STREAMKEEPER'S MANUAL

by

ACTERRA

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About Us

San Francisquito Watershed Council

San Francisquito Creek is an important unchannelized waterway flowing into South San Francisco Bay. The creek watershed drains an area of approximately 45 square miles, including large portions of the communities of East Palo Alto, Palo Alto, Menlo Park, Stanford, Ladera, Woodside, Portola Valley, and portions of unincorporated San Mateo County and Santa Clara County. San Francisquito Creek and its tributaries provide habitat for one of the few remaining native runs of steelhead trout in San Francisco Bay.

The San Francisquito Watershed Council (SFWC) provides a forum where stakeholders representing more than 30 nonprofit, private, government and academic organizations discuss issues vital to the health and condition of the watershed and undertake joint efforts to restore and protect the creek. This consensus-based group studies flooding, habitat and water quality in the watershed; raises awareness about the watershed; performs on-the-ground restoration such as revegetation and fish passage improvement; produced a Draft Watershed Management Plan outlining the main needs for the watershed's maintenance; and helped initiate a Joint Powers Authority to facilitate watershed management decisions by the local jurisdictions.

Arastradero Preserve Stewardship Project

ARASTRADERO PRESERVE
STEWARDSHIP PROJECT

The 609-acre Arastradero Preserve lies in the foothills of the Santa Cruz Mountains within the city limits of Palo Alto, nestled between Stanford University's undeveloped lands, Palo Alto's Foothills Park and Midpeninsula Regional Open Space District preserves. The preserve contains savanna grasslands, oak woodlands, Arastradero Creek, and two human-made ponds providing habitat for warm-water fish, amphibians, and aquatic invertebrates. Arastradero Creek is part of the Matadero Creek watershed and is home to a healthy population of endangered red-legged frogs. The health and biodiversity of these ecosysystems are currently threatened by the proliferation of non-native species including several thistle species, eucalyptus, bristly-ox-tongue, harding grass, numerous other non-native annuals, and bullfrogs. The ecosystem also faces the threat of deterioration due to deferred trail maintenance and the historic effects of cattle grazing.

In July of 1997, the city of Palo Alto signed a five-year stewardship agreement with Acterra to provide education, research, and land management on the preserve. The Arastradero Preserve Stewardship Project (APSP) works to enhance the preserve's grasslands, oak woodlands, watershed plant communities and wildlife through plantings and protective efforts. The project also provides environmental education to local schools and engages community volunteers and university interns in habitat restoration and trail maintenance. Each year, we welcome the involvement of hundreds of volunteers representing every walk of life – high-school students, Eagle Scouts, recent immigrants from agricultural backgrounds, mothers and fathers with their children, men and women who write the code, market the goods, and surf the Net, as well as retired teachers, local activists, and many more.

Arastradero Preserve is important bluebird habitat.

In 1997 the Santa Clara Valley Audubon Society (SCVAS) initiated a program to restore local western bluebird

populations, joining forces with the National Audubon Society and the North American Bluebird Society in promoting the California Bluebird Recovery Program. Nest boxes were installed in grassland and riparian habitat suitable for these cavity-nesting birds.

During the breeding season the boxes are checked weekly for parasitism, predation, number of eggs, nestlings, and young fledged. At the end of the nesting season results are then reported to SCVAS and to the State coordinator. Noting an alarming trend in population decline among many bird species, SCVAS has recently made a commitment to diversify the recovery program to include other cavity nesters such as violet-green swallows, tree swallows, chestnut-backed chickadees, oak titmice, white-breasted nuthatches, ash-throated flycatchers, Bewick's wrens, house wrens, American kestrels, Western screech owls, wood ducks and barn owls.

Acterra

The SFWC and APSP are both projects of Acterra, a non-profit environmental organization based in Palo Alto. Acterra was formed in 2000 by the merger of Bay Area Action and Peninsula Conservation Center Foundation. Acterra's mission is "to protect and restore our local environment through stewardship, education, and leadership."

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The Streamkeeper Project

Acterra's Citizen Streamkeeper Project recruits citizens to monitor their local creeks and watersheds. Through their observations they learn to recognize trends, identify problems, and become more familiar with the creek on a deeper level, all of which we believe helps keep streams healthy. This project will help people understand what they can do individually and as part of the community to connect with the natural world and improve its health.

What is a Streamkeeper?

Streamkeepers know that the health of a stream is directly affected by the actions of humans on the surrounding landscape and therefore the watershed.

Streamkeepers observe a wide range of creek characteristics encompassing the physical, chemical, biological and social nature of streams. On their walks they might take note of the creek water quality, different fish and wildlife habitat features; land uses changes that could affect large stretches of creek; and in some cases even violations of city or county regulations. Streamkeepers know that the health of a stream is directly affected by the actions of humans on the surrounding landscape and therefore the watershed.

Acterra Streamkeeper Areas of Responsibility

We ask Streamkeepers to participate in stream preservation and enhancement, now and into the future in any of three different ways:

- By periodic visits to their designated reaches of creek to monitor and observe creek phenomena, including those described in the Indicators section, and to coordinate with the program coordinators in reporting any problems they see to the proper authorities.

- By serving as ambassadors for creeks to their neighbors and the community at large, raising awareness and teaching stewardship.

- By participation in special monitoring projects when opportunities arise, such as a benthic macroinvertebrate surveys, the GPS weed mapping that was conducted in conjunction with the Santa Clara Valley Audubon Society in 2002, and the dissolved oxygen monitoring program partnership with the City of Palo Alto that began in 2003.

Why Become a Streamkeeper?

Streams and rivers are invaluable natural resources and important features of the community. They provide vital habitat and a source of fresh water for fish and wildlife. Streams also provide humans with water for drinking, irrigation, industrial supplies, power production, transportation, fishing, boating, swimming and aesthetic enjoyment. Healthy watersheds and streams remove pollution from runoff and help to reduce the severity of floods. Collectively, humans are the primary cause of stream degradation, but we are also the primary source of solutions. By keeping an eye out for problems and observing long term trends on a reach of creek you can help keep that creek healthy.

Watersheds

Each of us lives in a **watershed,** an area surrounding and 'shedding' water into a stream, river, lake, or wetland. A watershed is also called a **catchment area** or **drainage basin.** Watersheds vary in size; they can be very small, such as one that feeds a small stream, or very large such as the 259,000 square mile watershed that feeds the Columbia River. A large watershed may be comprised of many smaller sub-watersheds, which may in turn be made up of even smaller sub-watersheds. For instance, McGarvey Gulch is a sub-watershed of Bear Creek, which in turn is a sub-watershed of San Francisquito Creek, which drains to San Francisco Bay.

Fed by mountain streams flowing between the upper reaches of Page Mill Road and Huddart Park, the **San Francisquito watershed** is one of the great natural treasures of our community. **Matadero and Adobe-Barron Creeks** are small foothill watersheds south of San Francisquito Creek. The lower reaches of both of these creeks are straightened and channelized, as are many Santa Clara County streams. However, the upstream areas still have important areas of natural habitat and even the channelized concrete sections are used by some wildlife.

Local creek stewards and managers are concerned about water quality, riparian and aquatic habitats, and flooding. These concerns are the drivers behind most local watershed management initiatives.

Water Quality

Pollution is a major threat to our creeks. As creeks wind slowly through the more rural upper watersheds, runoff from roads, lawns and gardens, vineyards, horse stables, grazing areas, and septic tank leach fields can cause problems. Fertilizer, livestock manure piles, and leaking septic tanks that are too close to the creek add excess nutrients, which can cause excessive and unwanted algae growth. Too much algae also blocks out sunlight needed by other aquatic plants and as the algae dies, its decomposition consumes oxygen. This reduces the amount of dissolved oxygen available to other aquatic life forms such as fish and freshwater mollusks. Animal waste products release harmful bacteria and chemicals that can affect both wildlife and people. Horses and cattle can cause erosion problems as they clamber down the banks to drink and graze. Water diversion used for irrigation, domestic supply, or filling of livestock ponds may reduce water flows needed by fish and other wildlife. Pesticides, toxic to aquatic life, filter down to the creeks via irrigation flow, ground water flow, over-spraying, and attached to eroded soil particles.

Individuals who dump are either unaware of the adverse environmental damage caused by dumping substances into sewers or storm drains, unaware of the availability of proper disposal options, or unwilling to make the extra effort needed to properly dispose of toxic products or waste.

Further downstream, urbanization impacts the creek in a variety of ways. Once again, fertilizers, pesticides, and organic matter enter the creeks from lawn, park, and golf course runoff. Roads, streets, and parking lots collect copper from brake pads, cadmium and zinc from tire wear, tail pipe emissions, and leaking automobile fluids. Many people are unaware that **runoff from our streets is not processed through the sewer system**, but instead, with every storm this material is carried directly into the creeks through storm drains. Plants and animals that live in the sediment and water take up these contaminants and pass them through the aquatic food chain to higher feeding organisms, compounding the effect of the poisons.

When individuals drain swimming pools or dispose of household hazardous wastes such as oil or paint into storm drains, this is considered illegal dumping. Businesses may also engage in illegal dumping by disposing of chemicals or substances, which are by-products of their production processes, into storm drains or directly into creeks. The cost of disposing

of household or industrial hazardous waste properly can be expensive. Illegal dumping is viewed by some as a way of disposing of waste material cheaply, even with the risk of being caught and fined. Individuals who dump are either unaware of the adverse environmental damage caused by dumping substances into sewers or storm drains, unaware of the availability of proper disposal options, or unwilling to make the extra effort needed to properly dispose of toxic products or waste. The cost to clean up illegal dumping is far greater than the cost of proper disposal, and all of us foot the bill. This is why we encourage you to report any incident of illegal dumping.

See also the Water Quality Appendix at the back of this manual.

Riparian and Aquatic Habitats

Since the first Europeans arrived in California, 90 percent of our state's streamside habitat has been lost or degraded along with the ecological richness and health of this extraordinary estuary.

Early in the nineteenth century, sea captain Jean la Perouse entered San Francisco Bay. In his diary he exalted at the "inexpressible fertility of this land. There is not any country in the world which more abounds in fish and game of every description." Similarly Russian explorer Otto van Kotzebue marveled at the "superfluity of game" and that the Aleutian Eskimos he had brought with him to hunt sea otters "had never before seen game in such abundance, and being passionately fond of the chase, they fired away without ceasing." (Malcolm Margolin's The Ohlone Way)

Since those first Europeans arrived in California, 90 percent of our state's streamside habitat has been lost or degraded along with the ecological richness and health of this extraordinary estuary. San Francisquito Creek and other surviving corridors of this lush but fragile ecosystem are lifelines for numerous wildlife species, including many migratory birds and endangered or threatened species such as the CALIFORNIA RED-LEGGED FROG, the CALIFORNIA TIGER SALAMANDER, STEELHEAD TROUT, WESTERN POND TURTLES and the SAN FRANCISCO GARTER SNAKE.

Native trees such as Fremont cottonwoods, alders, willows, oaks, big leaf maples, California buckeyes, and bay laurels provide precious shade in spring and summer. The leaves from these trees provide food and shelter for insects that provide food for fish and wildlife. Streamside shrubs, reeds, and sedges provide food for many birds and small mammals and filter pollutants from runoff.

Creekside vegetation provides nesting habitat for several species of migrating songbirds. The black-headed grosbeak, Allen's hummingbird, olive-sided flycatcher, and orange-crowned warbler raise their young here each spring, along with the Swainson's thrush, yellow warbler, and Wilson's warbler. The numbers of these migrant species are declining due to destruction of their winter homes in the forests of Central and

South America, as well as loss of streamside (riparian) habitat in California.

When winter storms arrive between late December and early March, adult STEELHEAD TROUT leave the ocean, travel to the southern reaches of San Francisco Bay, and enter San Francisquito Creek making their way to gravelly spawning beds in the tributary creeks. Unlike some other species of anadromous fish, steelhead spawn more than once, so they may make the annual round trip from the ocean to the mountains as many as three times during their lives.

Steelhead eggs require special conditions to survive and develop into juvenile fish. Water temperatures should be around 50-58 degrees F. Native plants overhanging the creek, such as willows, alders, valley oaks, and buckeyes nurture insects, create undercut banks with their root masses, and provide shade cover, which cools the water and makes shadows where fish can hide. Loss of vegetation causes higher water temperatures that can stress or kill young fish. Erosion from denuded stream banks can clog spawning beds with sediment and smother eggs.

Riparian systems provide habitat for 83 percent of reptile species in California. Nearly 50 percent of all bird species in the state are associated with riparian habitats. Stream channelization for flood control or land-clearing for development eliminates the vegetative cover that provides shade, moisture, and food, and protects wildlife from predators.

Flooding

Flooding is a natural and regular occurrence on most rivers and streams. Because we have built many homes and businesses in the flood plains of creeks and rivers, flood management has become important to reduce risks to safety and property. People can also unknowingly increase the severity of flooding through their activities. Thus in flood-prone areas it is very important for community members to understand the dynamics of their watershed so that they can work to minimize flood risks to their health and property and to maintain the greatest level of natural creek structure and function possible.

A flood occurs when the volume of water in a creek is too great to be transported away by the channel, and a portion of the water spills over the banks. While this sounds quite obvious, the conditions that lead to high flows or insufficient channel capacity are not always obvious and can interact in complex ways.

When we think about flooding in the San Francisquito watershed, we make a distinction between the alluvial fan segment of the watershed and the upstream areas. Although there is localized and sometimes severe flooding in the upper watershed, the more major and system-wide flooding occurs in the mid and lower watershed. San Francisquito below the bridge at Sand Hill Road is a creek that has cut a deep, steep-sided arroyo on top of a 120-foot ***alluvial fan***, built of gravel and sediment that has been washed out of the mountains. So it's actually a creek that has formed on top of a hill, rather than down in a valley. When heavy floods from the Santa Cruz Mountains fill the thirty-foot deep arroyo, the water overflows its banks and travels swiftly downhill to the lower part of the watershed as a thin sheet-flow. Here it can accumulate many feet deep because these areas are former tidal marsh and also because we have effectively built a dam along the fringe of the alluvial fan, Highway 101. Once the peak flows ebb, the creek stops overflowing and the streets are left with a thick layer of sediment. It is this sediment that, over the millennia, has been the main building block of the fan.

Infiltration and soil absorption

Water levels rise in our creeks when we have lengthy and/or intense rain storms. In the upper watersheds the ground has a

substantial capacity to absorb rain then slowly release it to the stream later on. When it rains for many days straight, the ground can become fully saturated with water, causing additional rain to sheet off directly into the nearby creek. Rain water also sheets directly off into creeks when it falls at a rate faster than the ground can absorb it. In many urban watersheds the severity of flooding increases over time as the ground is covered with impervious surfaces such as pavement and buildings. Expanding impervious cover means that less precipitation is absorbed into the ground and more is delivered directly to the creek during peak flow times, making floods larger. In the San Francisquito watershed, the effects of impervious surfaces on flooding are not severe yet, but expansion of impervious cover could make flooding worse in the future.

Creek channel flood conveyance

The flood conveyance capacity of a creek channel is finite and can be reduced in several ways. Construction in floodplains and straightening of creek channels reduces the width and length of the channel, leaving less channel volume to convey water. When large amounts of sediment from natural or human sources move down the channel, some of this material may aggrade (stick to) the sides and bottom of the channel, reducing the width and depth of the channel cross section. Humans can also create constriction points along the creek when they build undersized culverts and bridges. At these bottlenecks water backs up and may overtop the banks, particularly if trees or other large objects become lodged in the bottleneck. A vegetative bottleneck can form when the invasive weed Arundo donax grows into and across the channel, blocking flood flows and catching sediment and debris that can reduce the cross-sectional area of the channel.

Three major floods have occurred in the lower portions of the San Francisquito watershed in the last 100 years. The flood of record, in 1998, innundated a huge area of Palo Alto, East Palo Alto and Menlo Park. In parts of East Palo Alto the flood waters were eight feet deep and the total property damage for the entire flooded area was over $28 million.

Streamkeepers can help to reduce flood risks by educating others about the importance of “perviousness” in the upper watershed; watching out for flood plain encroachment and channel straightening activities; spotting and reporting erosion hot spots; keeping an eye out for downed trees and debris jams in the lower reaches; and reporting new clumps of Arundo.

Streamkeeper Reconnaissance and Reporting

Streamkeepers who make periodic visits to a stream reach should be looking especially for the things outlined and described in the following "Indicators" section. We have divided the indicators into four categories: biological, chemical, physical, and social. Descriptions of each indicator are provided below. Most of the observations Streamkeepers make will simply serve to enrich their familiarity and experience with the creek. Others merit timely communication to the Streamkeeper coordinators, either to discuss whether some action is needed or because it's something that we are particularly interested in tracking. A small, but very important subset of the indicators and observations may require immediate attention and notification of the proper authorities.

Three levels of response described below provide examples of the kinds of observations that might trigger that response. Unfortunately, there is no single decision tree to indicate the correct response for every possible situation. The intensity of events may merit upgrade or downgrade to the next response category. We attempt to give some response action guidance below, and contact information for non-emergency situations is given in the “Important Numbers” section (see page 57). Please also use the Watershed Council staff as a resource in developing the experience to help you determine whom to contact in which situations.

[1] **EMERGENCY**. Call 911 and notify coordinator at once. Fire, accident, spills, and threat to human health or safety. Use your judgement regarding the degree of severity when calling 911. This will bring on a major response including a fire engine. We want to use this tool when necessary, but not overuse it.

In these cases, Streamkeepers may need to act fast and notify authorities directly, but please also notify the Streamkeeper program coordinators and creek authorities soon thereafter at the following numbers:

San Francisquito Creek
Watershed Council office: 650-962-9876 x 305
Jim Johnson: 650-364-3768 or 650-465-4052 (cell)
San Francisquito Creek Joint Powers Authority: 650-330-6765

Matadero and Adobe-Barron Creeks
David Houston: 650-303-2777 (cell)

[2] **Record and notify coordinator** and/or relevant agency as soon as possible. See "Important Numbers" on page 57. Fish kills, outfall events, discoloration or milky water, oil or grease, odor, foam, manure, digging, grading, vegetation removal, poaching, infrastructure problems, rare or damaging animals and plants, camping, dam building, debris dumping, vandalism, and paintball. Depending on severity, any of the above incidents may be upgraded to a 1 or downgraded to a 3.

[3] **Record and update** coordinator and other streamkeepers at periodical Streamkeeper meetings. Algal blooms, upland activity runoff, sediment loading, de-watering, anomalous flows, bank erosion, debris jams, drug and alcohol use, rat bait tubes, downed trees, denuded banks, and gullying.

We will hold quarterly Streamkeeper meetings to share observations, enhance interactions, and come up with strategies for handling situations that we may encounter. Hopefully, we will have a Streamkeeper webpage where observations can be posted and linked to a map of the watersheds sometime within the next year. This would allow both other Streamkeepers and any interested parties to benefit from our observations. If and when this is created, it will become more important to be as accurate as possible to with the locations of various observations. We are not planning to GPS anything, though we can if necessary. We think that our purposes will be served by a thoughtful initial paper map location for all observations.

Biological, Chemical, Physical and Social Indicators of Creek Health

Biological Indicators

San Francisquito, Matadero, and Adobe-Barron Creeks are home to a host of creatures that live in and around the creeks and their banks. Some are native, others are not. Many of our native plant species are also being out-competed by non-native weedy species that arrive from other locales, even other continents. Not all non-native species are considered invasive however. Only those that adapt so well to their new environment that they spread rapidly and seriously impact survival of native species are considered invasive, and the Watershed Council and Arastradero Preserve only target the very worst of these for control and removal. Different stream sections may have only a few of these invasive species or many.

FAUNA

Animal species that are native to the area but are threatened or endangered include **steelhead/rainbow trout** (*Oncorhyncus mykiss*)**, California red-legged frogs** (*Rana aurora draytoni),* **western pond turtles** (*Clemmys marmorata*), and **tiger salamander** *(Ambystoma californiense)*. Species that are native and becoming less frequently sighted include **wood duck** (*Aix sponsa*)**, dipper** (*Cinclus mexicanus*)**, California quail** (*Lophortyx californicus*)**, California thrashers** (*Toxostoma redivivum*) and **Pacific tree frogs** (*Hyla regilla)*. Now that there are no large camps in the creek, it is more usual to see wild animals using the creek as a corridor.

Non-native invasive animal species that are seen more and more often in this area include **mitten crabs** (*Eriocheir sinensis*)**, red foxes** (*Vulpes vulpes*)**, feral cats, small mouth bass** (*Micropteris salmoides*) and **bullfrogs** (*Rana catesbeiana*). **Mitten crabs** burrow into the stream bank to build their homes and, in so doing, severely damage and de-stabilize the banks of the stream. **Small mouth bass** are particularly voracious eaters and will dine on native fish and insects including **stone fly**

larvae (*Plecoptera*) and **caddis fly nymphs** (*Tricoptera),* reducing the food supply for native species. **Bullfrogs** are also particularly problematic. Not only do they breed very successfully in stagnant water, but they eat virtually anything, which in turn enhances their chances of survival compared to our native frog species that are either eaten or simply out-competed.

Red foxes will eat any small animals they can catch. Some live in the marshes and devastate the endangered **California clapper rail** and the threatened **black rail**. Cats similarly will prey on small native wildlife, such as birds, rodents, and amphibians.

House sparrows and European starlings are two non-native invasive bird species that are a threat to native cavity nesting birds such as the western bluebird and the chestnut back chickadee. House sparrows will actually kill young bluebirds by scalping them with their hooked beaks.

The following list includes both native and invasive species. Identification often requires binoculars and should be done carefully. This is not a comprehensive survey, but will help us monitor and identify trends, problems, and positive events such as the running of the steelhead. How we respond to sightings differs and the bracketed numbers correspond to responses listed in "Streamkeeper Reconnaissance and Reporting."

Most of the species listed below are difficult to positively identify without binoculars and we want to be very careful in recording sightings. Just seeing a frog, a fish or a turtle is not enough. You might record a non-specific sighting but don't identify it to species unless you get a good look at it and are sure of your identification.

Excellent pictures of the fauna described below can be found on the CalPhotos online photo-database at http://elib.cs.berkeley.edu/photos/.

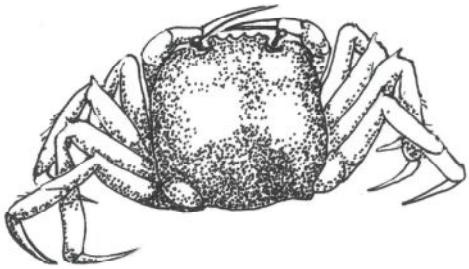
Non-Native Animals

Many animals (and this applies to plants also) have come to this area from other places often without those species with which they have evolved and which have kept them under control. Some invasive species possess characteristics (such as early

sexual maturity, numerous progeny, omnivory, etc.) which give them a competitive advantage over native plants or animals that are displaced or diminished and thereby driven towards extinction. Some are on state or federal watch-lists and need to be controlled, while some we just want to monitor for trends.

Mitten crab *(Eriocheir sinensis)* **[2]***

* See page 14 for Response codes



This is a very recent invader (originally from China), which is rapidly spreading throughout the San Francisco Bay-Delta system by the millions. US Fish and Wild life Service has declared it a noxious species, meaning that it can't be imported or possessed live. It is catadromous, meaning that it spawns in salt water, and then makes its way into freshwater as it matures. It is omnivorous and causes damage to banks by extensive burrowing. On our creek it is now approaching those reaches where steelhead spawn and we can expect that it will prey on the eggs. Sightings of live crabs should be reported immediately and we hope to develop a monitoring system to track bank damage. Any crab seen in fresh water will be a mitten crab. If found, they should be killed.

House Sparrow *(Passer domesticus)* **[3]**

These are European invaders whose introduction has caused decline of native cavity-nesting birds in our urban areas. They are usually found in urban areas where there is a year round food source since they do not migrate. This is a species we want to keep an eye on. The picture above is one of a male house sparrow. Binoculars are usually needed for positive ID.

Small Mouth Bass *(Micropteris salmoides)* **[3]**

It is unlikely that anyone will see bass. They are carried over the spillway of Searsville Dam in floods but they never get very big in the stream before they are swept out to sea. A few small mouth bass have been sighted on stringers of poached fish at Piers Lane. They are omnivores, eating steelhead young. Report them if seen.

Red fox *(Vulpes vulpes)* **[3]**

These are European invaders that cause a great deal of damage especially to low-nesting and ground birds. They are usually found in the Baylands but have been seen making their way up the creek. It is a species we want to keep an eye on. They are easily identified by their rich red coat and white-tipped tail.

Bullfrog *(Rana catesbeiana)* **[2]**

Bullfrogs, like bass, are swept over the Searsville dam and only persist in stagnant water. They are quite damaging to native frogs and indeed anything they can catch, including birds and bats as they skim the water. They grow quite large and have a very low-pitched, booming call. If the round tympanum (eardrum) on the side of the head is larger that the eye, it is a bullfrog. The bullfrog call is also diagnostic; once you know what it sounds like, that alone will identify it.

Feral cats [3]

Whether wild (feral) or pets, cats can cause a great deal of damage to bird populations and are the leading cause of the decline in California quail and thrashers. Thirty years ago there were quail and thrashers in urban Palo Alto but now they are becoming increasingly uncommon even in undeveloped areas close to town. Let’s try to keep track of feral cats and note feeding stations.

Dogs [3]

While we hesitate to define either cats or dogs as invasive exotics, both can be a source of real problems, particularly if uncontrolled. Dogs unaccompanied by humans should be reported to Animal Control. Even accompanied dogs can be a problem if they are chasing wildlife or digging in banks. There doesn't seem to be a problem now but let's be observant.

Native Threatened and Endangered Animals

Steelhead/rainbow trout (*Oncorhyncus mykiss*) **[2]**

This is our most 'charismatic mega-fauna' and a great deal of energy goes into preserving it. San Francisquito Creek is one of the last and best steelhead streams in the South Bay. The National Marine Fisheries (NMFS, pronounced "nymphs") placed this population on the federal threatened species list in 1997 for protection under the Endangered Species Act (ESA). It also has special state status. It is a part of the Central Coast ESU, or evolutionarily significant unit, of genetically similar steelhead.

Every stream evolves its own distinct population, uniquely adapted to local conditions, because adults return to the streams

of their birth to spawn. They find their natal creek using both its geological and bio-chemical signatures. Some straying takes place and this, over time, helps create the ESU. But local conditions and genetic drift evolve distinctly different populations on streams only a few miles apart.

Most streams flowing into the central and south bay have been channelized and dammed and therefore no longer support a steelhead run, although most also support a landlocked population of their ancestral steelhead thriving as rainbow trout in the upper reaches. Rainbow and steelhead trout are genetically indistinguishable alternate life forms. Steelhead are actually rainbow trout that have gone to sea. The San Francisquito Creek watershed has such landlocked populations above the Searsville and Bear Gulch Dams, but its other branches support one of the best native steelhead runs south of the Golden Gate.

Life stages and identification of Steelhead

Adult Steelhead

From January through March adult steelhead return from the ocean to spawn in San Francisquito Creek, perhaps in the same headwater stream where they were hatched, and afterwards travel back to the ocean. They may return to spawn a second or even third time in future years. The fish will be 18 to 30 or more inches long and a steely silver color. Sometimes an adult may be trapped when the lower reaches of the creek dry up earlier than normal, or an old fish may remain to die in the stream of its birth after spawning.

It is rare to see adult spawners, as they tend to move swiftly upstream in the dusk when the stream is just clearing after a storm. Huddart Park's Richard's Road Trail along West Union Creek may be the best place to see spawning. Migrating adults pair up during this run. When they have reached the tail of a suitable headwater pool above a riffle, the female digs a nest (called a "redd") by turning on her side and arching her body vigorously to excavate gravel, which is washed downstream by the swift current. Then she and the male deposit eggs and sperm in the redd. Moving upstream she repeats the dig and this gravel, cleaned of fine sediment by the current, drops into the downstream nest and covers the eggs quite deeply, protecting them from predators and floods. Once all the eggs have been deposited, the spent adults (called "kelt") then return to sea.

Parr or Juvenile Steelhead/Rainbow Trout

If they are not washed out by subsequent floods or smothered by fine sediment, the eggs hatch in about 50 days. The sac-fry (called “alevin”) spend another week absorbing their yolk sac and, when they are thin enough, swim upwards between the gravels, often schooling in the slight depression of the redd or congregating in the shallows near the shore behind the shelter of a rock. Even then, less than an inch long, they will characteristically face the current, wriggling furiously to maintain their position, and darting out to spear a drifting bit of food. From this point they are known as “parr” or juveniles until they reach the adolescent, out-migrant “smolt” stage. By the way, most of these strange terms for trout are Scottish, as Scottish streams are rich in salmon.

As the weeks pass, the parr grow and move out into the riffle, over time establishing territories that they defend vigorously. If startled by the slightest movement, they quickly hide behind a rock or under a cut bank and stay there for many minutes. A positive ID is made by observing the “parr” marks or row of 10-13 oval spots along the lateral line from gill to tail. Other trout and salmon also have these marks but on this stream such a fish is almost certainly a steelhead or rainbow trout. The eye is also quite prominent and has a golden glint. A white tip may also be observed on the back (dorsal) and pelvic (anal) fins. The tail (caudal fin) has black dots. Binoculars are necessary to make this identification.

Smolt or Out-migrants

On San Francisquito Creek, parr may grow to 3 inches during the first year, 6-8 inches in the second year, and to 10-12 inches in their third year, depending on the availability of insects. Our fish appear to smolt (go to sea) later than the literature suggests and most are between 8 and 12 inches long when they undertake this journey.

April is a good time to observe the smolt, as they congregate in the same pools year after year, fattening up on spring insects in preparation for the transformation to salt water tolerance and a solitary life out in the open ocean feeding on squid. During this smolting period they may take on a wide variety of colors, though a constant seems to be the development of a broad black

fringe on the tail. As they finally enter the saltwater they turn almost completely silver with the exception of some red or pink markings.

The pool just upstream of the San Mateo Avenue bike bridge and the one below the Ira Bonde bike bridge in El Palo Alto Park are the best places to observe these out-migrants. They usually show up in early April and wait for a late rain to flush them out. If they wait too long and a rain doesn't come, they may be trapped as the stream sinks quickly into the deep gravels of the alluvial fan. The mid-section of the creek usually begin to dry out in early May. If the steelhead are trapped, they are eaten by raccoons and birds. This is normal on our creek and evolution selects fish whose behavior matches the environment.

Some juvenile trout that are especially well fed, those trapped behind a dam, or those that are just plain headstrong may stay in streams with year-round flow to mature into adult rainbow trout. They may reproduce as rainbows for decades, perhaps centuries, until the dam comes down or until their young change their minds. This developmental plasticity is an attribute (in addition to multiple spawning cycles and tolerance of warmer, less oxygenated water than salmon can survive), which makes the steelhead a very robust species. Their biology is an asset in our preservation efforts.

Recording and Reporting

It is necessary to be quite accurate when identifying a steelhead, and therefore binoculars are an almost essential tool. Adult in-migrants will be hard to mistake, but other life stages require patient stalking and observation. Once a positive identification has been made, try to estimate the size (this is difficult and may be aided by comparing the fish to a nearby rock or stick, which can be measured later). Estimate the number of fish seen in one location by counting only the maximum number that can be seen at the same instant. Note the date, time of day, weather, location, habitat and number, size and behavior of the trout as well as any other significant details.

If fish are juveniles or adult rainbow, record and report later **[3].**

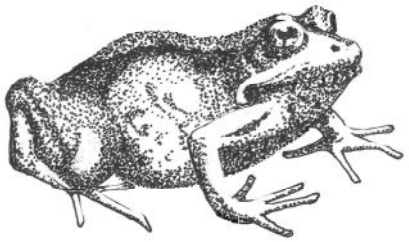
If adult steelhead spawners or outmigrating smolt are seen, please also call the coordinator **[2]** as this may influence dam

operations or trigger a run of observers, in addition to the fact that Watershed Council want to come see the steelhead too!

One further note: Since steelhead are on the federal threatened list, it is technically illegal to "harass" steelhead trout. This could even include scaring them by waving your hands or wading. On Los Trancos Creek, a dead juvenile trout was found where a backhoe had been operating next to a stream. The natural territorial instinct and flight/fight reaction of trout is so strong that, if there is a severe local disturbance for a prolonged period, they will keep racing about their territory until they die of tissue acidosis.

We are not going to be invasive in our reconnaissance, but we really don't want to agitate trout unnecessarily, particularly in the spawning and older juvenile stages. And during the incubation season, which can last through April, wading in the upstream reaches, particularly in the tails of pools just above riffles (riffles are where you see whitewater as the water cascades down rocky inclines) can crush the "redd." As newly hatched fry and as smolt, they seem to school and be less sensitive to outside activities. But always act calmly around trout. If you move at the slow speed of a heron you can sneak right up to even the wary parr.

California red legged frog (*Rana aurora draytoni)* **[2]**



These are federally endangered and by no means common. California red-legged frogs do not do well around development because they range far and wide in search of food. Though red-legged frogs are primarily active in the day, those with an irresistible urge can best find them at night by shining a light held at chin level. (The angle of reflection of the light from your eye to the frog eye is critical. You won't see the reflection in

their eyes if the light is held anywhere else.) To make a positive identification, you will need binoculars. They are relatively large at maturity, up to 5 inches long, reddish-brown to gray with ill-defined dark blotches and specks. The face has a dark mask with a light stripe along the jaw. Definite dorso-lateral ridges parallel the backbone high on either side of the body from behind the eye to the end of the body. The eardrum is slightly smaller than the eye. Red-legged frogs breed in ponds or backwaters from January to March, laying fist-sized egg masses attached to vegetation at the pond edge. The tadpoles take many months to metamorphose. The adults like stream edges and wetlands but also range far afield through moist woods to hunt for insects, worms or anything they can catch. They are great jumpers and are usually gone before they can be spotted. They "ribbit" softly.

Western pond turtles (*Clemmys marmorata*) **[2]**

On rare occasions one may see this endangered turtle sunning itself on logs, but it most often remains in favored deep pools or ponds. It is very shy and slips into the water at the least disturbance. One of the least distinctive of American turtles, it can be identified by its dark brown or deep olive shell, up to 7 inches in diameter, faintly mottled with tan. It also has a rather tall, square snub nose. The jaws are yellow edged and the mouth interior reddish. The throat and forelegs are whitish with dark spots. Females lay a clutch of up to 10 oval eggs in late spring in an earthen chamber in a sunny spot of bare earth or nearby field.

You are not likely to positively identify one, but if you see a shy, solitary, non-descript turtle, note the particulars.

California Tiger Salamander (*Ambystoma californiense*) **[2]**

This is not a stream dwelling species, but they may be encountered by curious log-lifters. There is a population of them living in the foothills and even in the West Menlo Park neighborhoods surrounding their breeding site, Lake Lagunitas on the Stanford Campus. They are 8 or more inches long, jet-black with small yellow spots above and grayish underneath.

Being mole salamanders, they dwell underground in ground squirrel burrows and old cisterns or anywhere dark and hidden. They feed with very sharp jaw ridges on snails, insects, tree

frogs and, during the larval phase, on aquatic insect larvae. During the January and February rains, usually at night, they skitter down from the hills to spawn in the lake. Individual eggs are laid on vegetation and the larvae transform by the time the lake dries in June. The young may aestivate under the lakebed during the summer and their possible presence there was the reason the Big Game bonfire tradition at Lake Lag was abandoned several years ago for fear of cooking them.

Nothing else looks like them, so a positive ID is possible. Note the particulars.

Native Animals Becoming Less Common

Again, this is not a comprehensive survey, but merely an anecdotal record of a few select species that are easy to identify and provide a rough indicator of ecosystem health. Some of them used to be common even in the urban areas, but are now seen less and less. Some, like the mountain lion, or cougar, seem to be expanding their territory. You are encouraged to learn to identify more and we will record positive sightings. For instance, a mink was positively identified on Los Trancos Creek recently.

Wood duck (*Aix sponsa*) **[3]**

This is perhaps the most colorful of all birds, and one of only a few tree roosting and nesting ducks. It lays its eggs in a cavity in a tree near the water so its young can fledge directly into the water. It is also very shy, bolting at the slightest disturbance and is rarely seen. There are quite a few of them living on the creek above Sand Hill Road where it is very quiet. They will also venture downstream in the deep arroyo of the creek. They have even been seen as far down as El Palo Alto Park flying through the stream canyon. Large nest boxes in solitary locations near water can help increase their numbers.

Dipper *(Cinclus mexicanus)* **[2]**

Dippers, also called water ouzels or ovenbirds for their ball-shaped nest of moss that they build close to the water, are extremely rare around here. They are a sure indicator of a clean, healthy stream and are never seen far from water. They hunt insects by flying underwater, even in swift torrents, turning over rocks with their feet. A slate-colored, stub-tailed bird like a

large wren, dippers characteristically and constantly dip, bending their knees and bobbing every few seconds without ceasing. Feel privileged if you spy a dipper.

California quail *(Lophortyx californicus)* **[3]**

This is our state bird. Quail are large birds that travel along the ground, often in groups. They can be identified by the distinctive upright plume on their head. They are becoming less common even in the foothills. Feral cats are no doubt chiefly responsible for decimating this ground-nesting bird and it would be wonderful to see their numbers rebound.

California thrasher (*Toxostoma redivivum*) **[3]**

Like the quail, thrashers have a passion for insects and will often rummage through dry leaf piles in gardens or elsewhere using their long curved bills searching for tasty morsels. Also in common with the quail, they are hardly ever seen anymore. These plain brown birds, about the size of a robin, nest in bushes and their careless, ground-feeding habits make them vulnerable to cats. Their thrashing noises are unmistakable and, once seen, their bill gives them away at once.

Pacific tree frog (*Hyla regilla)* **[3]**

Only a couple of decades ago, the noisy chorus of breeding spring peepers along the creek used to keep people awake at night. Pacific tree frogs are gone from urban areas, although still numerous farther afield. They spawn in slow water and ponds, laying thumb-sized egg masses on emergent vegetation in winter. The tiny adults, one to two inches long, are green to bronze in color with a dark mask across their eyes. They hunt in grass and bushes.

Cougar *(Felis concolor)* **[1 or 2]**

Also called mountain lion, puma, catamount, panther and painter, the cougar's many names reflect their original wide distribution throughout the New World. Their large size (as adults, up to 250 pounds and 6'-9' long with the tail), tawny color with white underparts, and their long, black tipped tail make them hard to mistake for anything else. If the face looks like certain death, it's a cougar, if it looks like a big house cat, it's a bobcat. A cougar sighting merits an immediate call.

Cougar sightings are becoming more frequent chiefly because they are now a protected species and because deer, their preferred prey, are multiplying as the hunting pressure from humans' decreases. As we become more urbanized, we are taking ourselves out of the predator hierarchy and a different balance is evolving, not one always comfortable to humans.

The recent sightings of mountain lions in Palo Alto in the summer of 2004 shows just how widely they may be ranging. Cats that range down into suburban areas are often young adult males searching out territory, perhaps ranging down to the baylands. No doubt San Francisquito creek has served as a migration corridor for cougar movement between the hills and the bay just as it does for steelhead, birds, fox, coyote and a variety of other animals. Mountain lions, primarily nocturnal and able to cover up to 25 miles a night, would find it easy to forage down to the Bay in the deep secluded canyon of San Francisquito Creek.

Such urban sightings elicit both wonder and fear, for these large cats lie quietly concealed in wait for prey. Then they pounce without warning, easily overpowering large prey, breaking the neck with one bite. Domestic dogs and cats are on their menu, but they avoid humans except in rare instances. In the Bay Area, there was one non-fatal mountain lion attack in Gilroy in 1911. Statewide there have been twelve reported attacks since 1890, five of them fatal. In a close encounter one should not run as this elicits a chase response and is futile anyway, but rather wave arms, stamp feet, shout and open a coat or shirt like wings to befuddle the cat.

Bobcat (*Lynx rufus*) **[3]**

Bobcats are far more frequently seen than mountain lions as they hunt during the day, are more numerous and are not particularly secretive or afraid of humans, though they tend to move into cover when seen. It has a dark tan or even gray coat that may become lighter in the summer with reddish highlights and is streaked with black. The face of a bobcat is like a house cat, very round because of their cheek ruff, with black tufts at the tips of the ears. The bobcat is a little smaller than a coyote or a collie dog, 20 or so inches at the shoulder, and has a bobbed tail white. They probably range regularly into the border of the urbanized creek area and are frequently seen around the Stanford golf course. Ground squirrels, gophers, rodents and

rabbits are their chief prey and they den amid rocks or at the hollow base of a tree.

Coyote *(Canis latrans)* **[3]**

Best described as a lanky, medium-sized dog with a fox-like face, coyotes are more common than bobcats and can be aggressive, though they tend to slink off when observed. The coat is medium long and gray to reddish with light under parts, reddish on the legs and backs of the ears (which are white inside), with a bushy, black-tipped tail. One was seen on the lower San Francisquito Creek with a long, thin tail, which was probably a domestic dog mix. They eat whatever they can get, including berries and small domestic animals, and den in burrows. Often their scat is seen on trails in places where they gather to yip and howl in the night.

Grey Fox *(Urocyon cinereoargenteus)* **[3]**

The native gray fox looks very much like a smaller, more compact coyote with a less pointed, face and quite large ears. The tail is longer in proportion to the body than the coyote's. Overall the color is salt-and-pepper gray on the back, with reddish under parts, collar and ears. The chin and chest are white. The tail is black-tipped and black on top. They are active day and night, eating whatever they can catch, and when seen are almost always trotting quickly.

Benthic Macroinvertebrates (BMI) as indicators of stream health

These are aquatic invertebrates at least 0.5 mm long, which spend part of their life, chiefly the larval stage, in the bottom substrate of streams and rivers. Some, such as those described below, are extremely intolerant of pollution. Their presence indicates a healthy ecology. Complex and expensive chemical sampling can only detect pollution at the moment when samples are collected. But insects cannot escape the flushes of pollution and will disappear if a reach of stream is periodically polluted.

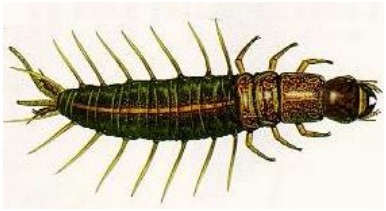
We are not planning a rigorous scientific biological assessment program for BMIs. But if we can identify and document these insects even to the order level (the groups below are orders of insects, the family level is one step more precise) with a simple "turn over the rock" survey, we will have identified clean, cold water habitat. One of the main goals of informal BMI surveys

is to get a visual sense of the amount and variety of life that exist within the creekbed, life that is the basis of the whole aquatic and riparian food webs!

Caddis fly nymphs (*Tricoptera*) **[3]**

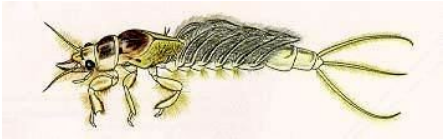
Caddis fly nymphs secrete a sticky silk that collects bits of sand and small sticks to make a protective case. The case may be attached to the underside of a rock or free in the stream, depending on the family.

Dobson fly larvae 'Hellgramites' (*Megaloptera*) **[3]**



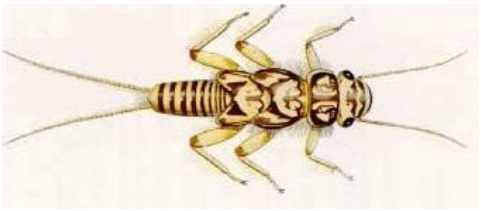
These can be very large, up to three inches long, with a distinct head and large mouthparts. The body is long and flattened with feathery gills fringing each abdominal segment. The thorax has no wing nubs. At the tip of the abdomen there is either a long pointed tip or two tips spread sideways with two smaller tips between, depending on the species.

Mayfly larvae (*Ephemeroptera*) **[3]**



Mayflies have two thoracic segments, the rear with wing nubs, long legs, and three tails or cerci. Family level ID is required since some families are very intolerant of pollution and others are quite tolerant of it.

Stonefly larvae (*Plecoptera*) **[3]**



These have long antennae, long legs, and three thoracic segments with pairs of wing nubs on the rear two segments. The abdomen is slender and ends in two long tail-like appendages called cerci.

FLORA

A well vegetated riparian (steam side) corridor is very important to bank stability and erosion control. But it does make a difference if the plants are native and part of the long-evolved web of life specific to this area, as opposed to non-native invasive species. The integral part these plants play in the smooth functioning of a riparian habitat is outlined below.

Native plants such as big-leaf maple, bay laurel, coast live oak, California buckeye, toyon, California wild rose, coffeeberry, creeping snowberry, sticky monkey flower, and even poison oak provide food, shelter, runoff filtration and other benefits for native creatures.

Fallen trees in and near the stream channel are sometimes a flood hazard and sometimes an important habitat feature. It is important for Streamkeepers to know how to differentiate those that create a flood hazard from those that don't.

The walls of this "very deep arroyo," as the Spanish described it in the 1770s, are naturally quite barren of plants in many areas and floods produce new open areas every few years. But the channel is very stable in its present configuration until some rare, complete blockage throws the torrent out of its old channel and cuts a new channel to the bay. That is why the flood control agencies do not allow blockages to build up in the alluvial reaches of the creek. Such a reconfiguration today would be devastating to the entire urban area.

Trees growing in mid-channel in this reach also divert the floodwaters into the banks, causing sudden massive erosion with potential loss of life. The current practice is to cut mid-channel vegetation to the ground every few years, but allow shrubby re-growth to establish habitat. Trees on the banks are, in general, not disturbed unless they have fallen over or are undermined and deemed a threat to topple with the next flood, perhaps jamming at the bridges and causing catastrophic over-banking. The cities, flood control agencies, Department of Fish and Game (DFG) and our Watershed Council, coordinate these maintenance decisions each fall before the winter rains arrive. Streamkeeper observation of potential hazards can help give us an idea of what to expect on the yearly maintenance walks.

In the upstream areas of the watershed, these potential threats are given far less attention, though certainly problems can result

to streamside properties from downed or badly placed instream trees or log jams. A DFG Stream Alteration Agreement (SAA) is required for any removal work except during an emergency and the landowners are responsible for applying for permits and doing the work.

DFG is not inclined to give SAA permits unless there is a real threat to property. This is because large woody debris is a natural component of healthy streams, creating complex habitats and also food for shredding insects as the wood rots. Debris jams also provide these benefits and are frequently less a barrier to steelhead movement than one might imagine. This is because steelhead are prodigious jumpers, logjams often float somewhat, allowing fish to swim through. Logjams are also often short-lived, there one year and gone the next. But let's note downed trees and in-stream blockages. Some may need to be worked on by property owners.

Invasive non-native plants

The following are a few of the invasive non-native plants we are most concerned about. Many invasives have already found their way to the watershed but we focus on a few because of the severity of their impact and the opportunity to control them. Some, such as Arundo, we have begun to control throughout the watershed. Some we are mapping with the intent to eventually establish a control plan. And some are so wide-spread we control them only in a few locations as we have time. On our revegetation plots we control all non-natives and even a few native weeds.

Giant reed (*Arundo donax*) **[3]**

This grass, originally from India, grows rapidly to twenty feet tall and spreads by rhizomes to form impenetrable clumps with massive roots. No plant can out compete it and a clump that falls in the water will root at all nodes where it settles to form a new infestation. The forest of stems captures flood sediments into which the plant grows new roots from the nodes, gradually raising the creek bed and shrinking the channel area as the root mass grows. When large masses of the plant break off in severe floods, they have a great chance of forming debris jams, leading to over-banking.

The plant is flammable even when green but springs back from the burnt stumps at up to a foot a week. All other riparian plants are completely killed by fire and so Arundo eventually changes a flood-based ecology into a fire-based one.

No insects or animals eat Arundo and eventually a complete monoculture with no diversity is formed. In Southern California some infestations are now covering whole river floodplains with fires periodically sweeping up the channels through the suburbs. The plant is spreading rapidly in the Central Valley.

On San Francisquito creek we have cut and killed most infestations, but a few remain to be treated and we need to record any new culms or resprouts we see. Arundo looks like a blue-green, giant corn plant as much as 20 feet tall when growing well. When stressed for water it looks more bedraggled and yellowish. The outer clumps often droop outward into the channel. This is not a hard plant to spot and we want to know if there are plants we haven't found yet, even in upland locations, so we can target them for elimination.

Cape Ivy *(Delairea odorata)* **[3]**

This is another extremely fast growing plant which twines around other plants, drags them to the ground, and smothers them. If a growing tip finds a tree leaf it quickly twines around

it and up the branch, while other growth tips follow behind. In a short time a heavy rope of this succulent sunflower-family plant several feet across is hoisting itself up into the tree. Eventually even the trees that are too big for it to overpower will die of old age and no young plant (except Arundo) can outgrow it. It contains alkaloids that are poisonous to fish, and few insects can tolerate it. Some people even get a bit nauseous pulling it.

In inland areas, frost will periodically kill it to the ground, but, as it also grows by underground runners, it quickly re-establishes itself. On the coast, no such check interrupts its spread and, growing rapidly in all seasons, it has become the most serious plant problem there.

Cape ivy is easy to spot in January when it bears bright yellow flowers. The leaves are coarsely scalloped, smooth, thick and waxy, the stems round and without ridges. There are no tendrils as on the native wild cucumber, which has a similar growth habit but dies to the root in June. Wild cucumber also has a fuzzy leaf and ribbed stem. Cape ivy is widespread along the creek and a removal project will be starting in the fall of 2004. So it is not necessary to report this plant to us in the lower part of the watershed, but note how fast it spreads and be aware. Upstream infestations should be recorded.

French Broom *(Genista monspessulana)* **[3]**

This pea-family shrub forms impenetrable thickets that are flammable in the dry season and drops large numbers of long-lived seeds. After the plants are pulled, the seeds in the ground quickly sprout to restart the colony. Without follow-up, there may soon be no evidence that any work was done to remove the plant. More seeds may be waiting patiently in the ground to sprout even decades later.

It is easy to spot its bright yellow pea flowers in March and April. Its small fuzzy leaves have three leaflets like a clover. Scotch broom and gorse look similar but there is no need to make a distinction, as all brooms are invasive and need control. Make a note of where it’s growing in your area. We like to target clumps of this easy-to-pull plant in the spring with weed wrenches and perhaps we’ll do a project on your reach if there is time and reasonable hope of eliminating an entire patch. If you are inspired, you should certainly pull small plants yourself

if the soil is moist or sandy. But follow-up is needed to get next year's resprouts.

Pampas grass *(Cortaderia selloana)* **[3]**

Everyone recognizes the large feathery plumes of this South American grass that can form clumps towering overhead. On the coast another smaller, frost-sensitive species spreads rapidly, but the inland species *C. sellowana* does not usually seed well and so does not spread quickly. Still we'd like to get rid of it because it can become invasive. The long arching leaves have a sharp serrated edge, so be careful since it can cut the skin. Even the simple act of removing the seed heads every year can help to bring pampas grass under control in an area.

Blue gum (*Eucalyptus globulus*) **and other Eucalyptus [3, seedlings]**

Leland Stanford imported this drought resistant giant from Australia to use for railroad ties on the Central Pacific Railway. But the higher rainfall here causes the trees to grow more rapidly than in Australia and with a twist. As the sawn lumber dries, it warps, making it useless as timber. And it's so hard to split it's never been used much for firewood. But Eucalyptus thrive in our climate and out compete native plants particularly since they have oils that retard the development of other plants and, until very recently, they have had no local insects that fed on them. Now two species of Australian insects have suddenly appeared in the area and are seriously restraining the growth of several species, even killing some trees.

Because of their great size and the fact that some people absolutely love eucalyptus and will fight for them, we recommend a tactic of controlling the seedlings and waiting for fire, frost, or old age to kill the shaggy giants. Then, if we (and our successors) have done our work well, there will be no progeny left. Note the location and size of seedlings (up to perhaps 8 inches in diameter) and we will target them for removal.

Perennial Pepperweed or White Top (*Lepidium latifolium*) **[3]**

This is a very fast spreading weed in the mustard family that has underground runners and a multitude of tiny seeds. It seems to

have appeared only very recently in the area upstream of the creek mouth and it may be possible to control before it becomes more established, so make a special effort to spot this one and report it at once.

It is relatively easy to identify in spring and early summer by the frothy white flowers floating over plants about 3 or 4 feet tall with lance-shaped leaves clasping the stem. The individual flowers are tiny and four-petaled.

Rogue's Gallery

There are many other invasive non-natives taking over our creeks and every year we seem to find a new one we hadn't seen before on San Francisquito Creek. Below is a "second tier" of the worst offenders though we won't be asking you to look for them specifically. If you want to know more about them just ask.

Acacia (*Acacia* spp.)

Himalaya berry (*Rubus discolor*)

Tree of Heaven (*Ailanthus altissima*)

English and Algerian ivy (*Hedera helix* and *canariensis*)

Fennel (*Foeniculum vulgare*)

Poison hemlock (*Conium maculatum)*

Thistle spp. (*Circium*)

Periwinkle (*Vinca major*)

Silver Lace Vine (*Polygonum aubertii)*

Salt Cedar (*Tamarix* spp.)

Rice Grass or Smilo (*Oryzopsis mileacea)*

Chemical Indicators

Pollution (contamination and degradation of the water quality) can be chemical in nature. There are a number of very obvious signs indicating chemical pollution. Chemical degradation affects both plant and animal life in the immediate vicinity of the pollution event as well as downstream from the area. Signs indicating chemical pollution include: **fish kills**, **outfall events**, **discoloration** or **milky water**, **oily sheen** or **congealed grease**, **odor**, **foam** and **rat bait tubes**. Often these are a result of upland activities such as **car washing**, **oil changing, animal waste emissions** and **cleaning sprayers in the gutter**.

Chemical pollution usually refers to contaminants of man-made origin in quantities sufficient to cause undesirable effects. A little nitrogen or phosphorous, for instance, is a natural component of streams, but large quantities in run-off from agriculture or other sources can cause **eutrophication** or excessive algae growth. This can simplify the food chain by killing off important insects and clogging the habitat. As the excess biomass dies, the aerobic bacteria that break the algae down deplete the system of oxygen and many animals can be killed because of this lack of **dissolved oxygen (DO)**. Finally, the excess particulate matter that results from this over-production and decomposition makes the water cloudy (turbid), further degrading it.

Another important concept is the difference between **point and non-point sources** of pollution. If a significant contaminant source can be clearly identified it is called a point source. Typically this is a factory or sewage treatment plant whose pipes discharge directly to a water body. But it could be a discrete, traceable, one-time event such as the recent 'Dustac' spill at Ford Field that killed trout in Los Trancos Creek in the spring of 2002.

Non-point sources are the myriad untraceable upland sources of contamination, a drop of engine oil, soap from car washing, or pesticide runoff from yards. If they went onto the bare earth most would be absorbed and broken down by bacteria. However, if the quantity or quality of the pollutant is sufficient, it can travel with the rainwater flowing over the soil or enter the stream with the groundwater. On an impervious surface like a road, rain or a jet of water from a hose washes pollutants into

the storm drain and directly to the nearest creek. Here their concentration may cause direct effects on the stream life or slowly degrade its quality over time.

Streamkeepers are encouraged to locate the source of urban runoff by sleuthing upstream. Dated and labeled pictures and a sample of water in a washed bottle with the exact location marked on a street map would be ideal. However, chemical analysis is expensive and unless we can provide an educated guess what the contaminant might be, it is unlikely authorities will analyze it.

When a spill occurs, calling 911 should mobilize the appropriate response tree, but recent experience has shown that network to be full of holes. Calling 911 is not likely to elicit the right response in many cases. The emergency **HazMat** (hazardous materials) **Teams** housed at the fire departments are chiefly concerned about effects on humans. The **Department of Fish and Game** (DFG) and the **Regional Water Quality Control Board** (RWQCB) are the two agencies that are most concerned with pollution effects on stream life. DFG has one warden in Santa Clara County and one in San Mateo County, and RWQCB has one inspector for the area. The **Santa Clara Valley Water District** (SCVWD) also has an emergency line and they will respond to problems in Santa Clara County. During working hours, the **San Francisquito Creek Joint Powers Authority** (JPA) should also be called. All of these numbers are listed in the "Important Numbers" section on page 57 and they should be contacted. Due to the size of their territory, however, the response may not be immediate. Your individual effort to document the problem can be very valuable these agencies.

Non-point source pollution activities are often most effectively addressed through different approaches. Friendly education by a neighbor can often correct problems. Many people don't know that storm drains drain directly to creeks.

The following are descriptions of some of the pollution indicators you are likely to encounter, what they mean, and how to respond.

Fish kills [1 or 2]*

* See page 14 for Response codes

If you find dead fish or other animals floating in the creek, there is clearly something wrong (though crabs and crayfish molt regularly as the animals grow and exoskeletons may be mistaken for carcasses). If it's only one fish with no other evidence, it might not mean anything, so call us first. If we are unavailable, start the **non-emergency** phone calls anyway and let the responders decide what to do. If it seems there is a threat to human health or safety, call 911. This is always a judgment call. Hopefully we can be there to help make it, but you may have to make that decision if we are unavailable.

Fish kills will produce the strongest agency response because it is tangible prima facie evidence of poaching, pollution, or some other problem they are empowered to investigate. However, if no one responds on the day of the kill, collect the carcasses and freeze them, because raccoons and other scavengers will make short work of them overnight.

Take pictures of the dead fish and if possible, take a water sample as soon as possible in a clean bottle using rubber gloves, and refrigerate the sample. Describe any observations, odors, cloudy water, etc. Explore upstream to try to locate the source of the problem and downstream to see if you can detect the leading edge of a spill moving through the system. Record times and locations as accurately as possible. Whenever samples change hands, a Chain of Custody form must be filled out to fulfill legal requirements.

Outfall events [1 or 2]

If you observe water that has an unusual odor, color, or suds coming out of a drainpipe into the creek bank call us and the local jurisdiction's public works department or county environmental health department if it is an unincorporated area. They should be able to help trace the storm sewer lines to find the source of the water. Remember, it's not illegal to hose off walks or driveways, but this water can contain chemicals, detergents or oils in some concentration. Friendly education can help address this problem. But the source has to be found, so try to find the upland cause.

Depending on the volume, nature, and concentration of the pollutant, a vigorous response may be needed, including a 911 call. But try not to over-react. Usually such flows are short-lived and agency personnel are not likely to get there before it's

over. Some footwork may locate the source. If it is not too serious and the perpetrator is there, talking to them may be the best policy.

Swimming pool draining [2]

A long, steady, clear flow from an outfall or running down the gutter may be a sign of swimming pool draining. This is a problem because most pools are maintained with copper compounds, chlorine and other substances that are toxic to fish and frogs. Try to find the owner and educate them. If they are not receptive, you can tell them that draining swimming pools to creeks is illegal. Pools should be drained to landscaped areas or to the sanitary sewer clean-out located in the front of most properties. Call the local sanitary district for information.

Discoloration, milky water [2]

Often pesticides or other chemicals turn water cloudy or milky. Even non-toxic substances, such as milk, when spilled into water in sufficient quantity can cause harm to stream life. If the source of the milky water is not immediately obvious it can be very difficult to identify a pollutant.

Oily sheen, congealed grease [1 or 2]

An oily sheen is probably oil, gasoline or other fuel. If you smell gasoline, call 911. Most likely it's motor oil coming from a storm drain. Local public works departments may be able to help track down the source using storm drain maps.

There are, however, some natural seeps from banks with an oily sheen that usually have rusty iron traces too. There is one such seep just downstream of the Piers Lane Bridge on the north side of the creek. Consult with us if you are not sure.

Congealed grease sometimes appears on the creek looking like ice on the surface. Restaurants will sometimes dump hot grease into the storm drain and it may make it to the creek if chased with hot water. Or, in Menlo Park, some of the old sanitary sewer lines have emergency overflow outlets to the storm sewers underground. If grease is poured into the sanitary sewer and it congeals, the backflow goes into the storm drains and then into the creek. Public works and the local sanitary districts are the agencies to be contacted. The creek will be pumped if

there is little or no flow or allowed to clear naturally if there is too much flow to stop. Some time will elapse before the creek is opened again.

Odor [1 or 2]

If the odor is of sewage, there may be an overflow from a clogged sanitary sewer or pumping station. Local public works departments and the local sanitary district are the authorities to contact.

Chemical odors can help characterize a spill. If a spill has a strong chemical odor it is probably best to go to a 911 response immediately.

Foam [2]

Some foam on a creek, particularly a little stiff brownish foam during high water is natural. If the foam is white, particularly if it's floating on a stream with a more moderate flow, it is probably detergent from car washing. And after dry periods, a rain will wash soap from car washing into the creek.

Detergent, which seems to be the most common form of pollution on the creeks, is harmful to the fish's body coating that they need to prevent fungal and bacterial infection. It is best to use a car wash or wash cars on the lawn or another pervious surface.

For charity car washes, the Palo Alto Water Quality Control Plant loans out a street wash kit free of charge. It is just sandbags to block the storm drain inlet, a small pump with extension cord, and a hose to let the water onto a landscaped area or sanitary drain. Simple, but that's all that's needed to help comply with the federal Clean Water Act. Here again, we encourage friendly education.

Commercial traveling auto detailers who have no drain control should be reported to the county Environmental Health Department and RWQCB. They need to set up their own run-off control measures to be in compliance with the law.

Rat bait tubes [3]

In East Palo Alto, the County of San Mateo still puts out many plastic tubes along the creek bed with paraffin-impregnated grain blocks containing Diphacinone anti-coagulant rat poison. This kills all manner of small rodents and the birds that feed on their bodies. This is a decision made by the county vector control department that controls the rat problem along the creek. The tubes are left in the creekbed until before the first rain, at which time the County should remove them. Streamkeepers can help make sure they are being removed and count the number still in the creek in the fall.

Manure [2]

On rare occasions, a horse stable along the creek will dump manure along the creek bank. Or manure might be stockpiled too close to the creek and left unbermed so rain flushes a dark manure tea into the water. These practices have largely been curtailed, but keep your eyes open for violations. County environmental health, DFG, RWQCB, and local code enforcement officers are all concerned about these practices. Lots of manure at places where trails cross or come near creeks can also be a problem.

Sometimes septic systems will also fail, particularly when the ground is saturated and effluent can't infiltrate from the leach lines. This isn't usually visible during the rainy season, but as the creeks sink in the summer, gray water may collect in pools near homes. This is a pretty good sign of a failed septic system that should be reported to county Environmental Health.

Algal blooms [3]

Several species of filamentous algae that clings to the rock appears in the creek as spring advances. The sunny spots will have the most and it diminishes in the shade. These mats, which can be quite big, usually die in June for some reason and there may be some concern about biological oxygen demand as it decomposes. Downstream, where the creek normally sinks into the gravel in summer, the algae leaves a thick dried carpet on the rocks. Our creek is not really very high in nitrogen according to all the analysis that's been done, so we have to suppose this is natural. Algae are certainly used as food by certain guilds of creek insects and so it can be part of the food chain. The actual size of these mats is cause for concern as this may be an indicator that nitrogen levels are higher than

originally suspected. Automatic sampling stations are set up at several locations in creeks throughout the San Francisquito watershed in order to gain better knowledge of this situation. Therefore, unless accompanied by additional information, filamentous green algae should be treated as a natural phenomena.

Upland activities [2 or 3]

Really anything that happens across the landscape can affect the creek. That is why we try to watch the whole watershed. Some specific activities to watch out for are car washing, oil changing and pesticide and fertilizer application. These topics are discussed in other sections of the Manual.

Physical Indicators

The physical condition of the channel is important to habitat quality, flood risk management, water quality, and human safety. Physical signs to keep an eye on include**: excessive sediment loading, unexpected water flows** (either an increase or decrease), **digging, grading and vegetation removal, bank erosion, undermining and outflanking of infrastructure, debris jams and accumulations, down trees, trees on steep banks and trees in the creek bed, and denuded banks**.

The upstream, headwater reaches of the creek are physically different from the lower, alluvial reaches even under undisturbed conditions. So the signs of creek health for upstream and downstream reaches will vary. For example, in the lower watershed, the creek naturally forms a deep, canyon-like arroyo because of its slope, sediment loads, and flow. In the upper watershed, a deeply incised channel can be a sign of gullying and accelerated erosion, which is bad for habitat and disconnects the creek from its floodplain, making flood problems worse downstream. Log jams and debris pile ups are another sign that can be good or bad depending on where you are in the watershed. A small logjam in a headwater stream can provide important habitat for fish. A large log and debris pile up in the lower mainstream can force flows against the bank or out of the creek, causing erosion or flooding.

Sediment Loading/ Erosion [2 or 3] *

* See page 14 for Response codes

Excessive loads of sediment in the creek can smother habitat for fish and other aquatic organisms and can exacerbate flood problems by causing localized debris pile-ups or aggradations downstream. Sediment loading may also indicate erosion problems upstream. When banks erode at unnaturally high rates or gullies eat their way up a stream channel, valuable topsoil is lost and human property can be undermined.

Brown, turbid water or lots of fine particles moving along the bottom of the channel are signs of sediment loading. Because of its geology the San Francisquito watershed naturally produces a lot of sediment. Some turbidity in the creek after a big rainstorm can be expected. Human activities can also accelerate erosion and cause unnaturally high sediment levels in

the creek. Watching the sediment loads in your reach of creek over a long period of time can give you a sense of how much sediment to expect at particular flows or after particular size rainstorms.

The sudden appearance of turbid brown water unrelated to a rain event is an indication that someone is grading in a wetted stream channel or flushing sediment into the stream from an upland source. Both are illegal activities. **Call us at once. It may be appropriate to call DFG, RWQCB, and local Planning and Public Works Departments, and the SCVWD if you're in Santa Clara County**.

De-watering [2 or 3]

Sudden reductions in flows in the creek can severely impact aquatic creatures. Many people depend upon the San Francisquito watershed for part of their water supply and diverting surface waters from the stream or pumping groundwater can reduce in stream flows. Keeping an eye on flows in the creek and recording observations can help in efforts to strike a balance between the needs of in-stream aquatic organism and humans.

You will observe natural changes in creek flows from one season to the next, between daytime and nighttime, and according to the weather. Sudden dewatering of the creek should be fairly dramatic and easy to identify. One day there may be a decent flow in the creek and the next there may not even be enough water to connect pools.

If the falling water level kills fish by leaving them high and dry or subject to easy predation, action is needed. **Call us and it may be appropriate to call DFG.**

In addition to sudden reductions in flow, it is also helpful to note when stream segments stop flowing and when remaining pools dry up completely.

Anomalous Flows [2 or 3]

Sudden increases in flow can indicate that a diversion has been turned off or that water is being discharged to the creek from a pool, storage tank, irrigated field, pond, or some other water storing facility. Discharges can be a concern because they can

contain pollutants such as chlorine, chloramine, pesticides, human waste, or other contaminants. If a pond is being discharged or pumped out, invasive aquatic species such as bass or bullfrogs may be entering the creek system. As with dewatering, the change in flow will likely be dramatic and easy to identify. Making additional observations about the visual appearance and smell of the water can help clarify if pollutants are being discharged to the stream.

Investigate upstream and if you find a source, try to get more information about what is being pumped, then call us if you think it's a problem that should be addressed.

Water main breaks are now a potential source of fish, frog, and insect kills because the chloramine now in our drinking water is poisonous to aquatic wildlife. Report breaks immediately (large breaks are a 911 call) and check downstream for dead animals.

Digging, Grading and Vegetation Removal [2 or 3]

Disturbing ground and removing vegetation near streams can accelerate erosion and degrade habitat. Runoff can pick up bare and loose soil and carry it to streams. Large grading and digging projects that are close to streams can destabilize entire banks or cause gullies to form, reducing water quality and putting property at risk. When vegetation is removed, not only is soil more vulnerable to erosion, but the stream ecosystem may also lose important shade, shelter, food supply, and runoff filtering capacity. Large piles of soil, areas of bare and rutted soil, heavy machinery, and piles of removed vegetation in close proximity to the stream are indicators of a potential problem.

Grading, digging, and significant vegetation removal are activities that are regulated and permits must be obtained and complied with. C**all DFG, the local jurisdiction Planning Department, and SCVWD** (if in the lower watershed) and **notify us**. If no permit has been acquired, a stop work order should be issued by one of these agencies until compliance is established.

Bank erosion, undermining and outflanking of infrastructure [2 or 3]

Creek channels are dynamic. A stream typically erodes its banks in some places and builds up sand bars and banks in other places. Sometimes they change their courses dramatically.

Undermining occurs when the bank immediately below a structure or site erodes away, leaving the structure or site in danger of falling down into the creek. Outflanking occurs when the creek scours away the bank upstream or downstream of a structure or site. The danger of outflanking is that the creek will make an "end run" around a structure such as a wall, leaving the structure stranded as an island and leaving the property the structure was meant to protect vulnerable. Ideally, infrastructure and property improvements should be designed to give dynamic creeks lots of room to move so that undermining and outflanking is not a concern. But much important infrastructure and property improvement does already exist near stream banks so watching for undermining and outflanking at these locations is important.

Slight or partial undermining and outflanking can be observed at many locations on the creek. These locations should be watched carefully and Streamkeepers should keep their eyes out for new scouring below or upstream from structures. Property owners should be advised of changes as they may not be aware of what is happening.

Debris Jams and Accumulations [3]

Large objects, from shopping carts to tree trunks, can become lodged in the creek channel and catch other natural and unnatural debris that is floating downstream to form a jam. Bridges and culverts are particularly important spots to watch. These debris jams can force the creek out of its channel or up against the bank, causing flooding or erosion. Debris jams can also act as barriers to migrating fish and other aquatic organisms. Large debris usually moves down the creek during big storms and/or high flows. Look for new debris jams when the creek is full of water or shortly after big storms.

The removal of debris jams requires a DFG Streambed Alteration Agreement that is up to the landholder to apply for. DFG may not give this permission and often a jam will blow out the next winter naturally. Let the landowner make this decision in consultation with DFG

Downed Trees, Trees on Steep Banks and Trees in the Creek Bed [3]

Large woody debris occurs naturally in streams and is an important part of the aquatic ecosystem. Logjams are especially

important to the steelhead, providing important shelter and food to both adult and juvenile fish. Downed trees in the channel can also pose a flood hazard. It is important to note and report downed trees, trees in the channel, and log jams so that large woody debris can be left or removed as appropriate. Generally, downed trees and logjams in the upper watershed are not a threat and should be left for habitat and those in the lower watershed are a potential concern and should be reported.

Denuded Banks [3]

As noted above, stream bank vegetation stabilizes banks, filters runoff, and provides important shade, shelter, and food supply to the aquatic ecosystem. Bare banks should be noted down as potential locations for revegetation projects and, if severely denuded, reported to us. The vertical earth banks on the lower alluvial fan are natural. They may be a problem for infrastructure on the bank, but in many cases it is impossible to revegetate them.

Gullying [3]

Gullying is one of the primary erosive agents in watersheds and can move substantial amounts of sediment into streams. When located right in the channel of a creek, gullying can also aggravate flooding problems and dry out and degrade important wet habitats. These on-stream gullies are very important to spot and treat, since they can quickly creep up a stream as a “head cut” if not addressed. Watching small gullies to see if they are growing over time can point out future problems. The best treatment for gullying is to spread out the water before it gets to the gully by bio-engineering the land surface. Then it may be possible to fill or regrade the gully and replant it with native grasses and shrubs.

Social Indicators

There are numerous positive social indicators in the watershed. Frequently you will see people learning about, appreciating, and even stewarding the creek – picking up litter, planting native plants, doing good bank stabilization projects, managing their runoff. The majority of this section is focused on the negative indicators that we are concerned about, but don't forget to cheer on the people who are treating the creek well!

Social problems include **poaching, trout harassment, temporary dam building and engineered fish migration barriers, camping, fires, arson, drug and alcohol abuse, debris dumping, tagging, paint balling, and construction.**

In this category we consider the behavior of individuals or small groups whose actions in and around the creeks cause considerable negative impacts and which are, generally, illegal.

Again, unless there is an emergency situation such as an out-of-control fire or an assault, **consider calling us first** to work out the best way to approach a problem.

Poaching, trout harassment [2]*

* See page 14 for Response codes

In the past trout and salmon were important food sources for the ancestral inhabitants. In the American Period after 1849, food and sport fishing were common and resorts in the Woodside area widely advertised the abundance of trout and wild game to be had, followed by evenings of gambling and carousing by the fire. And many people who have grown up in the area in the recent past fished for trout as children.

But even in Stanford's early days the University lands were declared a state game refuge to keep trespassers out. At some point fishing was declared illegal throughout the watershed. Any fishing or gathering of shellfish from the creek at any time of year is poaching and should be reported. Steelhead are a federally and state protected species. Even above Searsville Dam where steelhead can no longer migrate, the landlocked rainbow cannot be caught.

If you see fishing on San Francisquito Creek, call Caltip, the DFG violations hotline or the dispatcher in Monterey, and give precise locations and times. If a pattern is established or if there are a number of anglers at the mouth during the winter migration run, the warden may put the site on the patrol list. **We also encourage a call to the local police** (the business number, not 911) who have been made aware that they may cite poachers.

In addition, our practice has been to put up “No Fishing” signs authorized by DFG at places where we observe poaching, though not generally where the general public can see them and be alerted to the fishing prospects, but near where the fishermen must stand to poach.

Since the listing of local populations of steelhead as federally threatened in 1997, it has become illegal to even harass them, which could include wading or dog wallowing. Walking in a creek in the late winter when eggs are in the "redd” should be avoided. Operating power equipment near the stream can cause frantic activity, acidosis, and death to the trout. In general, the quieter the stream environment, the more the trout population and that of other native species will be enhanced.

Temporary dam building and engineered fish migration barriers [2]

Building small temporary dams of rocks and logs is a common activity. Even small dams can impede the movement of trout and other fish. This limits their habitat options as stream conditions change. It can also prevent smolt from running to sea in spring if the dams are significant. Education is important here. In addition, this is an illegal activity and citations may be issued by DFG or possibly by the local police if the dam builders are caught. Call us if dams are seen.

We have recorded, and there are plans to modify, all the small engineered dams on the creek to improve fish passage, so it is unnecessary to note them. Even Searsville Dam is being evaluated.

Camping [2]

One of the early struggles of our creek restoration efforts was to convince the local jurisdictions that camping in the creek should not be allowed. Much effort and several organizations were

oriented toward this end and began pushing for better public services. When the Urban Ministry finally hired a director who understood that by allowing camping in the creeks, the cities were acting as co-dependents for the manifold drug and alcohol problems of creek dwellers, that organization ceased advocating for the inalienable right of the homeless to live there.

Palo Alto and Menlo Park then began to enforce already existing no-camping ordinances. They had Caltrans sign over to them law enforcement jurisdiction under the El Camino Bridge, which until then was in the hands of the Highway Patrol who paid no attention to the problem. The cities posted the large encampment there and soon it was gone. Since then, camping in the creek has been minimal and the incredible flood of trash washed out of the camps every year has become a trickle.

Camps should be reported to the business phone of the police jurisdiction in which the camp is located. An exact location with an access point is required and they may want you to show them where it is. Camps on private property need owner authorization for removal.

Normal procedure is for an officer to go into the creek and post or issue an order to vacate within 24 hours with a list of alternatives. If you find a camp that is abandoned feel free to clean it up or report the location to us so we can target it at the next clean up.

Fires, arson [1 or 2]

Building contained fires in the creek is also illegal and should be reported to police dispatch. Arson and out of control fires are a different matter and should be reported to 911 immediately.

Drug and alcohol abuse [3]

Illegal substance abuse is to be discouraged wherever it occurs. Alcohol consumption in the creek is banned by ordinance. If you see someone just having a beer in the creek you should exercise your judgement in deciding whether to respond in some way or not.

Debris dumping, littering [2 or 3]

Dumping debris of any type, organic yard waste, construction debris or household garbage, is against city, DFG, SCVWD and probably other ordinances as well. **A call to the local police code enforcement officer reporting where the infraction occurred may be the best tactic**. Get the license number of a vehicle if possible and where the dumping is occurring. If it is appropriate you might try educating the responsible parties first.

If it's a long-term, over-the-back-fence yard waste problem, calling Code Enforcement, the JPA, and even the SCVWD is a good idea. All cities now have green waste programs and there is no longer any excuse for this practice. Yard waste prevents native vegetation from rooting; may be the source of non-native vegetation; can consume a great deal of dissolved oxygen if it gets in the water; has been known to cause fish kills when pesticide laden grass clippings get in the water; and may contribute to debris jams at bridges and over banking.

At the very least, if it's not a violation in progress, make a note for later reporting so we can decide what to do later. For miscellaneous trash, carry a garbage bag or just pocket the odd candy wrapper. It really does make a difference.

Vandalism, tagging [2 or 3]

Vandalism in creeks mostly takes the form of tagging with spray paint or magic markers. In the creek bed itself this may not be too bad and is often limited to a name on a rock. If it covers bridge abutments and walls it needs to be painted over. The individual departments that own the infrastructure need to be contacted so they can send out a city team.

Graffiti on rocks, fences, bridges or park facilities needs to be removed. We have cans of graffiti remover and can do small jobs if contacted. We are particularly vigilant about tagging of the educational panels we've established in the City Parks on either side of the Bonde Bike Bridge on San Francisquito Creek.

Other kinds of vandalism to creek side structures or plants should be reported to the appropriate city department. Report the problem to us and we may be able to help.

Paintball [2]

Paintball wars are destructive to the creek environment as participants create forts and scramble up and down banks. The paint, while non-toxic, defaces the environment. Local police are interested in controlling the problem but must catch the paintballers in action. So don't call it in to the dispatch number (not 911) unless it's active. But make notes of areas where paintball signs occur and **report them to us**.

Informal Construction [2]

Sometimes children will create structures in the creek from construction debris or dig in the banks. This is to be discouraged, particularly the bank digging because it can lead to increased erosion and bank undermining. Structures need to be removed before the rainy season. If they are small-scale and made of found natural materials they are probably of no concern; the floods will wash them away.

On the alluvial fan such problems are probably best addressed by the SCVWD or local public works. Or we can remove structures during cleanups. **Call us to let us know what's going on and then call the appropriate department.**

If there is a landowner construction project on the creek bank, they must have all the proper permits in hand. This may include the local jurisdiction, DFG, SCVWD, and other agencies. Get the address and call the Planning Divisions of the relevant jurisdictions if you want to verify that the landowner has all the necessary permits and if they are in compliance with those permits. If you think they may be committing a violation, ask for an inspection.

Streamkeeper Indicator List

The following is a summary list of all the indicators described in greater detail above. You may find it useful to have with you when you do your creek walks to use as a guide for some of the indicators that you might see on your reach of creek.

Biological – Animals

Non-native
- Mitten crab (*Eriocheir sinensis)*
- Red fox (*Vulpes vulpes*)
- Feral cats
- Dogs
- Bass (*Micropteris salmoides*)
- Bullfrog (*Rana catesbeiana*)

Native, threatened and endangered
- Steelhead rainbow trout *(Oncorhyncus mykiss*)
- California red legged frog (*Rana aurora draytoni*)
- Western pond turtles (*Clemmys marmorata*)

Native, becoming less common
- Wood duck (*Aix sponsa*)
- Dipper (*Cinclus mexicanus*)
- California quail (*Lophortyx californicus*)
- California thrasher (*Toxostoma redivivum*)
- Pacific tree frog (*Hyla regilla)*

Benthic Macro invertebrates (BMI)
- Stone fly larvae (*Plecoptera*)
- Caddis fly nymphs (*Tricoptera*)

Biological – Plants

Trees growing in mid-channel
Revegetation
Invasive exotic plants
- Giant reed (*Arundo donax*)
- Cape ivy (*Delairea odorata*)
- French Broom (*Genista monspessulana*)
- Pampass grass (*Cortaderia jubata* and *selloana*)
- Himalaya berry (*Rubus proceus*)
- Eucalyptus seedlings (*Eucaluptus globules)*
- Acacia (*Acacia* spp.)
- Tree of Heaven (*Ailanthus altissima*)
- English and Algerian ivy (*Hedera helix and canariensis*)
- Pepperweed (*Lepidium latifolium*)
- Fennel (*Foeniculum vulgare*)
- Poison hemlock (*Conium maculatum)*
- Thistle spp. (*circium*)
- Annual weeds downstream from permanent outfalls
- New infestations

Chemical

Fish kills
Outfall events
Swimming pool draining
Discoloration, milky water
Oily sheen, congealed grease
Odor
Foam
Rat bait tubes
Manure
Algal blooms
Upland activities likely to affect the creek (i.e., car washing, oil changing, cleaning sprayers in gutter)

Physical

Sediment loading
De-watering
Anomalous flows
Digging, grading and vegetation removal
Bank erosion, undermining and outflanking of infrastructure
Debris jams and accumulations
Down trees, trees on steep banks and trees in the creek bed
Denuded banks

Social

Poaching, trout harassment
Temporary dams / engineered fish migration barriers
Camping
Fires, arson
Drug and alcohol use
Debris dumping, littering
Vandalism, tagging
Paintball
Construction

Doing your stream walks

We ask that you commit to walking your reach of creek on a monthly basis. If that seems like too much you might split responsibility for a reach with someone else.

When you go out in the field, take a copy of the indicator list, a notebook, and a pen or pencil. Take time to stop and make observations. Look at both the areas along the creek and in the channel itself. If your reach is dry in summer, walk the creek bottom occasionally. There may be important spots to watch in your reach, such as a storm drain outlet, a pool where steelhead congregate or a section of denuded stream bank. You may want to note such spots to track changes over time. Please write down observations of any of the indicators health on the list. It is good to note things like time, location, extent or intensity of phenomenon, potential sources, and other useful supplemental information.

It is very important to be certain and provide a lot of detail when you make an important observation. For example, if you are not certain you saw a federally listed red-legged frog, it is OK to simply note that you saw a frog that may have been a red-legged frog and note any distinguishing characteristics that can be used for further identification later. As another example, if you come across a chemical spill or discharge, please try to record as much information as possible so that the source and potential impacts can be identified later – color, smell, density, consistency, visible source, etc.

Important Numbers

Streamkeeper Coordinators

David "Tex" Houston	650-962-9876 x347, 650-303-2777 (cell), tex@acterra.org
Katie Pilat	650-962-9876 x305 (Mon-Fri, 9-5), katiep@acterra.org
Jim Johnson	650-364-3768 (hm/office), 650-465-4052 (cell), jimmyjj@earthlink.net

Local Government and Agency Contacts

San Francisquito Creek Joint Powers Authority	650-330-6765
California Department of Fish & Game	888-334-2258 (Cal Tip Hotline, to report items like poaching) 831-649-2801 (Monterey dispatcher, to report emergencies in progress)
Regional Water Quality Control Board	510-622-5400 (Day) 800-852-7500 (After hrs)
Santa Clara Valley Water District	408-265-2600 (Main number) 888-510-5151 (Hazardous spill or illegal dumping 24-hr hotline)
San Mateo Co. Environmental Health	650-363-4305
CA Bluebird Recovery Program	
David Houston (Santa Clara County)	650-962-9876 x347
Howard Rathelsberger (San Mateo County)	650-367-1296
Stanford (Alan Launer, Conservation Biology Dept)	650-725-1854

Police

Palo Alto	650-329-2413
East Palo Alto	650-321-1112
Menlo Park	650-330-6300
San Mateo Co. Sheriff (Including Woodside and Portola Valley)	650-363-4911
Santa Clara County	408-867-9715

Public Works

Palo Alto	650-329-2579	
Menlo Park	650-330-6780 (Day)	650-330-6300 (After hours)
East Palo Alto	650-858-3132 (Day)	650-321-1112 (After hours)
Woodside	650-851-6790 (Day)	650-363-4911 (After hours)
Portola Valley	650-851-1700 (Day)	650-363-4911 (After hours)
San Mateo County	650-363-4100	
Los Altos Hills	650-941-7222 x238	

Sanitary Districts

P.A. Water Quality Control Plant	650-329-2589 (Day)	650-329-2579 (After hrs)
West Bay Sanitary District	650-321-0384	

Appendix

Water Chemistry

The concentration of various substances in the stream depends on a number of factors including natural and human.

Evaluating the chemical water quality of a stream involves looking at the concentration of dissolved and suspended substances in the water. These substances may come from the atmosphere and reach the stream via precipitation, whereas other substances may be picked up from soil, vegetation and other sources and carried to the stream via runoff. The concentration of various substances in the stream depends on a number of factors including natural and human. Concentrations can vary from stream to stream, site to site, season to season, day to day and sometimes hour to hour.

The chemical quality of water in a stream is good if naturally occurring substances are present in appropriate amounts for a particular stream and the life it supports. Human activities can significantly alter the concentration of naturally occurring substances and often introduce foreign substances that can be toxic and sometimes deadly to stream life.

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pH (parts hydrogen)

The pH of a stream measures how acidic or basic the water is and is an important chemical limiting factor for aquatic life. If the water in a stream is too basic or acidic, crucial biochemical reactions may be disrupted harming or killing stream organisms. pH is expressed in a scale, which ranges from 1 to 14. A solution with a pH value of less than 7 is considered acidic and greater than 7, basic. A solution with a pH of 7 is considered neutral.

Each individual stream tends to have a narrow range of pH values and many stream organisms adapt to this specific range of pH values. For some stream organisms, a small change in pH can be deadly, while others can tolerate a much broader range.

Human activities influence the pH of our surface water bodies. Air pollution from car exhausts and other fossil fuel burning

increases the concentrations of sulfur and nitrogen oxide in the atmosphere. In turn, these pollutants can move far from their original sites and become part of the hydrologic cycle, falling back to earth as ‘acid rain’.

Dissolved Oxygen

Several natural and human factors can affect the concentration of dissolved oxygen in a stream.

Compared to the atmosphere, the oxygen present in water is in a dissolved form and there is a lot less available in water. Aquatic organisms have evolved with specialized means of extracting and storing oxygen from the water. Many aquatic plants have spongy tissue that allows them to store oxygen, whereas most aquatic animals have gills or other specialized breathing adaptations. The amount of dissolved oxygen present in water is expressed as a concentration. The dissolved oxygen content concentration in a stream is the mass of oxygen gas present, in milligrams (mg) per liter (l) of water, which can also be expressed as parts per million (ppm).

Several natural factors can affect the concentration of dissolved oxygen in a stream. Oxygen is more easily dissolved in cold water, therefore, temperature is very important to certain organisms like, salmonids, stoneflies and caddisflies that inhabit coldwater streams. Faster flowing white water areas of streams tend to be more oxygen rich than in slower stagnant areas. Green plants release oxygen into the water during photosynthesis, which occurs during the day and deplete it through respiration during the night. In streams with significant populations of algae and other aquatic plants, the dissolved oxygen concentration may fluctuate daily, reaching its highest in late afternoon. Oxygen is also more easily dissolved into water with low levels of dissolved or suspended solids. Consequently, salt water tends to have lower concentrations of dissolved oxygen than fresh water.

Certain human activities also influence the amount of dissolved oxygen in stream water. Increased water temperatures may lower the concentration of dissolved oxygen in a stream when riparian canopy vegetation is removed. Certain typical human urban activities may also lower oxygen concentrations, such as run-off from impervious surfaces. Salts, sediments and other pollutants can be washed into the stream water increasing the amount of dissolved and suspended solids. Organic wastes and other nutrient inputs from sewage and industrial discharges, septic tanks and agricultural and urban run-off can result in

increased algal growth. When the algae dies the organic matter is decomposed by bacteria and this process consumes a great deal of oxygen.

Most stream organisms have specific oxygen requirements and can only live in streams or in areas of streams that meet their needs. If the oxygen concentration falls too low due to any of the above factors, a stream may not be able to support aquatic life. Usually, streams with high dissolved oxygen concentrations (greater than 8mg/l) are considered healthy systems. They are able to support a greater diversity of aquatic organisms and typified by cold, clear water, with enough riffles to provide sufficient mixing of atmospheric oxygen into the water.

Temperature

Water temperature is a controlling factor for aquatic life: it controls the rate of metabolic activities, reproductive activities and therefore, life cycles.

Water temperature is a controlling factor for aquatic life: it controls the rate of metabolic activities, reproductive activities and therefore, life cycles. Most aquatic organisms are cold blooded, which means they cannot regulate their own body temperatures and assume a temperature similar to the surrounding water and carry out their metabolic activities within this range. If stream temperatures increase, decrease or fluctuate too widely, metabolic activities may speed up, slow down, malfunction, or stop altogether. Many factors influence the temperature of stream water. Temperature may fluctuate seasonally, daily and hourly. There are, however factors that can buffer the effect of summer heat and keep stream temperatures cool, such as springs discharging cool groundwater or an overhanging canopy of stream vegetation providing shade.

Water temperature is also influenced by the quantity and velocity of stream flow and the warming action of the sun has much less affect on greater, swifter flowing streams than smaller, slower flowing ones.

Human activities can also alter the temperature regime of a stream. Water released from power plants, industrial facilities and return flows from irrigation systems can significantly increase the temperature of a stream.

Other Parameters

Alkalinity

The alkalinity (buffering capacity) of a body of water refers to its ability to absorb or neutralize acidic pollution. The buffering capacity of a body of water is compromised as increasing amounts of acid enter it. If the surrounding rocks and soil are alkaline, the buffering capacity of the stream may eventually be restored, however, a temporary decrease in alkalinity can allow the pH to drop to levels harmful to life in the stream.

Biochemical Oxygen Demand

The amount of oxygen consumed by bacteria when decomposing organic material is known as **Biochemical Oxygen Demand (BOD)**. This also includes the amount of oxygen required for the oxidation of various chemicals that may be present in the water, such as sulfides, ferrous iron and ammonia. Unpolluted natural waters should have a BOD of 5mg/l or less.

Nutrients

All organisms require nutrients such as nitrogen and phosphorus for basic processes of life, growth and reproduction. Various forms of nitrogen and phosphorus occur naturally in stream water, but in excessive amounts, these nutrients over-stimulate the growth of aquatic plants. This excess of vegetation can clog waterways and when it dies is decomposed by bacteria and dissolved oxygen levels can drop significantly. Aquatic invertebrates and fish can be adversely affected by this lack of oxygen.

All organisms require nutrients such as nitrogen and phosphorus for basic processes of life, growth and reproduction.

Excess nutrients can enter the groundwater from a variety of sources including: fertilizers applied to agricultural fields, lawns and gardens; poorly maintained sewage treatment plants and septic systems; industrial effluent; pet, livestock and other animal wastes; detergents and plant cuttings from illegal dumping left on stream banks.

Bacteria

Pathogenic, or disease causing bacteria and viruses can be carried to stream systems in human and animal wastes. Along with these disease-causing organisms, a number of common types of non-pathogenic bacteria can also be found in animal

intestines, such as fecal coliform bacteria, enterocci bacteria, and escherichia coli (E. coli) bacteria.

Other sources contributing to the presence of pathogenic bacteria in streams are septic tank failure; poor pasture management and animal keeping practices, pet waste, urban run-off and sewage from storm water overflows.

Conductivity

Conductivity is a measure of how well water can pass an electrical current. It is an indirect measure of the presence of dissolved solids such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, iron and aluminum. These substances help to conduct electricity because when dissolved in water they are negatively or positively charged ions. Organic substances such as oil, alcohol and sugar do not conduct electricity very well and therefore have a low conductivity in water. Although dissolved solids are essential ingredients for aquatic life, too many dissolved solids can cause water balance problems for aquatic organisms.

The conductivity of a stream is affected by the underlying bedrock and soil that make up the watershed.

The conductivity of a stream is affected by the underlying bedrock and soil that make up the watershed. Where the soil and bedrock is composed of material that does not dissolve in water, conductivity tends to be low. Conductivity tends to be higher in areas with clay soils, because clay contains some substances that dissolve into ions.

Human influences also have an impact on conductivity. Agricultural runoff and failing sewage systems tend to raise conductivity due to the presence of phosphate and nitrate. Oil spills generally lower conductivity and industrial discharges may raise or lower the conductivity, depending on the chemical make-up.

Turbidity

The cloudiness or turbidity of water is caused by particles of solid material and plankton that are suspended in the water. Moderately low levels of turbidity can indicate a healthy and well functioning ecosystem. Higher levels of turbidity may block out the light needed by submerged aquatic vegetation. Surface water temperatures may also increase due to suspended particles near the surface facilitating the absorption of heat from

sunlight. Suspended particles may also carry nutrients, pesticides and other pollutants throughout the stream system that can bury fish and invertebrate eggs, bottom dwelling creatures and cause plankton blooms.

Streamkeeper's Field Guide

Purpose: To provide descriptions and information on a few species listed in the animal list. Please use this as a reference and verify with a second source or available field guide when possible.

Scope: To provide information to help ID certain animals based on their appearance, the sounds they make, their habitat, and their behaviors.

Species found in this guide currently or to be added eventually*:

Species	Status	Origin **
California red-legged frog	Endangered	Native
Steelhead/rainbow trout	Threatened	Native
Western pond turtle	Endangered	Native
Tiger salamander	Special Concern	Native
Wood duck	Less Frequent	Native
Mitten crab	Non-Native Invasive	China

* A wealth of information on these and other species is available from multiple sources including published field guides and the internet. If you find information on other species found within San Francisquito, Matadero, or Adobe-Barron Creek watersheds that you would like to add to this field guide and would be willing to write up a short description following the format used below, please contact Katie Pilat at katiep@acterra.org. Three great resources for good images of local plants and animals include

U.C. Berkeley's CalPhotos collection (http://elib.cs.berkeley.edu/photos/),
Stanford's Jasper Ridge Biological Preserve (http://www.stanford.edu/~merigan/), and
Stanford's Natural Resources Inventory (http://ccb.stanford.edu/sunri/).

** "Native" indicates that this species is known to be in the San Francisquito, Matadero or Arastradero Creek watersheds.

General Notes:

A permit is required for handling any Endangered or Threatened species.

Identifying an animal either by sight or color only can be risky since color depends on the amount of light available, which varies depending on several physical factors (amount of light, angle of light, etc.). Behavior, location and sound combined with visual clues are the best way to ensure accurate identification of an animal.

When reporting identifications always indicate percentage or degree of certainty, it's OK to write or say something like, "Definitely a frog but not sure if red-legged frog or a green frog since I only heard the frog". It would be ideal to have 100% certainty in identifying these species, especially for Endangered or Threatened species, but this may not always be possible depending on the exact details of the sighting.

Common Name: California red-legged frog **Scientific Name**: *Rana aurora draytoni*

Size: 1.5 to 5.1 inches in length **Status**: Endangered

Visual tip(s): Red-legged frogs are brownish-red while bullfrogs are olive-green. A red-legged frog does not have as distinctive a tympanum or ear like the non-native bullfrog.

Aural tip(s): Call is a very low and insignificant, a soft "ribbit" like that of the green frog, unlike the common bullfrog's call, which is a guttural, bull-like and much louder.

Visual Identification: Rare and difficult, see details in Native Animal section.

Aural Identification: Not as rare as visual may be more difficult than aural.

Behavior: Primarily active by day, great jumpers and usually gone before spotted.

Habitat: Found in ponds and intermittent and permanent streams with slow or still water.

Notes: Red-legged frogs stress when exposed to water temperatures at or above 29^{o}C or 84^{o}F. The red-legged frog is the largest native frog in California in the genus Rana. In the Central Valley in 1988 red-legged frogs were found twice as frequently in intermittent aquatic habitats. This is probably due to their exclusion from permanent aquatic habitats by introduced predators like bullfrogs (*Rana catesbeiana*) that need permanent water.

Common Name: Western Pond Turtle **Scientific Name**: *Clemmys marmorata*

Size: Between 4 & 8 inches long **Status**: Endangered

Visual tip(s): Dark brown or olive-colored carapace that lacks prominent markings.

Aural tip(s):

Visual Identification:

Aural Identification:

Behavior: Mostly aquatic they move to upland areas for egg laying. They over winter in underground burrows in upland habitats. In the warmer months the pond turtle will bask on rocks and logs near slow-moving streams.

Habitat: Valley locations with slow-moving waterways. Upland habitat and basking sites must be easily accessible.

Common Name: California Tiger Salamander **Scientific Name**: *Ambystoma californiense*

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Size: male 80-108 mm, female 79-118 mm **Status**: Special Concern

Visual tip(s): *Ambystoma californiense* has broad rounded snouts with small eyes. It is a lustrous black and marked with rounded or irregular yellow spots. Bellies are a grayish color and may contain a few small dull yellow spots. These salamanders have 12 costal grooves on their sides.

Aural tip(s):

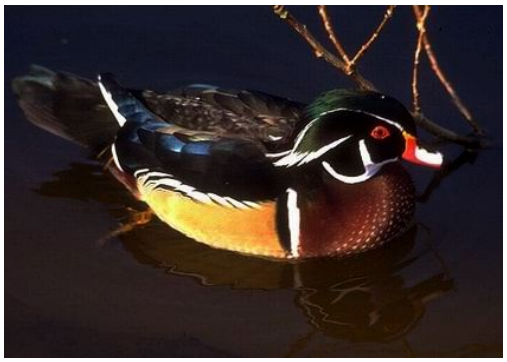
Visual Identification:

Aural Identification:

Behavior: *Ambystoma californiense* often burrows in holes made by ground squirrels and other rodent burrows near their natal pond. Adults are able to move at a rate of 50.8 meters per hour, while juveniles can only move at a rate of about 30.9 meters per hour. Adults use the same migratory pattern year after year.

Habitat: *Ambystoma californiense* likes a Mediterranean climate of cool wet winters and hot dry summers. They inhabit annual grasslands and open woodlands of foothills and valleys. It is endemic to California, and found in the Central Valley, adjacent foothills and coastal grassland.

Common Name: Wood Duck **Scientific Name**: *Aix sponsa*



Size: Size: 43-51 cm (17-20 in) long. **Status**: Less Frequent

Visual tip(s): Both adults have a crested head, white belly and a white line at the back of the wing (especially seen while the bird is in flight). The head of the male is iridescent green, blue, and purple, with two white lines that run parallel to each other from the base of the bill and behind the eye to the back of the head. The male also has a white chin and throat, red eyes, red at the base of the bill, a deep rust-colored chest, bronze sides, and a black back and tail. In contrast, the female is gray-brown overall, with white eye rings and a white throat and chin.

Aural tip(s): The male Wood Duck call is a strange high squeak.

Visual Identification:

Aural Identification:

Behavior: The Wood Duck is a cavity nester, readily using man-made nest boxes when natural cavities are limited. Nest cavities are usually located within 1 mile of water, and average 9 m (30 feet) above the ground. The nest is lined with wood chips and down. The female lays 6-15 (usually 10-15) eggs. Like many other bird species, a female Wood Duck will lay eggs in others' nests. The reasons for this behavior are unknown, but may include a female's own nest having been destroyed or a female not wanting to "put all her eggs in one basket," so to speak. Dumped eggs can result in an apparent clutch size of up to 50 eggs. Females incubate the eggs for approximately 30 days, only leaving the nest twice a day. The young remain in the nest for 24 hours. The female coaxes the young out of the cavity and leads them to the nearest water. The female will then care for the young for 56-70 days, at which time they become independent.

Habitat: Wood ducks prefer wooded swamps and river bottomlands. Natural cavities in trees serve as nests sites. Tree species important in producing desirable cavities in floodplain forests include bald cypress, sycamore, silver maple, black ash, sour gum, and black willow. Tree species that produce usable cavities in upland areas include black oak, red oak, white oak, blackjack oak, burr oak, and basswood. Unlike most other dabbling ducks, wood ducks do not have a stable home range. Their home range changes according to the rise and fall of floodwaters.

Common Name: Steelhead / Rainbow Trout **Scientific Name**: *Oncorhyncus mykiss*

Size: 18 – 30 inches long **Status**: Threatened

Visual tip(s): Steely silver in color

Visual Identification:

Behavior: From late December until early April, adult STEELHEAD TROUT leave the ocean, travel to the southern reaches of San Francisco Bay and enter San Francisquito Creek making their way to gravelly spawning beds in the tributary creeks. Unlike some other species of anadromous fish, steelhead spawn more than once, so they may make the annual round trip from the ocean to the mountains as many as three times during their lives.

Habitat: Steelhead eggs require special conditions to survive and develop into juvenile fish. Water temperatures should be around 50-58 degrees F. Native plants overhanging the creek, such as willows, alders, valley oaks and buckeyes are needed to provide shade cover, which cools the water and makes shadows where fish can hide. Higher water temperatures can be caused when vegetation is lost and this in turn can stress or kill the young fish in addition to causing erosion, which can clog spawning beds, and smother eggs.