent Habitat Conservation Plan (HCP) approved by the USFWS, so long as the HCP provides at least as much habitat value and protection for CTS as these Conditions of Approval.” (page 24)

At the time of the HCP drafting, none of the academic or residential GUP projects with the potential to impact the California tiger salamander had been proposed or constructed. However, several conditions of approval had been fulfilled, including the construction of eight new breeding ponds south of Junipero Serra Boulevard (JSB) and three amphibian tunnels across JSB.

Future development was also addressed through the California Tiger Salamander Management Agreement, approved by the CDFG, the Service, and Santa Clara County in June 1998. This agreement was entered into before California tiger salamanders were protected under the ESA, and does not provide incidental take authorization. However, the Management Agreement provides conservation guidelines that have been incorporated into the HCP’s Conservation Program (Section 4.0). The HCP will supersede the California Tiger Salamander Management Agreement.

3.10.2 Development Beyond the Santa Clara County 2000 GUP

The GUP will expire when development covered by the permit has been completed. Prior to its expiration, Stanford will determine its needs for housing, educational facilities, recreational facilities, etc., for the next planning horizon. Future development up to at least 2025 will be guided by Stanford’s Community Plan and the existence of the Academic Growth Boundary that was established in 2000. The Academic Growth Boundary restricts virtually all academic growth in unincorporated Santa Clara County to the currently developed portions of campus (primarily north of Junipero Serra Boulevard).

Planning for the future development of Stanford’s lands in Santa Clara County beyond the GUP, was estimated based on current planning principles of density and building efficiency. These assumptions present a reasonable forecast of future development during the 50-year life of the HCP; however, actual development could vary from these predictions. Specific future building projects have not been identified at this time, and the forecast is based on the distribution of potential building sites within currently undeveloped land.

In accordance with current planning principles of density and building efficiency, as well as economic and research uncertainties, the HCP forecasts that Stanford could develop 1-2 acres per year of land that provides habitat for, or is occupied by, the Covered Species. Development at this rate would result in a total development of 50-100 acres over the 50-year life of the HCP. This development likely would not occur in regular increments annually, but would more likely occur as a 20-acre project every decade, or a 10-acre project every 5 years, at a maximum⁵. It could also occur as small operational projects that result in permanent conversion of habitat.

⁵ Assuming a lower density campus development of 0.25 Ground Area Coverage and two-story buildings, 1-2 acres would support 20,000 to 40,000 gsf of academic development. Assuming a housing density of 4-5 single-family

3.10.2.1 Potential Effects of Future Development on the Covered Species

The future development beyond the GUP could remove approximately 50 to 100 acres of land that is either occupied by the Covered Species or that provides habitat for the Covered Species. The total future development during the 50-year term of the HCP represents 4.4 percent to 7.1 percent of the Covered Species' habitat, and would not affect the persistence of any of the Covered Species. However, reducing the amount of available habitat could reduce the future maximum size of the species' populations. Construction activities could result in the take of Covered Species. Species that became trapped in a construction area could be killed or harmed by construction related equipment, and future development could result in new barriers to migration. This would result in the loss of individuals due to direct mortality or reduction of reproductive success if adults were unable to reach breeding sites or juveniles are unable to disperse to upland sites.

3.11 HABITAT MANAGEMENT, MONITORING, AND ENHANCEMENT

Chapter 4 of the HCP describes the Conservation Program that Stanford will adopt in order to contribute to the recovery of the Covered Species, and to minimize the effects of the Covered Activities and mitigate for the unavoidable adverse effects of the Covered Activities on the Covered Species. Under the Conservation Program, Stanford will actively manage, monitor, and enhance some of its land for the Covered Species and will undertake numerous activities to reduce the potential effects of the Covered Activities on the Covered Species. These management, monitoring, and enhancement activities include the preservation of areas that are important for the long-term survival and persistence of the Covered Species, surveys for Covered Species and invasive species, water quality monitoring, revegetation, vegetation management, erecting fences if needed to protect the Covered Species, construction of new wetlands suitable for California tiger salamander reproduction, and employing adaptive management to modify or introduce new management techniques. Many of these activities will occur in the most biologically sensitive areas, where the Covered Species are located.

Specific management and monitoring activities that could affect Covered Species include the activities described below.

Surveys. Surveys will be conducted for Covered and non-native species. Methods include day and night visual surveys, snorkeling, dip netting, and trapping.

Pond construction. Pond construction includes grading activities to create the pond, planting of native materials and/or hydroseeding, and inoculating the new wetlands with appropriate species of aquatic invertebrates.

Creation of cover piles. This includes use of logs or rocks inserted into the ground. These attract ground squirrels and are useful in enhancing California tiger salamander upland habitat.

units per acre, 1-2 acres would support 4-10 housing units each year. Thus, during the life of the HCP, approximately 1,000,000 to 2,000,000 gsf of academic development, *or* 200-500 single-family housing units, *or* some combination of the two (e.g., 1,000,000 gsf of academic development and 200-350 housing units) could occur.

Modification of creek banks. A number of management and monitoring activities could affect the creek bank, including bank stabilization, erosion control, removal of barriers in the creek, restoration planting, and removal of non-native plants.

Relocation of “salvaged” individual Covered Species. The Conservation Program includes the relocation of individuals found in harm’s way (e.g., in urbanized areas or in side pools or ponds that were isolated and/or drying prematurely) to safer locations within protected areas.

Control of non-native species. The Conservation Program includes ongoing surveys for non-native species, and the removal of non-native animal species will occur through hand capture and trapping, as described in Section 4.3.1.2 Matadero/Deer Easement Monitoring, Section 4.3.2.2 CTS Reserve Monitoring and Management Plan, and Section 4.6 HCP Monitoring Program. Control of non-native plant species includes mowing, hand removal, grazing, and the spot application of herbicide if hand removal is not effective or is not feasible because of the range of the infestation.

3.11.1 Potential Effects of Habitat Management, Monitoring, and Enhancement on the Covered Species

The management, monitoring, and enhancement activities associated with the Conservation Program will benefit the Covered Species. Although the long-term effect of these activities will be beneficial to the Covered Species and their habitat, the activities could result in the incidental take of the Covered Species.

Surveys. Day and night visual surveys, and snorkeling, will not impact California tiger salamanders. Use of these methods does have the potential to temporarily alter the behavior of California red-legged frogs and garter snakes because these species typically attempt to avoid humans by either finding cover or by leaving the immediate vicinity of the person conducting the survey. These effects are minor and generally limited in duration to the brief periods during which the observer is surveying a particular area. Dip netting and trapping have the potential to impact the tiger salamander and garter snake. However, if employed with caution, the level of take associated with each of these techniques is minor. Dip netting has the least potential to cause take, but it should be expected that such activities will cause the take of several larval California tiger salamanders and California red-legged frogs. Dip netting will not affect garter snakes.

The proposed survey trapping for larval California tiger salamanders involves the use of aquatic minnow traps and is live trapping. No individuals of any species are released until positive identification is made. Trapping is very unlikely to affect California red-legged frogs because they are not located at Lagunita or the foothills ponds. Garter snakes could become trapped in the shallow traps. Larval California tiger salamanders may exhibit some cannibalism while being held in traps, and invertebrate predators that find their way into traps have been observed to eat amphibian larvae. Being held in a live trap does pose a risk of take, but the potential for take is minimized by frequent checking of the traps and discontinuing the use of the traps if predation or some other factor, such as water quality, becomes a problem.

The spread of pathogens is always a risk when field workers go from one site to the next, particularly in aquatic systems. However, there is very little risk of this problem at Stanford because the equipment (e.g., waders, nets, etc.) used to monitor the Covered Species at Stanford are only used at Stanford or in the immediate vicinity of the University (and all off-campus sites are within the same watersheds which occur at Stanford). Additionally, equipment used in aquatic surveys is typically washed and dried after each use.

Pond construction. Construction of new, off channel, wetlands could potentially affect garter snakes or California red-legged frogs, but preconstruction surveys and project siting considerations will essentially eliminate the chance of take of these species. A limited amount of take of California tiger salamanders, however, is likely when ponds are constructed for California tiger salamanders because the location of the new ponds will likely be in areas that are already occupied by California tiger salamanders and in areas where burrowing rodents are present. With preconstruction surveys and hand excavation of extensive burrow systems, take of California tiger salamanders during future pond construction will be minimized, and on the order of one or two salamanders per new pond. If the new ponds are located at the edge of occupied uplands, then the estimated number of California tiger salamanders impacted by construction activities is further reduced, but these more peripheral ponds will likely take longer to be used by California tiger salamanders.

It is possible that the wetlands could have hydrologic features which cause the wetland to act as population sinks for the Covered Species. As part of the long-term adaptive management program this possibility will be evaluated on a case-by-case basis, and any pond found to have significant negative effects on California tiger salamanders will be modified or eliminated.

Creation of cover piles. Construction of cover piles in or near riparian zones could potentially affect California red-legged frogs and garter snakes, but cover piles would only be constructed in locations noticeably lacking in cover that are very unlikely to support either species. The construction of cover piles in California tiger salamander-occupied uplands could affect California tiger salamanders. Preconstruction surveys, hand-excavation of extensive rodent burrows, and flexibility in where to exactly site the cover piles (they will be sited to avoid locations where construction would cause take) reduce the chance of take.

It is possible that the cover piles could attract predators, competitors, non-native species, or other biological elements that cause take of the Covered Species. As part of the long-term adaptive management program, this possibility will be evaluated on a case-by-case basis, and any cover pile found to have significant negative effects will be removed.

Modification of creek banks and channel. Work on the Matadero or Deer creek banks or channel will not affect California tiger salamanders, but could affect California red-legged frogs or garter snakes.

Relocation of “salvaged” individual Covered Species. Relocating individual Covered Species presents a risk that an individual will be harmed or killed. However, the relocation of individual Covered Species is only contemplated if that individual is already at risk of being harmed or killed, and the amount of take associated with moving it is less than leaving it in the original

risk-causing situation. California tiger salamanders are the most likely of the Covered Species to benefit from relocations as they frequently encounter human-built structures, including roads, during their rainy season migrations. Numbers of California tiger salamanders potentially handled during each year varies considerably (largely dependent on weather), and ranges from several hundred individuals to be moved off of roads, to a few individuals inadvertently trapped in utility boxes or drains. The release sites are chosen carefully. For example, in the 1990s, most utility box rescues occurred in the dry season, and the rescued California tiger salamanders were released in relatively damp areas or at the entrance of rodent burrows. While such dry season relocations do present risk, leaving the individual California tiger salamanders trapped in utility boxes is virtually guaranteed to result in death of the individual. Additionally, the relocation of individual California tiger salamanders should not affect California tiger salamanders that already inhabit the release area.

During the last decade of active conservation work at Stanford, no California red-legged frogs were found in situations that required relocation. In the future, as the population of these Covered Species increases, they could require relocation. Care will be taken to minimize the potential for take by handling the species as little as possible and choosing the release site carefully.

Control of non-native species. Trapping of non-native animal species can cause the inadvertent take of the Covered Species if they are present. Non-native animal species control will not affect California tiger salamanders or garter snakes. California red-legged frogs, particularly tadpoles, may be harassed by non-native species control activities. The proposed trapping involves the use of aquatic minnow traps and is live trapping. No individuals of any species are disposed of until positive identification is made. Being held in a live trap does increase the risk of being eaten or injured by aquatic predators, but this is minimized by frequently checking the traps and discontinuing the use of the traps if predation becomes a problem.

California red-legged frogs and garter snakes could be affected by the removal of non-native plants in the riparian zone. Such impacts will be short-term and non-lethal. Dry season mowing will not affect any of the Covered Species, including California tiger salamanders. Discing has the potential to kill California tiger salamanders, but discing is only allowed in areas where the expected density of California tiger salamanders and garter snakes is very low.