PRESIDIO TRUST

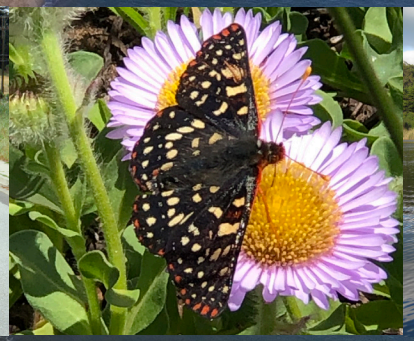
Presidio Environmental Health

2020-2022

Native Plant Cover

Threatened & Endangered Species

Invasive Species



Biodiversity

Water Quality

Nature in the Presidio

> 300 Native Plant Species
Ranging from wildflowers to oaks

12 Native Plant Communities
Including dunes, grasslands and wetlands

5 Species protected by the Endangered Species Act
Including the last known wild Franciscan Manzanita

> 323 Bird Species
Including 65 neo-tropical migrating birds that stop and rest here

21 Land Mammal Species
Including coyotes, foxes and bats

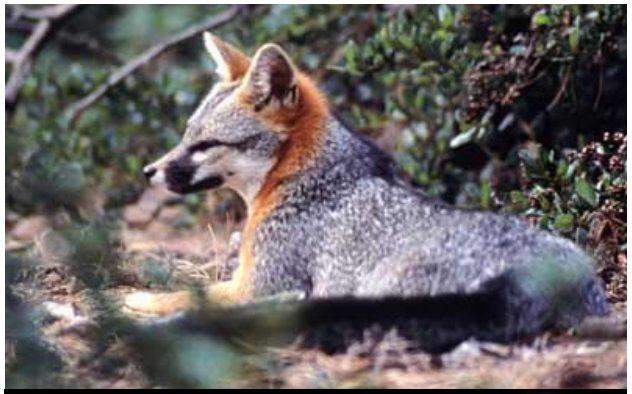
5 Reptile Species
Including lizards and turtles

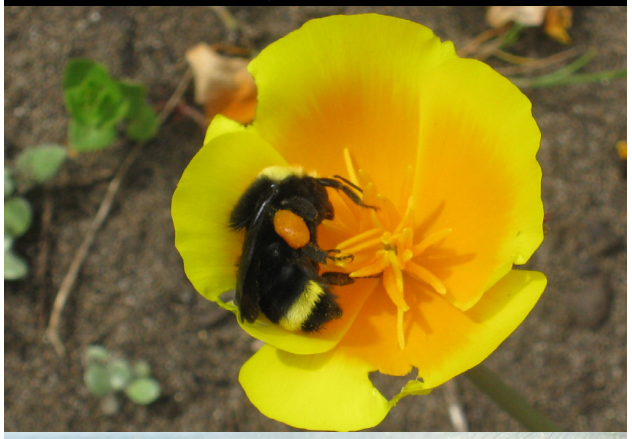
4 Amphibian Species
Including frogs and salamanders

28 Butterfly Species
Including Monarchs and Green Hair Streaks

54 Moth Species
Including the White-lined Sphinx Moth

Ecological Assets





50 Bee Species
Including important native pollinators

24 Wasp Species
Including important native and parasitic wasps

127 Spider Species
Including funnel weavers and pumpkin spiders

10 Ant Species
Including uncommon native ants

62 Fly Species
Including dung flies and hoverflies

13 Dragonfly and Damselfly Species
Including the extremely rare SF Fork-tailed Damselfly

3 Aquifer Systems
And a wealth of surface water resources including natural springs, streams, wetlands and a natural lake

23 Wetlands
Covering 40 acres

150,000,000 Year Old Rock Formations
Beneath the Presidio (and younger ones atop)

Table of Contents

List of Figures

List of Figures

List of Figures

List of Tables

List of Maps

Summary

Though at the center of a dense urban area, the Presidio is one of the most biologically diverse national parks in America. We and our partners have spent two decades revitalizing the Presidio's wild open spaces. Our goal is to develop and model innovative stewardship practices, with a target of increasing biodiversity in park landscapes.

How do we know how we're doing? We joined with cities across the country to develop a standard known as the Urban Biodiversity Inventory Framework and then expanded to include other important associated metrics in this document. The Presidio Environmental Health Report is the first report to track biodiversity and associated environmental metrics as part of the Presidio Trust's Project Management Center of Excellence (PMCoE) strategic Goal 2 "to be a model of environmental stewardship." This project and report was initiated to track the progress of Target 2.1 "to increase biodiversity." This is the second report that has been produced as a summary of data collected between 2020-2022. The report provides a holistic view of the Presidio's ecological health and includes five key measures: native plant cover, threatened and endangered species population estimates, invasive species, biodiversity, and water quality. The information presented in this report is not a comprehensive analysis of the Presidio's ecological resources, but rather a methodical assessment of existing data and expert opinion about the select resources that were chosen by staff as appropriate indicators of ecological health. This is not a peer-reviewed analysis but rather a self-assessment based on existing and new data collection efforts. Targets for determining ratings, or scores, were developed using methodology similar to that used by the National Park Service for its Natural Resource Condition Assessments (NRCAs) which relies on existing data, published scientific standards, and professional opinion. Future reports will be issued every three years and will serve as the ultimate assessment of Strategic Goal 2.1. Three of the four metrics measured in this report actually scored as "Good", however The Presidio received an overall Fair score in this second report due to the averaging of all four data metrics equally; water quality remains Fair and dragged down the overall Presidio score., In years ahead, we will also add Invasive Species as a 5th metric of this report. The following details how condition assessment ratings were determined for each category:

Native Plant Cover

Native Plant Cover has been sampled at 67 restoration sites over the last decade using a sampling protocol developed to monitor vegetation changes in Presidio ecological restoration sites through time. Since 2020 some lower priority sites or sites with very high native cover were not monitored due to an increased work load resulting from layoffs after the coronavirus pandemic. For this report, good, fair, and poor target thresholds for native plant cover were determined by Trust staff based on scientific studies and professional opinions for each habitat type. Each monitoring site receives a site rating of good, fair, or poor based on the results and the thresholds by habitat. To determine the overall rating for native plant cover each site rating receives 1 point for a good rating, 0.5 points for a fair rating, and 0 points for a poor rating. The points are added up and divided by the total number of sites resulting in the overall score. This score is then given a rating based on the native plant cover thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. **In this second report (2020-2022), Native Plant Cover is 75% which is GOOD and an increase from 69% from the previous report.**

Summary

Threatened and Endangered Species

Each year, staff sample or census populations of our threatened and endangered (T&E) annual plant species at sites throughout the Presidio. The census number, or confidence interval around the mean of the sample, helps us understand how our populations are doing relative to the minimum viable population thresholds identified in United States Fish and Wildlife Service endangered species recovery plans for each species and site. For certain species, Presidio Trust Natural Resources has moderately increased the target threshold to ensure species populations remain viable and to trigger management interventions if they fall below the threshold. Since 2020 some populations were not monitored due to an increased work load resulting from layoffs after the coronavirus pandemic. Each threatened and endangered species site receives a site rating of good, fair, or poor based on monitoring results relative to the thresholds identified for each site. To determine the overall T&E rating (all sites with all species), each site rating receives 1 point for a good rating, 0.5 points for a fair rating, and 0 points for a poor rating. The points are added up and divided by the total number of sites resulting in the overall score. This overall T&E score is then given a rating based on the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. **In this second report (2020-2022), T&E Species received 75% which is a GOOD and a decrease from 88% in the previous report.**

Invasive Species

The presence of invasive species is a leading indicator of biodiversity. The more area these species occupy, the less other species can thrive. In this report we have not begun assessment of invasive species since we are still working on establishing the baseline occupancy of the most ecologically impactful invasive plant species by which future assessments will be made. In the future, good, fair, and poor target thresholds for invasive species will be determined by Trust staff based on our professional opinion of the ecologically meaningful scale to which control treatments occur. The overall score will be determined by finding the average of the percent of mapped populations that received treatment and the percent of area reduction of mapped populations. This score would then be given a rating based on the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%.

Biodiversity

The Presidio along with several American cities developed the Urban Biodiversity Index Framework (UBIF) to track biodiversity in our respective locations through time. The Presidio began UBIF data collection in 2018 and have further modified it to integrate into this report. Based on the UBIF protocol, which uses a surrogate species approach to measure biodiversity, good, fair, and poor biodiversity target thresholds are determined by Trust staff based on professional opinion derived from published and grey literature and reports. The overall score is determined by the percent of all surrogate species observed throughout the entire UBIF project area. This score is then given a rating based on the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. **In this second report (2020-2022) Biodiversity received 79% which is good and an increase from 71% in the previous report.**

Water Quality

Monthly water quality measurements have occurred at various sites for the past two decades and the data they provide is a good indicator of biodiversity and ecosystem health. In this report, good and poor target thresholds for water quality are determined by Trust staff based on San Francisco Bay Regional Water Quality Control Board standards and professional opinion for each parameter. Parameters are sampled at each site multiple times a year so each parameter at each site would receive a site parameter score based on the percentage of samples that were rated

Summary

good based on the determined thresholds. Determining the average of all site parameter scores results in an overall score. This score would then be given a rating based on the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. **In this first report (2018-2019) Water Quality received 61% which is a FAIR and a decrease from 64% from the previous report.**

Overall Presidio Score

Summarizing all of the above metrics into one aggregated rating allows us to provide a simple snapshot of the Presidio's overall ecological health. The overall rating is determined by finding the average of all of the scores of preceding categories, excluding the Invasive Species score which will not be available until the next report. This score would then be given a rating based on the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. **In this second report (2020-2022) the Overall Presidio score is 73% which is a FAIR and is the same from the previous report.**

The following pages include the scoreboards and detailed descriptions for each Presidio Environmental Health data category.

Presidio Environmental Health Scoreboard

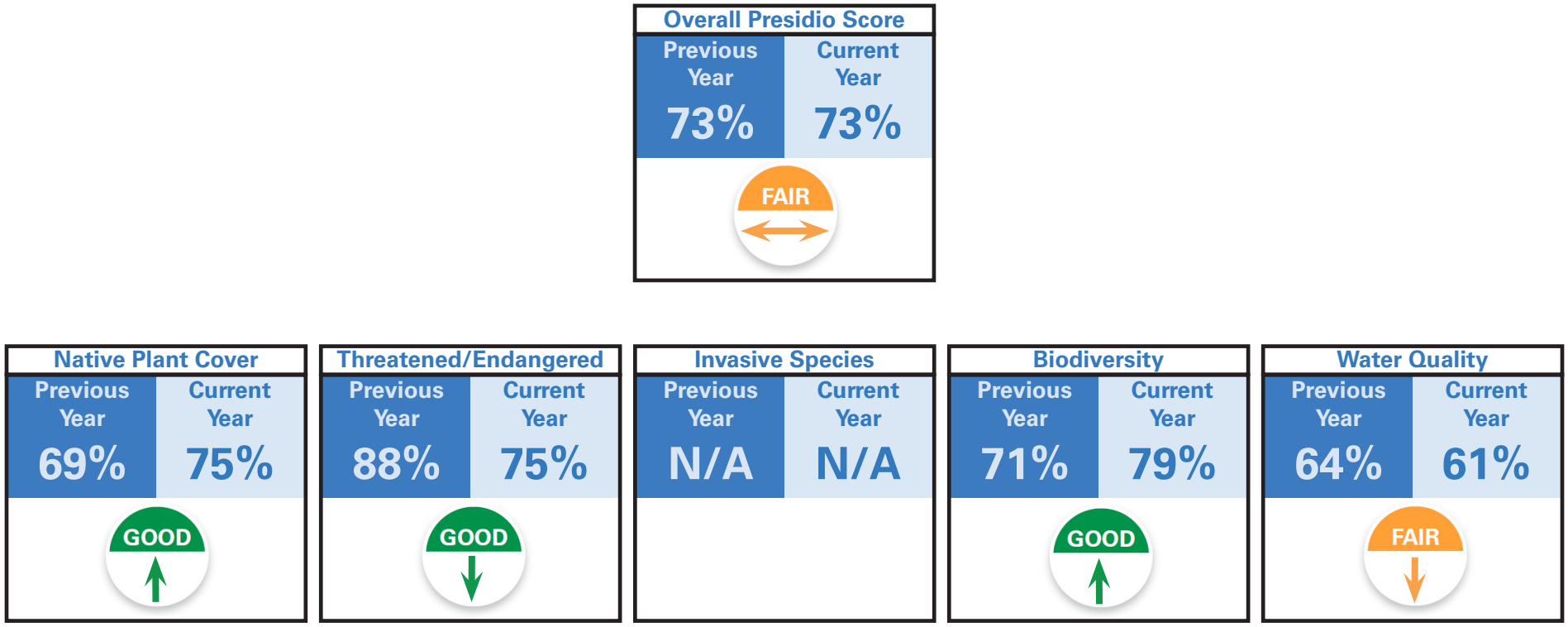


Figure 1: Presidio Environmental Health Scoreboard

Native Plant Cover Scoreboard

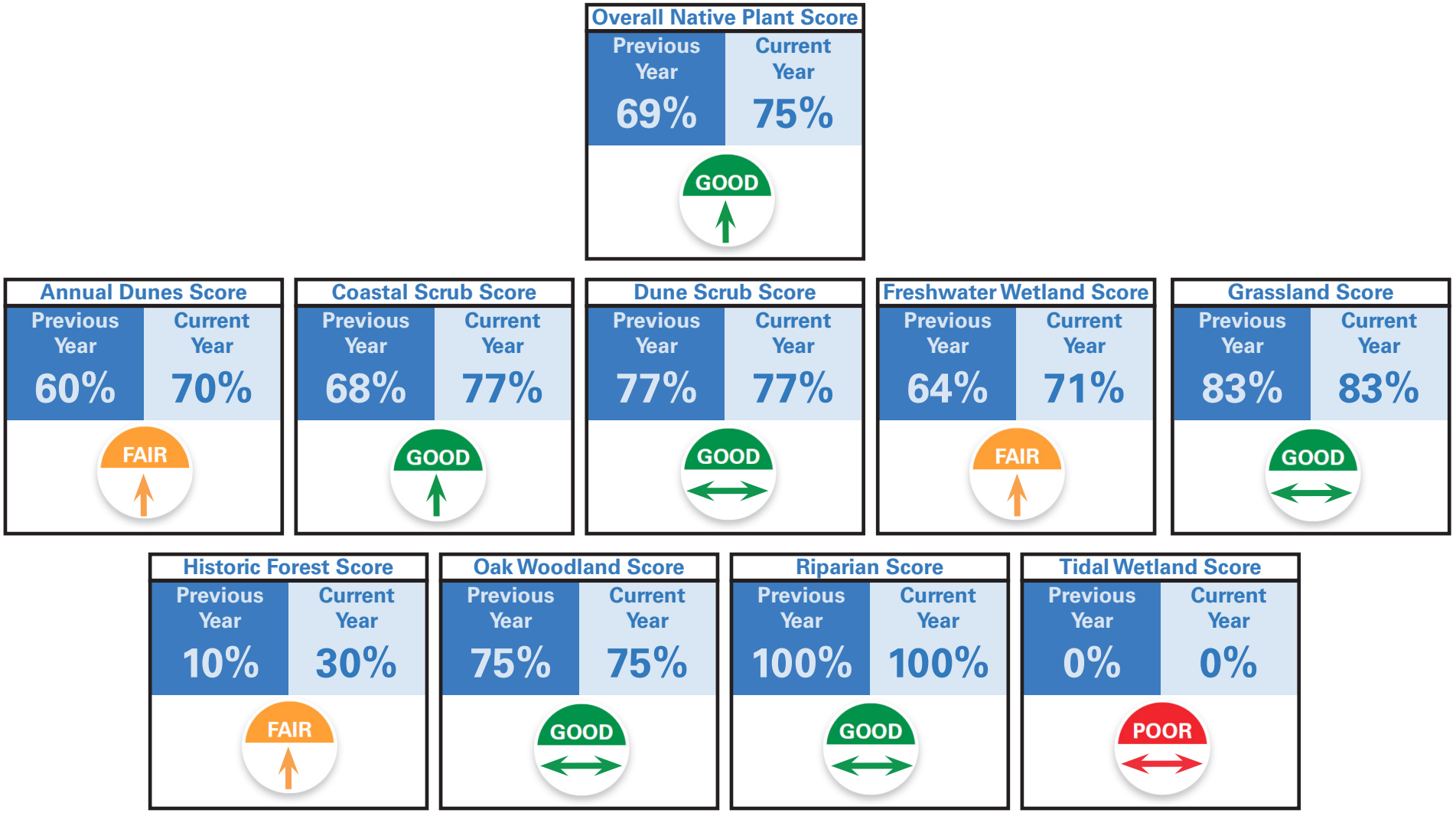


Figure 2: Native Plant Cover Scoreboard

Threatened and Endangered Species Scoreboard

Figure 3: Threatened and Endangered Scoreboard

Invasive Species Scoreboard

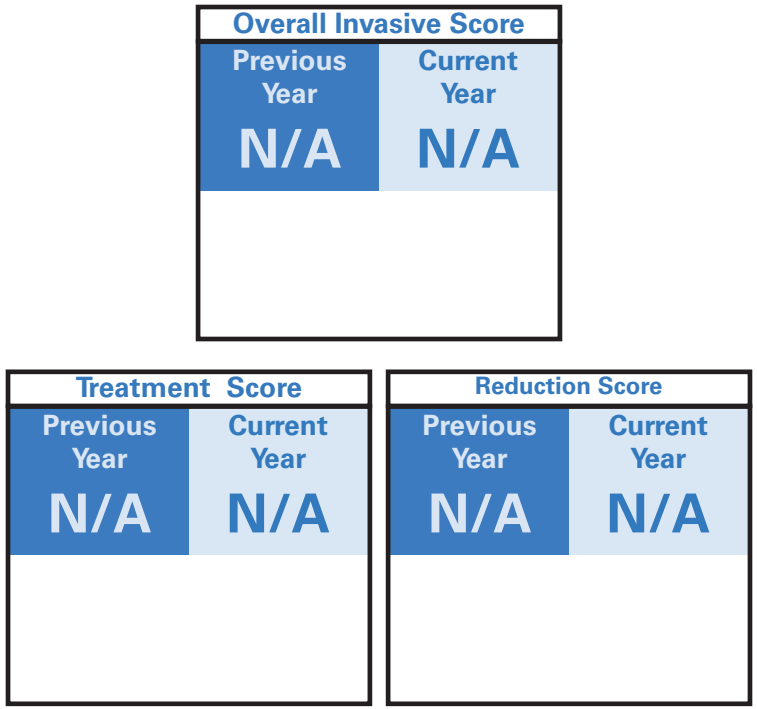


Figure 4: Invasive Species Scoreboard

Biodiversity Scoreboard

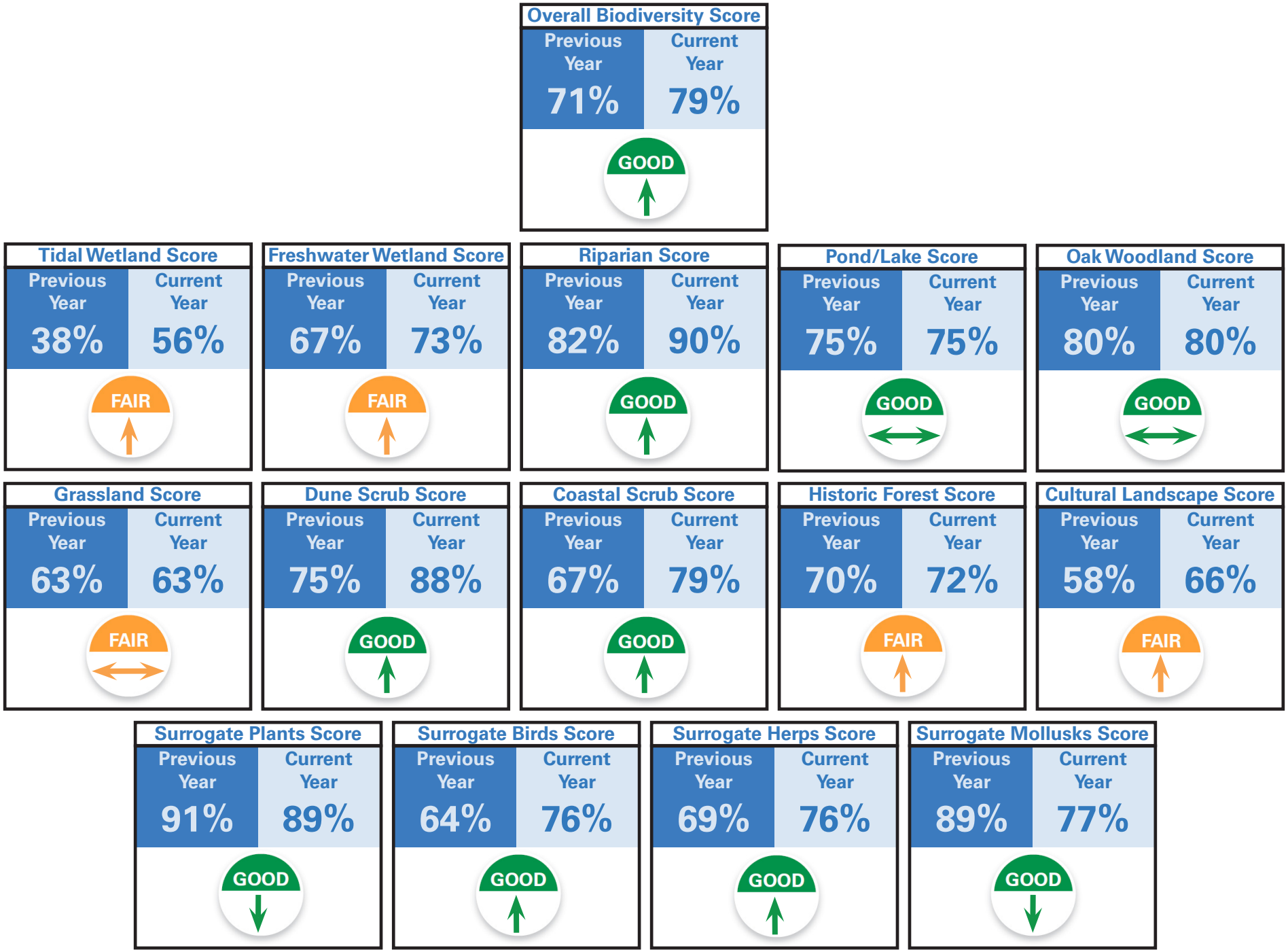


Figure 5: Biodiversity Scoreboard

Water Quality Scoreboard

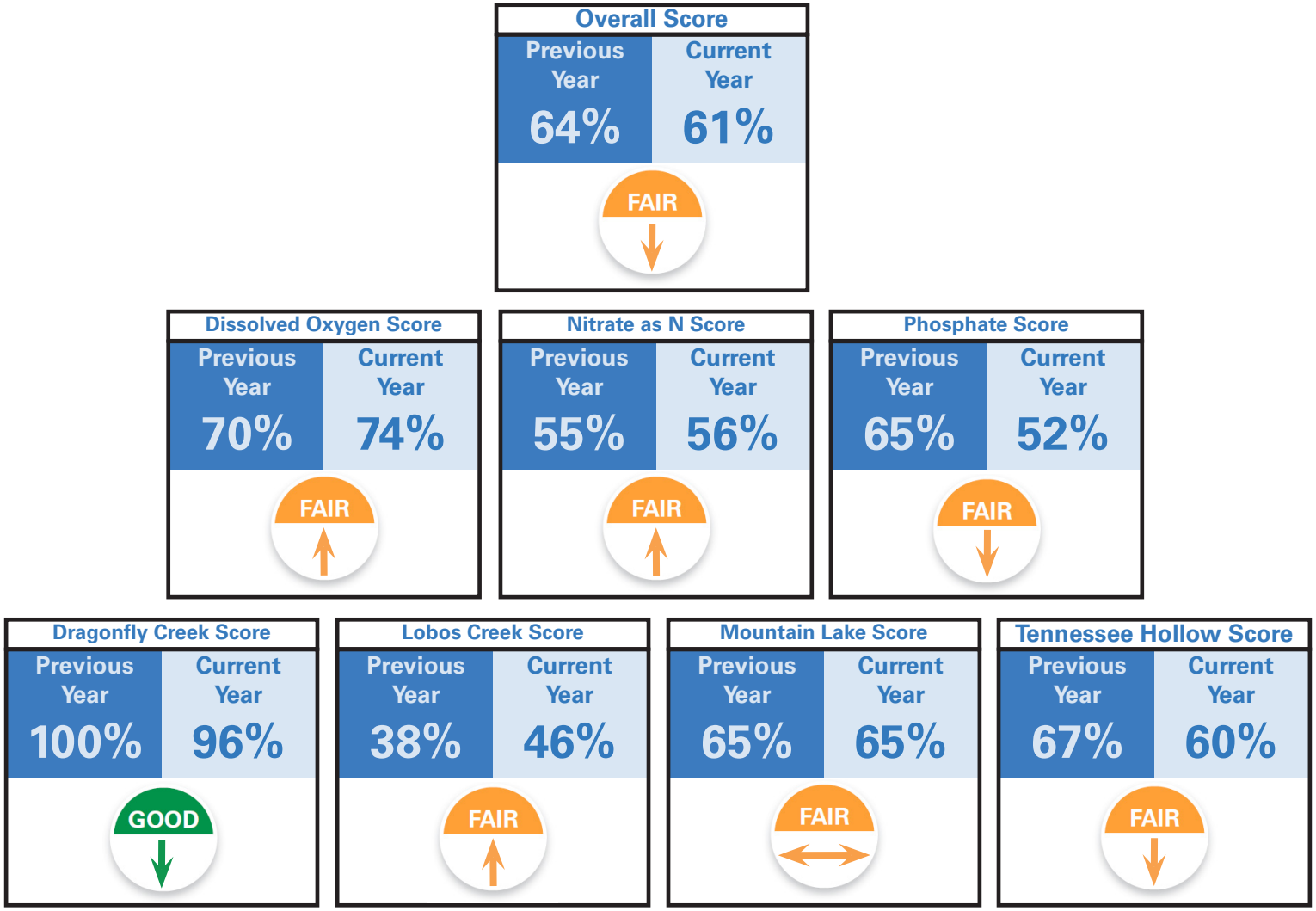


Figure 6: Water Quality Scoreboard

Native plant cover is the percent of an area covered by native species and can be assessed by measuring the presence of individual native species as a fraction of all the plant species recorded within a set monitoring area. Native plant cover is used in this report as one measure of habitat quality. Subjective target thresholds based on scientific studies and professional opinion were created by Natural Resources staff to distinguish if the percent native cover of a particular Presidio habitat is either good, fair, or poor. Using this method of targets we have assessed the quality of native plant cover at three different levels by: individual site, aggregate of sites of the same habitat type, and all measured sites combined throughout the Presidio. These are lagging indicators of environmental health.

We measure native plant cover throughout the Presidio by using a multiple-hit, point-intercept monitoring method to sample the presence or absence of individual species at sampling points along transects. Figure 7 and Figure 8 illustrate the monitoring protocol. Native plant cover is derived from the resulting data by removing any non-vegetation or abiotic data to show what percentage of the monitoring area is covered by native versus exotic vegetation. Additionally, exotic trees (e.g. Monterey pines, Blue gum eucalyptus, etc.) are removed for this analysis since the removal of these species are outside of day-to-day management.

Ecological restoration project sites that have undergone major construction are monitored prior to restoration, 1, 3, 5, and 10 years after planting then every 5 years after that. Stewardship sites, which are more mature project sites or remnant areas, are monitored every 5 years. We currently monitor 67 different sites totaling 143 acres and consisting of 9 different habitats. 10 Annual Dune sites, 11 Coastal Scrub sites, 11 Dune Scrub sites, 7 Freshwater Wetland sites, 12 Grassland sites, 5 Historic Forest sites, 2 Oak Woodland sites, 8 Riparian sites, and 1 Tidal Wetland site (see page 6 for a table of these sites). There are 18 sites totaling roughly 38 acres in the Native Plant Community Zone or under our managment which we do not currently monitor due to staff limitations. In addition, we have paused monitoring some sites due to staff layoffs that occurred after the 2020 coronavirus pandemic.

As a site matures and if it reaches its target threshold for its habitat we may change the monitoring frequency if the act of monitoring causes too much disturbance or poses a safety risk to staff.

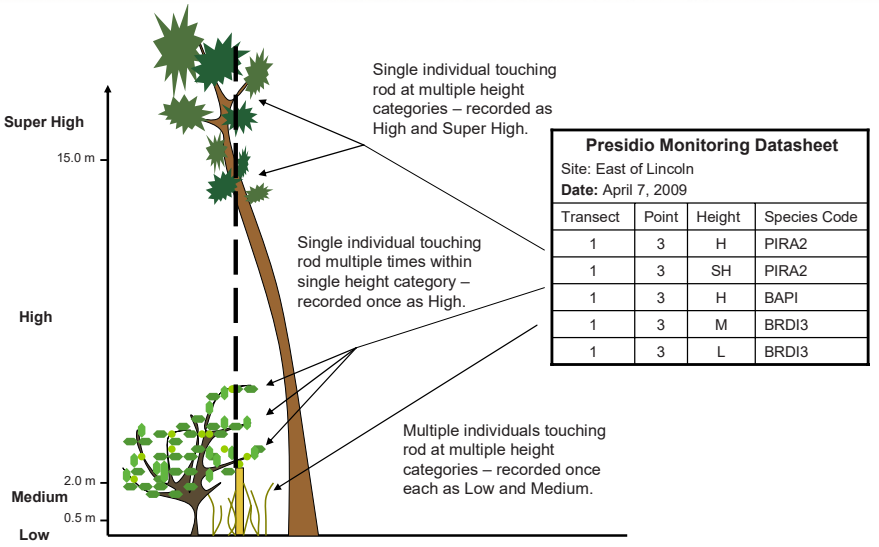


Figure 7: Schematic illustrating data collection protocol at a sampling point

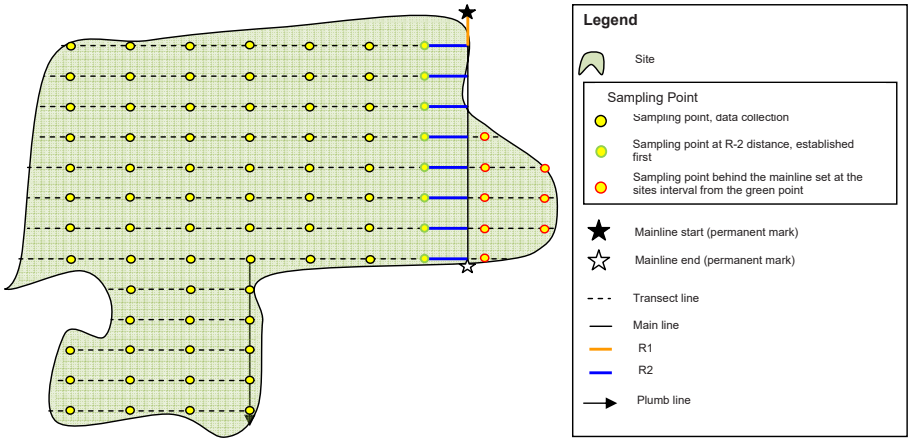


Figure 8: Monitoring schematic for a monitoring area shows how data points are distributed along transects throughout the monitoring area

Target thresholds of native plant cover by habitat were determined by Trust staff based on scientific studies and professional opinion and are are listed Table 1.

Habitat Type	Good Native Plant Cover	Fair Native Plant Cover	Poor Native Plant Cover
Annual Dune	≥ 50%	< 50% & > 35%	≤ 35%
Coastal Scrub	≥ 60%	< 60% & > 45%	≤ 45%
Dune Scrub	≥ 60%	< 60% & > 45%	≤ 45%
Freshwater Wetland	≥ 50%	< 50% & > 35%	≤ 35%
Grassland	≥ 40%	< 40% & > 25%	≤ 25%
Historic Forest	≥ 60%	< 60% & > 45%	≤ 45%
Oak Woodland	≥ 60%	< 60% & > 45%	≤ 45%
Riparian	≥ 50%	< 50% & > 35%	≤ 35%
Tidal Wetland	≥ 60%	< 60% & > 45%	≤ 45%

Table 1: Native plant cover target thresholds by habitat

Figure 9 illustrates how a site rating of good, fair, or poor is determined based on our native plant cover target thresholds designated for each habitat.

To determine the habitat rating each site rating within a habitat would receive 1 point for a good rating, 0.5 points for a fair rating, and 0 points for a poor rating. The points were added up and divided by the total number of sites in the habitat resulting in the habitat's score. This score would then be given a rating based on the thresholds in Table 2 with poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. Figure 10 illustrates this.

Score	Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 2: Native plant cover habitat and overall rating thresholds

Similarly, to determine the overall rating we used the same method described above for the habitat rating but instead used the results from all of the sites. Figure 11 illustrates this.

Figure 9: Example of site rating based on native plant cover target thresholds

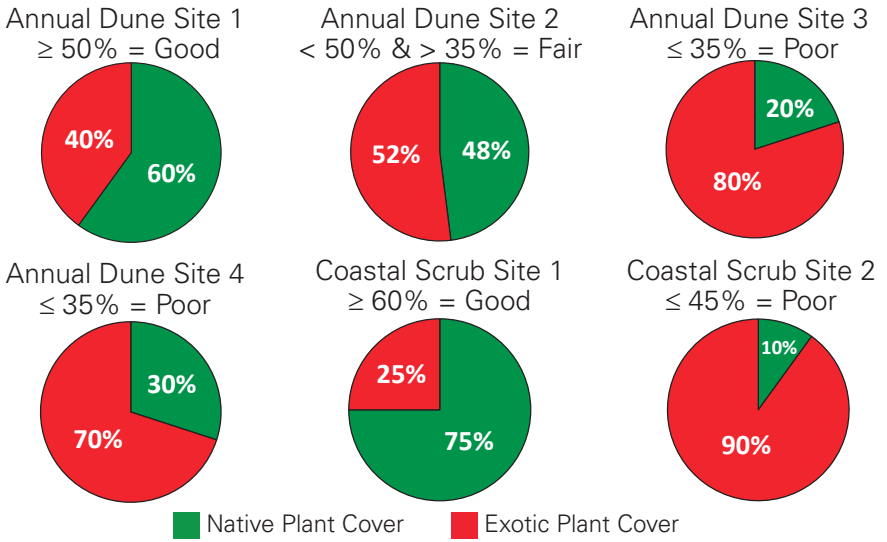
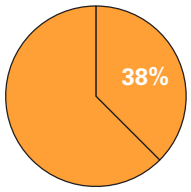
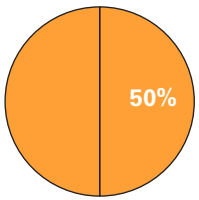


Figure 10: Example of habitat rating

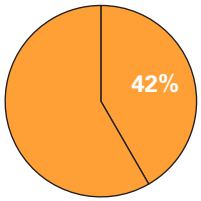


Annual Dune
1 Site Good = 1 Point
1 Site Fair = 0.5 Points
2 Sites Poor = 0 Points
1.5 Total/4 Sites = 38%
> 25% & < 75%=Fair



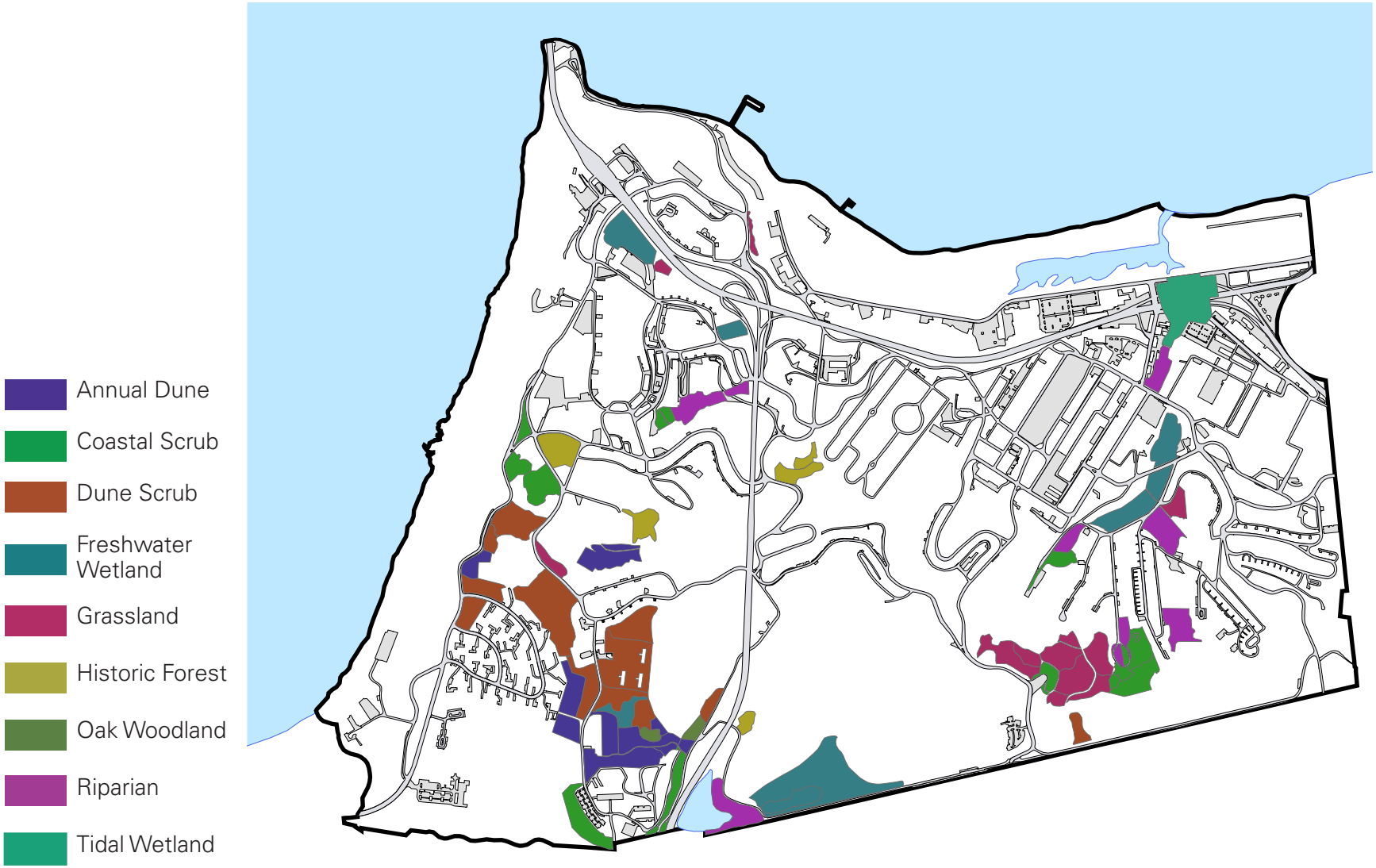
Coastal Scrub
1 Site Good = 1 Point
0 Sites Fair = 0 Points
1 Site Poor = 0 Points
1 Total/2 Sites = 50%
> 25% & < 75%=Fair

Figure 11: Example of overall rating



Overall
2 Sites Good = 2 points
1 Site Fair = 0.5 Points
3 Sites Poor = 0 Points
2.5 Total/6 Sites = 42%
> 25% & < 75% = Fair

Map 1 shows the different monitoring sites and their habitat type.



Map 1: Map of native plant cover monitoring sites and their habitat type

Figure 12 shows that the overall native plant cover rating is 75%. This is determined by assigning all site ratings a value of 1 point for good, 0.5 points for fair, and 0 points for poor then dividing it by the total number of monitoring sites. There were a total of 67 monitoring sites, of those 45 were good (45 points), 10 fair (5 points), and 12 poor (0 points) resulting in 50 points divided by 67 sites which equals 75%. With an overall score of 75%, native plant cover receives an overall *good rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%.

Figure 13 shows the acreage of all the sites monitored for each habitat type and the rating that they received. Coastal Scrub, Dune Scrub, Grassland, Riparian, and Oak Woodland habitats received good ratings. Freshwater Wetland, Annual Dune, and Historic Forest habitats received fair ratings. The Tidal Wetland habitat received a poor rating.

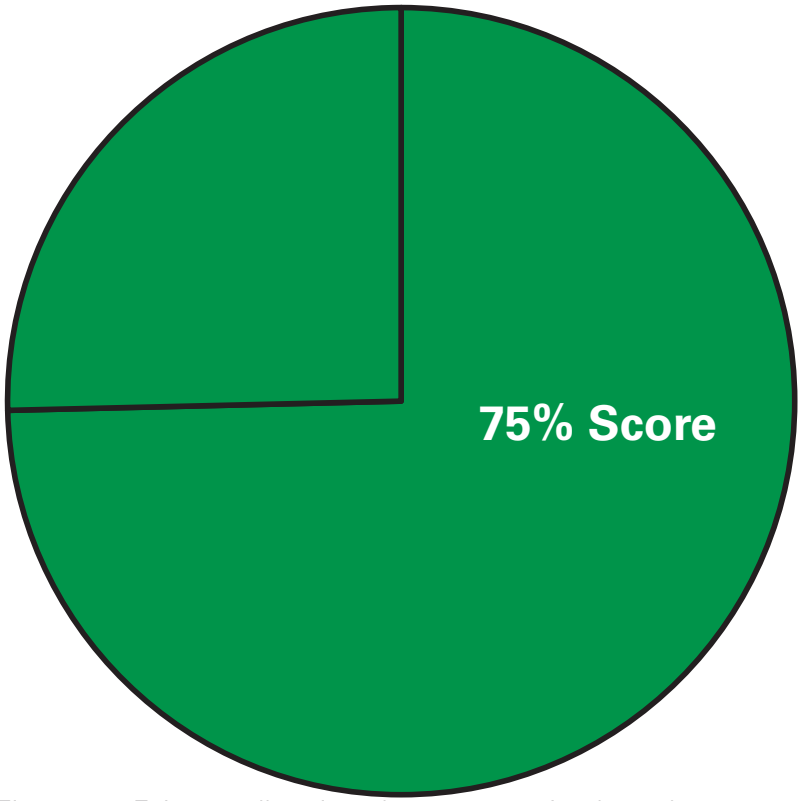


Figure 12: Fair overall native plant cover rating based on 69% score

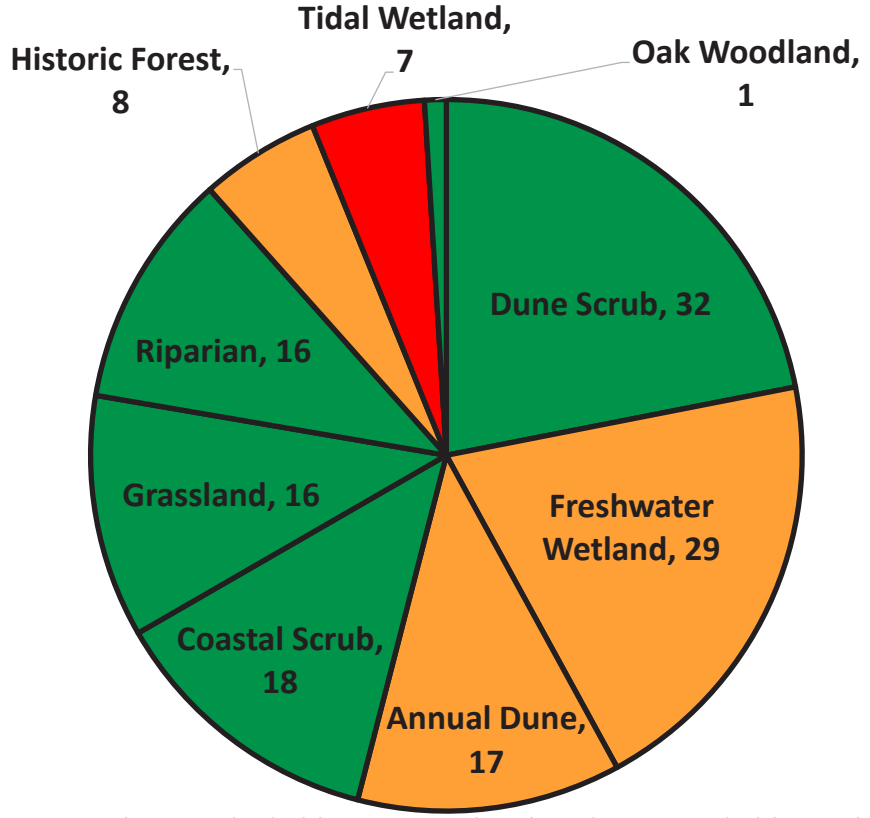


Figure 13: Acreage by habitat type and native plant cover habitat rating

Native Plant Cover Scoreboard

Overall Native Plant Score		Annual Dunes Score		Coastal Scrub Score		Dune Scrub Score		Freshwater Wetland Score	
Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year
69%	75%	60%	70%	68%	77%	77%	77%	64%	71%
GOOD ↑		FAIR ↑		GOOD ↑		GOOD ↔		FAIR ↑	

Grassland Score		Historic Forest Score		Oak Woodland Score		Riparian Score		Tidal Wetland Score	
Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year
83%	83%	10%	30%	75%	75%	100%	100%	0%	0%
GOOD ↔		FAIR ↑		GOOD ↔		GOOD ↔		POOR ↔	

Figure 14: Native plant cover scoreboard

Table 3, and Table 4 on the following page, show each habitat rating and their monitoring sites as well as their native plant cover, site rating, how the native cover is trending compared to the previous years results, and the dominant exotic species.

Habitat Type/Rating	Monitoring Site	Most Recent Year Monitored	Native Plant Cover	Site Rating	Trend	Dominant Exotic
Annual Dune: Fair	Mountain Lake, Park Dunes Full Site	2022	53%	Good	Increase	Exotic Annual Grass
	Presidio Hills, Dune Slope Full Site	2021	68%	Good	Increase	Exotic Annual Grass
	Presidio Hills, Landfill 8 Full Site	2018	48%	Fair	Decrease	Exotic Annual Grass
	Presidio Hills, Lessingia Recovery Full Site	2019	36%	Fair	Decrease	Exotic Annual Grass
	Presidio Hills, Remnant Lessingia Full Site	2022	71%	Good	Increase	Exotic Annual Grass
	Rob Hill, Lessingia Site Remnant site and TOB and Com Building	2019	54%	Good	Increase	Exotic Annual Grass
	Rob Hill, Lessingia Site Tree removal area	2020	41%	Fair	Decrease	Exotic Annual Grass
	Southwest Dunes, Graded Area 9 Full Site	2020	61%	Good	Decrease	Exotic Annual Grass
	Southwest Dunes, Silene Area Full Site	2021	30%	Poor	Decrease	Exotic Perennial Grass
	Southwest Dunes, Wherry Corridor West	2022	43%	Fair	Decrease	Exotic Perennial Grass
Coastal Scrub: Good	Dragonfly Creek, Above Palms Full Site	2021	61%	Good	Increase	Exotic Perennial Grass
	Inspiration Point, Overlook Full Site	2014	90%	Good	Increase	Exotic Annual Grass
	Lobos Creek Valley, Landfill 10 Full Site	2019	66%	Good	Increase	Exotic Annual Grass
	Mountain Lake, Park Scrub Full Site	2018	22%	Poor	Increase	Exotic Annual Grass
	Tennessee Hollow, El Polin Phase 1	2014	94%	Good	Increase	Exotic Annual Grass
	Tennessee Hollow, El Polin Phase 2, 3 & 4	2019	77%	Good	Increase	Exotic Annual Grass
	Tennessee Hollow, Fill Site 1 Full Site	2022	69%	Good	Increase	Exotic Annual Grass
	Tennessee Hollow, Western Tributary Landfill E	2018	95%	Good	Increase	Exotic Annual Grass
	World War II Memorial, Raven's Manzanita Full Site	2020	80%	Good	Decrease	Exotic Perennial Forb
	World War II Memorial, Sunset Scrub Full Site	2018	54%	Fair	Decrease	Exotic Annual Grass
	World War II Memorial, Triangle Full Site	2020	35%	Poor	Increase	Exotic Perennial Grass
Dune Scrub: Good	Presidio Golf Course Natural Areas, Golf Course Lessingia Site Full Site	2018	37%	Poor	Increase	Exotic Annual Grass
	Presidio Hills, East Scrub Full Site	2017	91%	Good	Increase	Exotic Annual Grass
	Presidio Hills, Nike Facility Full Site	2017	56%	Fair	Decrease	Exotic Annual Grass
	Presidio Hills, Quail Commons Full Site	2018	77%	Good	Decrease	Exotic Annual Grass
	Presidio Hills, Scrub Recovery Full Site	2019	89%	Good	Increase	Exotic Annual Grass
	Southwest Dunes, Baker Beach Housing Habitat Area	2022	80%	Good	Decrease	Exotic Annual Forb
	Southwest Dunes, East of Lincoln Full Site	2019	80%	Good	Decrease	Exotic Annual Grass
	Southwest Dunes, North Pershing Dunes Full Site	2019	86%	Good	Decrease	Exotic Annual Grass
	Southwest Dunes, Wherry Corridor East	2018	82%	Good	Increase	Exotic Perennial Forb
	Southwest Dunes, Wherry Dunes Full Site	2021	84%	Good	Increase	Exotic Perennial Grass
	West Pacific Natural Areas, Southeast Dunes Western block	2022	41%	Poor	No change	Exotic Annual Grass

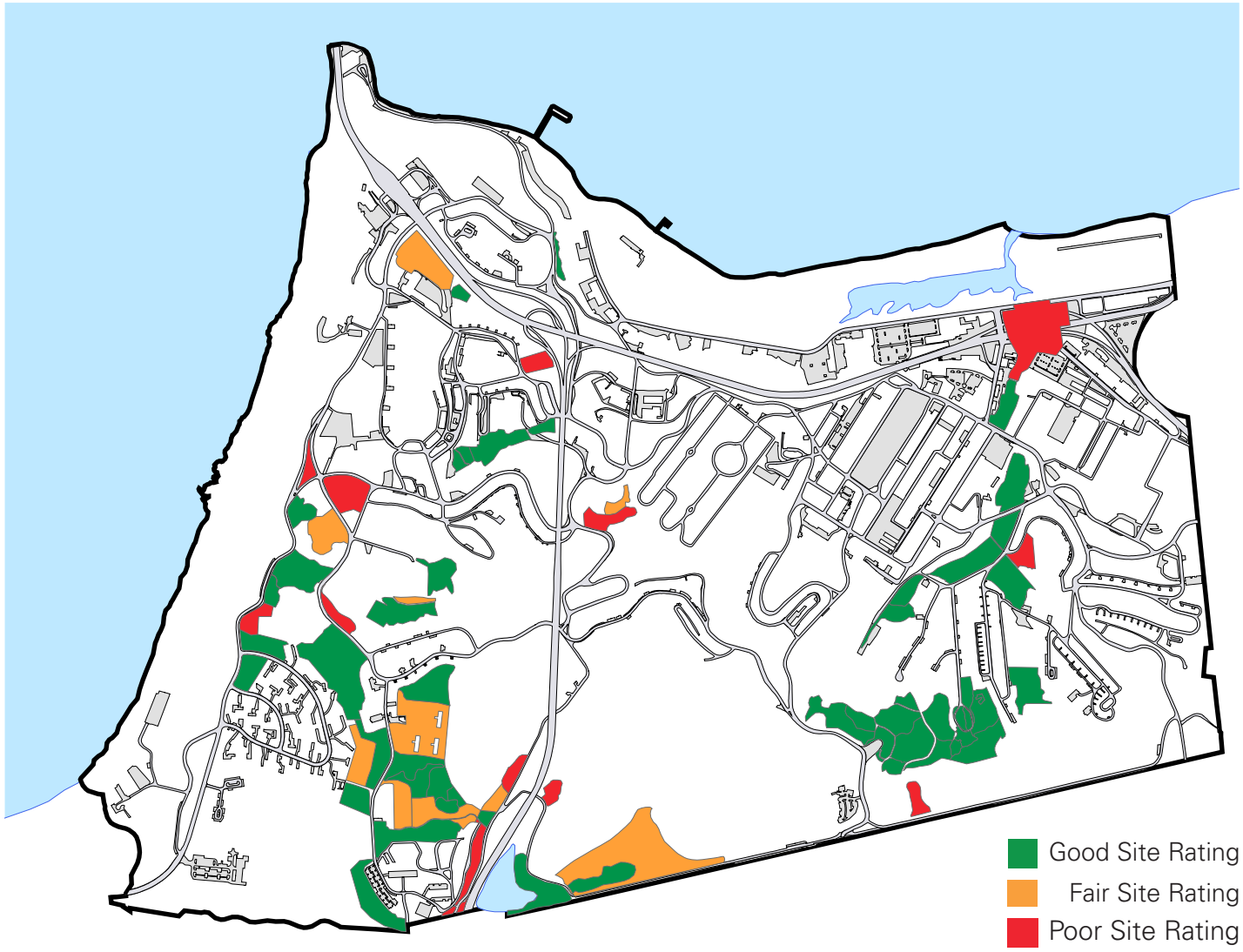
Table 3: Native plant cover results for each habitat and site

Table 4, and Table 3 on the previous page, show each habitat rating and their monitoring sites as well as their native plant cover, site rating, how the native cover is trending compared to the previous years results, and the dominant exotic species.

Habitat Type/ Rating	Monitoring Site	Most Recent Year Monitored	Native Plant Cover	Site Rating	Trend	Dominant Exotic
Freshwater Wetland: Fair	Doyle Drive Natural Areas, Log Cabin Wetland Full Site	2017	40%	Fair	Decrease	Exotic Perennial Shrub
	Doyle Drive Natural Areas, Storey Avenue Wetland Original monitoring boundaries	2016	32%	Poor	Decrease	Exotic Perennial Forb
	Mountain Lake, East Arm Full Site	2020	41%	Fair	Decrease	Exotic Perennial Forb
	Mountain Lake, East Arm SFO Project Area	2020	88%	Good	Increase	Exotic Annual Grass
	Presidio Hills, Wetland Full Site	2017	91%	Good	No change	Exotic Annual Grass
	Tennessee Hollow, MacArthur Meadow Full Site	2022	53%	Good	Decrease	Exotic Annual Forb
	Tennessee Hollow, YMCA Reach Full Site	2020	79%	Good	Increase	Exotic Annual Grass
Grassland: Good	Crissy Bluffs, West Crissy Bluffs Top of slope, active restoration area	2020	42%	Good	Decrease	Exotic Annual Grass
	Doyle Drive Natural Areas, Log Cabin Prairie Active restoration area	2019	40%	Good	Increase	Exotic Annual Grass
	Inspiration Point, East Grassland Full Site	2018	55%	Good	Increase	Exotic Perennial Grass
	Inspiration Point, Lower Quarry Full Site	2021	61%	Good	Increase	Exotic Annual Grass
	Inspiration Point, South Drainage FY19 Planting Area	2022	43%	Good	Decrease	Exotic Perennial Shrub
	Inspiration Point, Viewshed Full Site	2018	63%	Good	Increase	Exotic Annual Grass
	Inspiration Point, Viewshed Extension Phase 1	2019	53%	Good	Increase	Exotic Annual Grass
	Inspiration Point, West Grassland Main grassland	2018	49%	Good	Increase	Exotic Annual Grass
	Inspiration Point, West Grassland Scraped Area	2018	73%	Good	Increase	Exotic Annual Grass
	Rob Hill, Washington Prairie Western meadow	2016	12%	Poor	Decrease	Exotic Annual Grass
	Tennessee Hollow, Landfill 2 Full Site	2022	62%	Good	Decrease	Exotic Annual Grass
	Tennessee Hollow, Sumner Grassland Main grassland	2020	19%	Poor	Increase	Exotic Annual Grass
Historic Forest: Fair	Outside NPCZ, Kobbe Full Site	2017	33%	Poor	N/A	Exotic Perennial Grass
	Outside NPCZ, Mountain Lake Staging Area Full Site	2017	35%	Poor	N/A	Exotic Perennial Grass
	Outside NPCZ, Park Stand 1 Full Site	2017	30%	Poor	N/A	Exotic Annual Grass
	Outside NPCZ, Park Stand 2 Full Site	2017	52%	Fair	N/A	Exotic Annual Grass
	Outside NPCZ, Rob Hill Understory Enhancement FY20 Planting Area	2021	67%	Good	Increase	Exotic Perennial Shrub
Oak Woodland: Good	Presidio Golf Course Natural Areas, Golf Course Oak Woodland Full Site	2011	46%	Fair	N/A	Exotic Annual Grass
	Presidio Hills, Oak Woodland Full Site	2017	87%	Good	Decrease	Exotic Annual Grass
Riparian: Good	Dragonfly Creek, Lower Dragonfly Creek Original monitoring boundaries	2016	69%	Good	Decrease	Exotic Annual Forb
	Dragonfly Creek, Upper Dragonfly Creek Full Site	2019	77%	Good	Decrease	Exotic Perennial Forb
	Mountain Lake, Mountain Lake East and south shore	2015	89%	Good	Increase	Exotic Perennial Shrub
	Tennessee Hollow, Eastern Tributary Tree removal area and willows	2021	66%	Good	Increase	Exotic Perennial Grass
	Tennessee Hollow, El Polin Phase 5	2021	73%	Good	Decrease	Exotic Annual Grass
	Tennessee Hollow, Remnant Reach Full Site	2015	62%	Good	Increase	Exotic Perennial Shrub
	Tennessee Hollow, Thompson Reach Full Site	2015	94%	Good	Increase	Exotic Annual Grass
	Tennessee Hollow, Western Tributary Barnard Firing Range	2020	73%	Good	Increase	Exotic Annual Forb
Tidal Wetland: Poor	Tennessee Hollow, Quartermaster Reach Full Site	2022	34%	Poor	Increase	Exotic Annual Grass

Table 4: Native plant cover results for each habitat and site

Map 1 shows the site ratings each monitoring site received.



Map 2: Map of native plant cover monitoring sites and the rating they received

There are 10 Annual Dune sites that are monitored covering 17.37 acres. The Annual Dune habitat's native plant cover thresholds are good ≥ 50%, fair < 50% & > 35%, and poor ≤ 35%. Of the 10 sites monitored 5 (5 points) received a good rating, 4 (2 points) received a fair rating, and 1 (0 points) received a poor rating. Overall, the habitat received a *fair rating* based on receiving 7 points divided by 10 sites equaling 70%.

The combined relative plant cover, see Figure 16, of all the Annual Dune sites show the biggest threats to native plant cover are exotic annual grasses (31.28%), exotic perennial forbs (6.2%), exotic perennial grass (5.66%), and exotic annual forbs (5.59%).

The habitat's fair rating improved this report with the tree removal and seeding of dune annuals in the area behind the PHSH building, Presidio Hills - Dune Slope, which is flipped from poor to good. Presidio Hills - Remnant Lessingia and Mountain Lake - Park Dunes also changed from fair to good. Southwest Dunes - Silene Area went from fair to poor and Rob Hill - Lessingia Site Tree Removal Area went from good to fair. An improved rating could be achieved with increased effort on the removal of exotic annual grasses throughout all of the sites ranking fair or poor but particularly at Lessingia Recovery, Landfill 8, and Wherry Corridor West which all are within 10% of a good rating.

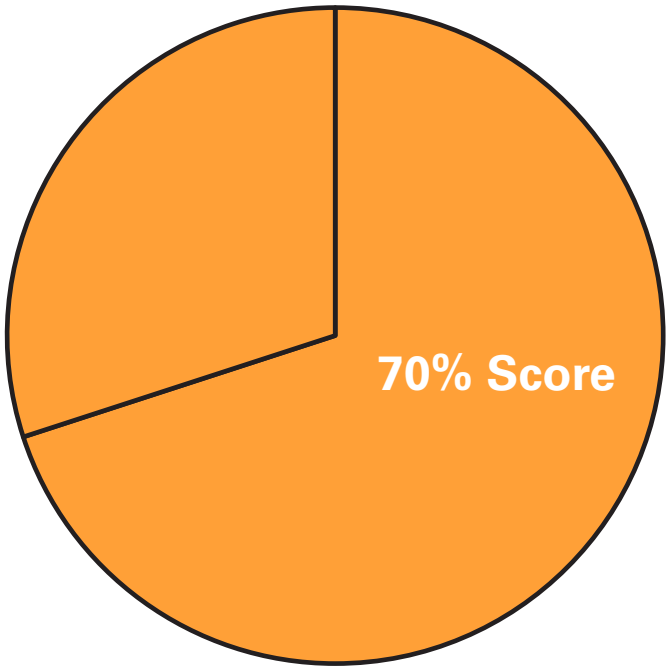


Figure 15: Fair Annual Dune habitat rating based on 70% score

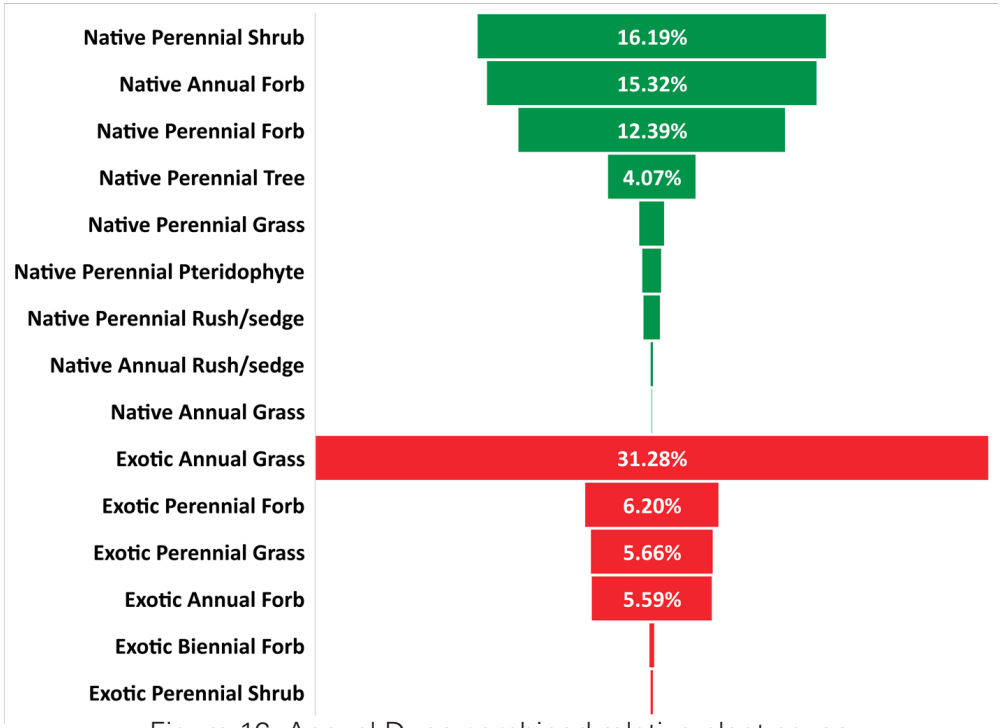
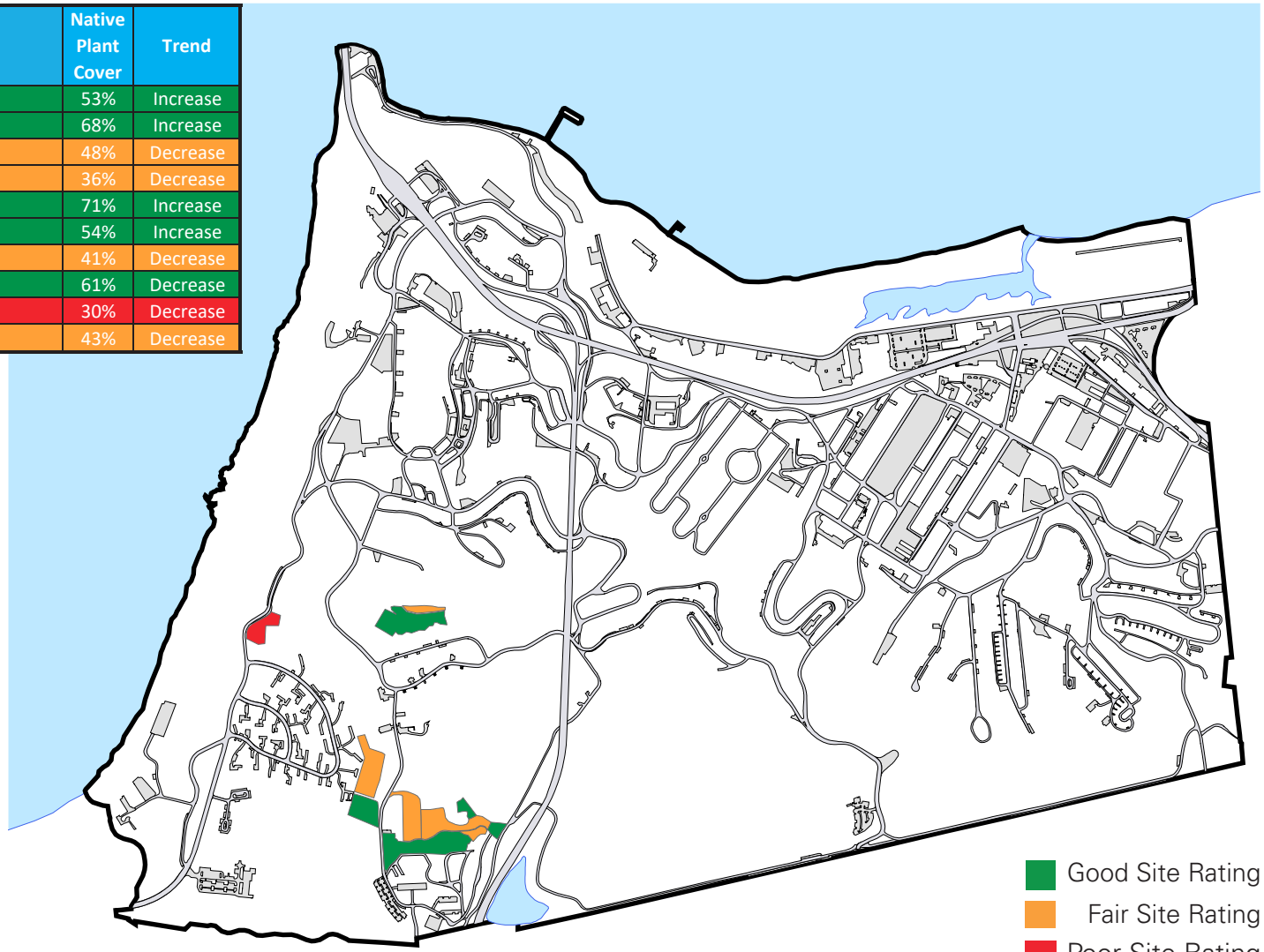


Figure 16: Annual Dune combined relative plant cover

Table 5 and Map 3 shows the site ratings each Annual Dune monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Mountain Lake, Park Dunes Full Site	53%	Increase
Presidio Hills, Dune Slope Full Site	68%	Increase
Presidio Hills, Landfill 8 Full Site	48%	Decrease
Presidio Hills, Lessingia Recovery Full Site	36%	Decrease
Presidio Hills, Remnant Lessingia Full Site	71%	Increase
Rob Hill, Lessingia Site Remnant site and TOB and Com Building	54%	Increase
Rob Hill, Lessingia Site Tree removal area	41%	Decrease
Southwest Dunes, Graded Area 9 Full Site	61%	Decrease
Southwest Dunes, Silene Area Full Site	30%	Decrease
Southwest Dunes, Wherry Corridor West	43%	Decrease

Table 5: Native plant cover results for each Annual Dune monitoring site



Map 3: Annual Dune monitoring sites and the rating they received

There are 11 Coastal Scrub sites that are monitored covering 17.66 acres. The Coastal Scrub habitat's native plant cover thresholds are good ≥ 60%, fair < 60% & > 45%, and poor ≤ 45%. Of the 11 sites monitored 8 (8 points) received a good rating, 1 (0.5 points) received a fair rating, and 2 (0 points) received a poor rating. Overall, the habitat received a *good rating* based on receiving 8.5 points divided by 11 sites equaling 77%.

The combined relative vegetation cover, see Figure 18, of all the Coastal Scrub sites show the biggest threats to native plant cover are exotic annual grasses (16.46%), exotic perennial grasses (6.14%), exotic annual forbs (4.62%), and exotic perennial forbs (3.48%).

Tennessee Hollow - Fill Site 1 and Dragonfly Creek - Above Palms both changed from fair to good ratings since the last report. Sunset Scrub, which also received a fair rating short of good by 6%, has had native vegetation cover impeded by highly compacted soils. Additional planting of scrubby plants may assist in increasing native vegetation cover and increased effort in reducing annual grasses could result in a good rating in the future. Park Scrub and the Triangle, the two sites which received poor ratings, are not priority sites due to being impacted by large exotic trees that are expensive to remove and receive limited staff resources.

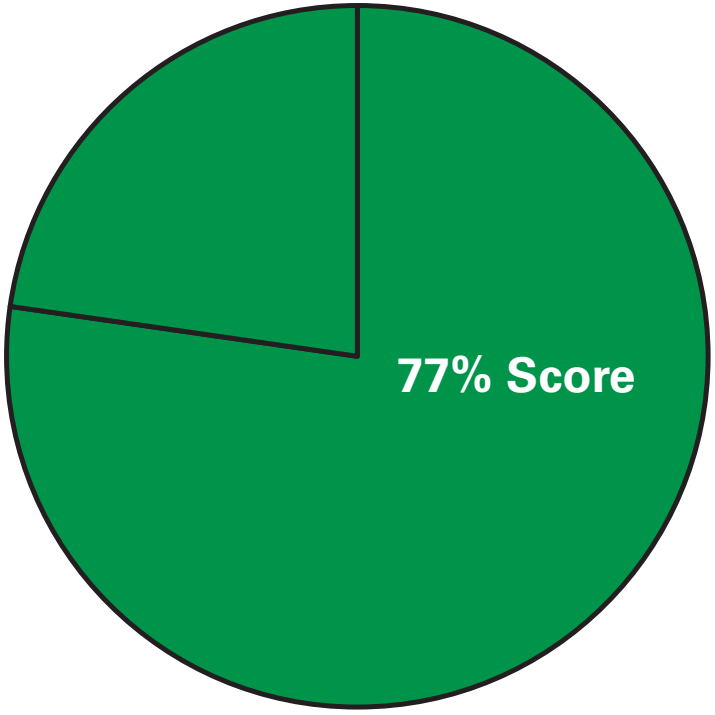


Figure 17: Fair Coastal Scrub habitat rating based on 77% Score

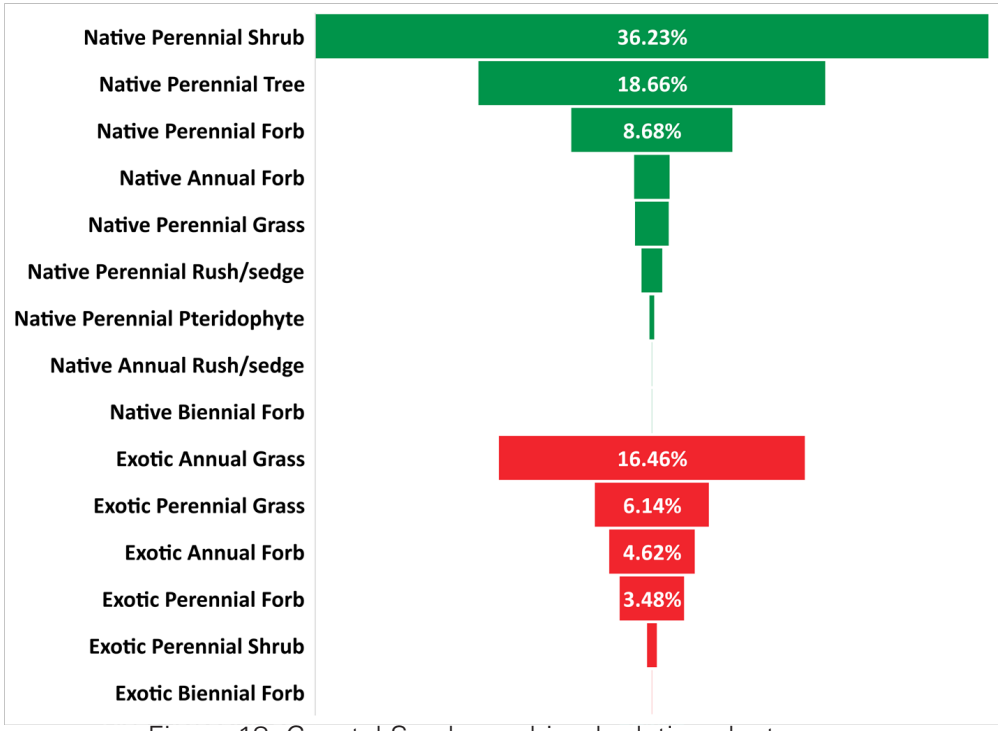
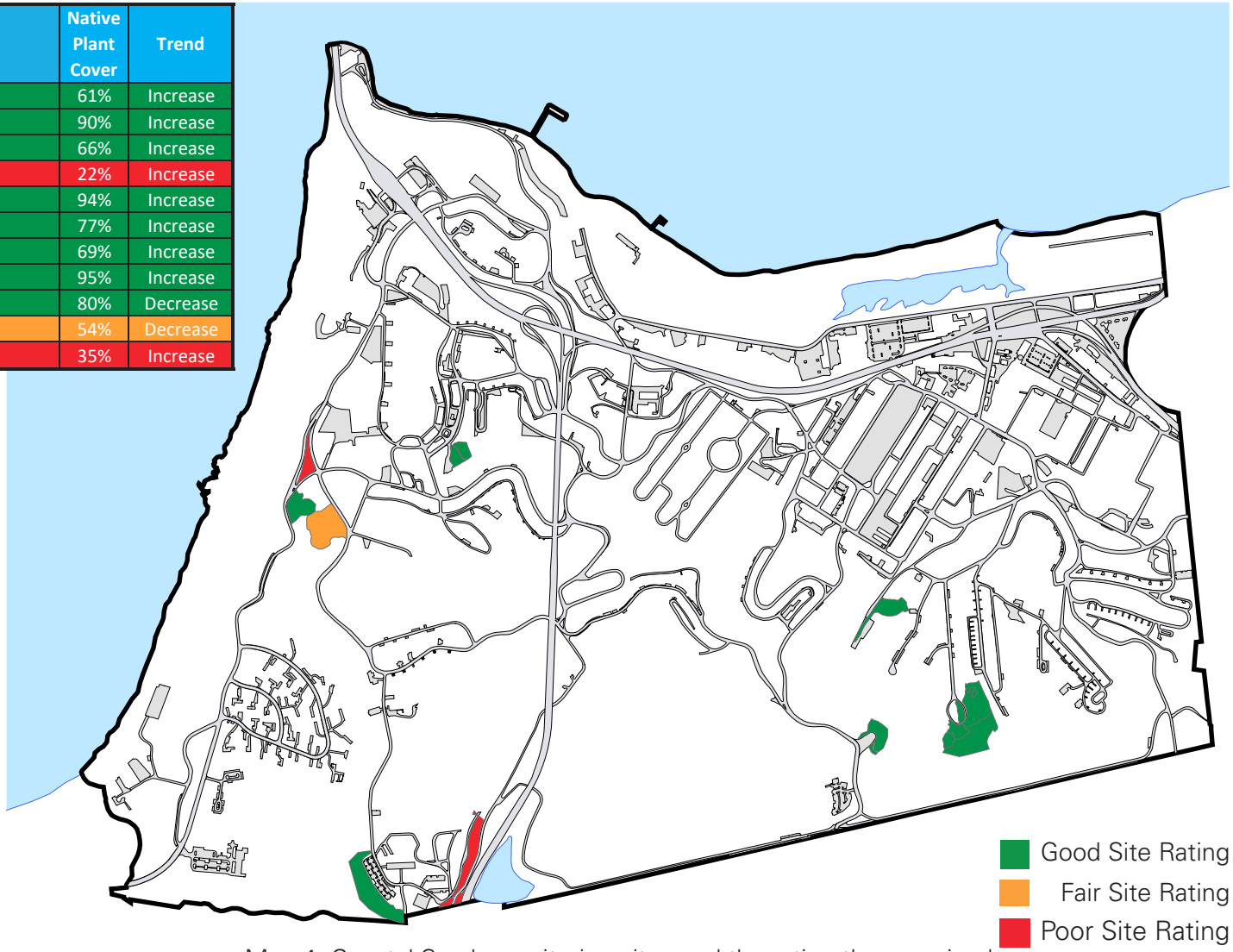


Figure 18: Coastal Scrub combined relative plant cover

Table 6 and Map 4 shows the site ratings each Coastal Scrub monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Dragonfly Creek, Above Palms Full Site	61%	Increase
Inspiration Point, Overlook Full Site	90%	Increase
Lobos Creek Valley, Landfill 10 Full Site	66%	Increase
Mountain Lake, Park Scrub Full Site	22%	Increase
Tennessee Hollow, El Polin Phase 1	94%	Increase
Tennessee Hollow, El Polin Phase 2, 3 & 4	77%	Increase
Tennessee Hollow, Fill Site 1 Full Site	69%	Increase
Tennessee Hollow, Western Tributary Landfill E	95%	Increase
World War II Memorial, Raven's Manzanita Full Site	80%	Decrease
World War II Memorial, Sunset Scrub Full Site	54%	Decrease
World War II Memorial, Triangle Full Site	35%	Increase

Table 6: Native plant cover results for each Coastal Scrub monitoring site



Map 4: Coastal Scrub monitoring sites and the rating they received

There are 11 Dune Scrub sites that are monitored covering 31.79 acres. The Dune Scrub habitat's native plant cover thresholds are good ≥ 60%, fair < 60% & > 45%, and poor ≤ 45%. Of the 11 sites monitored 8 (8 points) received a good rating, 1 (0.5 points) received a fair rating, and 2 (0 points) received a poor rating. Overall, the Dune Scrub habitat received a *good rating* based on receiving 8.5 points divided by 11 sites equaling 77%.

The combined relative vegetation cover, see Figure 20, of all the Dune Scrub sites show the biggest threats to native plant cover are exotic annual grasses (11.06%), exotic perennial forbs (7.06%), and exotic annual forbs (4.78%).

Increased effort in removing annual grasses at the Nike Facility, which was 3% short of being rated good, would be enough to change the site to a good rating. Golf Course Lessingia and Southeast Dunes, both rated poor, would require a large amount of work to increase their ratings to good. Both of these poor sites are currently low priority sites due to limited staff resources. Increased effort in removing annual grasses at both sites and removal of ice plant at Southeast Dunes would aid towards increasing native plant cover. All the good sites are at least 17% above the good threshold.

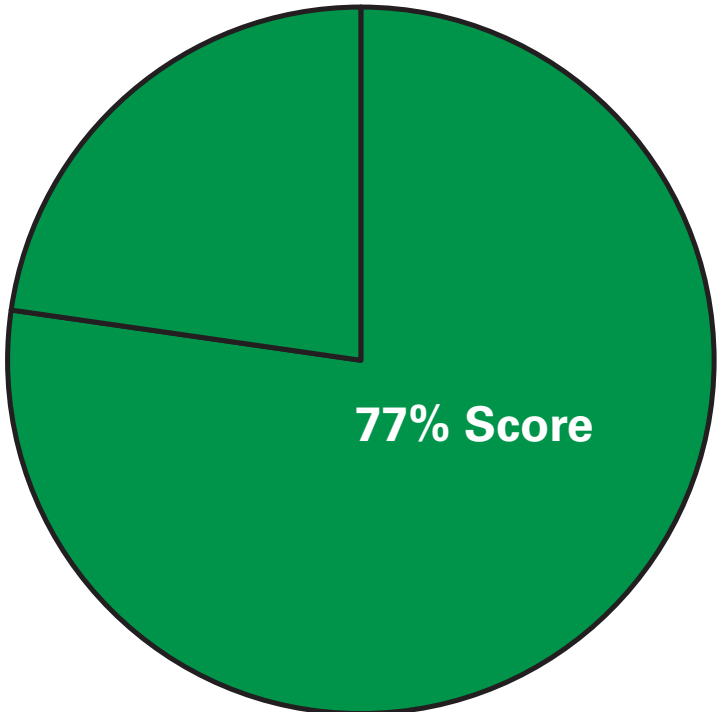


Figure 19: Fair Dune Scrub habitat rating based on 77% score

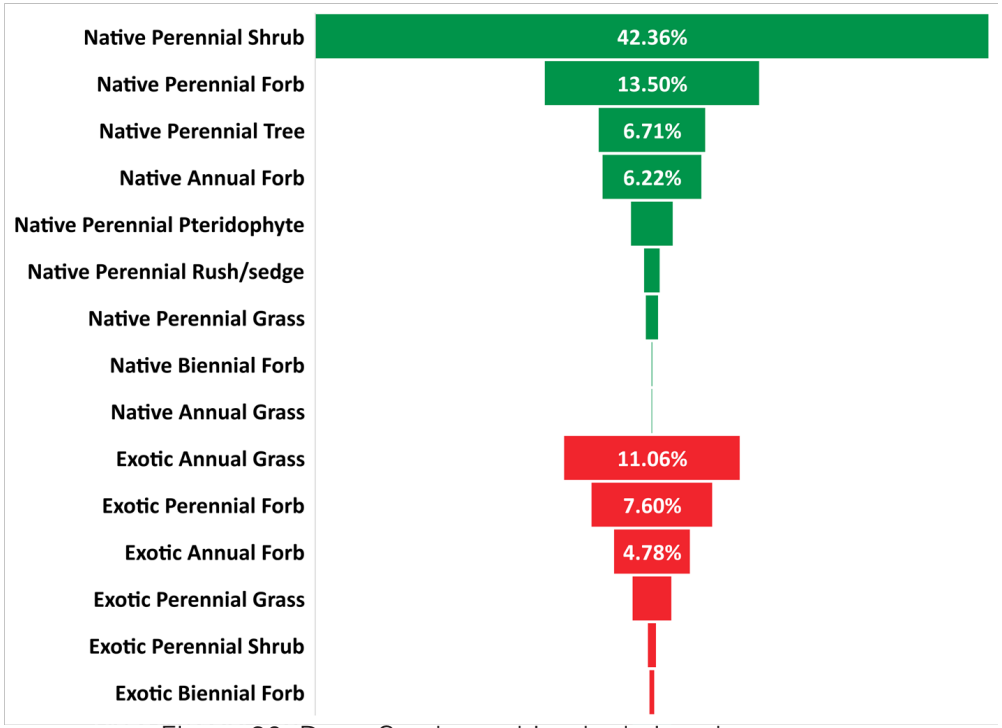
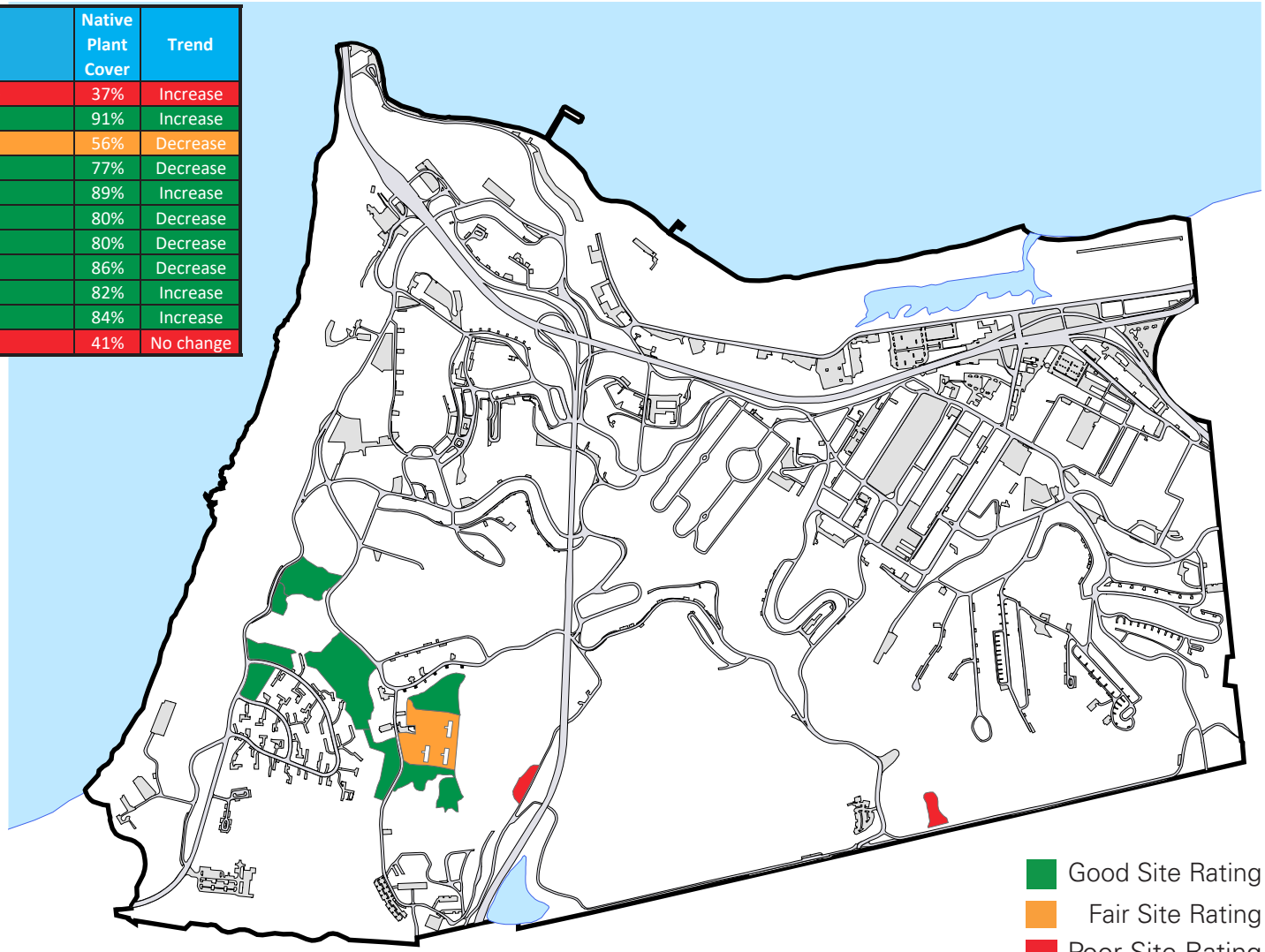


Figure 20: Dune Scrub combined relative plant cover

Table 7 and Map 5 shows the site ratings each Dune Scrub monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Presidio Golf Course Natural Areas, Golf Course Lessingia Site Full Site	37%	Increase
Presidio Hills, East Scrub Full Site	91%	Increase
Presidio Hills, Nike Facility Full Site	56%	Decrease
Presidio Hills, Quail Commons Full Site	77%	Decrease
Presidio Hills, Scrub Recovery Full Site	89%	Increase
Southwest Dunes, Baker Beach Housing Habitat Area	80%	Decrease
Southwest Dunes, East of Lincoln Full Site	80%	Decrease
Southwest Dunes, North Pershing Dunes Full Site	86%	Decrease
Southwest Dunes, Wherry Corridor East	82%	Increase
Southwest Dunes, Wherry Dunes Full Site	84%	Increase
West Pacific Natural Areas, Southeast Dunes Western block	41%	No change

Table 7: Native plant cover results for each Dune Scrub monitoring site



Map 5: Dune Scrub monitoring sites and the rating they received

There are 7 Freshwater Wetland sites that are monitored covering 28.8 acres. The Freshwater Wetland habitat's native plant cover thresholds are good ≥ 50%, fair < 50% & > 35%, and poor ≤ 35%. Of the 7 sites monitored 4 (4 points) received a good rating, 2 (1 points) received a fair rating, and 1 (0 points) received a poor rating. Overall, the Freshwater Wetland habitat received a *fair rating* based on receiving 5 points divided by 7 sites equaling 71%

The combined relative vegetation cover, see Figure 22, of all the Freshwater Wetland sites show the biggest threats to native plant cover are exotic annual grasses (10.52%), exotic perennial forbs (8.09%), exotic perennial shrubs (7.88%), exotic annual forbs (5.85%), and exotic perennial grasses (4.85%).

Storey Avenue Wetland,rated poor, and Log Cabin Wetland, rated fair, are both sites that have never been areas of high priority and are partially covered by exotic tree species. Improving native plant cover in these areas wouldn't be expected until more resources are invested in these sites. East Arm Full Site, which received a fair rating,has a large forested portion that we haven't put too much work into. That should change after the tree removal occurring in the summer of 2022 and we should expect to see an increase in native cover in the upcoming years. YMCA Reach flipped it's rating from fair to good with a healthy native cover 29% above the 50% good rating threshold.

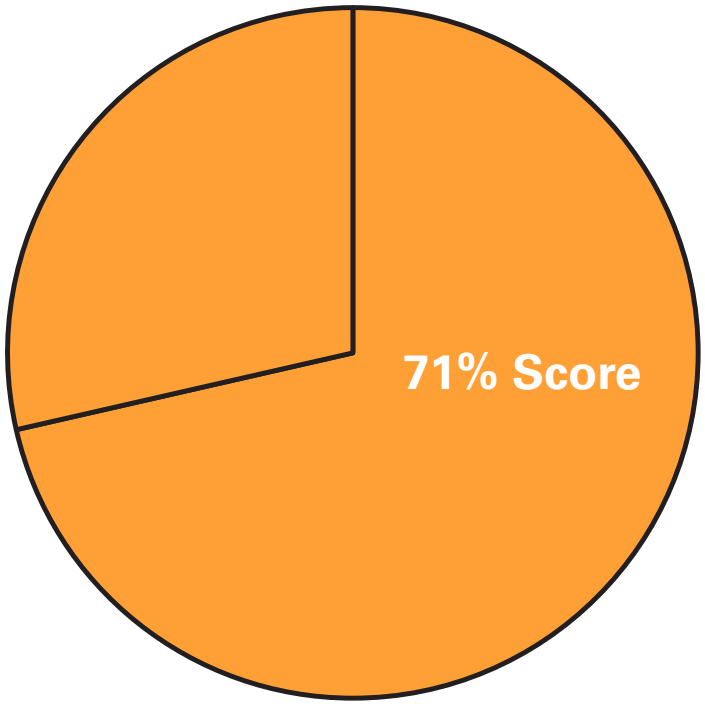


Figure 21: Fair Freshwater Wetland habitat rating based on 71% score

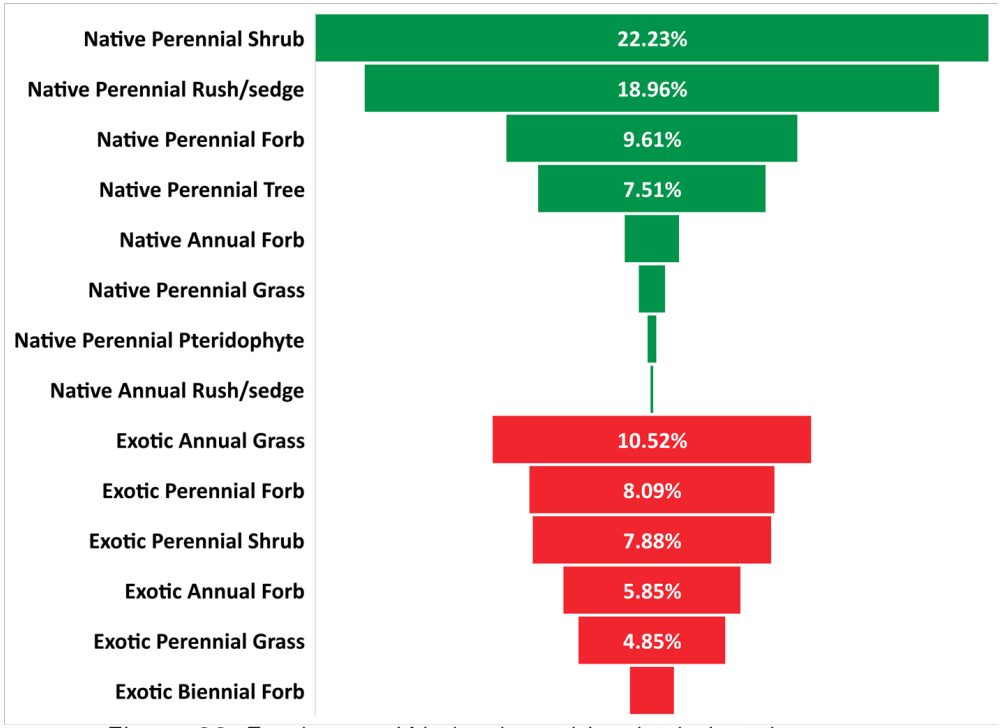
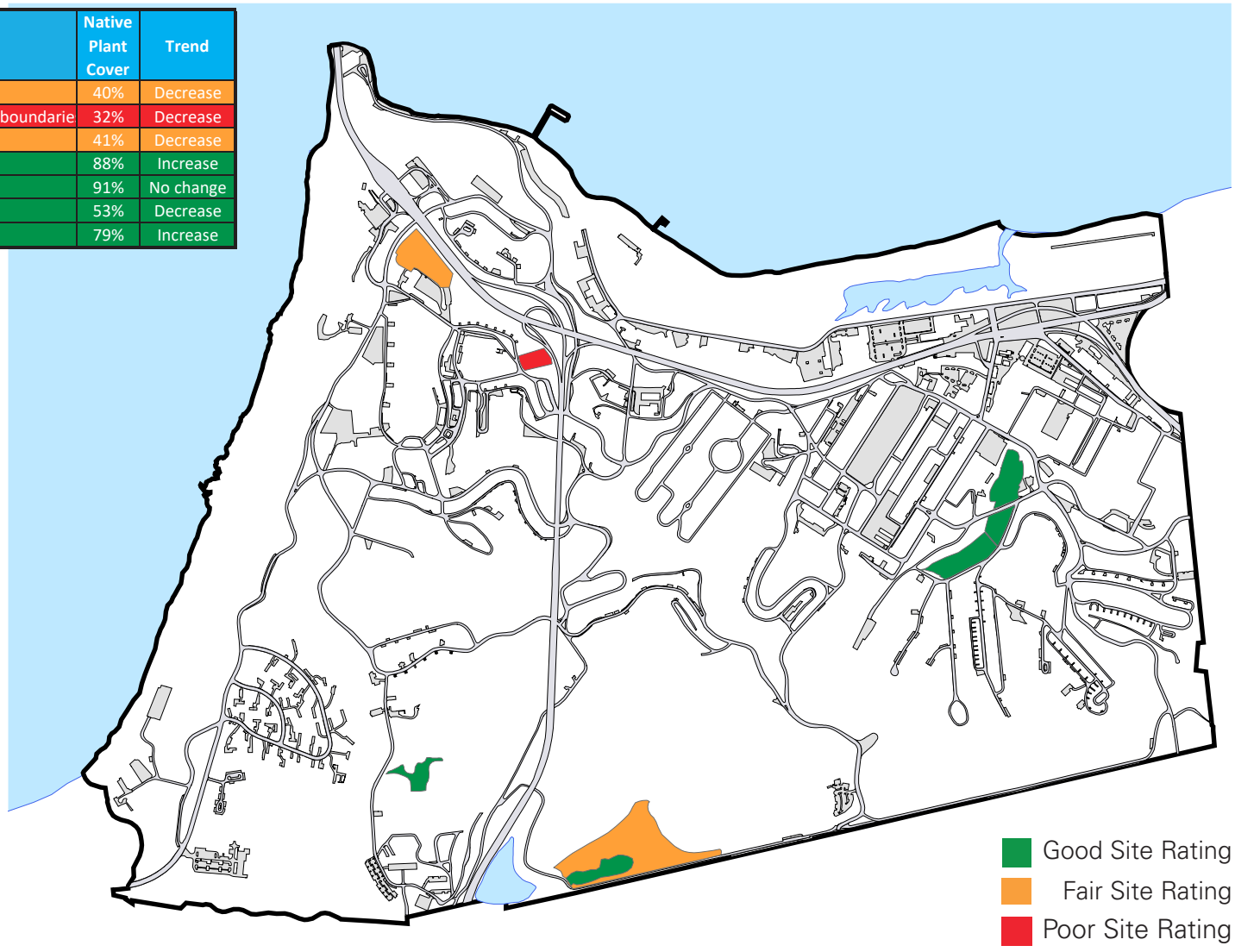


Figure 22: Freshwater Wetland combined relative plant cover

Table 8 and Map 6 shows the site ratings each Freshwater Wetland monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Doyle Drive Natural Areas, Log Cabin Wetland Full Site	40%	Decrease
Doyle Drive Natural Areas, Storey Avenue Wetland Original monitoring boundarie	32%	Decrease
Mountain Lake, East Arm Full Site	41%	Decrease
Mountain Lake, East Arm SFO Project Area	88%	Increase
Presidio Hills, Wetland Full Site	91%	No change
Tennessee Hollow, MacArthur Meadow Full Site	53%	Decrease
Tennessee Hollow, YMCA Reach Full Site	79%	Increase

Table 8: Native plant cover results for each Freshwater Wetland monitoring site



Map 6: Freshwater Wetland monitoring sites and the rating they received

There are 12 Grassland sites that are monitored covering 15.98 acres. The Grassland habitat's native plant cover thresholds are good ≥ 40%, fair < 40% & > 25%, and poor ≤ 25%. Of the 12 sites monitored 10 (10 points) received a good rating, 0 (0 points) received a fair rating, and 2 (0 points) received a poor rating. Overall, the Grassland habitat received a *good rating* based on on receiving 10 points divided by 12 sites equaling 83%.

The combined relative vegetation cover, see Figure 24, of all the Grassland sites show the biggest threats to native plant cover are exotic annual grasses (25.57%), exotic perennial grasses (13.94%), and exotic annual forbs (8.05%).

Tennessee Hollow - Sumner Grassland and Rob Hill - Washington Prairie are the only sites that received a poor rating. Both sites have been a lower priority in previous years due to resources being allocated elsewhere. Doyle Drive Natural Areas - Log Cabin Prairie just barely received a good rating and an effort should be made to increase native vegetation cover and control exotic annual grasses to retain this positive rating. Crissy Bluffs - West Crissy Bluffs and Inspiration Point - South Drainage, while both rated good, has shown a significant decrease since it's previous monitoring. Efforts should be increased at these sites to keep them above the good rating threshold.

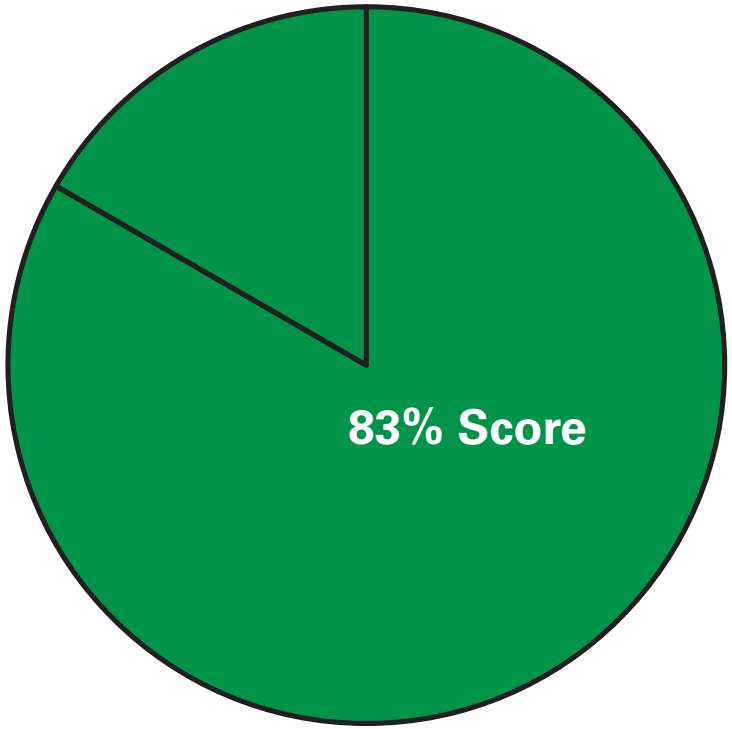


Figure 23: Good Grassland habitat rating based on 83% score

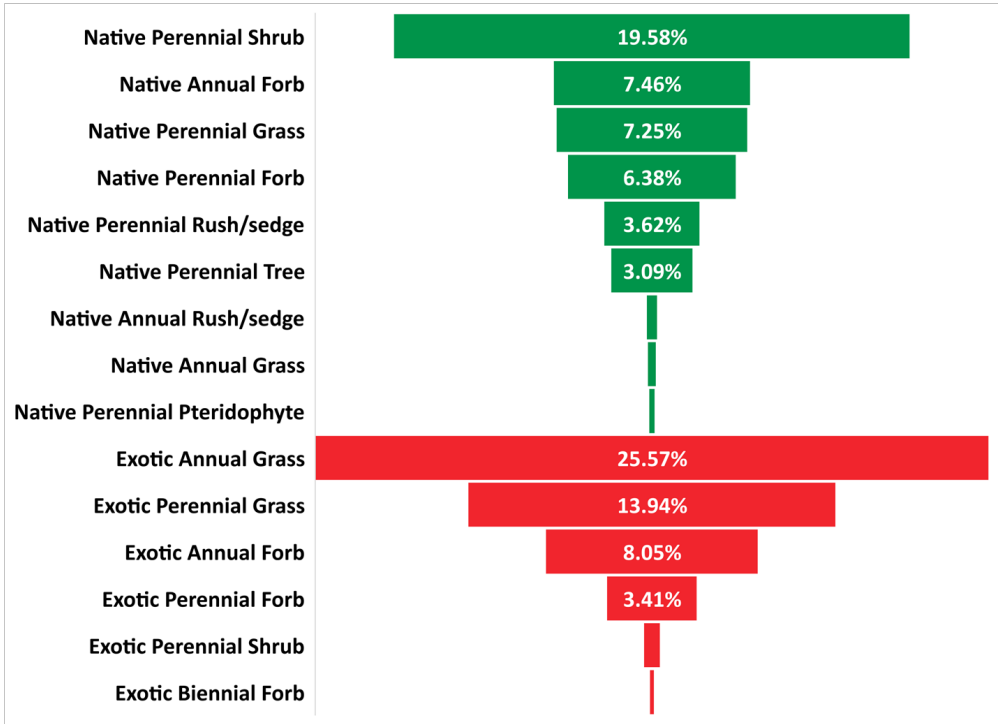
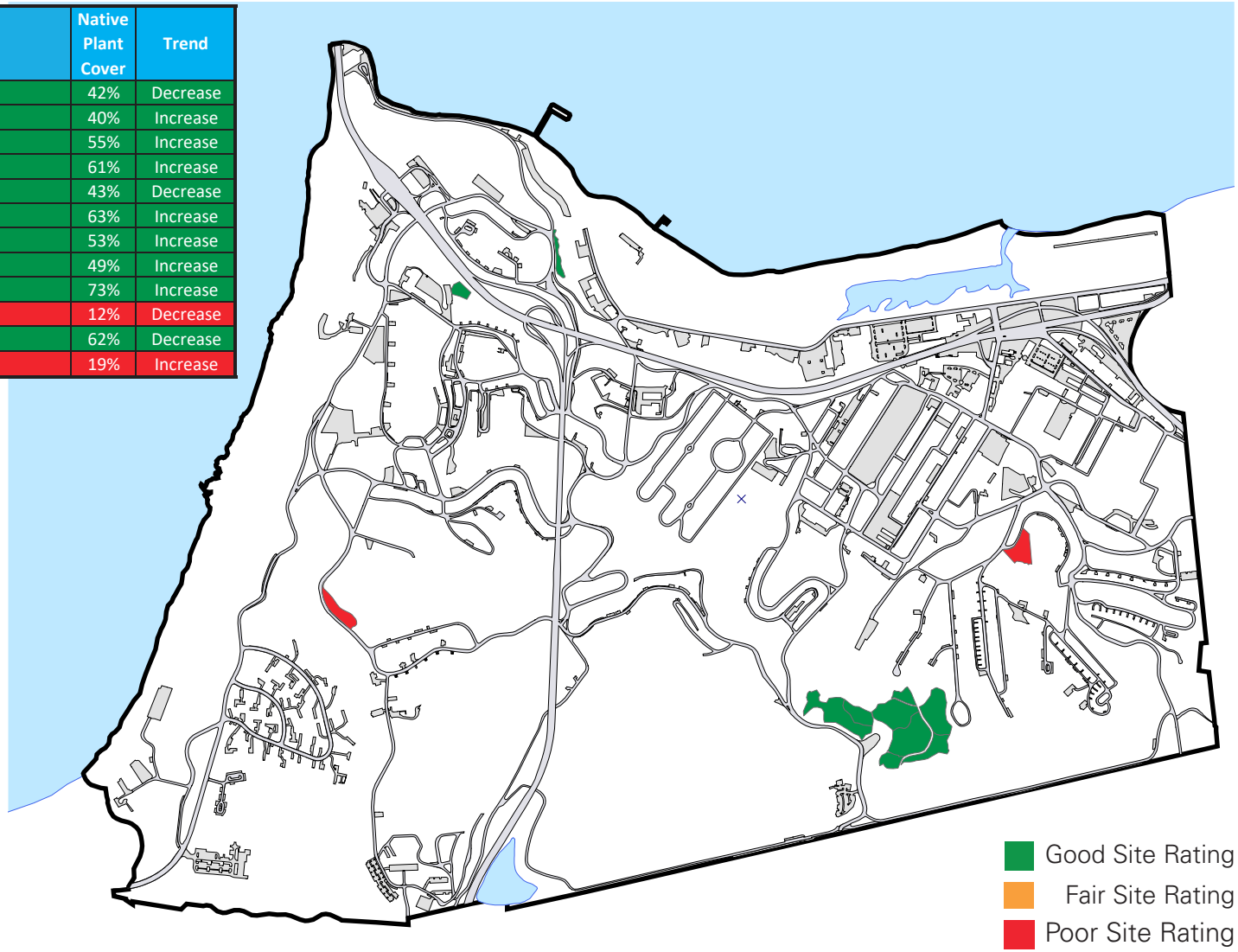


Figure 24: Grassland Combined Relative Plant Cover

Table 9 and Map 7 shows the site ratings each Grassland monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Crissy Bluffs, West Crissy Bluffs Top of slope, active restoration area	42%	Decrease
Doyle Drive Natural Areas, Log Cabin Prairie Active restoration area	40%	Increase
Inspiration Point, East Grassland Full Site	55%	Increase
Inspiration Point, Lower Quarry Full Site	61%	Increase
Inspiration Point, South Drainage FY19 Planting Area	43%	Decrease
Inspiration Point, Viewshed Full Site	63%	Increase
Inspiration Point, Viewshed Extension Phase 1	53%	Increase
Inspiration Point, West Grassland Main grassland	49%	Increase
Inspiration Point, West Grassland Scraped Area	73%	Increase
Rob Hill, Washington Prairie Western meadow	12%	Decrease
Tennessee Hollow, Landfill 2 Full Site	62%	Decrease
Tennessee Hollow, Sumner Grassland Main grassland	19%	Increase

Table 9: Native plant cover results for each Grassland monitoring site



Map 7: Grassland monitoring sites and the rating they received

There are 5 Historic Forest sites that are monitored covering 7.89 acres. The Historic Forest habitat's native plant cover thresholds are good ≥ 60%, fair < 60% & > 45%, and poor ≤ 45%. Of the 5 sites monitored 1 (1 point) received a good rating, 1 (0.5 points) received a fair rating, and 3 (0 points) received a poor rating. Overall, the Historic Forest habitat received a *poor rating* based on receiving 1.5 points divided by 5 sites equaling 30%.

The combined relative vegetation cover, see Figure 26, of all the Historic Forest sites show the biggest threats to native plant cover are exotic perennial grasses (23.66%), exotic annual grasses (19.33%), exotic perennial forbs (5.63%), and exotic annual forbs (5.53%).

As expected, the Rob Hill Understory Enhancement project increased from 28% to 67%, flipping from a poor to good rating, after two years of management. Due to staff shortages and an increase in work loads currently there is no plan to monitor the 4 other Historic Forest sites.

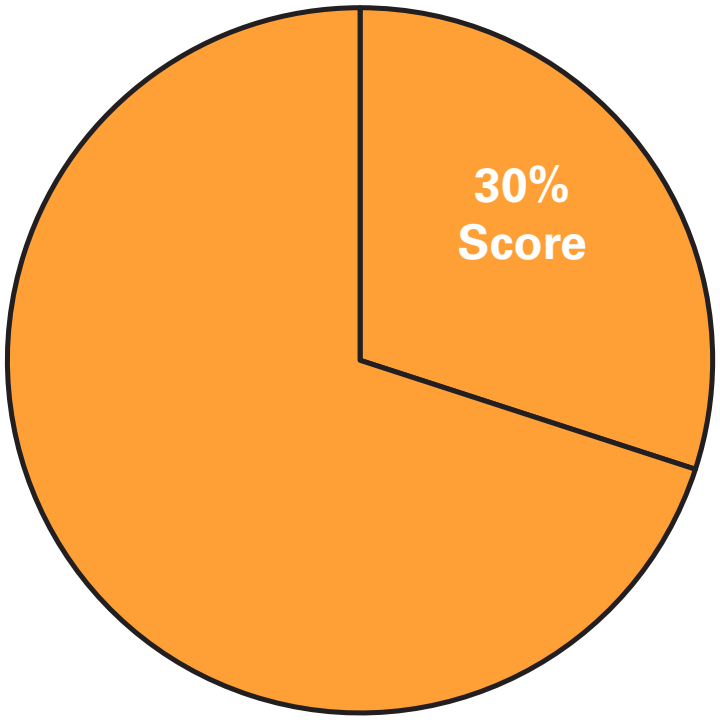


Figure 25: Poor Historic Forest habitat rating based on 30% score

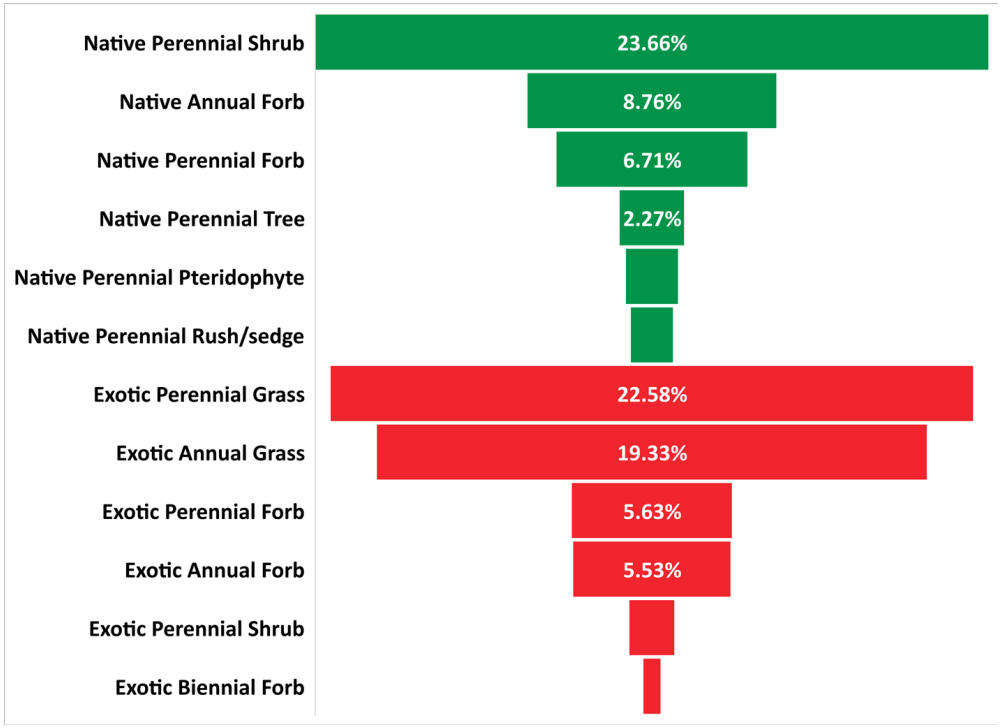
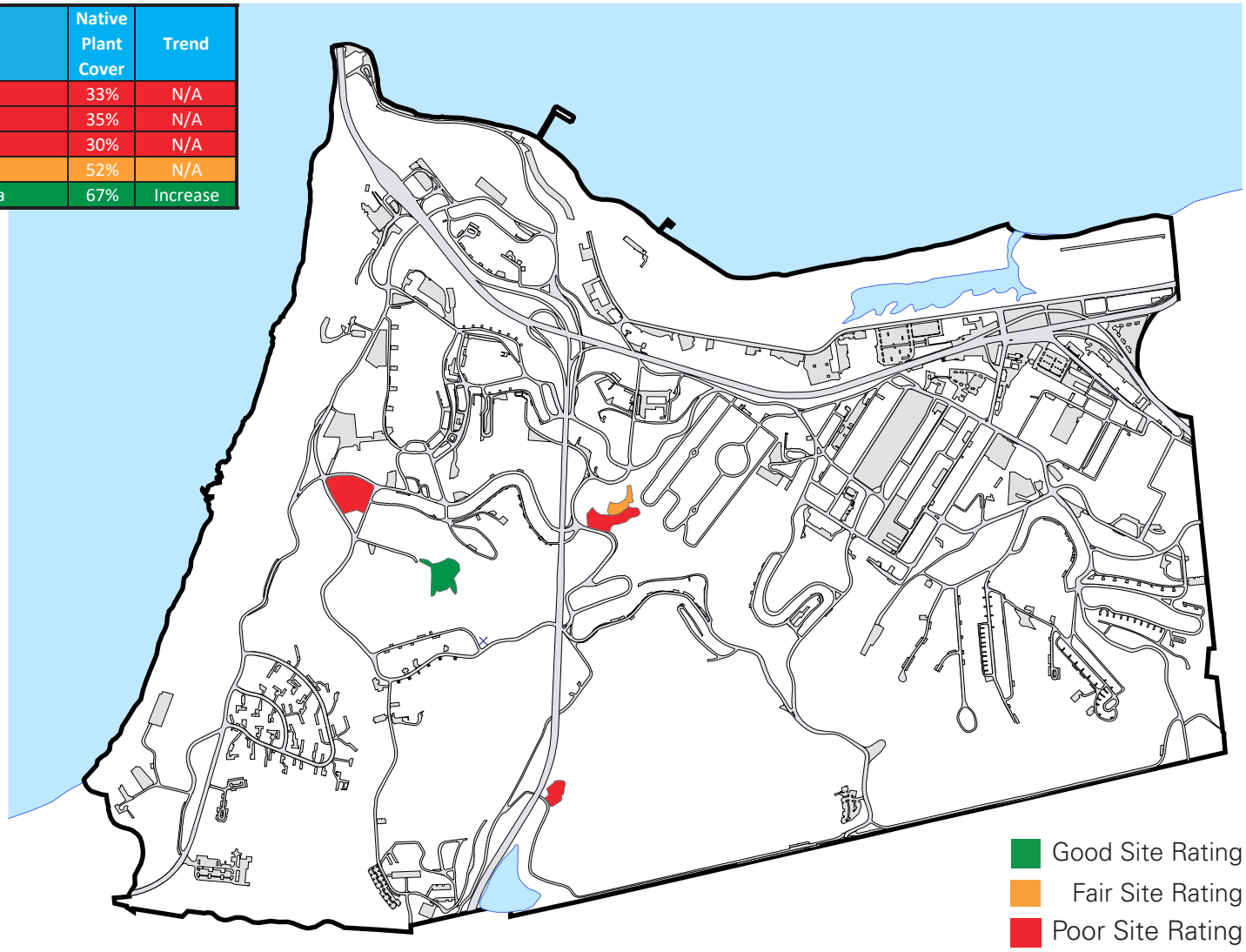


Figure 26: Historic Forest combined relative plant cover

Table 10 and Map 8 shows the site ratings each Historic Forest monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Outside NPCZ, Kobbe Full Site	33%	N/A
Outside NPCZ, Mountain Lake Staging Area Full Site	35%	N/A
Outside NPCZ, Park Stand 1 Full Site	30%	N/A
Outside NPCZ, Park Stand 2 Full Site	52%	N/A
Outside NPCZ, Rob Hill Understory Enhancement FY20 Planting Area	67%	Increase

Table 10: Native plant cover results for each Historic Forest monitoring site



Map 8: Historic Forest monitoring sites and the rating they received

There are 2 Oak Woodland sites that are monitored covering 1.43 acres. The Oak Woodland habitat's native plant cover thresholds are good ≥ 60%, fair < 60% & > 45%, and poor ≤ 45%. Of the 2 sites monitored 1 (1 point) received a good rating, 1 (0.5 point) received a fair rating, and 0 (0 points) received a poor rating. Overall, the Oak Woodland habitat received a *good rating* based on receiving 1.5 points divided by 2 sites equaling 75%.

The combined relative vegetation cover, see Figure 28, of all the Oak Woodland sites show the biggest threats to native plant cover are exotic annual grasses (16.74%), exotic perennial forbs (8.55%), exotic perennial grasses (4.39%), and exotic annual forbs (3.55%).

Golf Course Oak Woodland site is the only one of the two Oak Woodland sites to receive a fair rating. This site has a fair amount of exotic tree species limiting native vegetation cover and has been a lower priority area. Improving native plant cover in this area would not be expected until more resources are invested into this site. Golf Course Oak Woodland hasn't been monitored since 2011 since it is considered a lower priority site and couldn't be fit into the schedule. Presidio Hills - Oak Woodland was supposed to be monitored in 2022 but a homeless encampment made it unsafe to do.

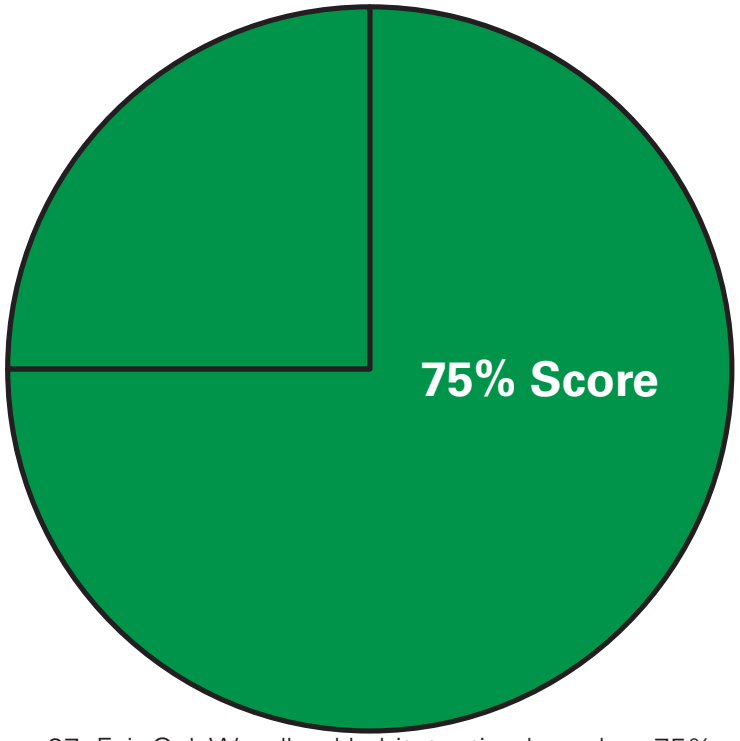


Figure 27: Fair Oak Woodland habitat rating based on 75% score

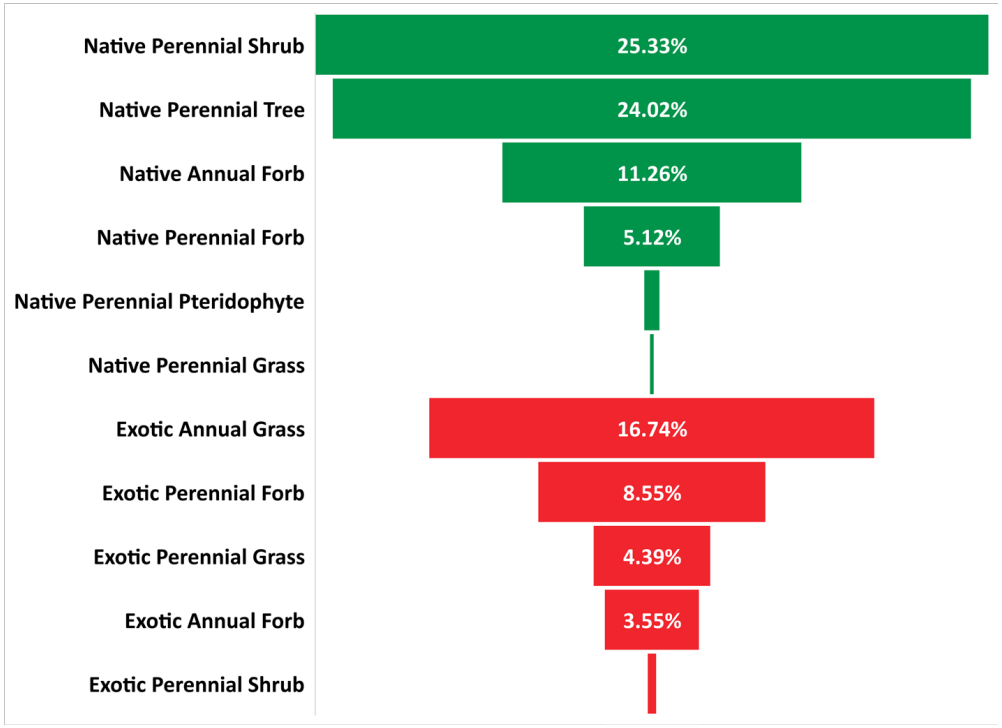
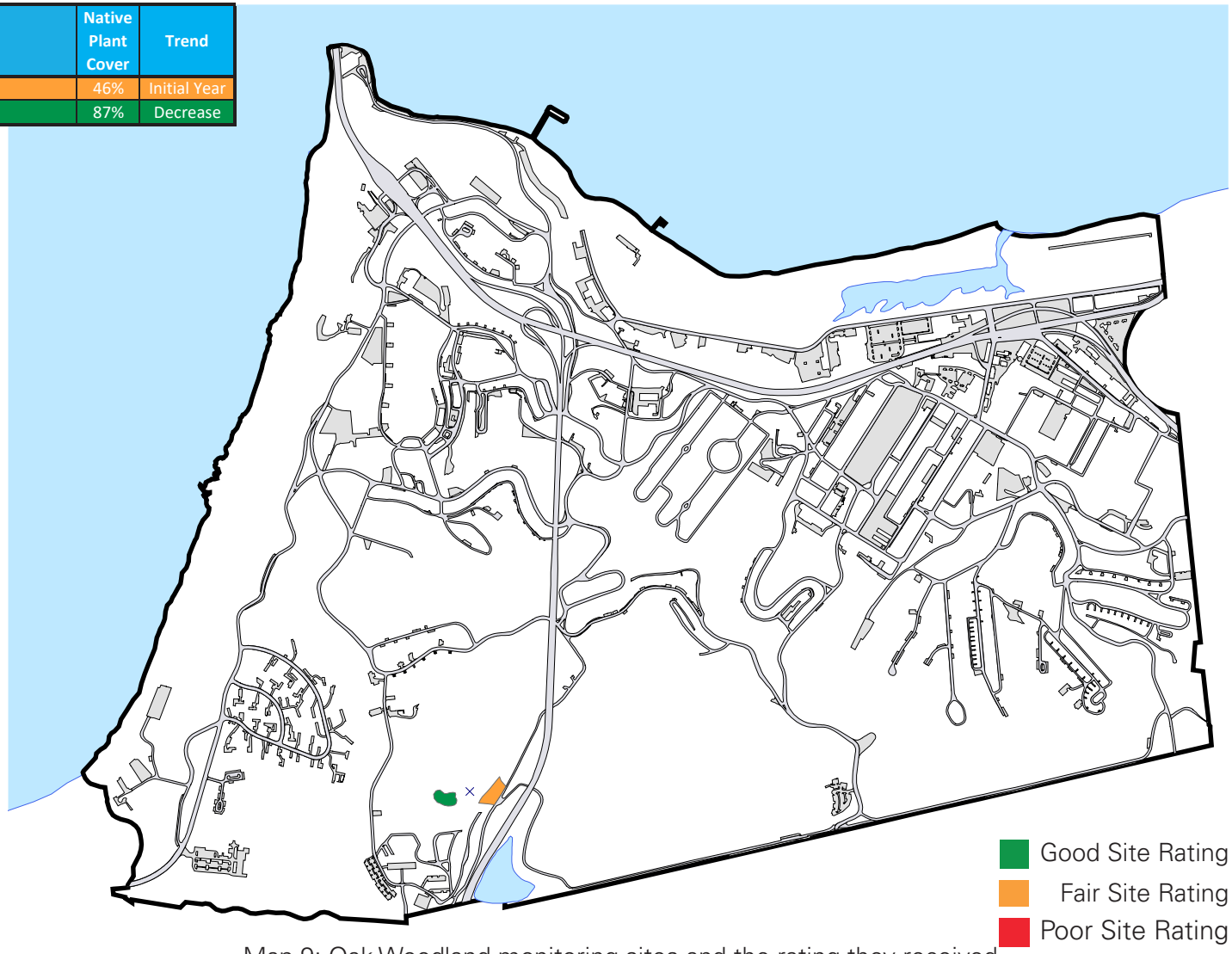


Figure 28: Oak Woodland combined relative plant cover

Table 11 and Map 9 shows the site ratings each Oak Woodland monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Presidio Golf Course Natural Areas, Golf Course Oak Woodland Full Site	46%	Initial Year
Presidio Hills, Oak Woodland Full Site	87%	Decrease

Table 11: Native plant cover results for each Oak Woodland monitoring site



Map 9: Oak Woodland monitoring sites and the rating they received

There are 8 Riparian sites that are monitored covering 15.12 acres. The Riparian habitat's native plant cover thresholds are good ≥ 50%, fair < 50% & > 35%, and poor ≤ 35%. Of the 8 sites monitored 8 (8 points) received a good rating, 0 (0 points) received a fair rating, and 0 (0 points) received a poor rating. Overall, the Riparian habitat received a *good rating* based on receiving 8 points divided by 8 sites equaling 100%.

The combined relative vegetation cover, see Figure 30, of all the Riparian sites show the biggest threats to native plant cover are exotic annual grasses (7.09%), exotic annual forbs (4.38%), and exotic perennial grasses (3.90%).

All of the sites in the Riparian habitat received good ratings. Those sites that have shown a decrease in native cover since the previous time they were monitored are still substantially above the 50% good rating threshold.

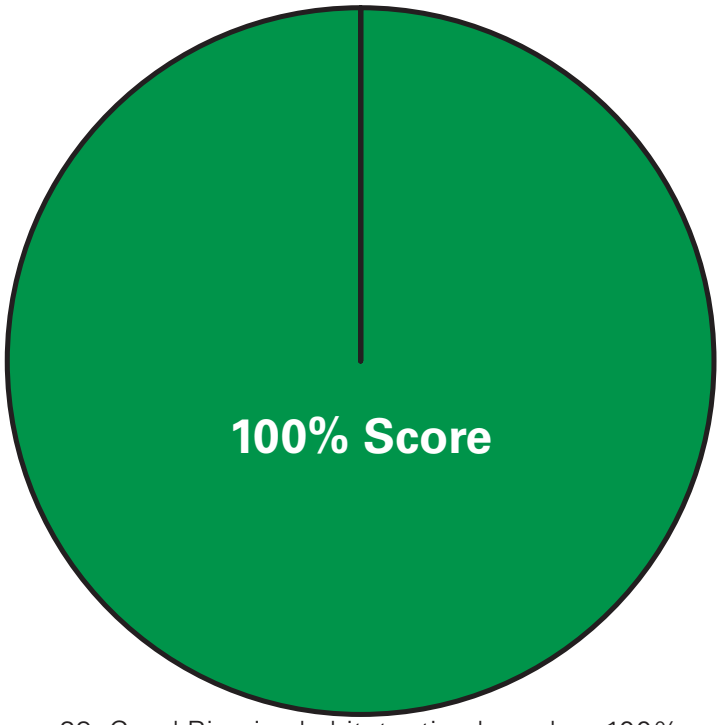


Figure 29: Good Riparian habitat rating based on 100% score

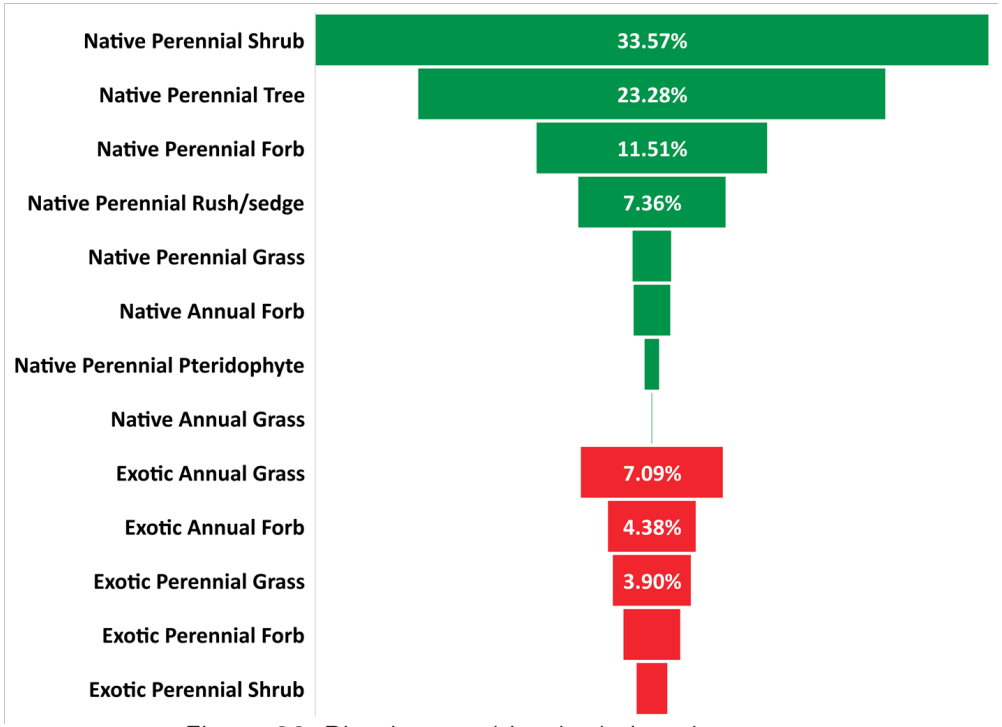
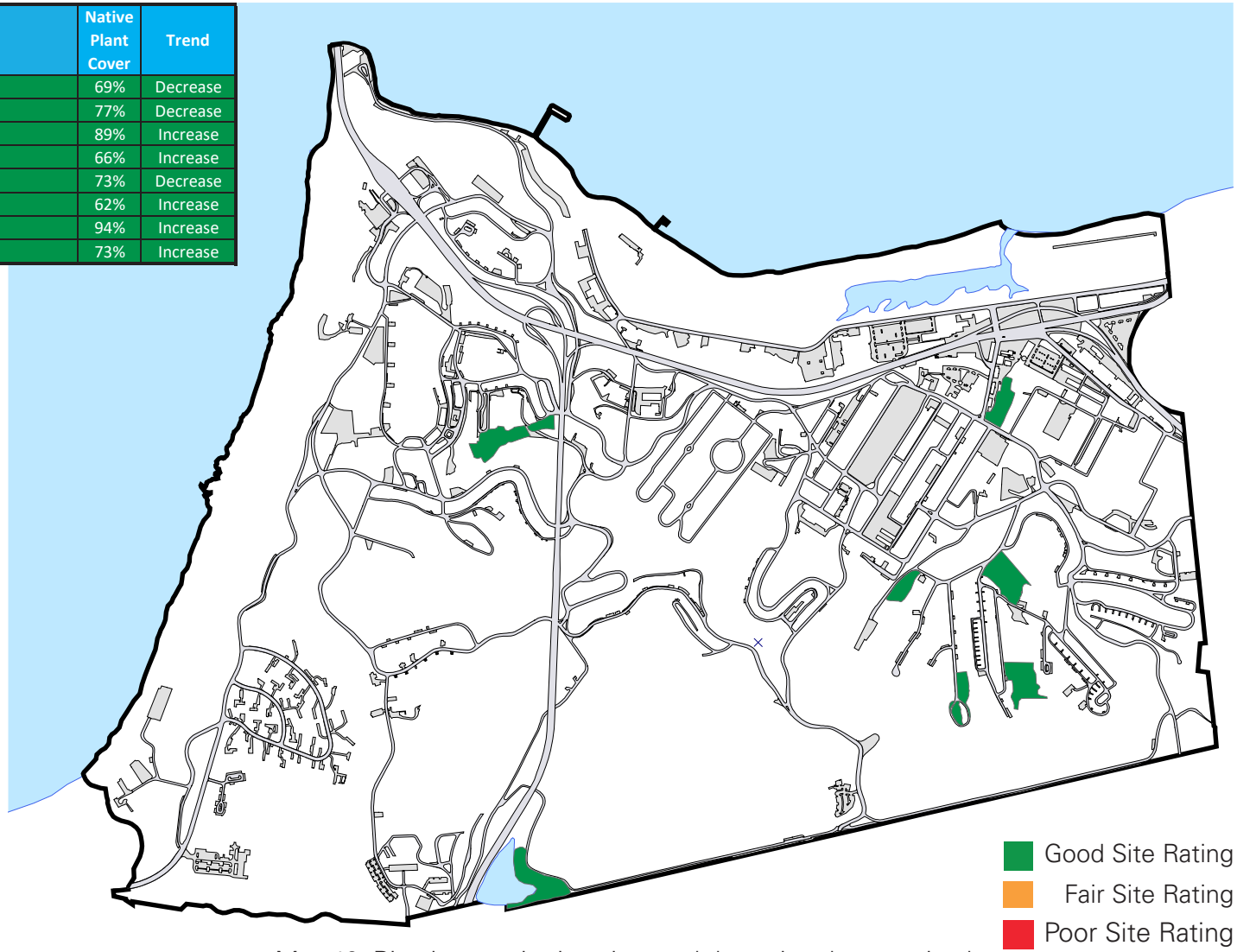


Figure 30: Riparian combined relative plant cover

Table 12 and Map 10 shows the site ratings each Riparian monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Dragonfly Creek, Lower Dragonfly Creek Original monitoring boundaries	69%	Decrease
Dragonfly Creek, Upper Dragonfly Creek Full Site	77%	Decrease
Mountain Lake, Mountain Lake East and south shore	89%	Increase
Tennessee Hollow, Eastern Tributary Tree removal area and willows	66%	Increase
Tennessee Hollow, El Polin Phase 5	73%	Decrease
Tennessee Hollow, Remnant Reach Full Site	62%	Increase
Tennessee Hollow, Thompson Reach Full Site	94%	Increase
Tennessee Hollow, Western Tributary Barnard Firing Range	73%	Increase

Table 12: Native plant cover results for each Riparian monitoring site



Map 10: Riparian monitoring sites and the rating they received

There is 1 Tidal Wetland site that is monitored covering 7.48 acres. The Tidal Wetland habitat's native plant cover thresholds are good ≥ 60%, fair < 60% & > 45%, and poor ≤ 45%. Of the 1 site monitored 0 (0 points) received a good rating, 0 (0 points) received a fair rating, and 1 (0 points) received a poor rating. Overall, the Tidal Wetland habitat received a poor rating based on receiving 0 points divided by 1 site equaling 0%.

The combined relative vegetation cover, see Figure 32, of the one Tidal Wetland site show the biggest threats to native plant cover are exotic annual forbs (37.35%), exotic annual grasses (18.07%), and exotic perennial grasses (9.64%).

Quartermaster Reach is the only Tidal Wetland site. One year after planting monitoring results have shown an increase in native cover from 18% to 34%. Over the next few years we expect to see a large increase bringing this sites rating from poor to fair or good.

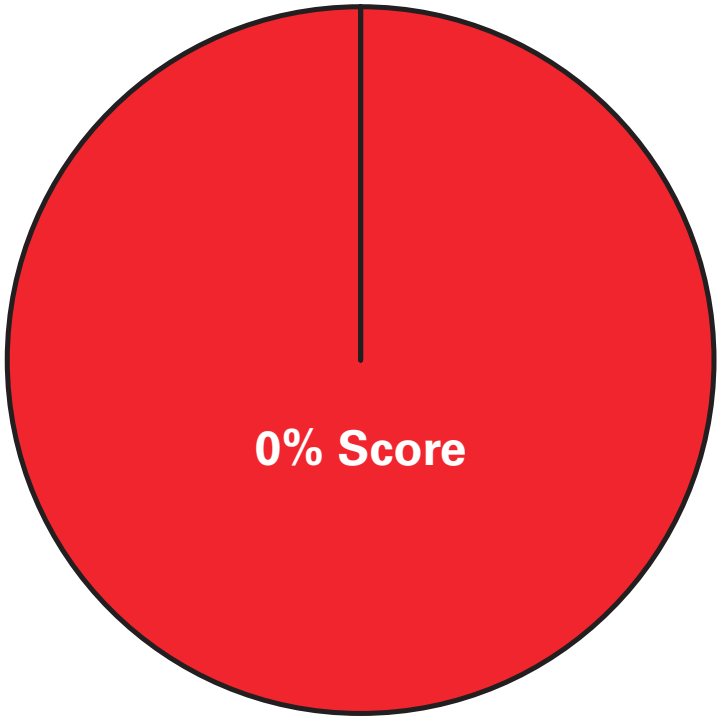


Figure 31: Poor Tidal Wetland habitat rating based on 0% score

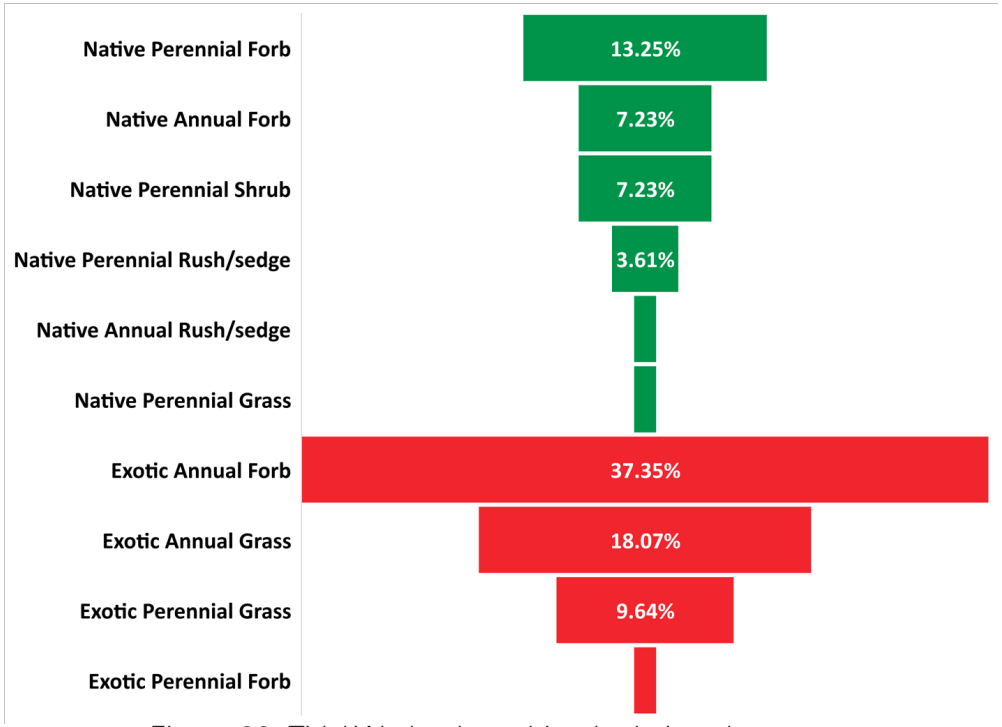
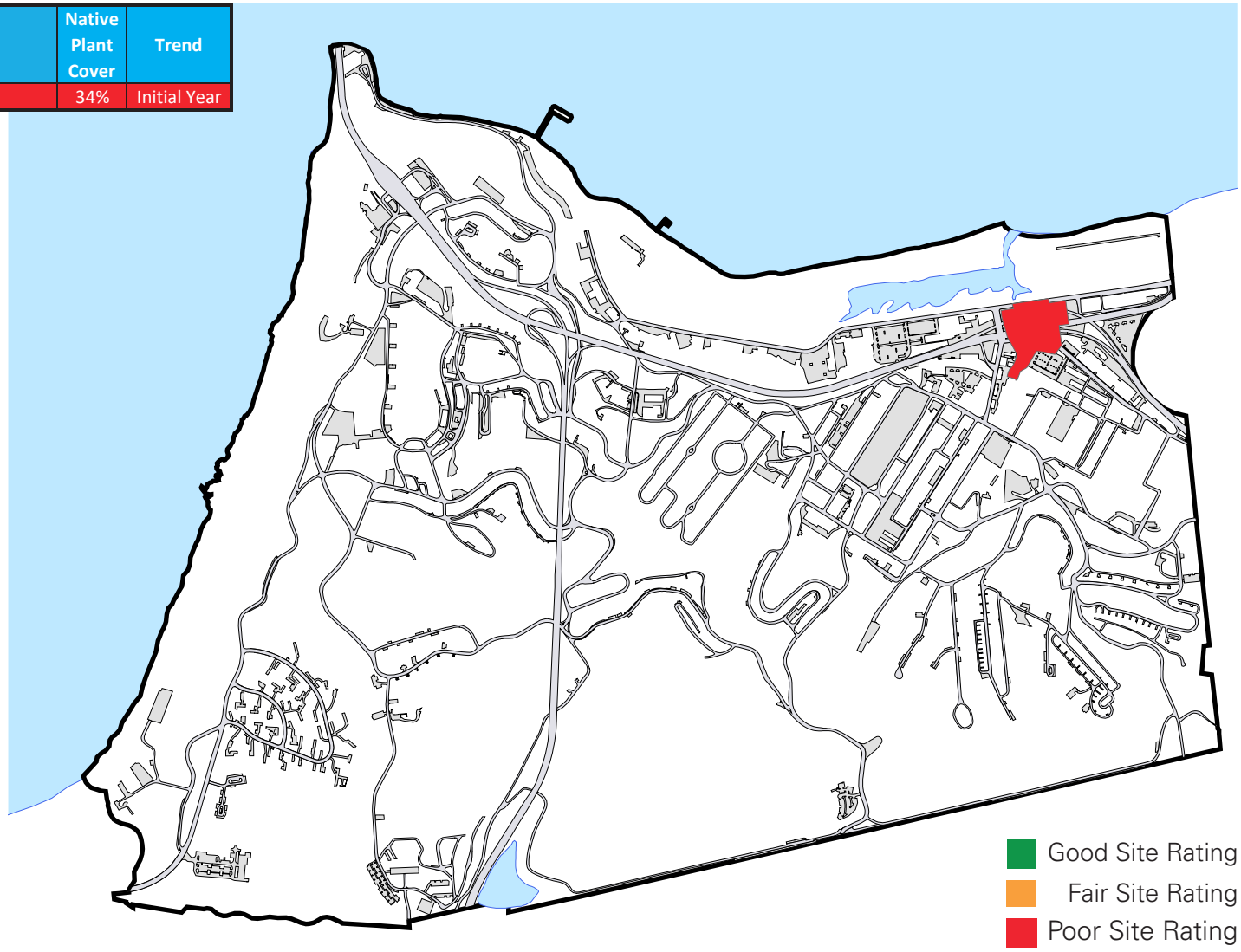


Figure 32: Tidal Wetland combined relative plant cover

Table 13 and Map 11 shows the site ratings each Tidal Wetland monitoring site received.

Monitoring Site	Native Plant Cover	Trend
Tennessee Hollow, Quartermaster Reach Full Site	34%	Initial Year

Table 13: Native plant cover results for each Tidal Wetland monitoring site



Map 11: Tidal Wetland monitoring sites and the rating they received

GOOD
75%

Threatened & Endangered Species

Of our roughly 350 species of native plants in the Presidio there are 14 special status species. Of those, 5 are Federally Endangered, 1 is Federally Threatened, and 10 are considered rare by the California Native Plant Society. There are also eight special status species that are presumed extripated, meaning they are believed to not be found in the Presidio but still exist elsewhere. Table 14 lists all the special status species known to currently occur at Presidio.

Threatened and endangered plant populations in the Presidio are assesed by using a variety of annual monitoring methods. For very large core populations of the endangered annual plants San Francisco lessingia, and Presidio clarkia, macroplots have been established to estimate population sizes by sampling. For smaller annual plant populations, censuses are conducted. For the two endangered Presidio manzanita species, qualitative assessments are done of the few plants remaining. We assess the success of threatened and endangered populations by comparing monitoring results to defined target thresholds modified from the USFWS recovery plans and assigning a good, fair, and poor rating based on those population estimates for the different species and locations. Population estimates with target thresholds provides the data needed to assess endangered populations by: site, species, and aggregated for all threatened and endangered species throughout the Presidio. These estimates are lagging indicators of environmental health.

Threatened and endangered species selected for this analysis include the federally listed *Clarkia franciscana, Hesperolinon congestum*, and *Lessingia germanorum* (see Figure 33). *Clarkia franciscana* sites included are the core population at Inspiration Point, West Crissy Bluffs, and the World War II Memorial. *Hesperolinon congestum* sites included are the only two populations in Area B at Inspiration Point and World War II Memorial. *Lessingia germanorum* sites included are the core populations from the 3 reserves identified in the USFWS recovery plan in Area B including Landfill 8 (PHSH Reserve), Rob Hill (Rob Hill Preserve), and Graded Area 9 (Wherry Reserve). A few of these populations were not monitored during this reporting period due to staff layoffs that occurred after the 2020 coronavirus pandemic.

Arctostaphylos franciscana and *Arctostaphylos montana* ssp. *ravenii* are not included in this analysis since monitoring is largely qualititative due to their small populations. Future reports may include them as the species is propagated and planted in new sites. *Arenaria paludicola* is also not included in this analysis since it is a new reintroduction that is not established.

Scientific Name	Common Name	USFWS	CDFG	CNPS	Life form
Arctostaphylos franciscana	San Francisco manzanita	FE		1B.1	Shrub
Arctostaphylos montana ssp. ravenii	Presidio manzanita	FE	SE	1B.1	Shrub
Arenaria paludicola	Marsh sandwort	FE	SE	1B.1	Perennial
Clarkia franciscana	Presidio clarkia	FE	SE	1B.1	Annual
Lessingia germanorum	San Francisco lessingia	FE	SE	1B.1	Annual
Hesperolinon congestum	Marin dwarf flax	FT	ST	1B.1	Annual
Arabis blepharophylla	Coast rock cress			4.3	Perennial
Chorizanthe cuspidata var. cuspidata	San Francisco spineflower			1B.2	Annual
Cirsium andrewsii	Franciscan thistle			1B.2	Perennial
Erysimum franciscanum	San Francisco wallflower			4.2	Perennial
Gilia capitata ssp. chamissonis	Dune gilia			1B.1	Annual
Horkelia cuneata var. sericea	Kellogg's horkelia			1B.1	Perennial
Iris longipetala	Long-petaled iris			4.2	Perennial
Silene verecunda ssp. verecunda	San Francisco campion			1B.2	Annual

Table 14: Special status species known to currently occur in the Presidio

Clarkia franciscana

Presidio Clarkia

Federally Endangered. Found on serpentine bluffs and serpentine grasslands in open sunlit areas. Grows only in the Presidio and in the East Bay hills.

Lessingia germanorum

San Francisco Lessingia

Federally Endangered. Found in the Presidio only in inland dune areas. The only population known outside the Presidio is in Daly City.

Hesperolinon congestum

Marin Dwarf Flax

Federally Threatened. Found on serpentine bluffs and grasslands. Grows in fewer than 20 locations in Marin, San Mateo, and the Presidio.

Figure 33: Threatened and endangered species included in analysis

Target thresholds of threatened and endangered populations were determined by using USFWS guidelines, some of which were modified by species and site to have higher targets (see Table 15).

Threatened & Endangered Species	Population	Good Rating	Fair Rating	Poor Rating
Clarkia franciscana	Inspiration Point	≥ 5,000	4,999 - 2,000	< 2,000
	West Crissy Bluffs	≥ 3,000	2,999 - 2,000	< 2,000
	WWII Memorial	≥ 3,000	2,999 - 2,000	< 2,000
Hesperolinon congestum	Inspiration Point	≥ 3,000	2,999 - 2,000	< 2,000
	WWII Memorial	≥ 3,000	2,999 - 2,000	< 2,000
Lessingia germanorum	Graded Area 9 (Wherry Reserve)	≥ 10,000	9,999 - 5,000	< 5,000
	Landfill 8 (PHSH Reserve)	≥ 10,000	9,999 - 5,000	< 5,000
	Rob Hill (Rob Hill Reserve)	≥ 10,000	9,999 - 5,000	< 5,000

Table 15: Threatened and endangered species target thresholds by species and habitat

Figure 34 illustrates how a site rating of good, fair, or poor is determined based on our population target thresholds designated for each species and site.

To determine the species rating each site rating for a species would receive 1 point for a good rating, 0.5 points for a fair rating, and 0 points for a poor rating. The points were added up and divided by the total number of sites for that species resulting in the species' score. This score would then be given a rating based on the thresholds in Table 16 with poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. Figure 35 illustrates this.

Score	Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 16: Threatened and endangered species rating thresholds

Similarly, to determine the overall rating we used the same method described above for the species rating but instead used the results from all sites and species. Figure 36 illustrates this.

Figure 34: Example of site rating based on population target thresholds

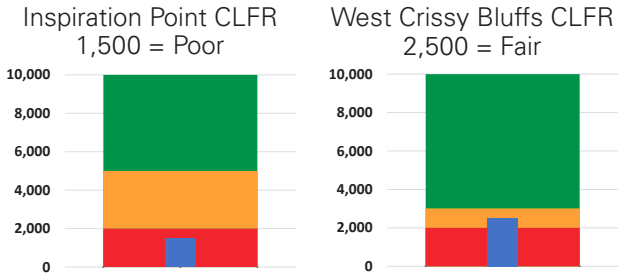
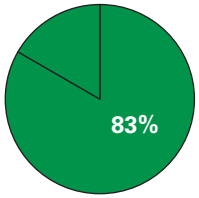
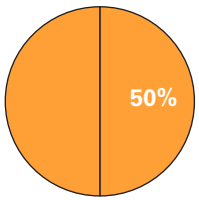


Figure 35: Example of species rating



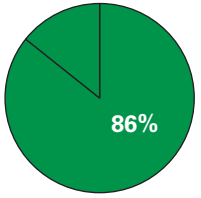
Clarkia franciscana
2 Sites Good = 2 Points
1 Site Fair = 0.5 Points
0 Sites Poor = 0 Points
2.5 Total/3 Sites = 83%
≥75%=Good



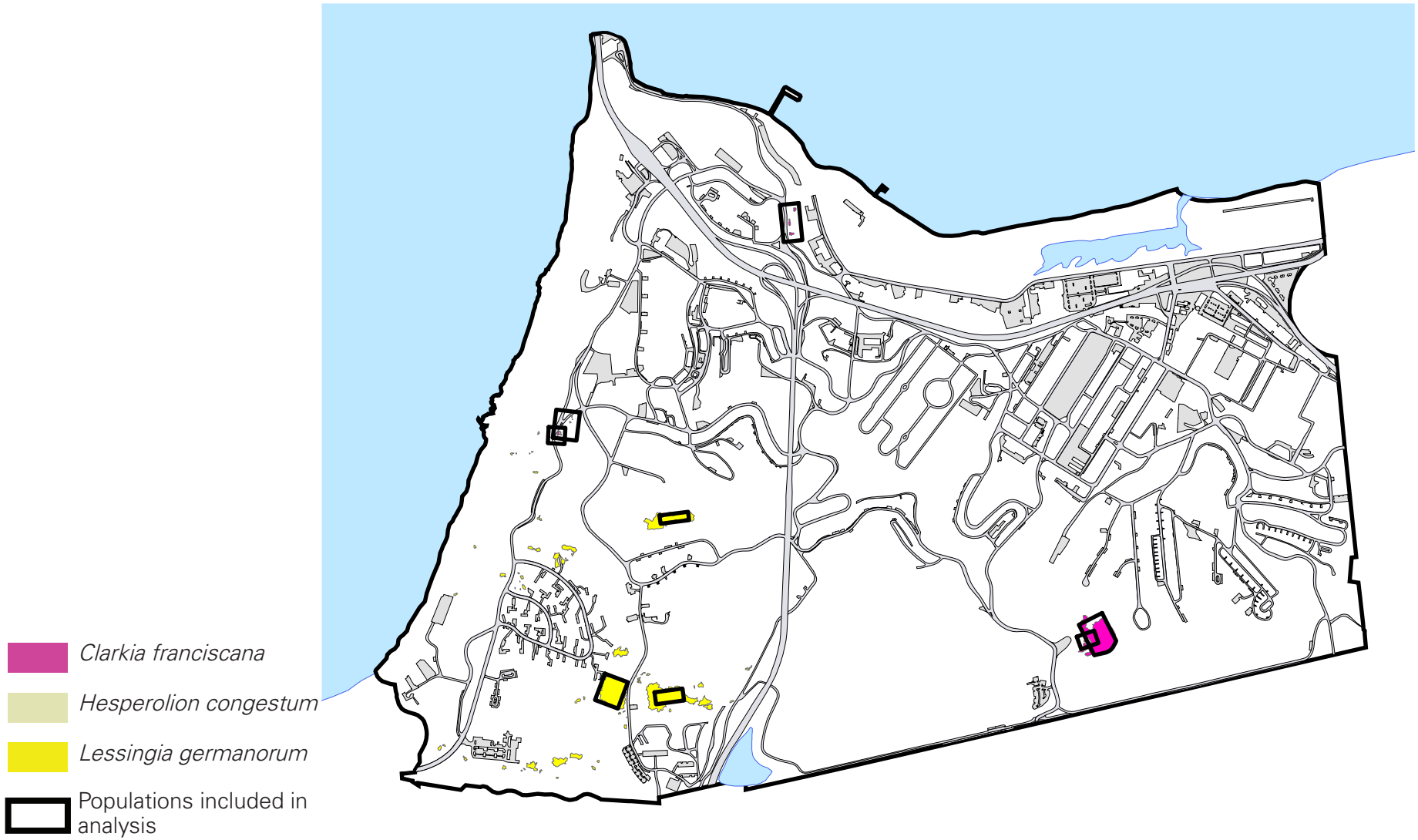
Hesperolinon congestum
1 Site Good = 1 Point
0 Sites Fair = 0 Points
1 Site Poor = 0 Points
1 Total/2 Sites = 50%
> 25% & < 75%=Fair

Figure 36: Example of overall rating

Overall
6 Sites Good = 6 Points
0 Sites Fair = 0 Points
1 Site Poor = 0 Points
6 Total/7 Sites = 86%
≥75%=Good



Map 12 shows all the populations of *Clarkia franciscana*, *Hesperolinon congestum*, and *Lessingia germanorum* as well as the core populations included in this analysis.



Map 12: All populations of *Clarkia franciscana*, *Hesperolinon congestum*, and *Lessingia germanorum* as well as the core populations included in this analysis

Figure 37 shows that the overall threatened and endangered rating is 75%. This is determined by assigning all site ratings a value of 1 point for good, 0.5 points for fair, and 0 points for poor then dividing it by the total number of monitoring sites. Due to the coronavirus pandemic and staff reductions we monitored 4 out of 8 monitoring sites. Of those 3 were good (3 points), 0 fair (0 points), and 1 poor (0 points) resulting in 3 points divided by 4 sites which equals 75%. With an overall rating of 75%, Threatened and Endangered species receives an overall *good rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%.

Figure 38 shows the species rating of all the species monitored. *Clarkia franciscana*, consisting of 1 site, received a good rating. *Lessingia germanorum,* consisting of 2 sites, received a good rating. *Hesperolinon congestum*, consisting of 1 sites, received a poor rating.

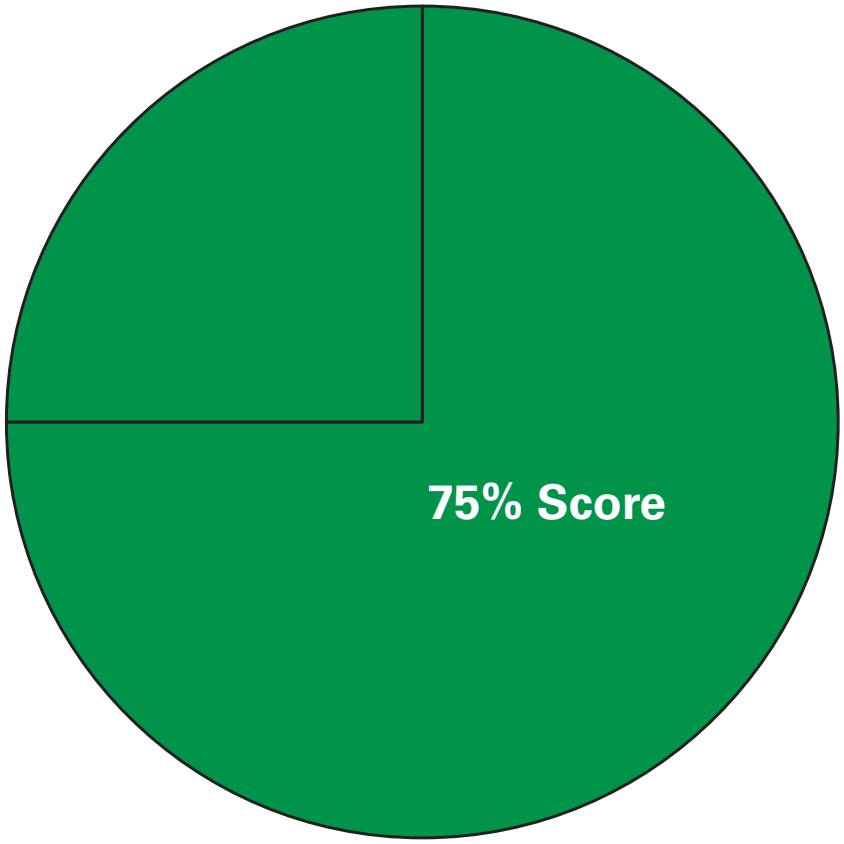


Figure 37: Good overall Threatened and Endangered species rating based on 75% score

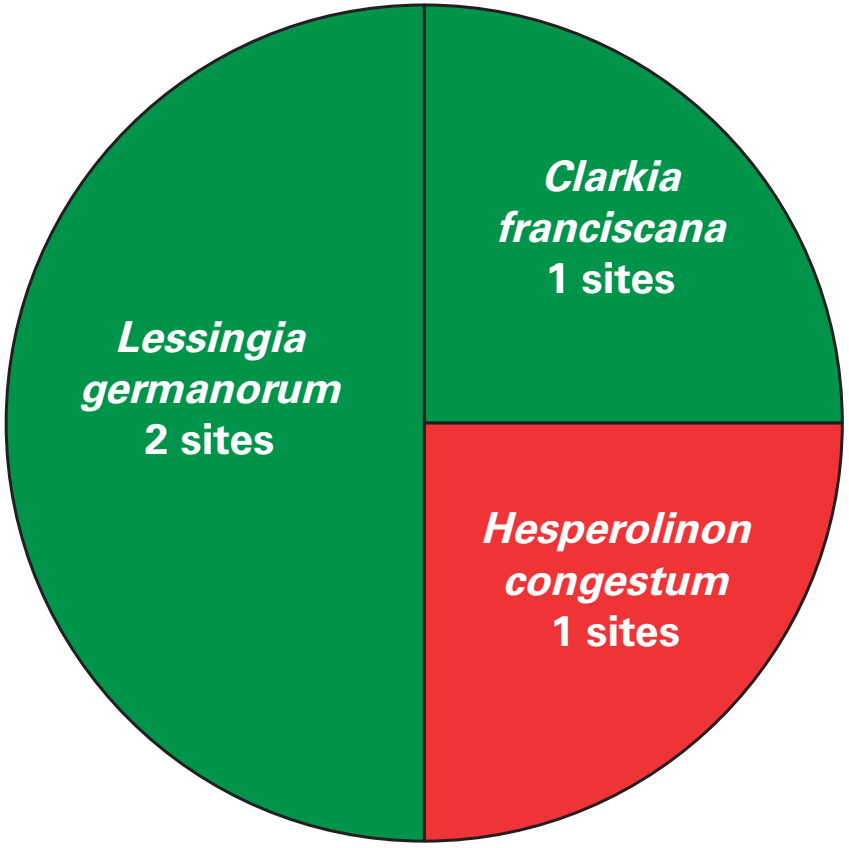


Figure 38: Species rating and number of sites analyzed

Threatened and Endangered Species Scoreboard

Overall T & E Score		*Clarkia franciscana* Score		*Hesperolinon congestum* Score		*Lessingia germanorum* Score	
Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year
88%	75%	100%	100%	50%	0%	100%	100%
GOOD ↓		GOOD ↔		POOR ↓		GOOD ↔	

CLFR Inspiration Point Score		CLFR West Crissy Bluffs Score		CLFR WWII Memorial Score		HECO Inspiration Point Score	
Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year
346,750	180,730	20,172	N/A	9,814	N/A	917	1,213
GOOD ↓		N/A		N/A		POOR ↑	

HECO WWII Memorial Score		LEGE Graded Area 9 Score		LEGE Landfill 8 Score		LEGE Rob Hill Score	
Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year	Previous Year	Current Year
3,877	N/A	805,848	294,497	98,887	112,600	75,258	N/A
N/A		GOOD ↓		GOOD ↑		N/A	

Figure 39: Threatened and endangered species scoreboard

Table 17 shows each species rating and their population sites as well as their site results, site rating, and how the population is trending compared to the previous years results.

Threatened & Endangered Species	Population	Site Results	Site Rating	Trend
Clarkia franciscana: Good	Inspiration Point	180,730	Good	Decrease
	West Crissy Bluffs	N/A	N/A	N/A
	WWII Memorial	N/A	N/A	N/A
Hesperolinon congestum: Poor	Inspiration Point	1213	Poor	Increase
	WWII Memorial	N/A	N/A	N/A
Lessingia germanorum: Good	Graded Area 9 (Wherry Reserve)	294,497	Good	Decrease
	Landfill 8 (PHSH Reserve)	112,600	Good	Increase
	Rob Hill (Rob Hill Reserve)	N/A	N/A	N/A

Table 17: Threatened and endangered species results for each species and site

Map 13 shows the site ratings each population received.

Map 13: Threatened and endangered species site rating results

Clarkia franciscana, Presidio Clarkia Federally Endangered, State Endangered

Presidio Clarkia is a slender, erect, herbaceous annual of the evening-primrose family (Onagraceae), 40 centimeters (16 inches) tall with few, very small and narrow leaves. The pink flowers bloom from May to July. Growing only on serpentine soils in the Bay Area, Presidio Clarkia is known only from the handful of populations in the Presidio and three occurrences in Oakland.

In the Presidio there are four core populations located at the Coastal Bluffs, Inspiration Point, West Crissy Bluffs, and the World War II Memorial. All but the Coastal Bluffs populations are in Area B and are under the Presidio Trust's management.

Inspiration Point's population is the true remnant population while the other three populations were established from seeds that were collected from Inspiration Point. The World War II Memorial population was established in 1972, the Coastal Bluffs population was established in 2009/2010, and the West Crissy Bluffs population was established in 2009/2010 and again in another part of that site in 2014/2015.

Threats to Presidio Clarkia include competition and the development of thatch layers from invasive annual and perennial grasses, encroachment of habitat by native shrubs, and lack of additional sepentine grassland habitat for expansion of existing range. Annual populations may also fluctuate annually due to the amount of percipitation received during the winter.

Results from this year are not complete due to two of the three sites not being since 2019 due to COVID-19 and staff reductions. Analyzing the one site we did survey results in an overall *good rating*. This is the same as the 2018/2019 reports overall rating of good.

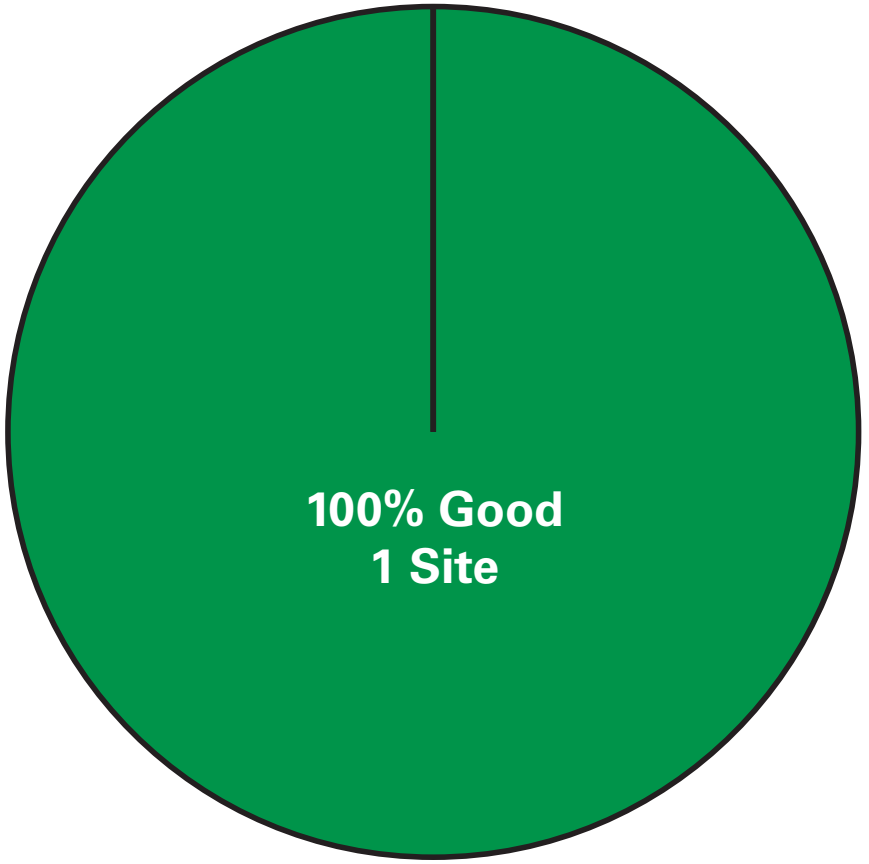
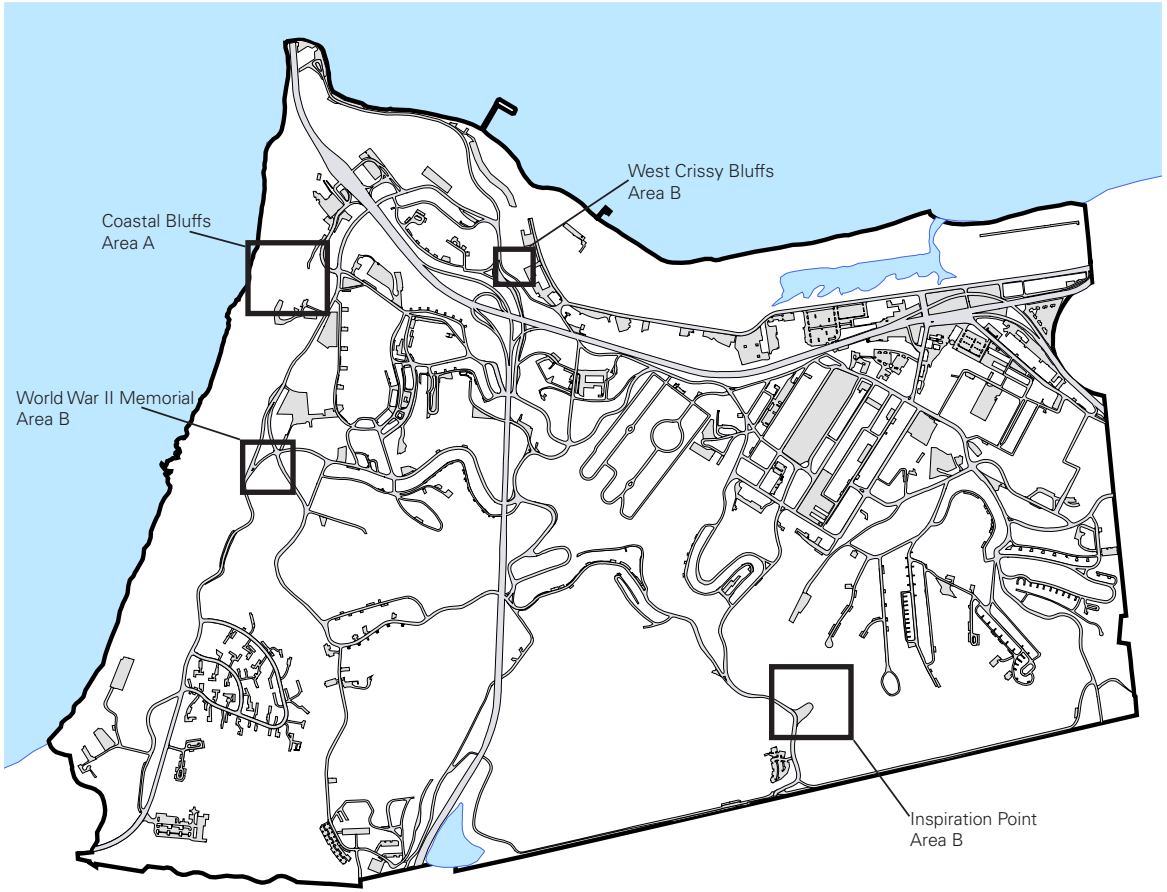


Figure 40: Good *Clarkia franciscana* species rating based on 100% score

Clarkia franciscana, Presidio Clarkia Federally Endangered, State Endangered

Map 14 shows all populations of *Clarkia franciscana*.



Map 14: All populations of *Clarkia franciscana*

Clarkia franciscana, Presidio Clarkia Federally Endangered, State Endangered
Inspiration Point Population

The Inspiration Point population consists of a main population located in the East Grassland and Overlook and many smaller populations in the surrounding areas in the West Grassland and Lower Quarry. Due to time constraints we prioritize surveying the East Grassland, which is the largest population at Inspiration Point. The other populations at Inspiration Point are mapped and visual population estimates are made every one to two years. The East Grassland survey consists of a restricted random sampling design of a 100x100 meter macroplot that allows us to be 80% confident that populations estimates are within ± 20% of the estimated true value. This area was not surveyed in 2020 or 2021 due to COVID-19 and staff reductions. Results in Figure 41 show that 2022 results received a *good rating* and were the second highest ever recorded in the East Grassland at 180,730.

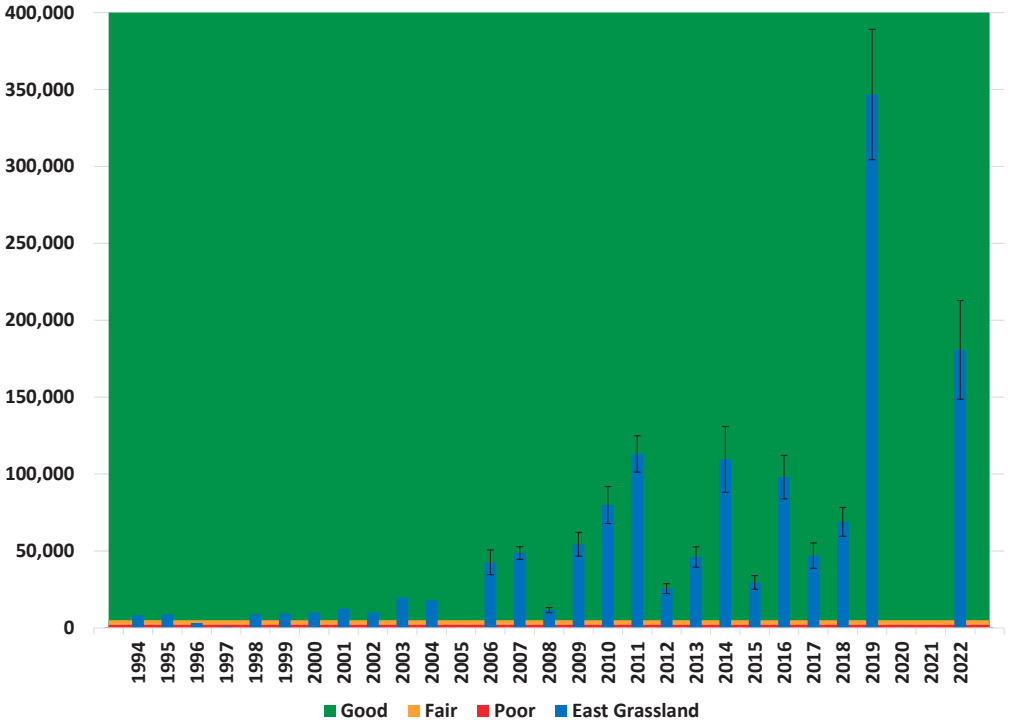
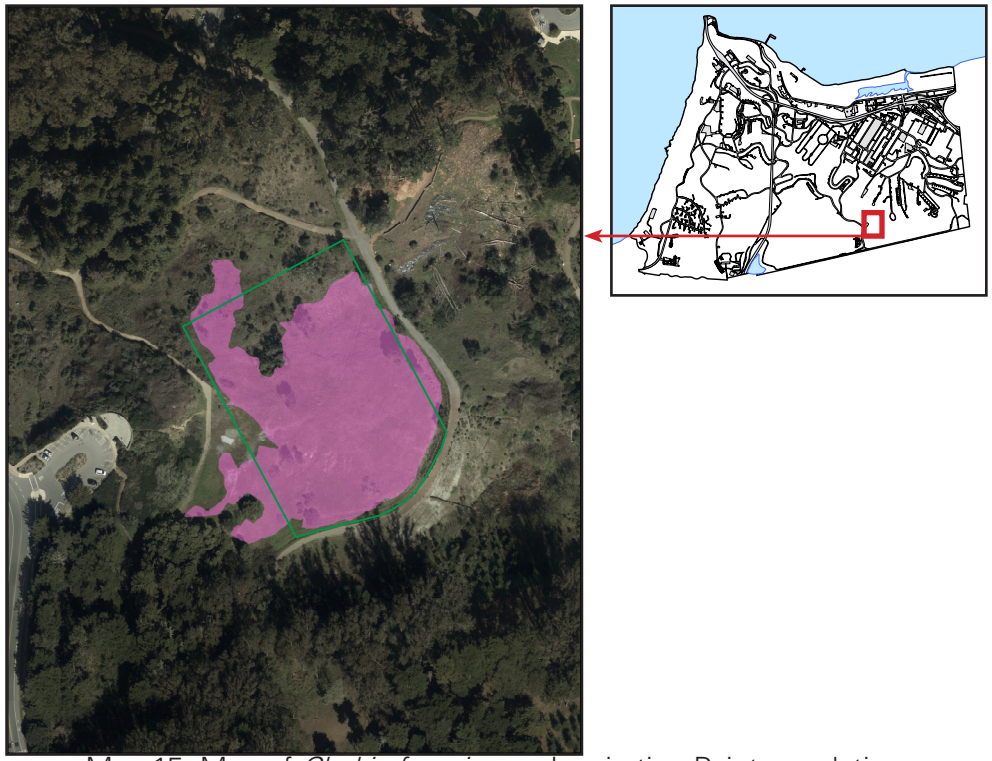


Figure 41: *Clarkia franciscana* Inspiration Point population results



Map 15: Map of *Clarkia franciscana* Inspiration Point population

Clarkia franciscana, Presidio Clarkia Federally Endangered, State Endangered
West Crissy Bluffs Population

The West Crissy Bluffs population consists of three subpopulations on the serpentine outcropping on the bluff above Crissy Field. These populations were established in 2009/2010 and again in 2014/2015 by direct seeding. This population is usually censused annually by laying out meter tapes to create counting lanes and manually counting each individual. Results in Figure 42 shows the historic data collected at this site. Surveying did not occur in 2020, 2021, or 2022 due to COVID-19 and staff reductions. Surveying should continue in 2023.

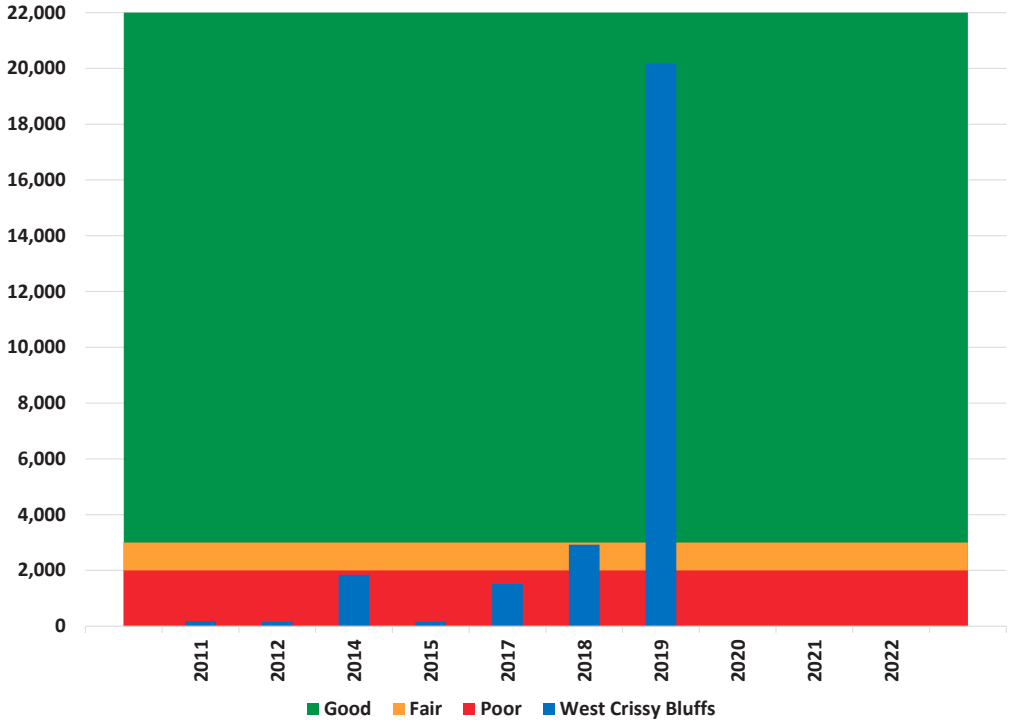
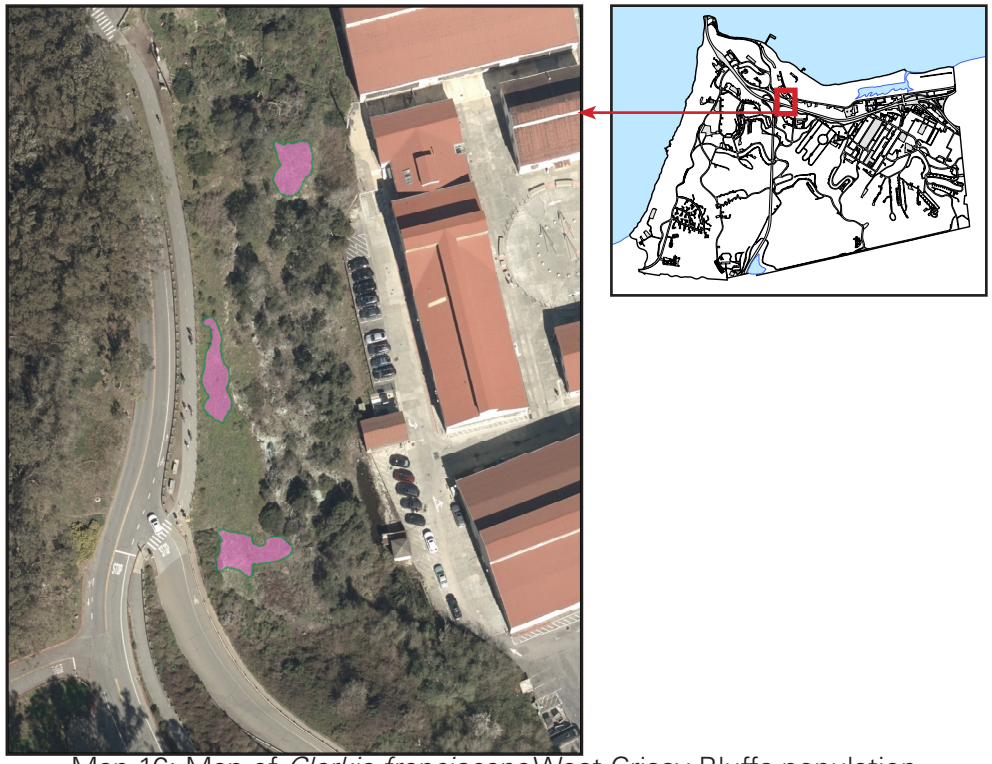


Figure 42: *Clarkia franciscana* West Crissy Bluffs population results



Map 16: Map of *Clarkia franciscana* West Crissy Bluffs population

Clarkia franciscana, Presidio Clarkia Federally Endangered, State Endangered
World War II Memorial Population

The World War II Memorial population consists of one main population and one subpopulation on the serpentine outcropping on the bluff above the Lincoln Blvd. The main population was established in 1972 and the smaller populations in 2016/2017 by direct seeding. This population is usually censused annually by laying out meter tapes to create counting lanes and manually counting each individual. Results in Figure 43 shows the historic data collected at this site. Surveying did not occur in 2020, 2021, or 2022 due to COVID-19 and staff reductions. Surveying should continue in 2023.

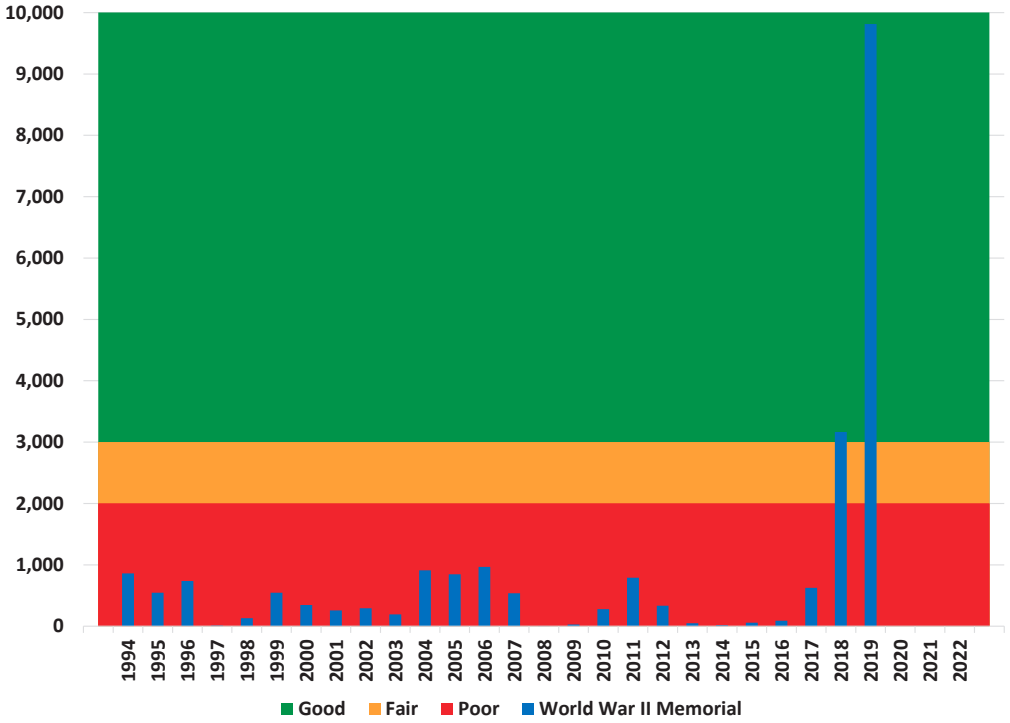
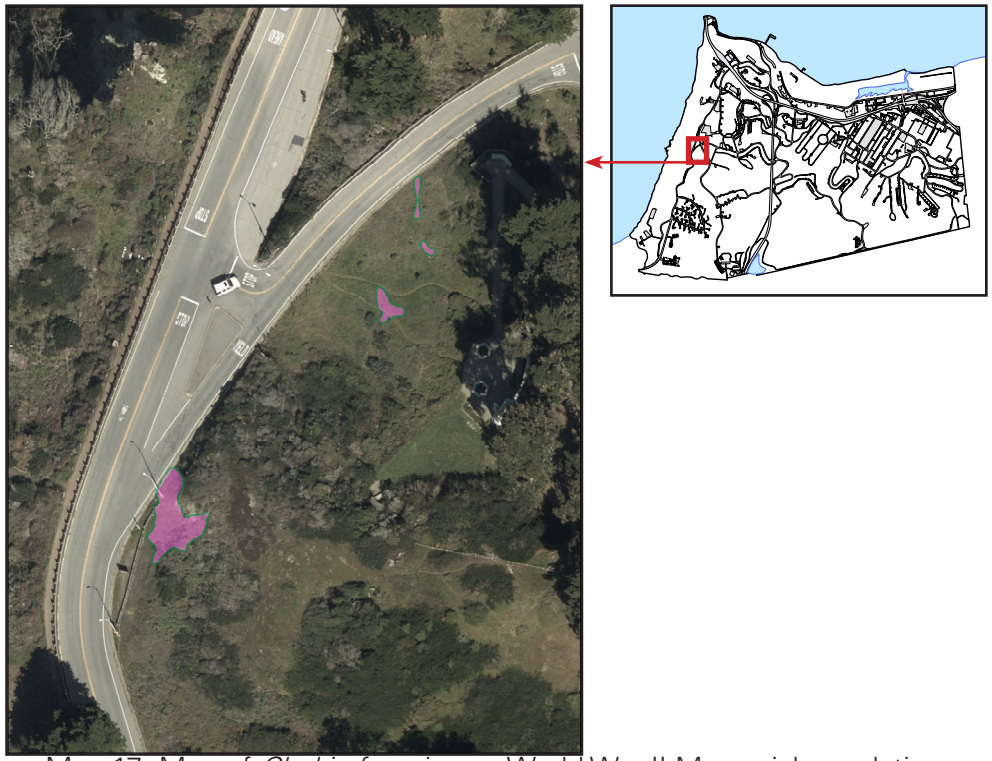


Figure 43: *Clarkia franciscana* World War II Memorial population results



Map 17: Map of *Clarkia franciscana* World War II Memorial population

Hesperolinon congestum, Marin Dwarf Flax Federally Threatened, State Threatened

Marin dwarf flax is an herbaceous annual in the flax family (Linaceae). Mature plants are generally 5-15 cm tall. It has alternate, linear leaves that are more or less glabrous, and well-developed stipule glands that produce red exudate. The white flowers bloom from May to July. Growing only on serpentine soils in the Bay Area, Marin Dwarf Flax is known only from about twenty small populations in Marin, San Mateo, and San Francisco counties.

In the Presidio there are three core populations located at Yerba Buena Serpentine, World War II Memorial, and Inspiration Point. All but the Yerba Buena Serpentine populations are in Area B and are under the Presidio Trust's management.

Marin Dwarf Flax is historically known to occur at World War II Memorial, Yerba Buena Serpentine, and Inspiration Point but only one plant was observed at Inspiration Point in 1985 and none were seen in 1986. Seed from the nearby Ring Mountain population was collected and reintroduced to Inspiration Point and became established in 2004 but after consulting with plant geneticists it was recommended to remove those plants and try reestablishing it with local seed from the Presidio. This was done in 2010/2011.

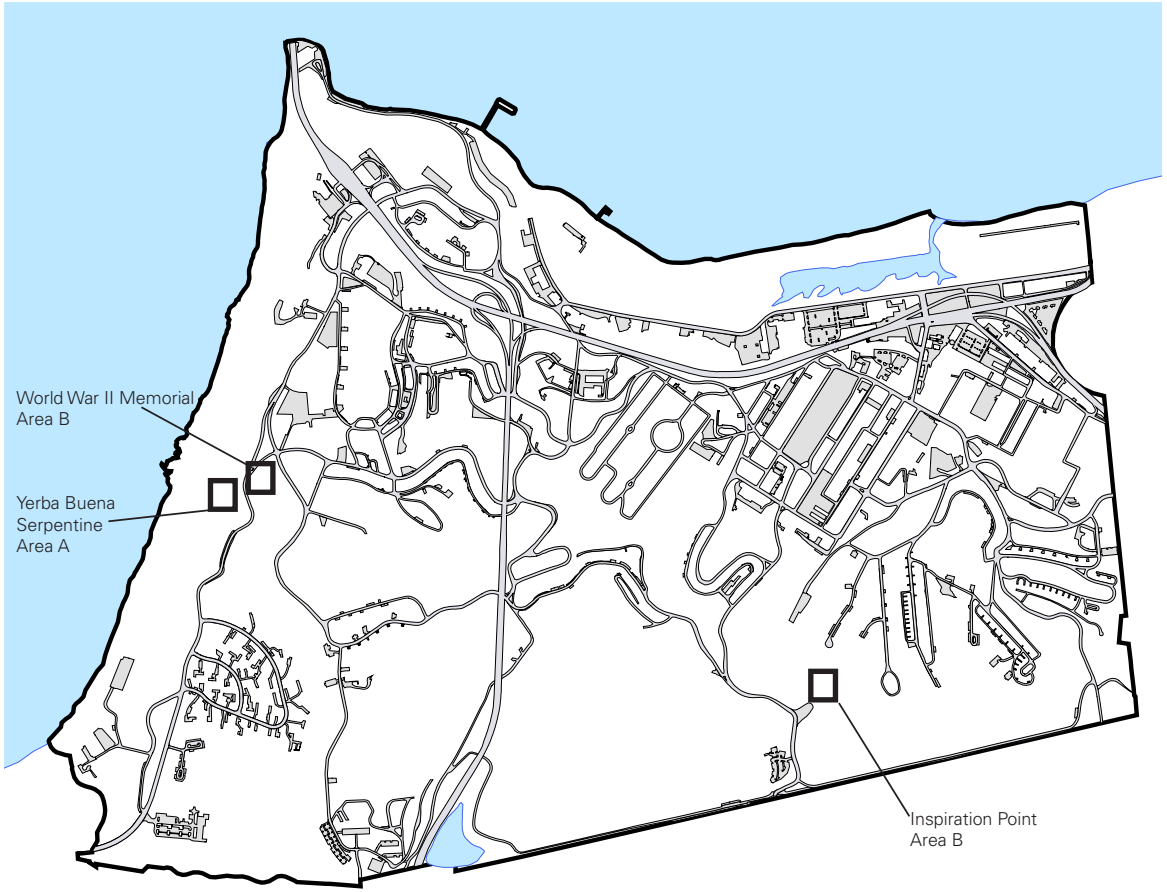
Threats to Marin Dwarf Flax include soil disturbance from gopher activity, competition from non-native annual species, and encroachment of habitat by native shrubs. Annual populations may also fluctuate annually due to the amount of percipitation received during the winter.

Results from this year are not complete due to one of the two sites not being since 2019 due to COVID-19 and staff reductions. Analyzing the one site we did survey results in an overall *poor rating*. This is a change from the fair rating in the 2018/2019 report.

Figure 44: Poor *Hesperolinon congestum* species rating based on 0% score

Hesperolinon congestum, Marin Dwarf Flax Federally Threatened, State Threatened

Map 18 shows all populations of *Hesperolinon congestum.*



Map 18: All populations of *Hesperolinon congestum*

Hesperolinon congestum, Marin Dwarf Flax Federally Threatened, State Threatened

Inspiration Point Population

The Inspiration Point population consists of one population in the thin soiled serpentine outcroppings in the East Grassland. These populations were established in 2010/2011by direct seeding. This population is censused annually by laying out meter tapes to create counting lanes and manually counting each individual. This area was not surveyed in 2020 or 2021 due to COVID-19 and staff reductions. Results in Figure 45 show that 2022 results received a *poor rating* but were the highest ever recorded at Inspiration Point at 1,213.

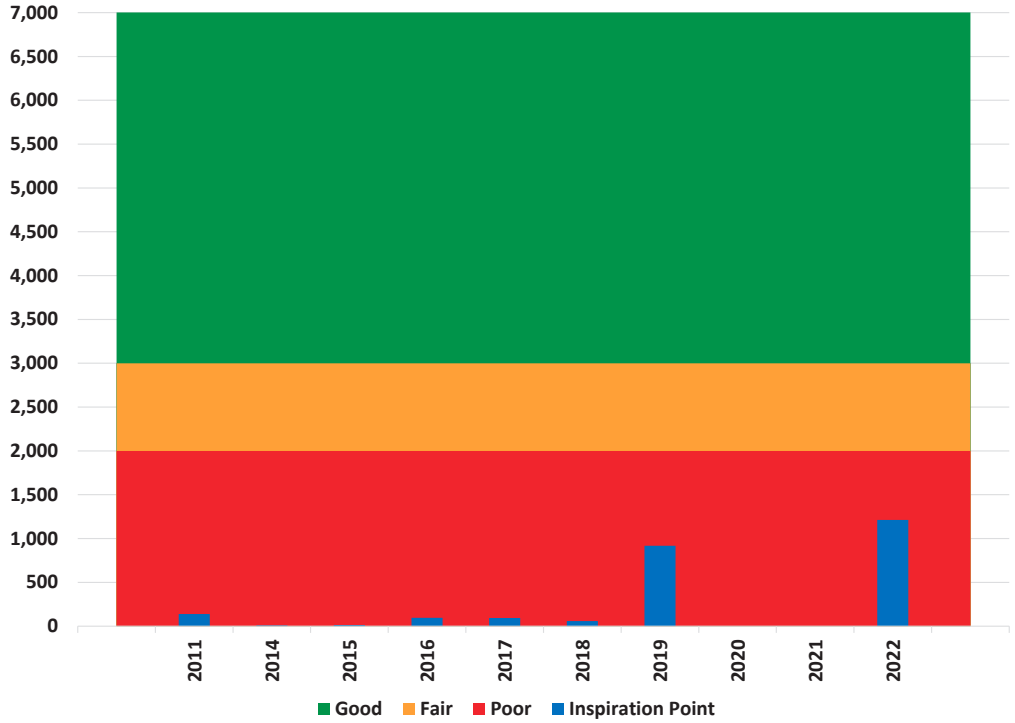


Figure 45: *Hesperolinon congestum* Inspiration Point population results

Map 19: Map of *Hesperolinon congestum* Inspiration Point population

Hesperolinon congestum, Marin Dwarf Flax Federally Threatened, State Threatened
World War II Memorial Population

The World War II Memorial population consists of one population in the thin soiled serpentine outcroppings above the coast. These populations are historic and were not established by human intervention. This population is usually censused annually by laying out meter tapes to create counting lanes and manually counting each individual. Results in Figure 46 shows the historic data collected at this site. Surveying did not occur in 2020, 2021, or 2022 due to COVID-19 and staff reductions. Surveying should continue in 2023.

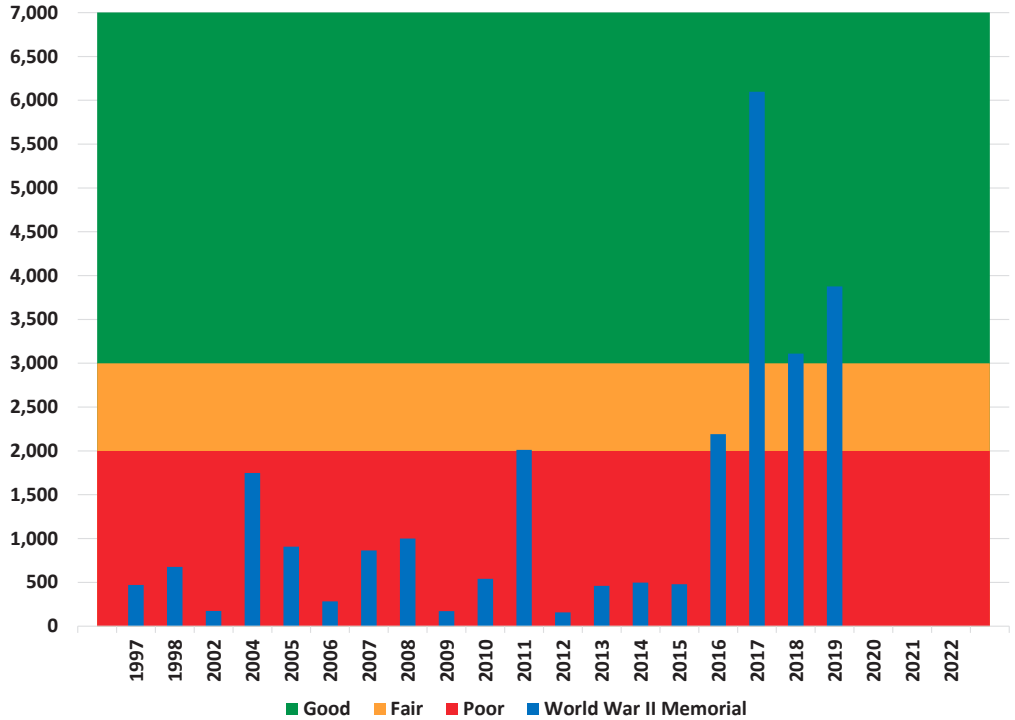
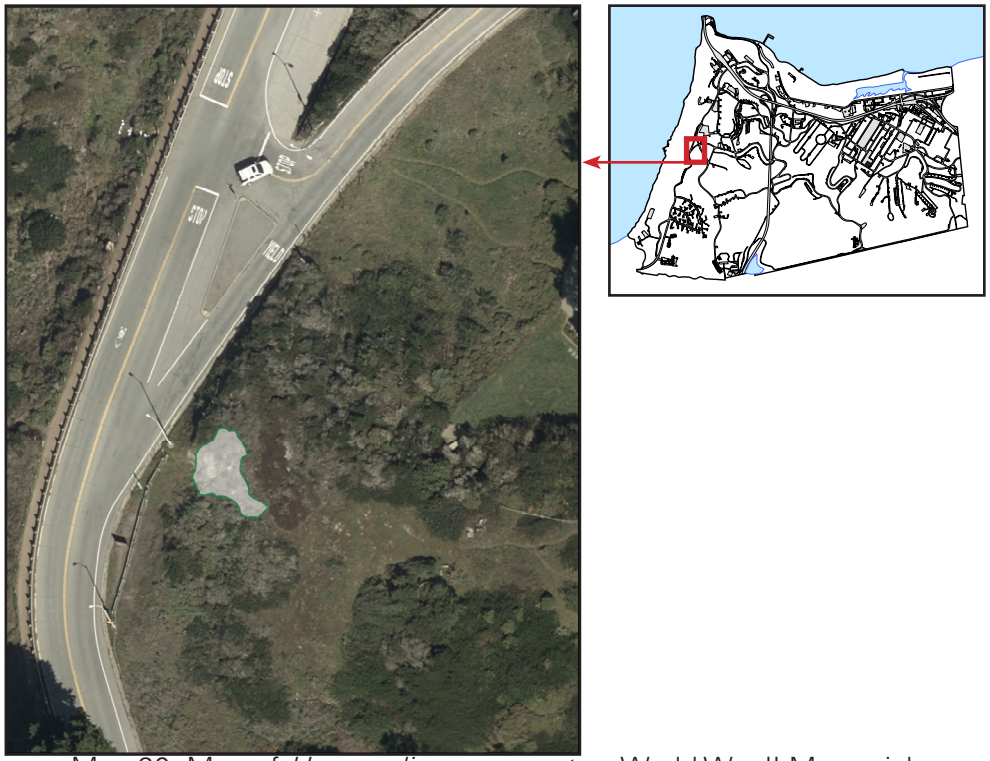


Figure 46: *Hesperolinon congestum* World War II Memorial population results



Map 20: Map of *Hesperolinon congestum* World War II Memorial population

Lessingia germanorum, San Francisco Lessingia Federally Endangered, State Endangered

San Francisco Lessingia is an herbaceous annual in the sunflower family (Asteraceae). The plant grows decumbent to erect, with reddish stems no more than 30 centimeters long. The yellow flowers bloom from July to November. Growing only on sandy soils in the Bay Area, San Francisco Lessiniga is known only from the populations in the Presidio and one in San Mateo county on San Bruno mountain.

In the Presidio there are six core populations located at Lobos Reserve, Battery Caulfield roadside, Wherry Reserve, Rob Hill Reserve, Public Health Services Hospital (PHSH) Reserve, Baker Beach, and North Baker Beach (see Map 21 on the next page). The Rob Hill Reserve, Wherry Reserve, and Public Health Services Hospital reserve are in Area B and are under the Presidio Trust's management.

The Lobos Reserve, Battery Caulfield roadside, Rob Hill Reserve, and PHSH Reserve all contain remnant populations though overtime they have been augmented by various restoration projects. The Wherry Reserve, North Baker Beach, and Baker Beach populations are not remnant and were all established through restoration projects and direct seeding.

Threats to San Francisco Lessingia include native scrub encroachment, non-native annual grasses, population locations segmented by historic forests, roads, buildings, and dune scrub, and populations that expand into landscape or historic forest zones that are not protected and are frequently impacted by park operations and visitor use. Annual populations may also fluctuate annually due to the amount of percipitation received during the winter.

Results from this year showed that all three populations scored good site ratings resulting in an overall *good rating*. This is the same overall rating as last year.

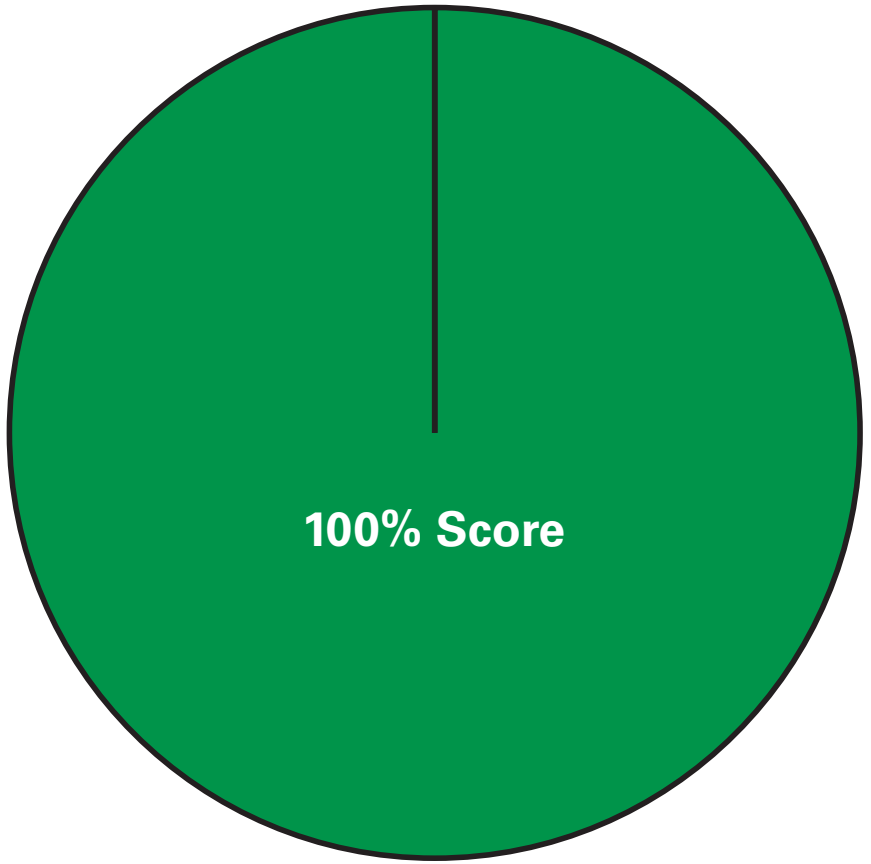
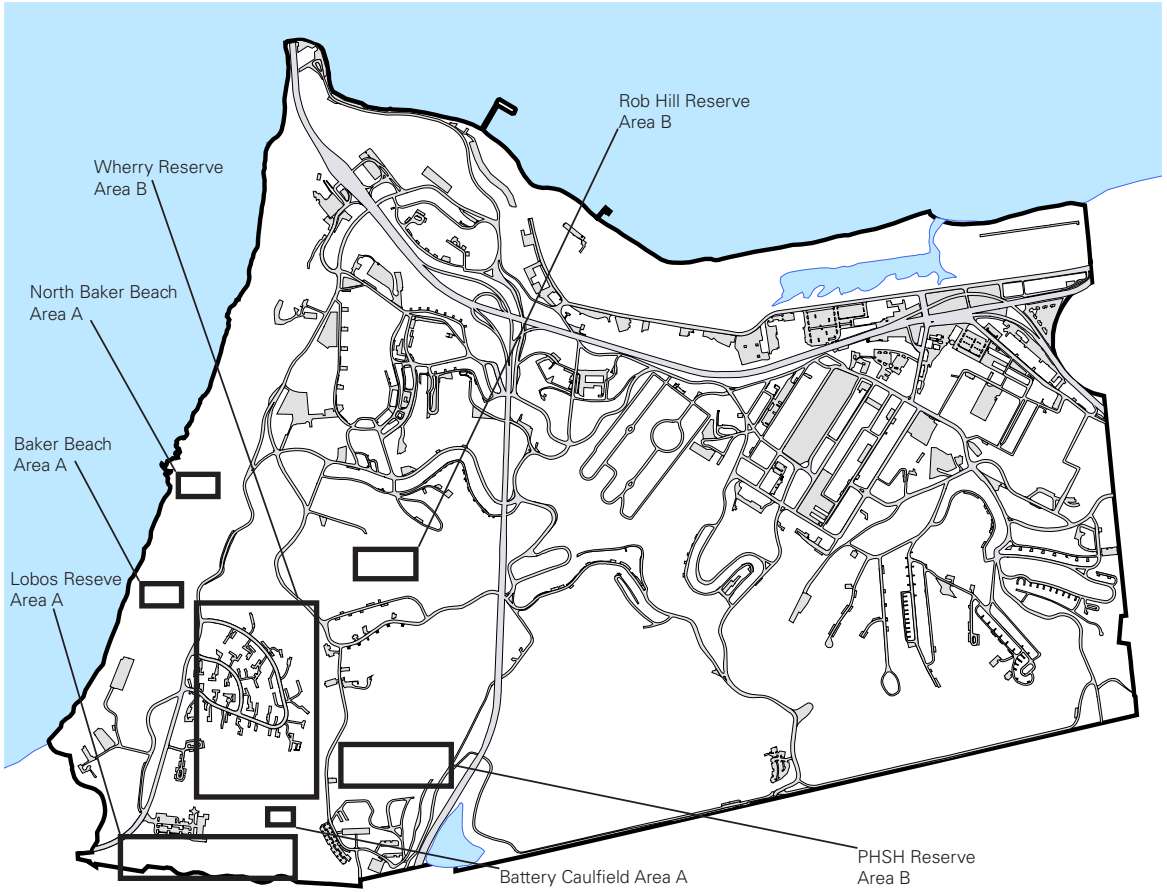


Figure 47: Good *Lessingia germanorum* species rating based on 100% score

***Lessingia germanorum,* San Francisco Lessingia** Federally Endangered, State Endangered

Map 21 shows all populations of *Lessingia germanorum.*



Map 21: All populations of *Lessingia germanorum*

Lessingia germanorum, San Francisco Lessingia Federally Endangered, State Endangered

Wherry Reserve - Graded Area 9

The Graded Area 9 population is the core population of the Wherry Reserve which also includes populations at Wherry Dunes, Wherry Coordior, Baker Beach Housing, North Pershing Dunes, and East of Lincoln Scrub. The Graded Area 9 population was established in 2012 by direct seeding. Due to time constraints we prioritize surveying the Graded Area 9 population, which is the largest population in the Wherry Reserve. The other populations in the Wherry Reserve are mapped and visual population estimates or censuses are made every one to two years. The Graded Area 9 survey consists of a restricted random sampling design of a 100x85 meter macroplot that allows us to be 80% confident that populations estimates are within ± 20% of the estimated true value. This area was not surveyed in 2020 or 2021 due to COVID-19 and staff reductions. Results in Figure 48 show that 2022 results received a *good rating* at 294,497.

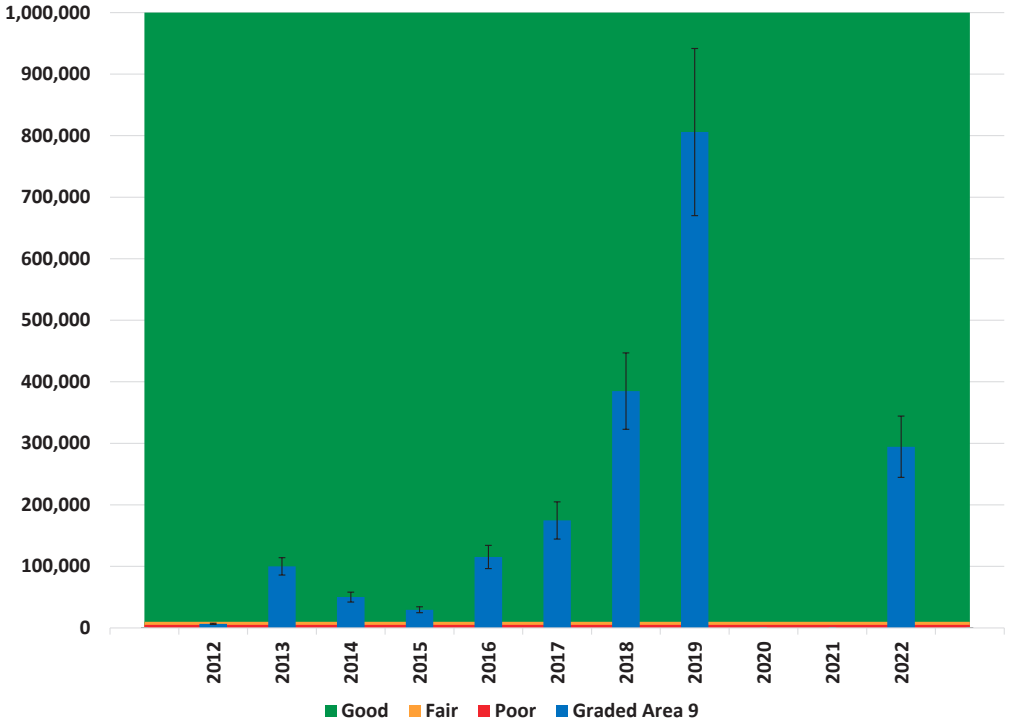
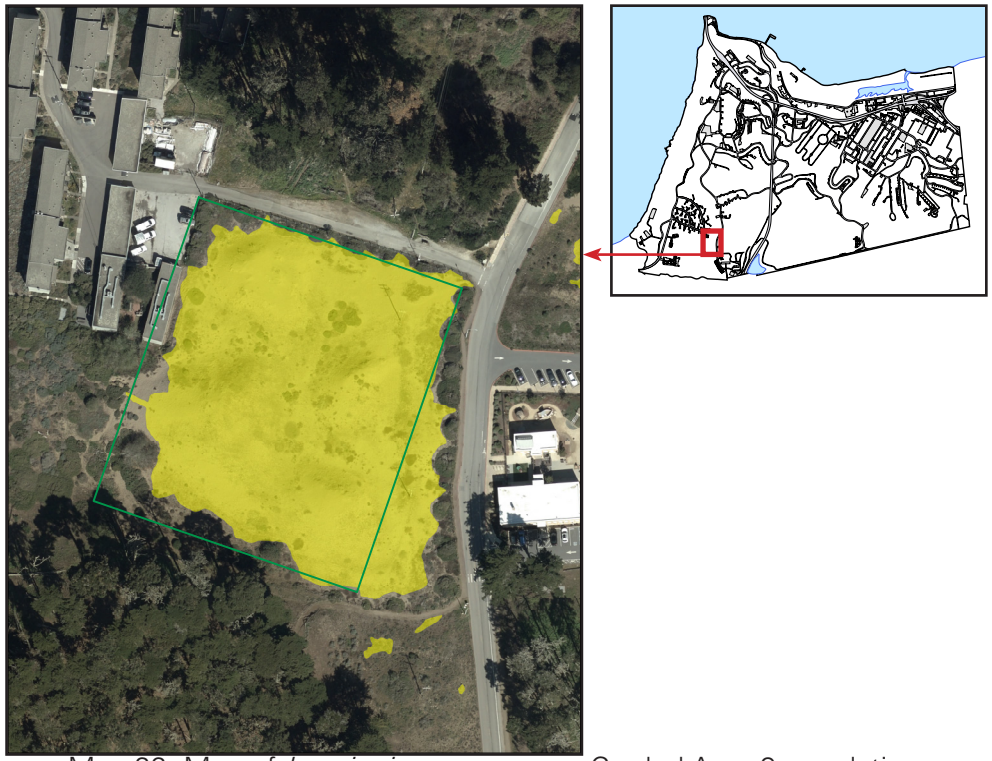


Figure 48: *Lessingia germanorum* Graded Area 9 population results



Map 22: Map of *Lessingia germanorum* Graded Area 9 population

Lessingia germanorum, San Francisco Lessingia Federally Endangered, State Endangered

Public Health Services Hospital Reserve - Landfill 8

The Landfill 8 population is the core population of the PHSH Reserve which also includes populations at other locations at Presidio Hills and Golf Course Lessingia. The Landfill 8 population was established in 2012 by direct seeding. Due to time constraints we prioritize surveying the Landfill 8 population, which is the largest population in the PHSH Reserve. The other populations in the PHSH Reserve are mapped and visual population estimates or censuses are made every one to two years. The Landfill 8 survey consists of a restricted random sampling design of a 100x40 meter macroplot that allows us to be 80% confident that populations estimates are within ± 20% of the estimated true value. This area was not surveyed in 2020 or 2021 due to COVID-19 and staff reductions. Results in Figure 49 show that 2022 results received a *good rating* and were one of the highest ever recorded in the Landfill 8 at 112,600.

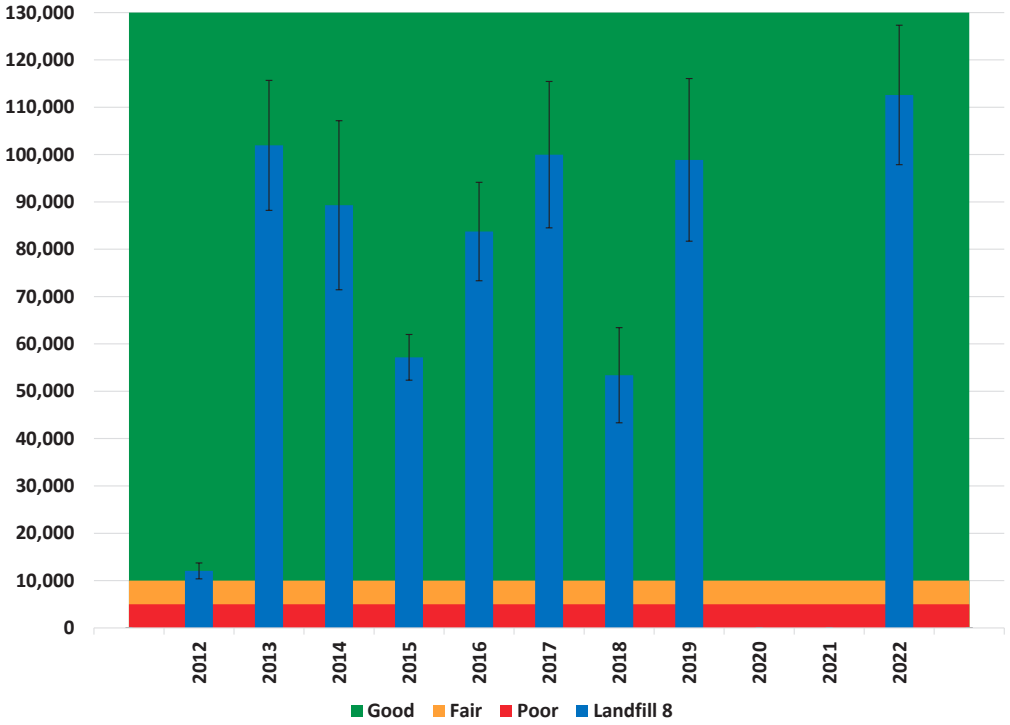
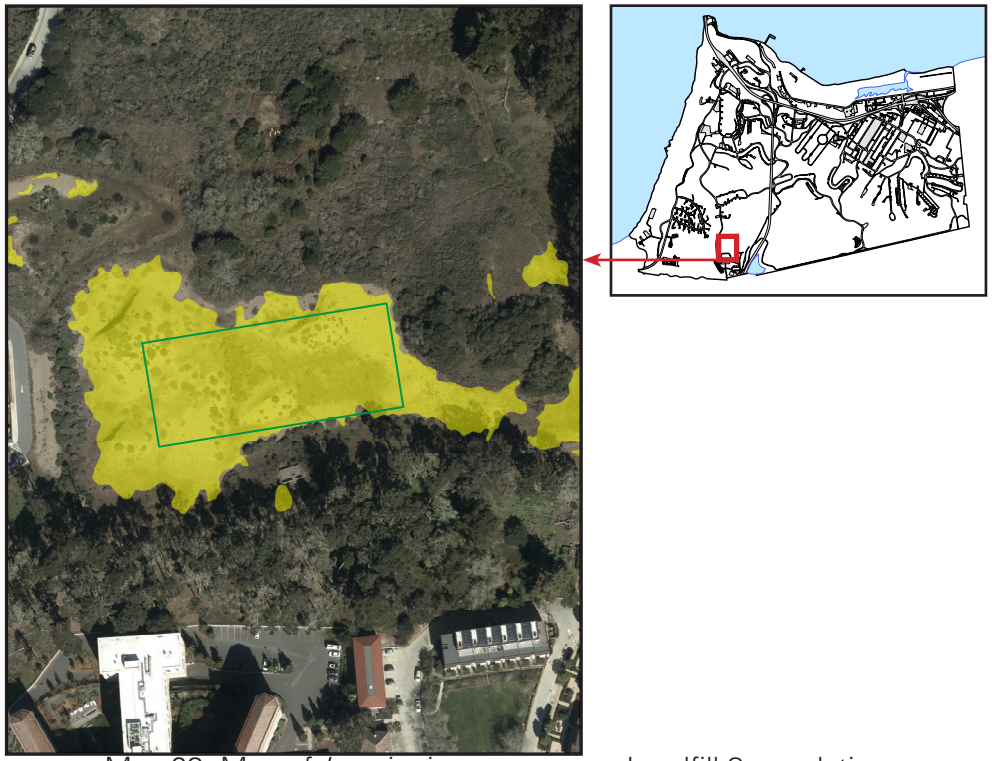


Figure 49: *Lessingia germanorum* Landfill 8 population results



Map 23: Map of *Lessingia germanorum* Landfill 8 population

Lessingia germanorum, San Francisco Lessingia Federally Endangered, State Endangered

Rob Hill Reserve

The Rob Hill population is the core population of the Rob Hill Reserve. The Rob Hill population is historic but was expanded through direct seeding with the removal of Eucalyptus trees in 2015. The Rob Hill survey consists of a restricted random sampling design of a 100x30 meter macroplot that allows us to be 80% confident that populations estimates are within ± 20% of the estimated true value. Results in Figure 50 shows the historic data collected at this site. Surveying did not occur in 2020, 2021, or 2022 due to COVID-19 and staff reductions. Surveying should continue in 2023.

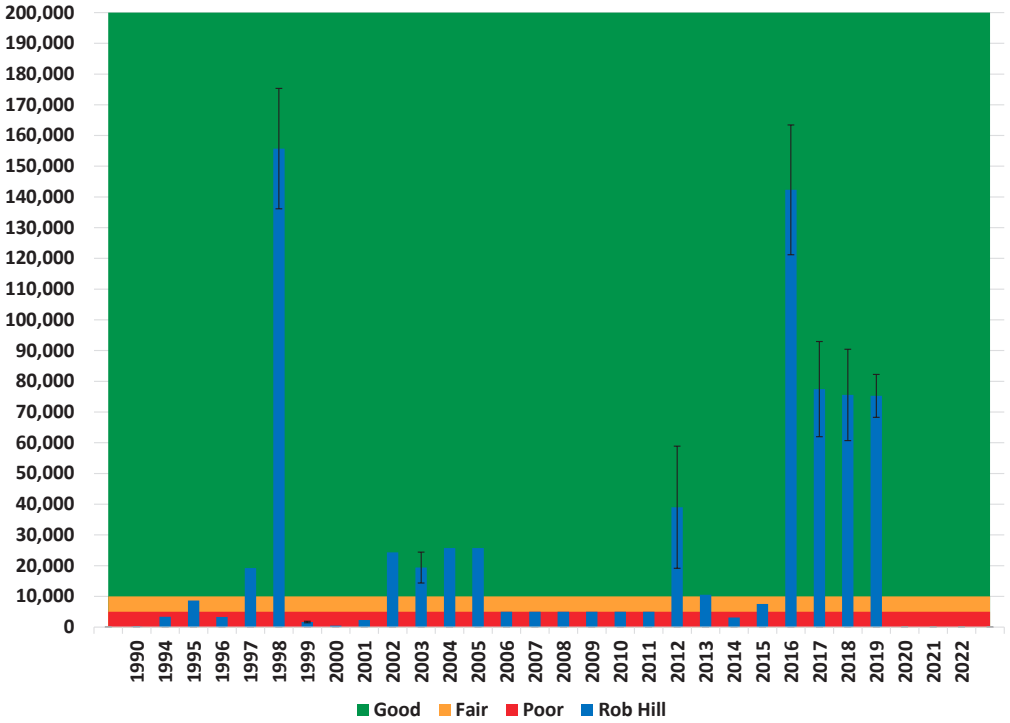
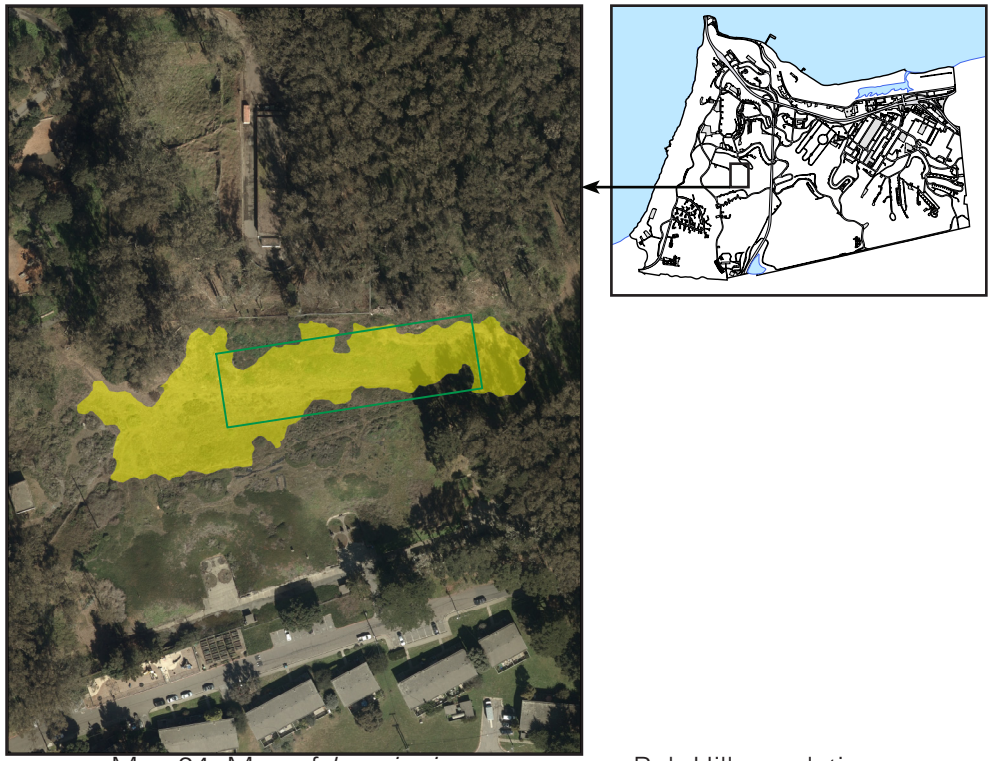
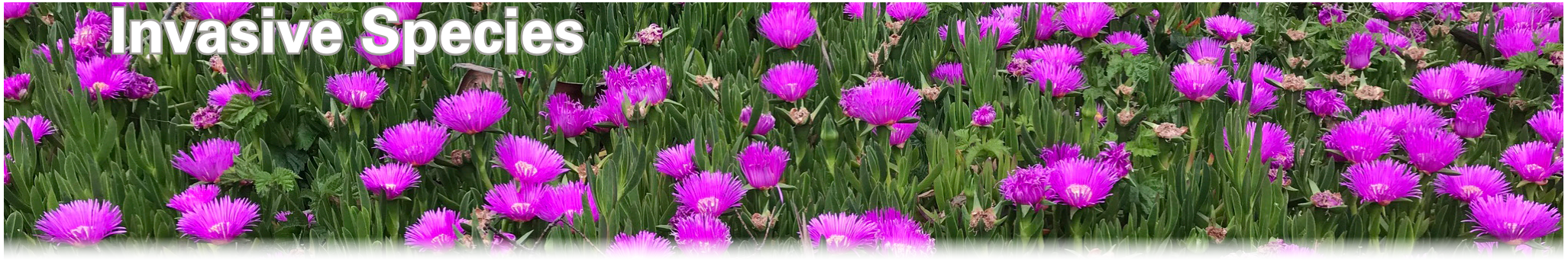


Figure 50: *Lessingia germanorum* Rob Hill population results



Map 24: Map of *Lessingia germanorum* Rob Hill population

Invasive Species



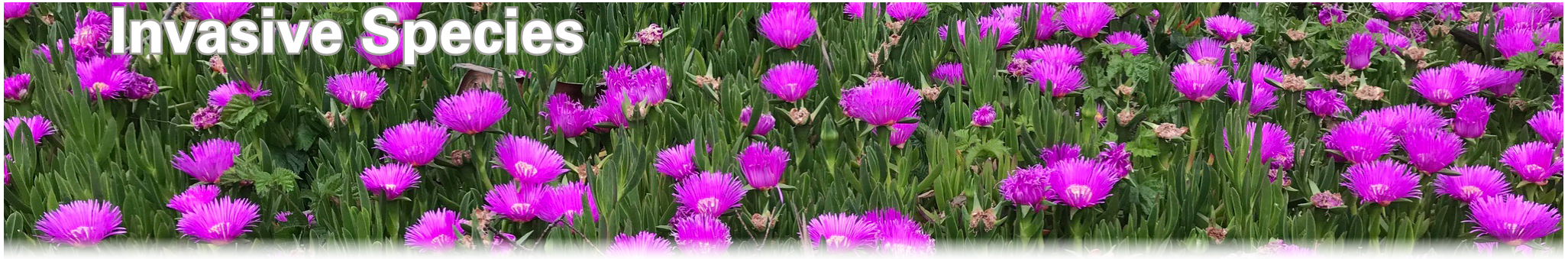
The California Invasive Plant Council (Cal-IPC) defines invasive plants as: plants that are not native to an environment, and once introduced, they establish, quickly reproduce and spread, and cause harm to the environment, economy, or human health . Of the Presidio's roughly 650 plant species, roughly 300 species are exotic. Of those species roughly 85 are rated as invasive by Cal-IPC.

To aid the management of invasive species we began mapping a selection of these species using ArcGIS Online in 2018. In 2022 we reassessed and found that Calflora's Weed Manager tool was a better tool for what we are trying to accomplish. We updated the list of invasive species to ones we find the most threatening to our native plant communities. Additionally, we added a number of species not listed as invasive by Cal-IPC that we felt are ecologically important to manage in the Presidio. Table 18 is a list of the Presidio high priority invasive species.

Throughout 2022 we have continued collecting baseline data in Calflora's Weed Manager. In future reports we will assess the success of the management of invasive species by comparing how many polygons and points from the current baseline data received treatment to defined target thresholds (good, fair, and poor). We will also analyze the reduction or enlargement of the size of mapped invasive species polygons and compare the results to defined target thresholds (good, fair, and poor). Using this method of targets we can assess invasive species populations at three different levels: treatment ratings, area reduction ratings, and an overall rating (a combination of treatment ratings and area reduction ratings). These are lagging indicators of environmental health.

Invasive Species	Common Name	California Invasive Plant Council Rating
Brachypodium distachyon	False Brome	Moderate
Bromus madritensis ssp. *rubens*	Foxtail Brome	High
Carduus pycnocephalus	Italian Thistle	Moderate
Carpobrotus chilensis	Sea Fig	Moderate
Carpobrotus edulis	Ice Plant	High
Cirsium vulgare	Bull Thistle	Moderate
Conicosia pugioniformis	Narrow-leaved Ice Plant	Limited
Conium maculatum	Poison Hemlock	Moderate
Cotoneaster franchetii	Francheti Cotoneaster	Moderate
Cotoneaster pannosus	Silverleaf Cotoneaster	Moderate
Delairea odorata	Cape Ivy	High
Eucalyptus globulus	Blue Gum	Limited
Genista monspessulana	French Broom	High
Hedera helix	English Ivy	High
Holcus lanatus	Purple Velvet Grass	Moderate
Lathyrus latifolius	Sweet Pea	Not Rated
Muehlenbeckia complexa	Mattress Wire Weed	Not Rated
Oxalis pes-caprae	Bermuda Buttercup	Moderate
Pennisetum clandestinum	Kikuyu Grass	Limited
Polypogon monspeliensis	Annual Beard Grass	Limited
Raphanus sativus	Wild Radish	Limited
Rubus armeniacus	Armenian Blackberry	High
Silybum marianum	Milk Thistle	Limited
Tropaeolum majus	Garden Nasturtium	Not Rated
Typha latifolia	Common Cattail	Not Rated
Vinca major	Periwinkle	Moderate

Table 18: Invasive species included in this analysis



Ratings of Invasive Species will be determined by the percent of mapped populations that received treatments, the percent of area reduction of mapped populations, and an overall rating based on the average of treatment and area reduction ratings. The percentages will be rated based on where they fall on the target threshold for each rating developed by Natural Resources staff listed in Table 19, Table 20, and Table 21. Note that these assessments will not analyze new populations mapped after the end of 2019. New populations mapped will not be analyzed until the following reporting period.

% of Mapped Populations Treated	Treatment Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 19: Invasive species treatment target thresholds

% of Square Meter Reduction	Area Reduction Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 20: Invasive species area reduction target thresholds

Average of Treatment & Area Reduction Rating	Overall Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 21: Invasive species overall ratings thresholds

Figure 51 illustrates how a treatment rating of good, fair, or poor is determined based on the target thresholds.

Figure 52 illustrates how an area reduction rating of good, fair, or poor is determined based on the target thresholds.

Figure 53 illustrates how an overall rating of good, fair, or poor is determined based on the target thresholds.

Figure 51: Example of treatment rating based on target thresholds

80% of mapped populations received a treatment so it's rated good.
≥ 75% = Good

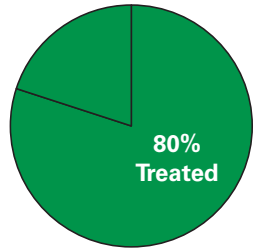


Figure 52: Example of area reduction rating based on target thresholds

25% of square meter reduction of mapped populations so it's rated poor.
≤ 25% = Poor

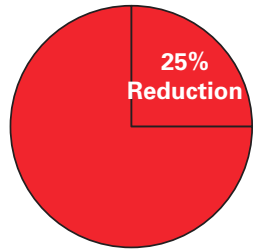
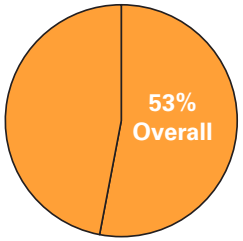
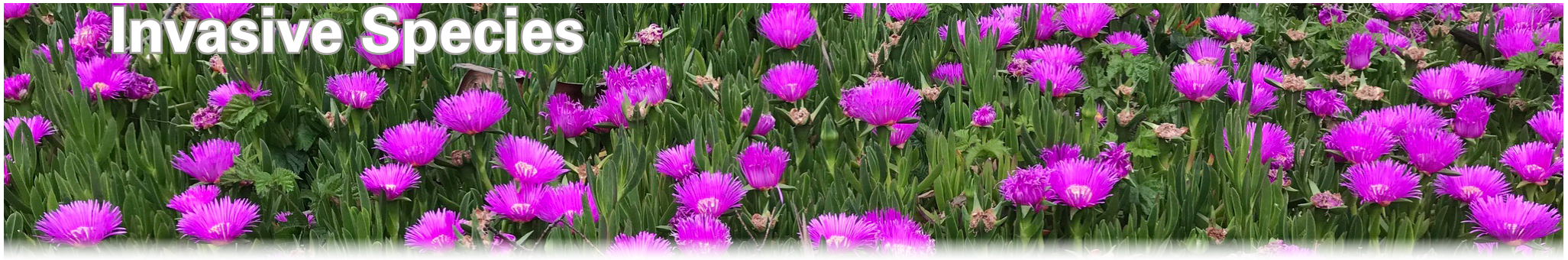


Figure 53: Example of overall rating based on target thresholds

The average of the Treatment Rating and the Area Reduction Rating is 53% so it's rated fair.
> 25% & < 75% = Fair





Invasive Species Scoreboard

Overall Invasive Score	
Previous Year	Current Year
N/A	N/A

Treatment Score	
Previous Year	Current Year
N/A	N/A

Reduction Score	
Previous Year	Current Year
N/A	N/A

Figure 54: Invasive species scoreboard

In 2015-16, representatives from the Urban Sustainability Directors Network (USDN) cities of Philadelphia, Pittsburgh, Portland, San Francisco and St. Louis collaborated to develop the Urban Biodiversity Inventory Framework. With $50,000 of grant funds, the team worked with the Samara Group to develop a systematic and standardized approach for cities to collect urban biodiversity data. The resulting Urban Biodiversity Index Framework (UBIF) established a standardized ecological framework for organizing the collection of biodiversity information in cities, including protocols for data collection.

In 2017, the Trust convened several interagency workshops with all San Francisco land-management agencies to implement the UBIF by selecting habitats, sites and surrogate species. Surrogate species are defined by the United States Fish and Wildlife Service (USFWS) as "a commonly-used scientific term for system-based conservation planning that uses a species as an indicator of landscape habitat and system conditions" (USFWS 2014a). The goal of a surrogate species approach is to use a few species to best represent the needs of the larger community (Weins et al. 2008).

Through these workshops, 72 surrogate species from four taxa groups were chosen including plants, birds, herpetofauna and mollusks. All surrogate species in each taxa group are known to currently reside, or to have once-resided in San Francisco. In our previous report we included pollinator insects as surrogate species but we have decided to no longer include them in the analysis due to the time consuming nature of observing and then identifying them. Scores from the previous report have been adjusted to reflect removing this group of surrogate species. Ten habitats of interest were identified (see Table 22). For each of the ten habitats of interest one to six Presidio monitoring sites were identified.

Subjective target thresholds based on similar ecological indexes and professional opinion were established by Natural Resources staff to distinguish if the percent of surrogate species present is either good, fair, or poor. Recording the presence or absence of surrogate species at different habitats and sites allows us to assess urban biodiversity at several levels including taxa, site, habitat, and Presidio wide. These assessments are lagging indicators of environmental health.

After the inital year of collecting data in 2018, we decided that data collection should be conducted on two-year intervals due to the amount of staff time required to conduct thorough surveys. After our initial report in 2018 and 2019 and the Covid-19 pandemic we decided to analyze three-years of data for this report including 2020, 2021, and 2022. The next report will return to the two-year interval and will analyze data collected in 2023 and 2024. In addition to occurrence data collected by staff, we also incorporated research grade citizen-science observations contributed to iNaturalist and eBird.

Habitat	Monitoring Site
Tidal Wetland	Crissy Marsh Tidal Wetland
	Quartermaster Reach Tidal Wetland
Freshwater Wetland	MacArthur Meadow Wetland
	Mountain Lake East Arm Wetland
	YMCA Reach Wetland
Riparian	Dragonfly Creek Riparian
	Eastern Tributary Riparian
	El Polin Riparian
	Lobos Creek Riparian
	Mountain Lake Riparian
	Thompson Reach Riparian
Pond/Lake	Mountain Lake
Oak Woodland	Lobos Creek Oak Woodland
Grassland	Fort Scott Parade Grassland
	Inspiration Point Grassland
Dune Scrub	East of Lincoln Dune Scrub
	Lobos Creek Valley Dune Scrub
	North Baker Beach Dune Scrub
	Presidio Hills Dune Scrub
	Rob Hill Dune Scrub
Coastal Scrub	Coastal Bluffs Coastal Scrub
	El Polin Coastal Scrub
	Landfill 10 Coastal Scrub
	Western Tributary Coastal Scrub
	World War II Memorial Coastal Scrub
Historic Forest	East Arm Forest
	Fort Scott Community Garden Forest
	Kobbe Stand 1-6 Forest
	Park Blvd Stand Forest
	Rob Hill Forest
Cultural Landscape	Calvary Bowl East Landscape
	Calvary Bowl West Landscape
	Main Post Landscape
	Simmonds Loop Landscape
	Tunnel Tops Landscape

Table 22: List of habitats and monitoring sites selected where data would be collected

Target thresholds based on similar ecological indexes and professional opinion were established by Natural Resources staff to distinguish if the percent of surrogate species present is either good, fair, or poor (see Table 23). The following figures illustrate how good, fair, and poor rating are determined for: Site, Habitat, Taxon, and Presidio Overall.

% of Surrogate Species Observed	Overall Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 23: Ratings thresholds based on proportion of surrogate species observed

Figure 55 illustrates how a site rating of good, fair, or poor is determined based on our target thresholds based on percentage of surrogate species observed. There are 35 monitoring sites throughout the UBIF project.

Figure 56 illustrates how a habitat rating of good, fair, or poor is determined based on our target thresholds based on percentage of surrogate species observed. There are 10 different habitats throughout the UBIF project.

Figure 57 illustrates how a Presidio-wide taxon rating of good, fair, or poor is determined based on our target thresholds based on percentage of surrogate species observed for each group throughout the entire project. There are 5 different taxa groups throughout the UBIF project including plants, birds, invertebrate pollinators, herpetofauna, and mollusks.

Figure 58 illustrates how an overall rating of good, fair, or poor is determined based on our target thresholds based on percentage of surrogate species observed throughout the entire project.

Figure 55: Example of site rating based on target thresholds

In this example, Mountain Lake Riparian site has 5 possible surrogate species that can be observed. In this example, only 3 out of 5 or 60% were observed which is fair per Table 23.

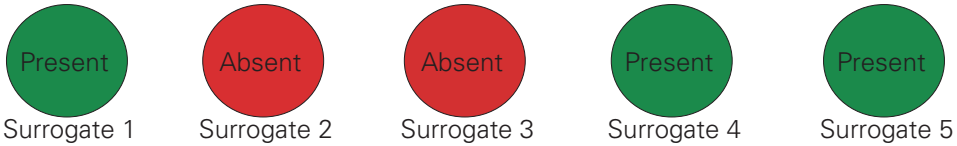


Figure 56: Example of habitat rating based on target thresholds

In this example, the Riparian Habitat has 2 sites and 5 surrogate species per site, for a toal of 10 possible surrogate observations for the Riparian habitat. Eight out of 10 possible surrogates, or or 80%, were observed, which is good per Table 23.

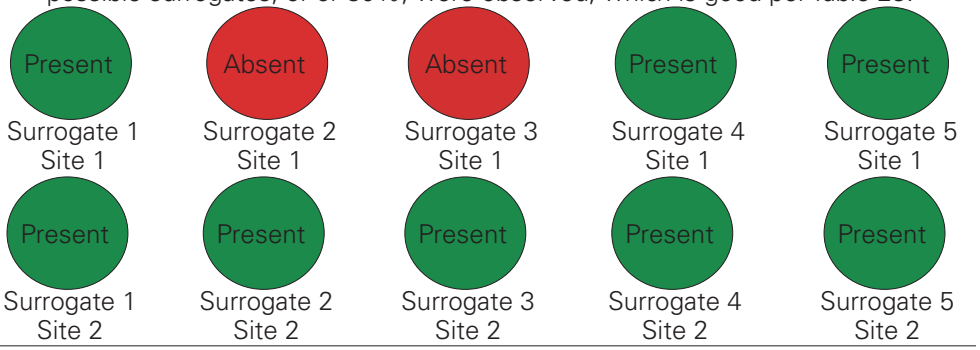


Figure 57: Example of Presidio-wide taxon rating based on target thresholds

If there are 20 possible invertebrate surrogate species throughout the Presidio's monitoring area, and only 4 out of those 20 or 20% were observed, the taxon rating is poor per Table 23.

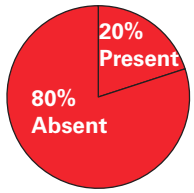
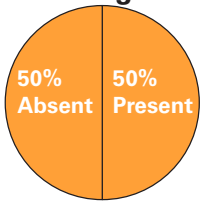
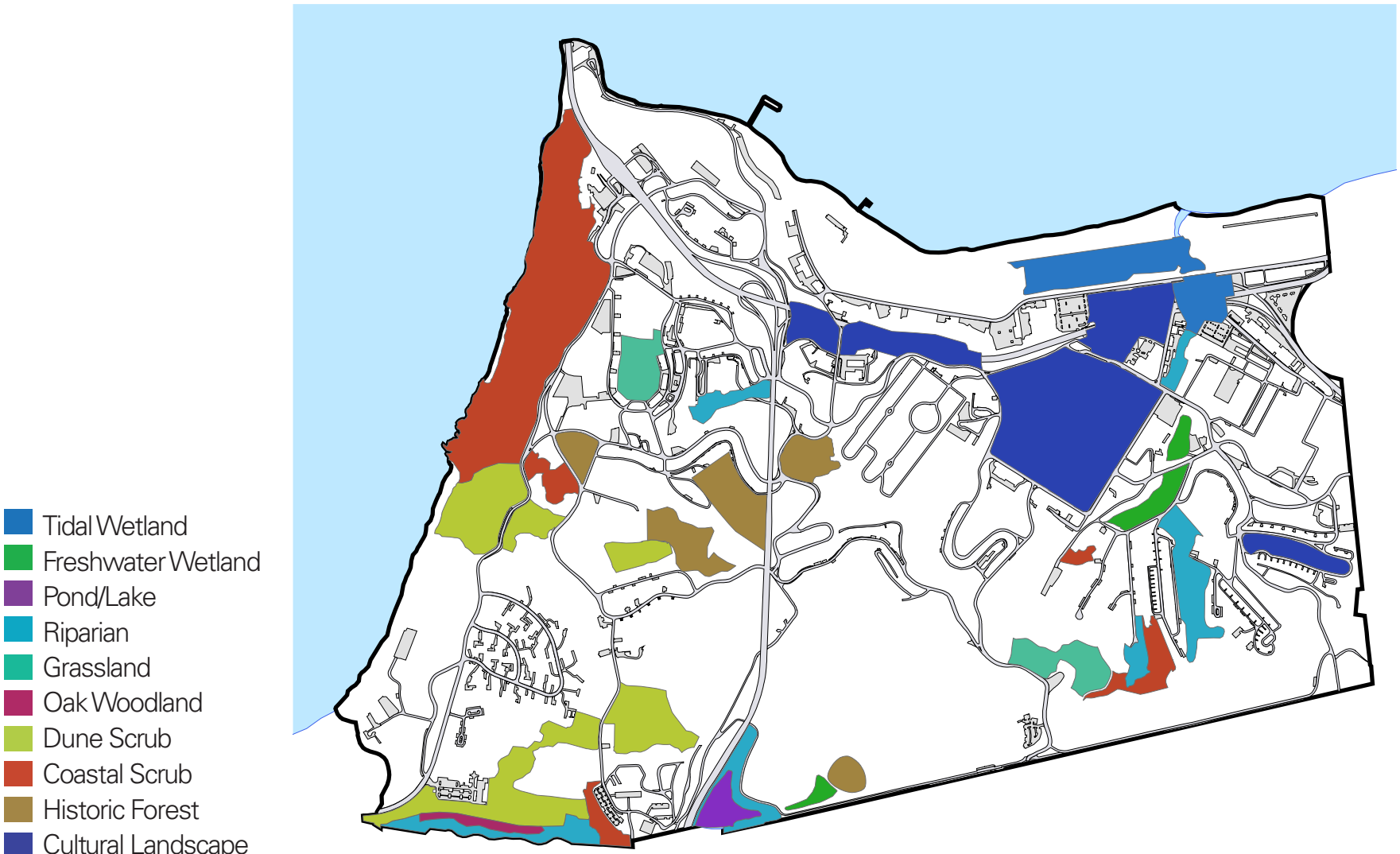


Figure 58: Example of overall rating based on target thresholds

If there are 50 possible surrogate species throughout the entire monitoring area that may be observed and 25 were observed the site rating would be fair due to 50% of surrogate species being observed.



Map 25 shows all the monitoring sites included in the UBIF analysis and their associated habitat.



Map 25: Map of Urban Biodiversity Inventory Framework monitoring sites and their habitat type

The entire UBIF project consist of 10 habitat types, 35 sites, and 176 surrogate species. There are a total of 551 possible surrogate species that may be observed throughout the project. Of the 551 possible surrogate species 433 were observed. Therefore, the proportion of surrogate species observed in 2020 to 2022 was 79% which falls into the *good* range when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is an increase of 8% when compared to 2018-2019's *fair* rating of 71%.

Figure 59 shows that overall 79% surrogate species were observed while 21% were not observed.

Figure 60 shows the acreage of all the UBIF habitats types monitored and the rating that they received, all of which received a fair rating.

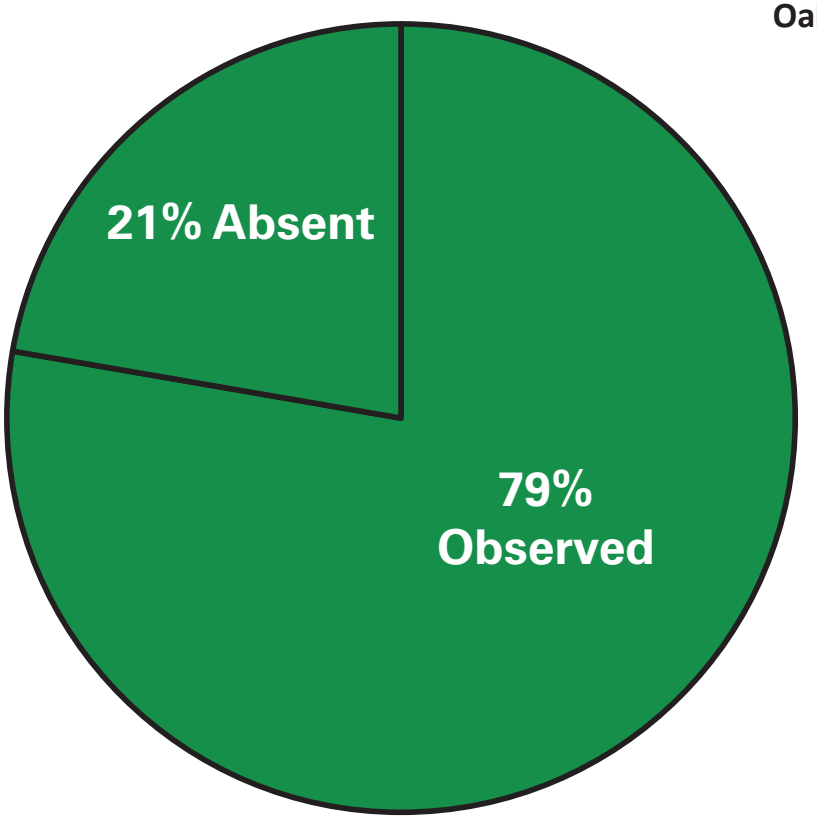


Figure 59: Good overall biodiversity rating based on 79% of surrogate species observed

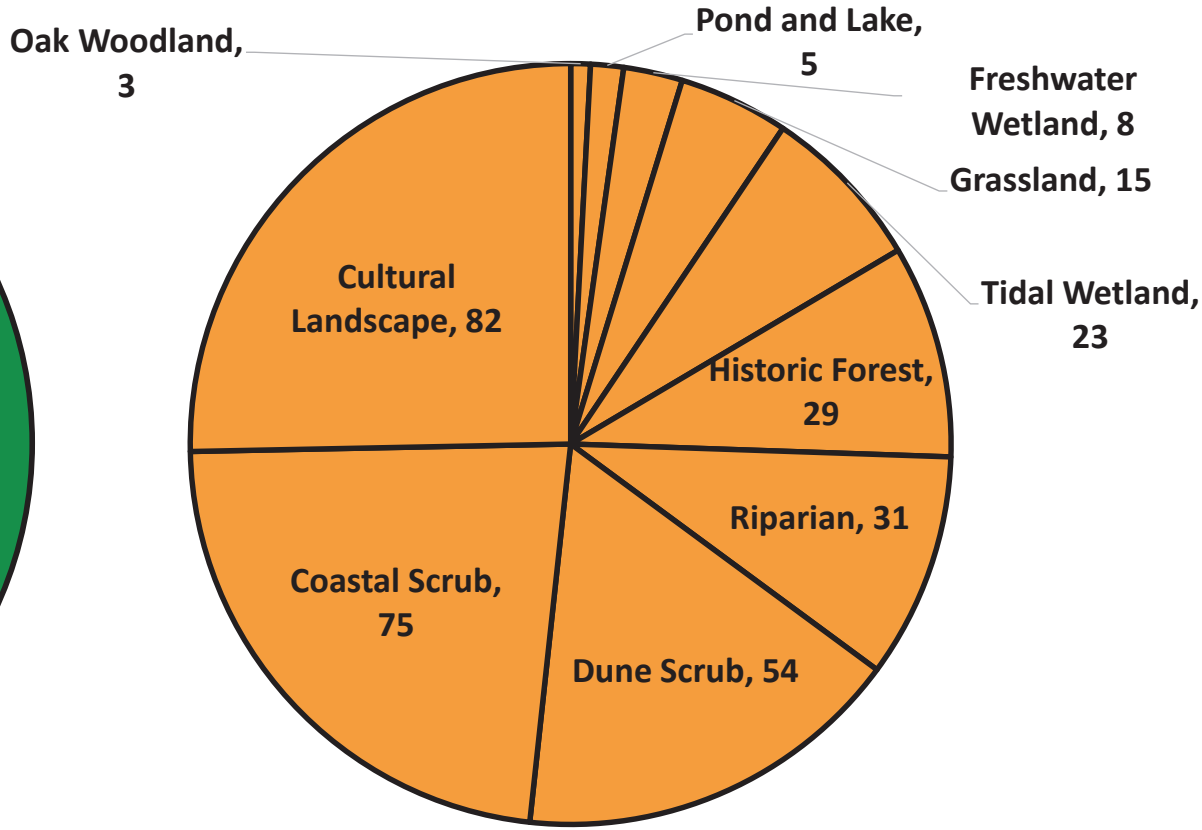


Figure 60: Acreage by habitat type and habitat rating

Figure 61 shows the proportion of surrogate species observed by each of the four taxa groups for all sites.

Figure 62 shows the proportion of surrogate species observed at all sites by habitat.

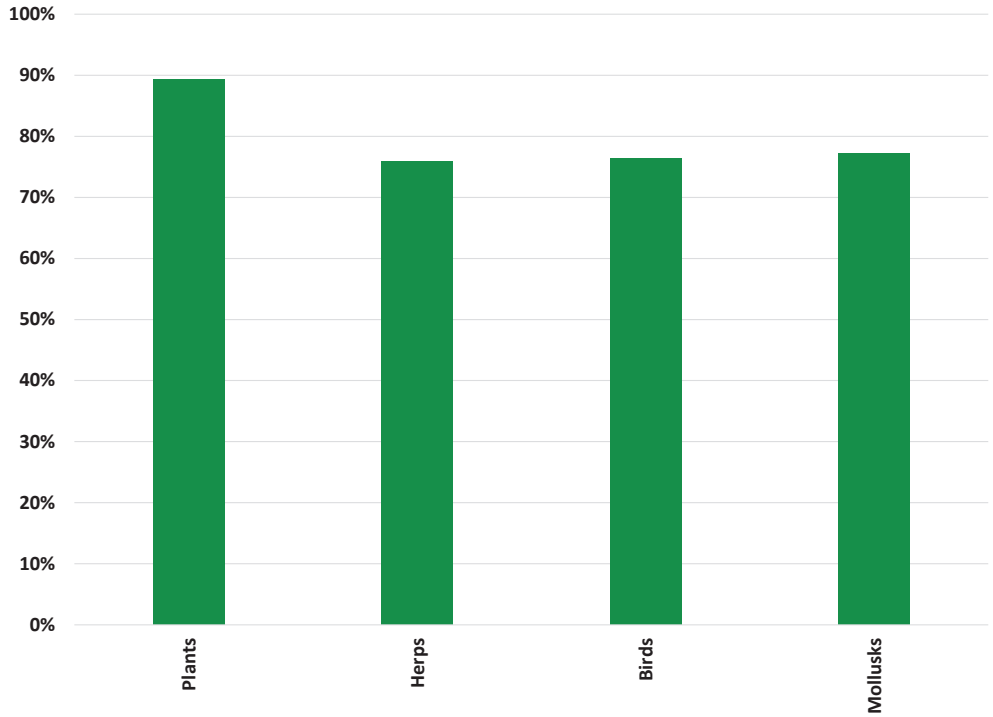


Figure 61: Proportion of surrogate species observed by taxa group at all UBIF sites

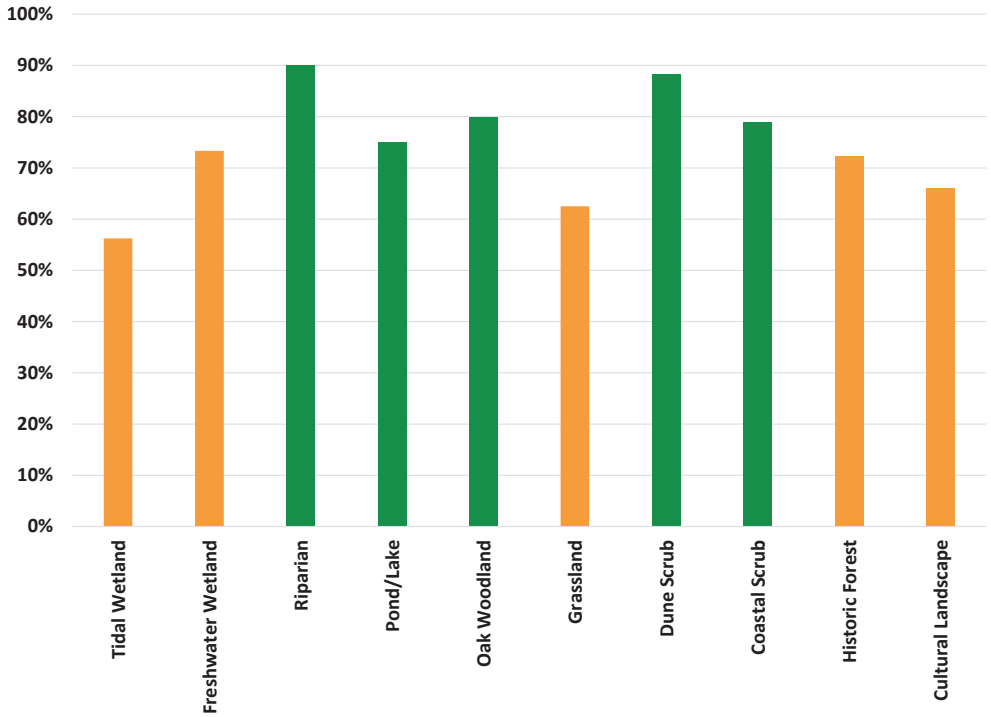


Figure 62: Proportion of surrogate species observed by habitat at all UBIF sites

Biodiversity Scoreboard

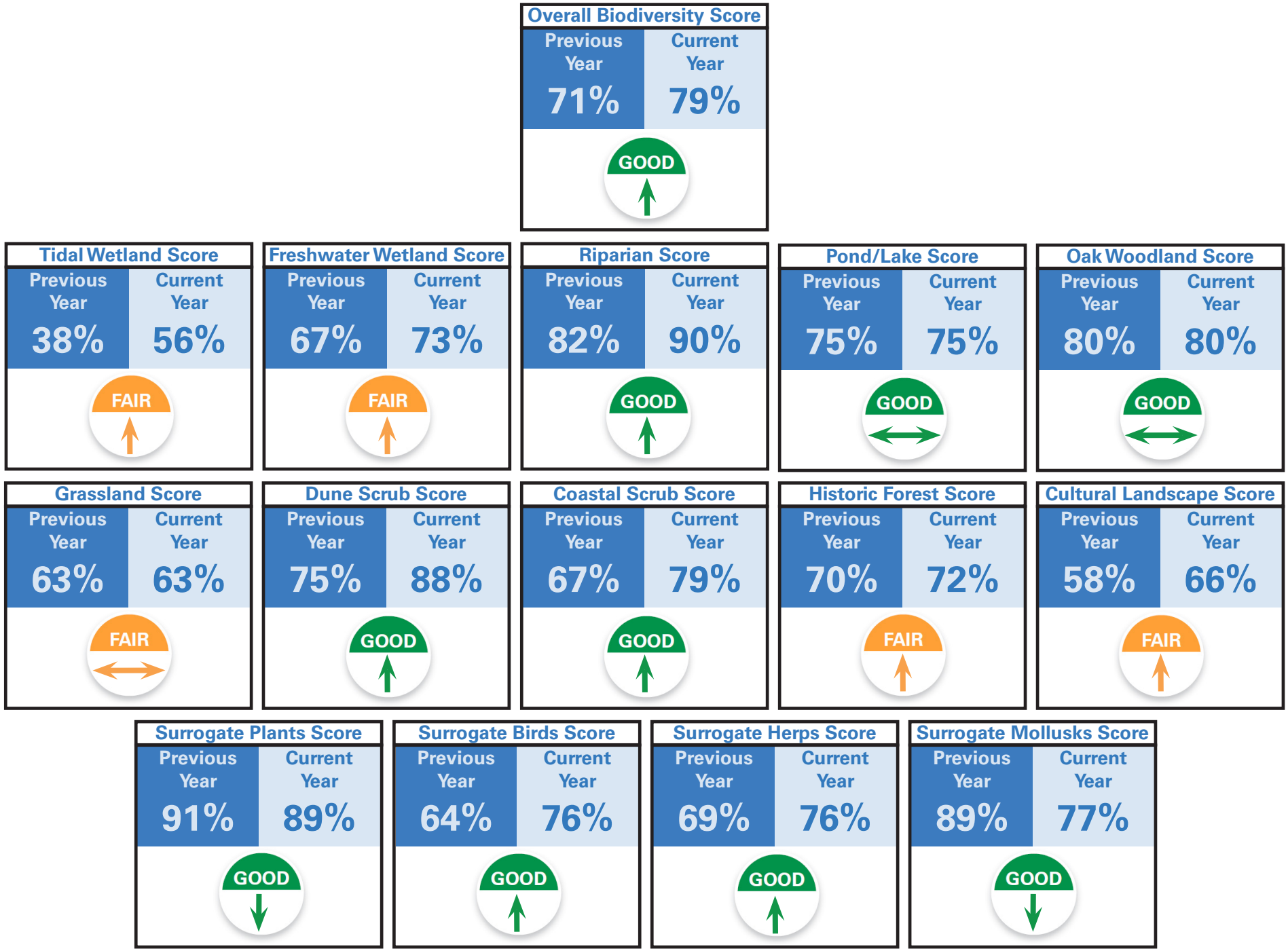


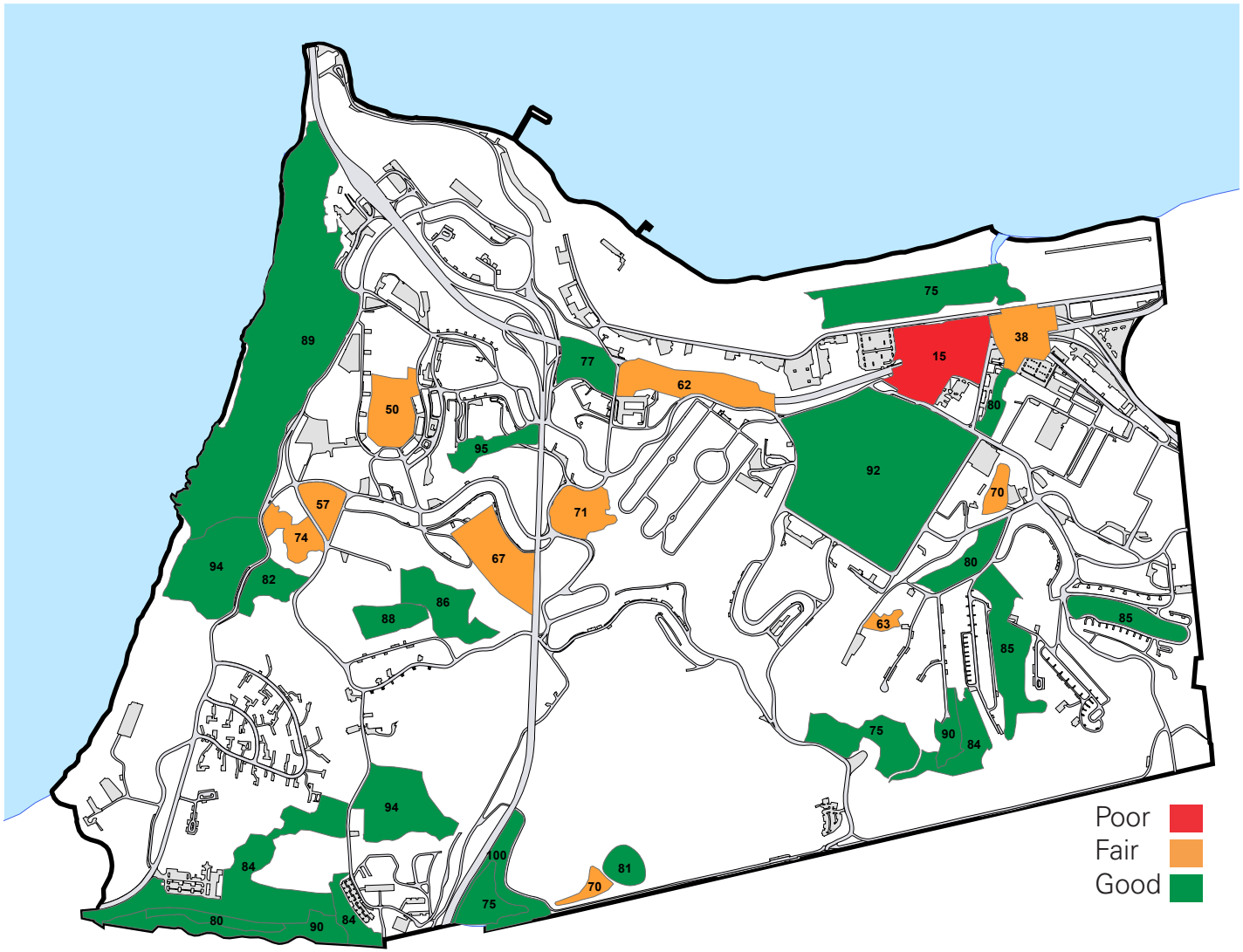
Figure 63: Biodiversity Scoreboard

Table 24 show each habitat rating and their monitoring sites as well as their percent of surrogate species observed, site rating, and how the site rating is trending compared to the previous years results.

Habitat Type/Rating	Monitoring Site	Percent of Surrogate Species Observed	Site Rating	Trend
Tidal Wetland: Fair	Crissy Marsh Tidal Wetland	75%	Good	No Change
	Quartermaster Reach Tidal Wetland	38%	Fair	Increase
Freshwater Wetland: Fair	MacArthur Meadow Wetland	80%	Good	Increase
	Mountain Lake East Arm Wetland	70%	Fair	No Change
	YMCA Reach Wetland	70%	Fair	Increase
Riparian: Good	Dragonfly Creek Riparian	95%	Good	Increase
	Eastern Tributary Riparian	85%	Good	Increase
	El Polin Riparian	90%	Good	Increase
	Lobos Creek Riparian	90%	Good	No Change
	Mountain Lake Riparian	100%	Good	Increase
	Thompson Reach Riparian	80%	Good	Increase
Pond/Lake: Good	Mountain Lake	75%	Good	No Change
Oak Woodland: Good	Lobos Creek Oak Woodland	80%	Good	No Change
Grassland: Fair	Fort Scott Parade Grassland	50%	Fair	Decrease
	Inspiration Point Grassland	75%	Good	Increase
Dune Scrub: Good	East of Lincoln Dune Scrub	82%	Good	Increase
	Lobos Creek Valley Dune Scrub	82%	Good	No Change
	North Baker Beach Dune Scrub	94%	Good	Increase
	Presidio Hills Dune Scrub	94%	Good	Increase
	Rob Hill Dune Scrub	88%	Good	Increase
Coastal Scrub: Good	Coastal Bluffs Coastal Scrub	89%	Good	Increase
	El Polin Coastal Scrub	84%	Good	Increase
	Landfill 10 Coastal Scrub	84%	Good	Increase
	Western Tributary Coastal Scrub	63%	Fair	Increase
	World War II Memorial Coastal Scrub	74%	Fair	Increase
Historic Forest: Fair	East Arm Forest	81%	Good	Decrease
	Fort Scott Community Garden Forest	67%	Fair	Decrease
	Kobbe Stand 1-6 Forest	57%	Fair	Decrease
	Park Blvd Stand Forest	71%	Fair	Increase
	Rob Hill Forest	86%	Good	Increase
Cultural Landscape: Fair	Calvary Bowl East Landscape	62%	Fair	Increase
	Calvary Bowl West Landscape	77%	Good	Increase
	Main Post Landscape	92%	Good	Increase
	Simmonds Loop Landscape	85%	Good	Decrease
	Tunnel Tops Landscape	15%	Poor	Decrease

Table 24: Biodiversity results for each habitat and monitoring site

Map 26 shows each UBIF site's poor, fair, or good ranking.



Map 26: Biodiversity results for each monitoring site

A Tidal Wetland is a wetland found along rivers, coasts and estuaries which floods and drains by the tidal movement of the adjacent estuary, sea, or ocean. They serve as flood protection to upland areas, impedes shoreline erosion, acts as filtration system for watersheds, and is crucial habitat for many creatures including migratory birds.

The Tidal Wetland UBIF habitat includes 2 sites and 8 surrogate species. This means there are a total of 16 possible surrogate species that may be observed throughout the habitat. Of the 16 possible surrogate species 9 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 56% which falls into the *fair* range. This is an increase of 18% from the 38% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 64 shows the percentage of each surrogate species observed versus those not observed for all sites in the Tidal Wetland habitat.
Figure 65 shows proportion of surrogate species observed at each Tidal Wetland site.

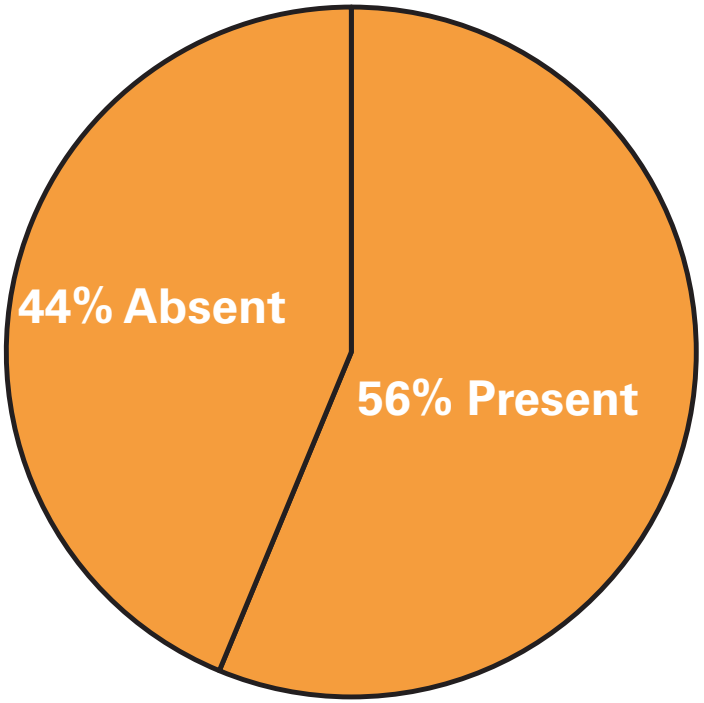


Figure 64: Fair habitat rating based on 56% of Tidal Wetland surrogate species observed

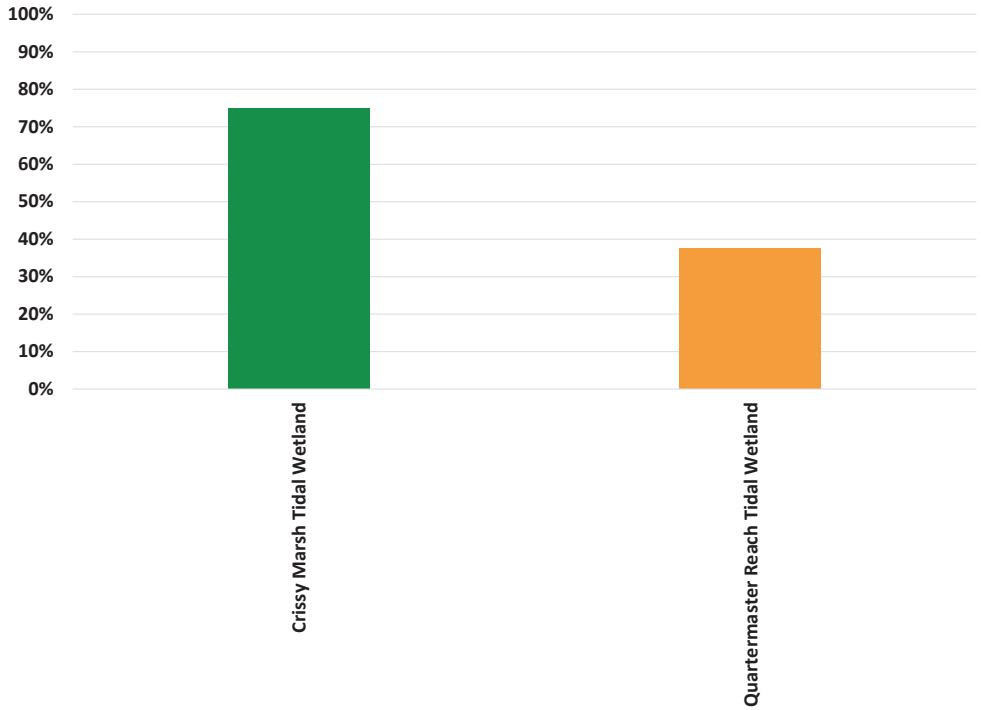


Figure 65: Proportion of Tidal Wetland surrogate species observed by site

Figure 66 shows the proportion of surrogate species observed by taxa group for all sites in the Tidal Wetland habitat.

Figure 67 shows the proportion of each surrogate species observed for all sites in the Tidal Wetland habitat.

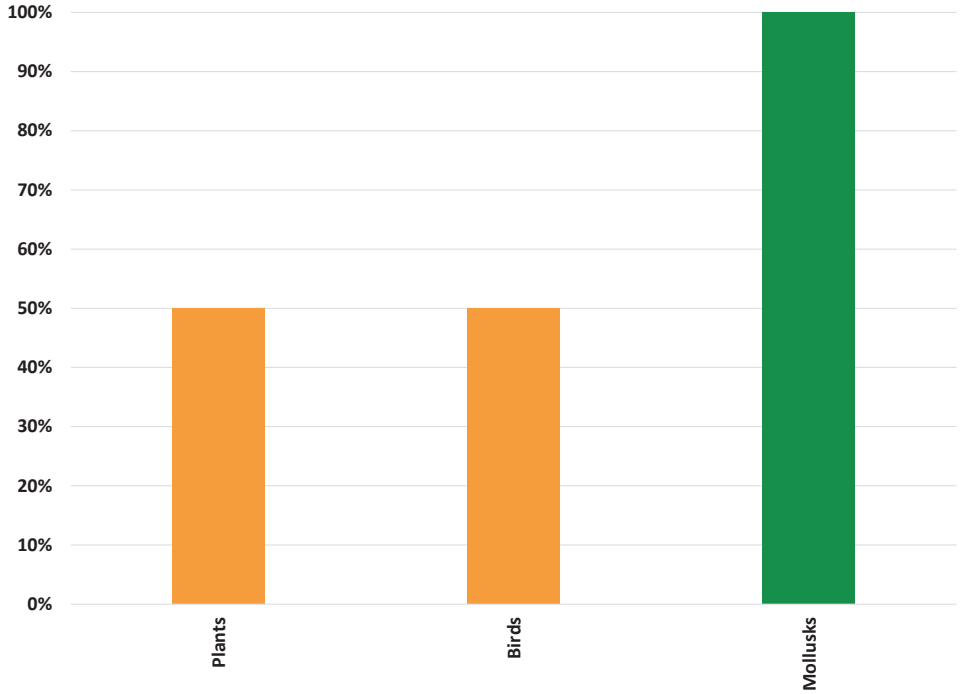


Figure 66: Proportion of Tidal Wetland surrogate species observed by taxa group

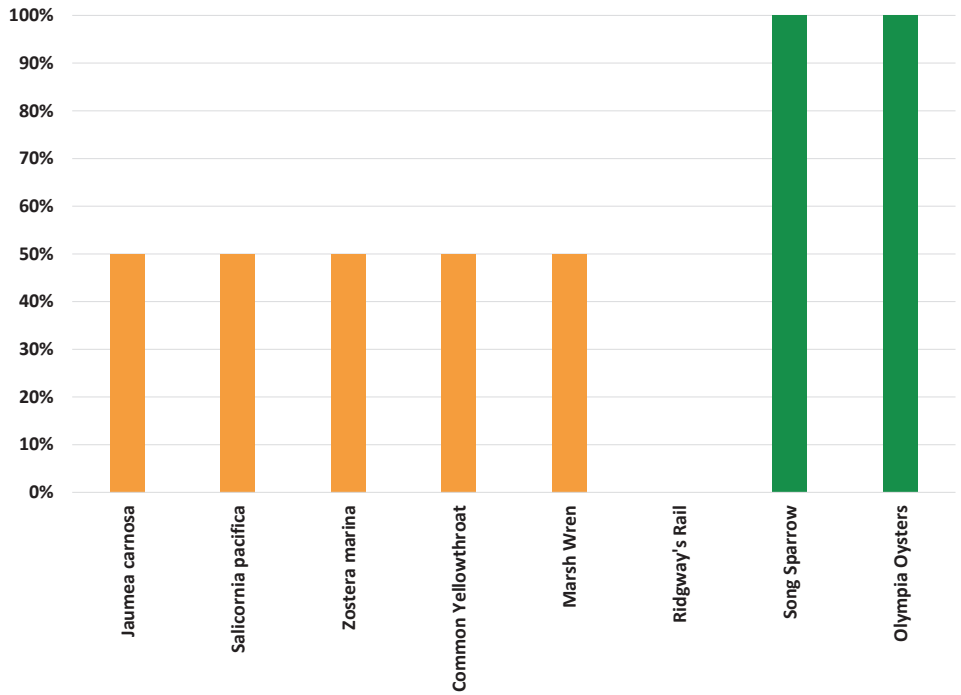
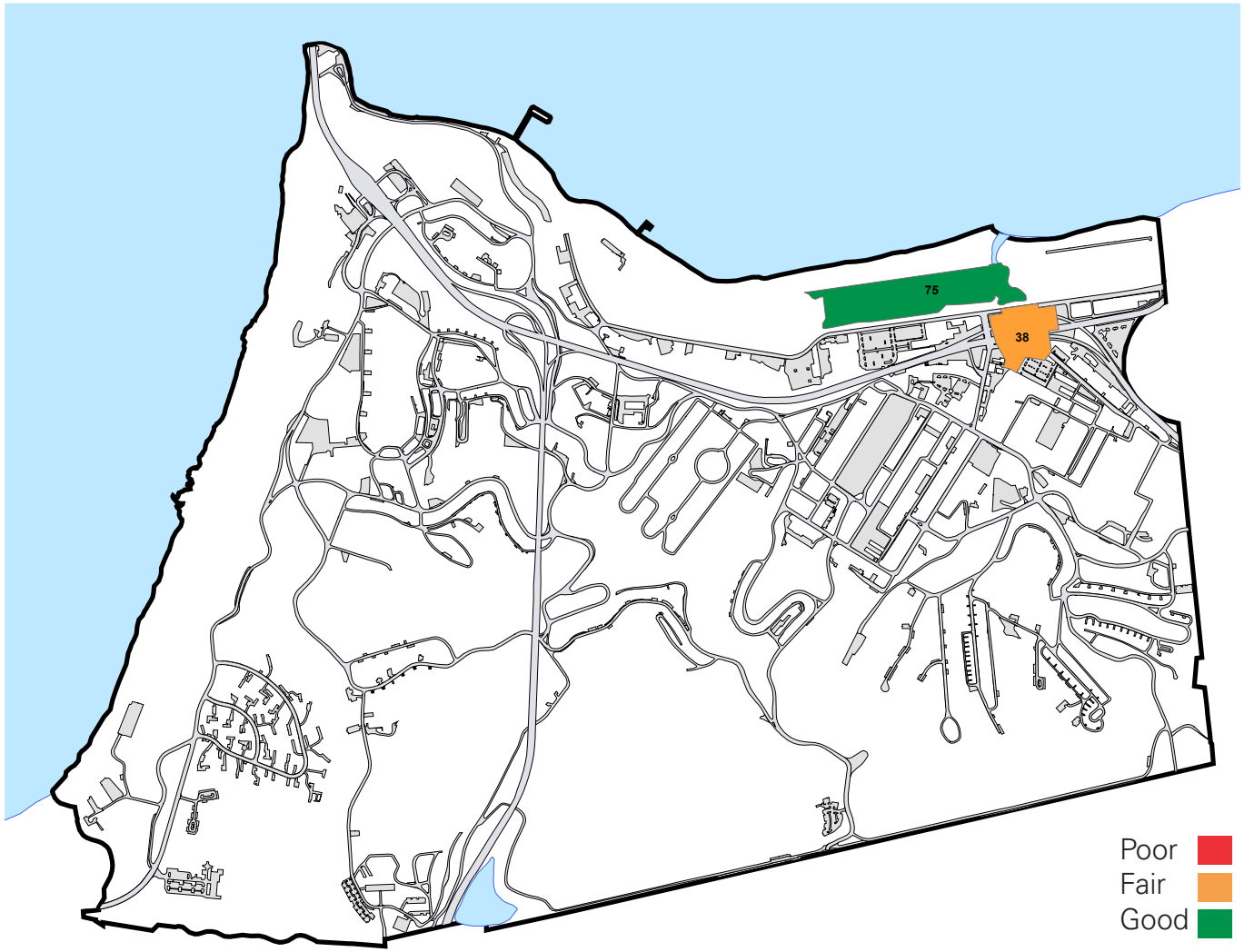


Figure 67: Proportion of Tidal Wetland surrogate species observed by species

Map 27 shows each Tidal Wetland site's poor, fair, or good ranking.



Map 27: Tidal Wetland monitoring sites and the rating they received

Table 25 lists all of the surrogate species and sites for the Tidal Wetland habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Tidal Wetland Habitat Summary page.

Taxon Group	Surrogate Species	Crissy Marsh	Quartermaster Reach
Plants	*Jaumea carnosa*	X	
	Salicornia pacifica	X	
	Zostera marina	X	
Mollusk	Olympia Oysters	X	X
Birds	Common Yellowthroat	X	
	Marsh Wren		X
	Ridgway's Rail		
	Song Sparrow	X	X

Table 25: List of Tidal Wetland surrogate species and their presence or absence at each monitoring site

The Freshwater Wetland community is composed of plants that grow in areas with perennial flooding or saturated soil and in areas where the water table is perched near the ground surface. They typically occur in nutrient-rich mineral soils that drain slowly and are waterlogged or saturated for most or all of the year. Freshwater Wetlands may reduce destructive flooding, decrease waterborne pollution, and support many species of resident and migratory animals.

The Freshwater Wetland UBIF habitat includes 3 sites and 10 surrogate species. This means there are a total of 30 possible surrogate species that may be observed throughout the habitat. Of the 30 possible surrogate species 22 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 73% which falls into the *fair* range. This is an increase of 6% from the 67% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 68 shows the percentage of surrogate species observed versus those not observed for all sites in the Freshwater Wetland habitat.
Figure 69 shows proportion of surrogate species observed at each Freshwater Wetland site.

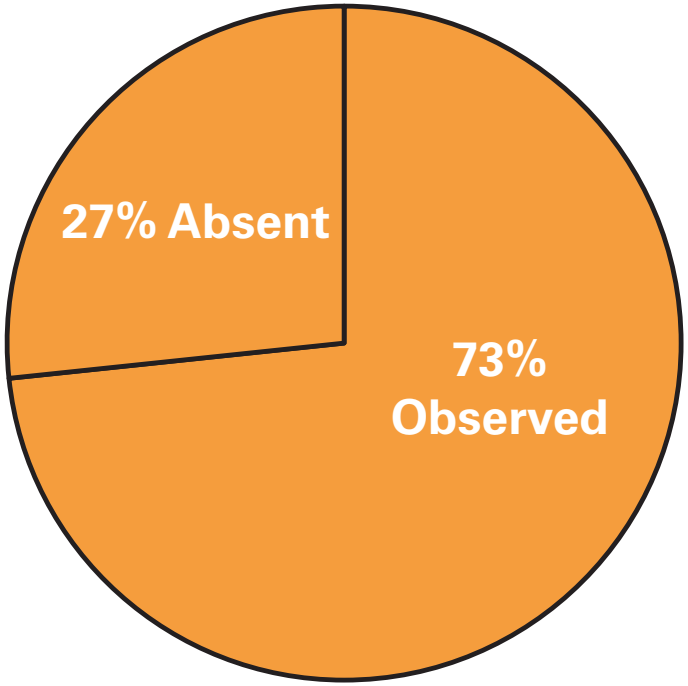


Figure 68: Fair habitat rating based on 73% of Freshwater Wetland surrogate species observed

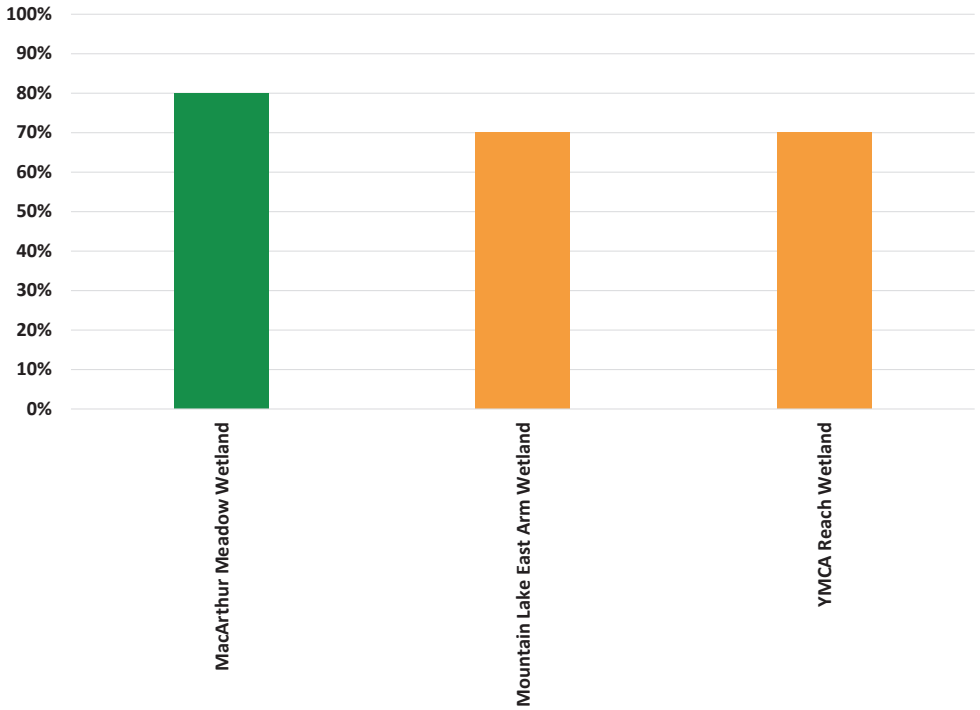


Figure 69: Proportion of Freshwater Wetland surrogate species observed by site

Figure 70 shows the proportion of surrogate species observed by taxa group for all sites in the Freshwater Wetland habitat.

Figure 71 shows the proportion of each surrogate species observed for all sites in the Freshwater Wetland habitat.

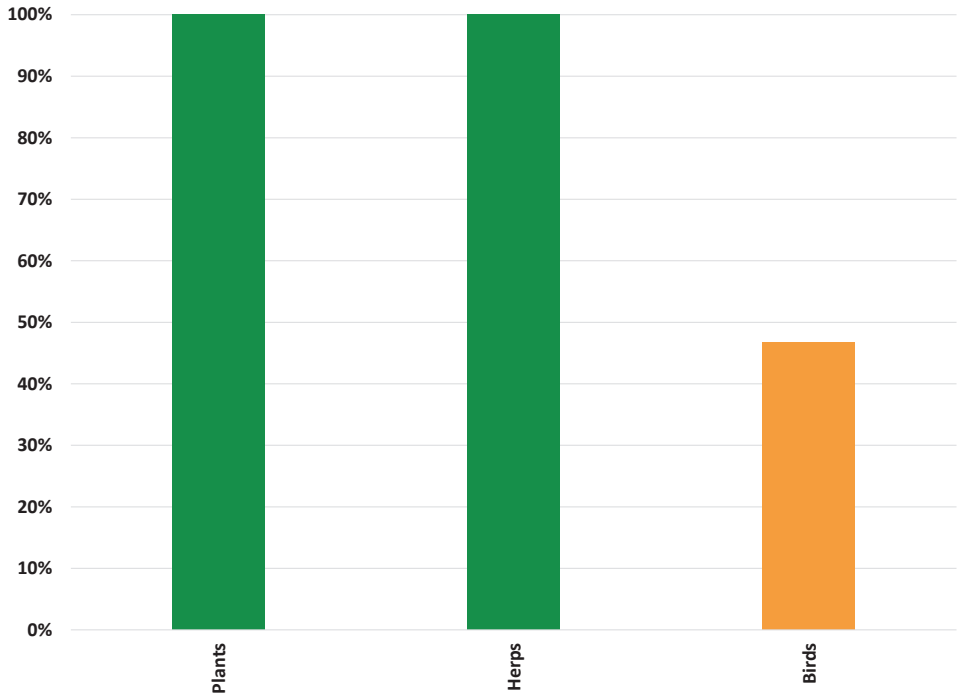


Figure 70: Proportion of Freshwater Wetland surrogate species observed by taxa group

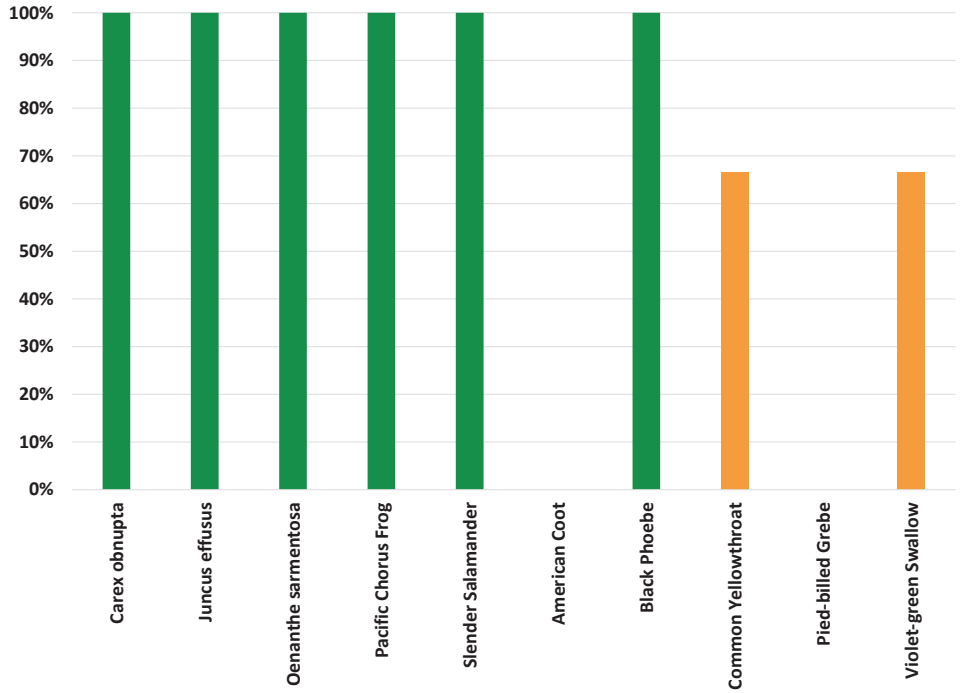


Figure 71: Proportion of Freshwater Wetland surrogate species observed by species

Map 28 shows each Freshwater Wetland site's poor, fair, or good ranking.

Map 28: Freshwater Wetland monitoring sites and the rating they received

Table 26 lists all of the surrogate species and sites for the Freshwater Wetland habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Freshwater Wetland Habitat Summary page.

Taxon Group	Surrogate Species	MacArthur Meadow Wetland	Mountain Lake East Arm Wetland	YMCA Reach Wetland
Plants	*Carex obnupta*	X	X	X
	Juncus effusus	X	X	X
	Oenanthe sarmentosa	X	X	X
Herps	Pacific Chorus Frog	X	X	X
	Slender Salamander	X	X	X
Birds	American Coot			
	Black Phoebe	X	X	X
	Common Yellowthroat	X	X	
	Pied-billed Grebe			
	Violet-green Swallow	X		X

Table 26: List of Freshwater Wetland surrogate species and their presence or absence at each monitoring site

Riparian habitats are found along rivers, creeks, streams, and lakes. These areas are important natural biofilters, protecting aquatic environments from excessive sedimentation, polluted surface runoff, and erosion. They supply shelter and food for many aquatic animals.

The Riparian UBIF habitat includes 6 sites and 20 surrogate species. This means there are a total of 120 possible surrogate species that may be observed throughout the habitat. Of the 120 possible surrogate species 108 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 90% which falls into the *good* range. This is an increase of 8% from the 82% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 72 shows the percentage of surrogate species observed versus those not observed for all sites in the Riparian habitat.
Figure 73 shows proportion of surrogate species observed at each Riparian site.

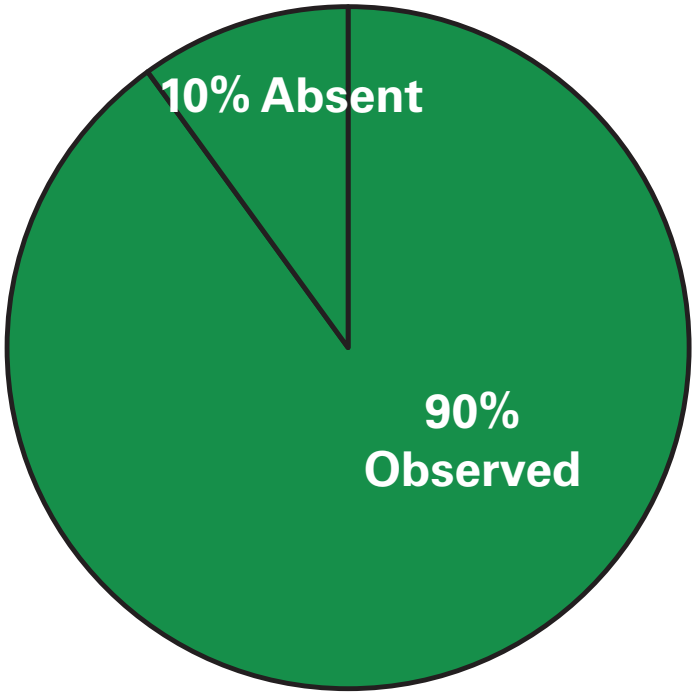


Figure 72: Good habitat rating based on 90% of Riparian surrogate species observed

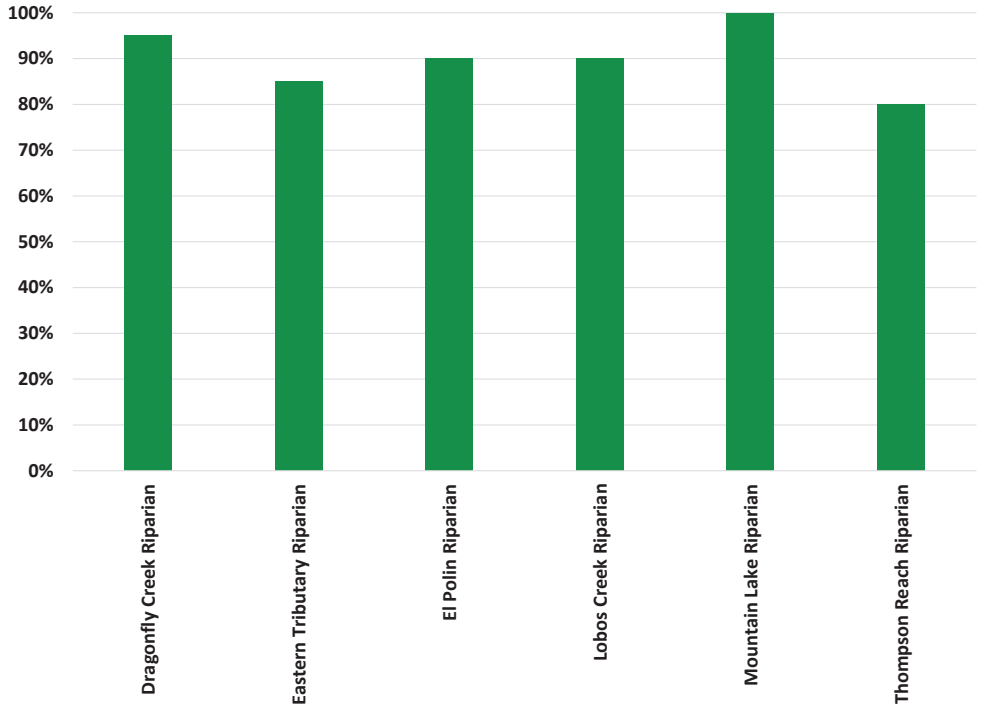


Figure 73: Proportion of Riparian surrogate species observed by site

Figure 74 shows the proportion of surrogate species observed by taxa group for all sites in the Riparian habitat.

Figure 75 shows the proportion of each surrogate species observed for all sites in the Riparian habitat.

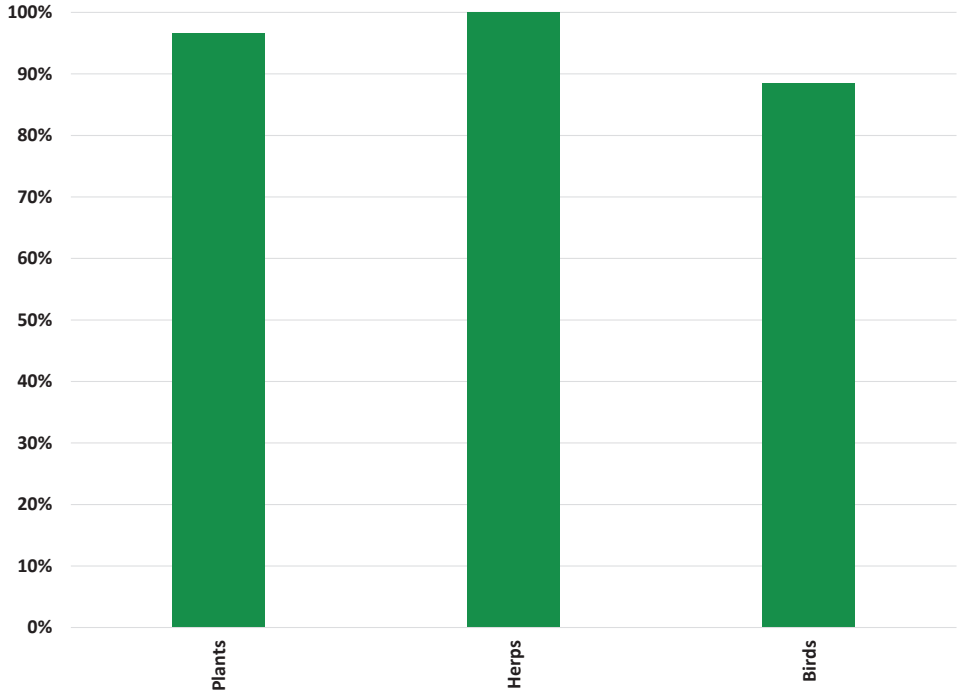


Figure 74: Proportion of Riparian surrogate species observed by taxa group

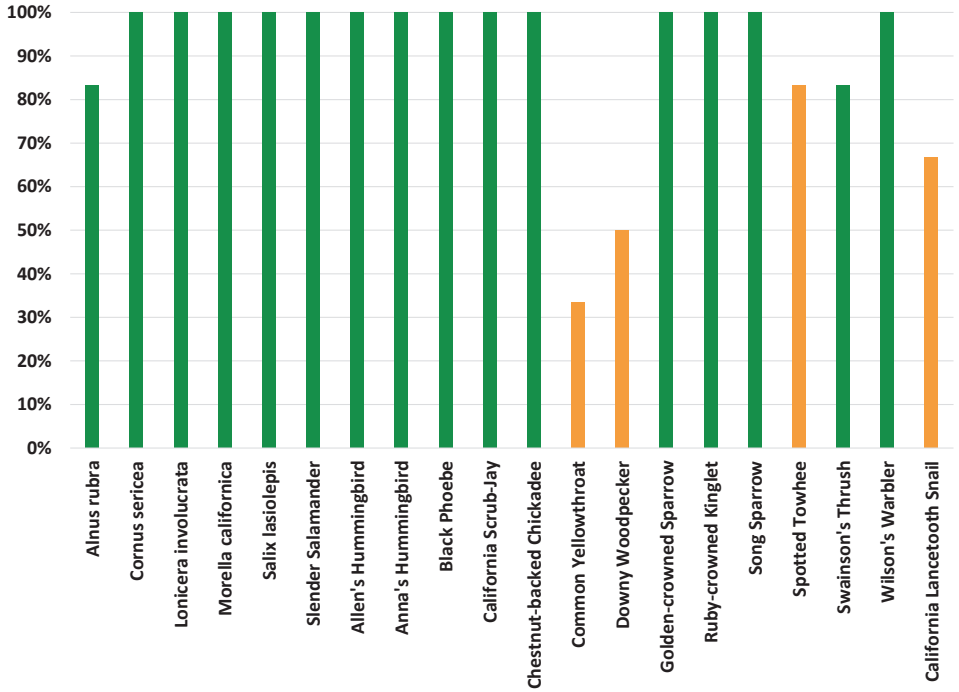


Figure 75: Proportion of Riparian surrogate species observed by species

Map 29 shows each Riparian site's poor, fair, or good ranking.

Map 29: Riparian monitoring sites and the rating they received

Table 27 lists all of the surrogate species and sites for the Riparian habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Riparian Habitat Summary page.

Taxon Group	Surrogate Species	Dragonfly Creek Riparian	Eastern Tributary Riparian	El Polin Riparian	Lobos Creek Riparian	Mountain Lake Riparian	Thompson Reach Riparian
Plants	*Alnus rubra*	X		X	X	X	X
	Cornus sericea	X		X	X	X	X
	Lonicera involucrata	X	X	X	X	X	X
	Morella californica	X	X	X	X	X	X
	Salix lasiolepis	X	X	X	X	X	X
Herps	Slender Salamander	X	X	X	X	X	X
Birds	Allen's Hummingbird	X	X	X	X	X	X
	Anna's Hummingbird	X	X	X	X	X	X
	Black Phoebe	X	X	X	X	X	X
	California Scrub-Jay	X	X	X	X	X	X
	Chestnut-backed Chickadee	X	X	X	X	X	X
	Common Yellowthroat	X				X	
	Downy Woodpecker		X	X		X	
	Golden-crowned Sparrow	X	X	X	X	X	X
	Ruby-crowned Kinglet	X	X	X	X	X	X
	Song Sparrow	X	X	X	X	X	X
	Spotted Towhee	X	X	X	X	X	
	Swainson's Thrush	X		X	X	X	X
	Wilson's Warbler	X	X	X	X	X	X
Mollusks	California Lancetooth Snail	X	X		X	X	

Table 27: List of Riparian surrogate species and their presence or absence at each monitoring site

Pond/Lake habitat is a wetland with standing water, which provides habitat for wetland plants and animals. This supports a diverse array of wildlife.

The Pond/Lake UBIF habitat includes only 1 site and 4 surrogate species. This means there are a total of 4 possible surrogate species that may be observed throughout the habitat. Of the 4 possible surrogate species 3 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 75% which falls into the *good* range. This is same amount observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 76 shows the percentage of surrogate species observed versus those not observed for all sites in the Pond/Lake habitat.
Figure 77 shows proportion of surrogate species observed at each Pond/Lake site.

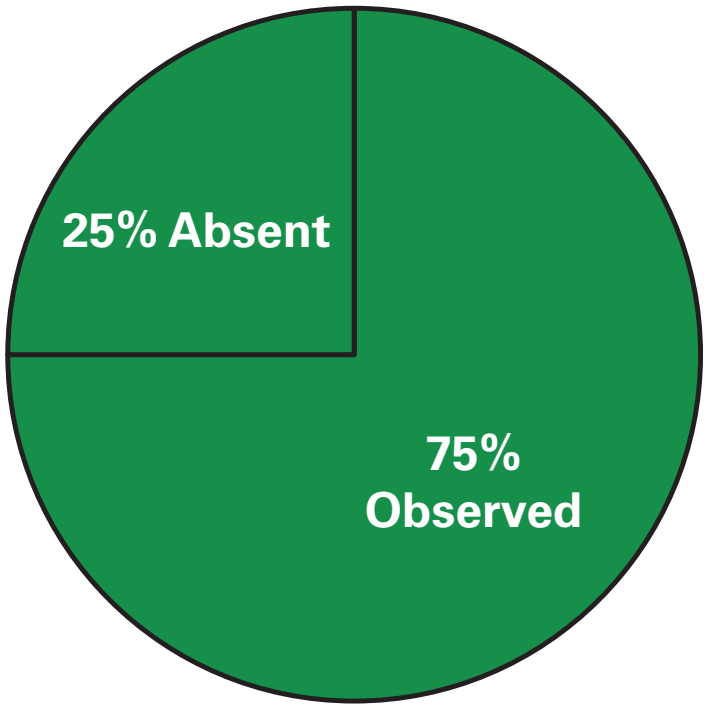


Figure 76: Good habitat rating based on 75% of Pond/Lake surrogate species observed

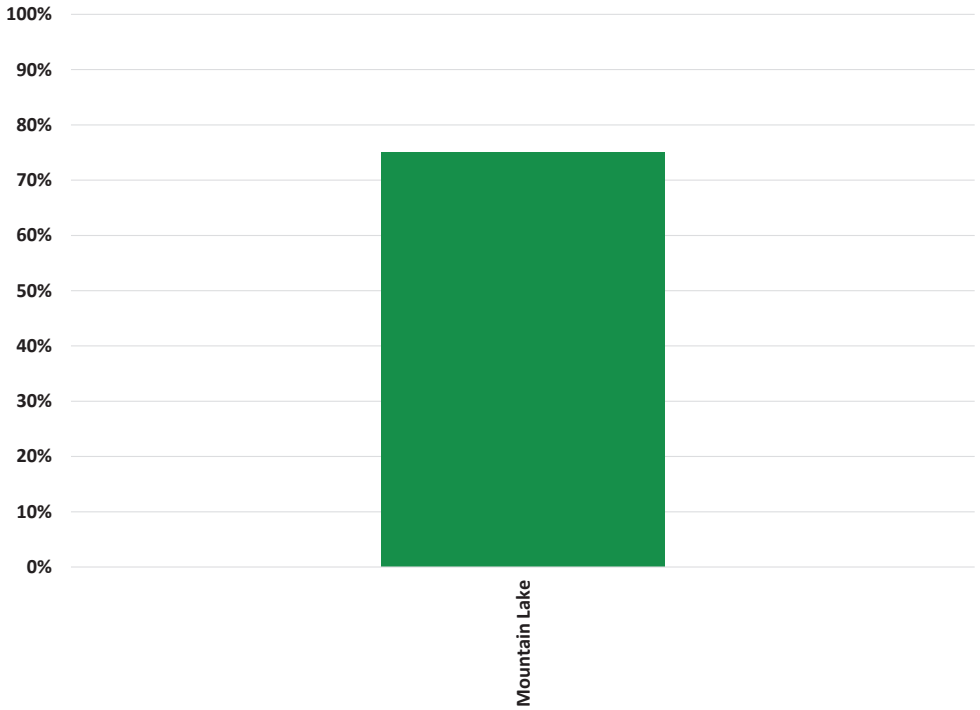


Figure 77: Proportion of Pond/Lake surrogate species observed by site

Figure 78 shows the proportion of surrogate species observed by taxa group for all sites in the Pond/Lake habitat.

Figure 79 shows the proportion of each surrogate species observed for all sites in the Pond/Lake habitat.

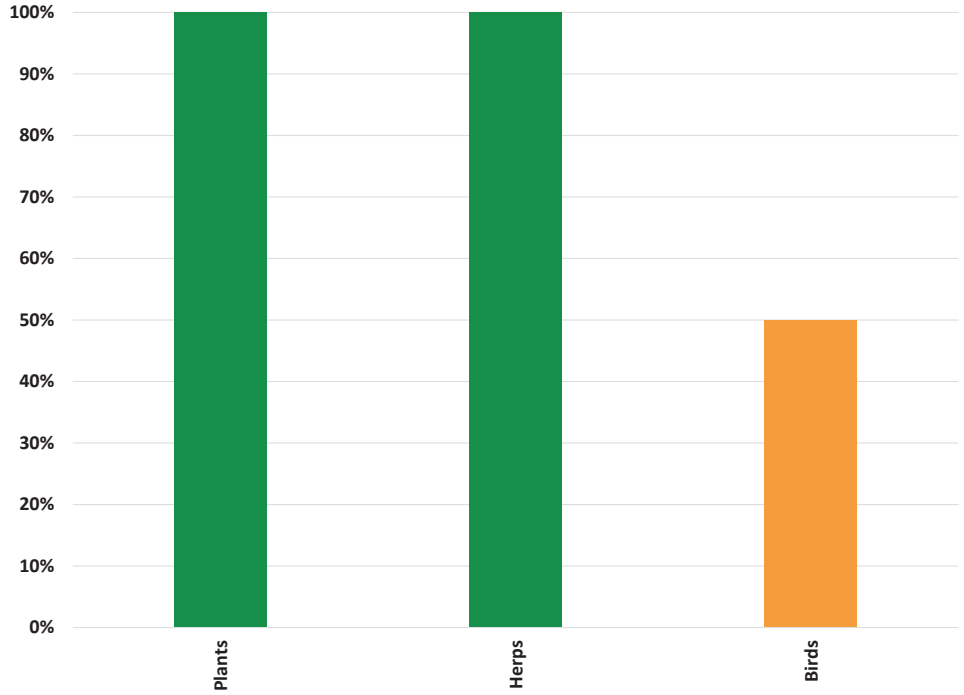


Figure 78: Proportion of Pond/Lake surrogate species observed by taxa group

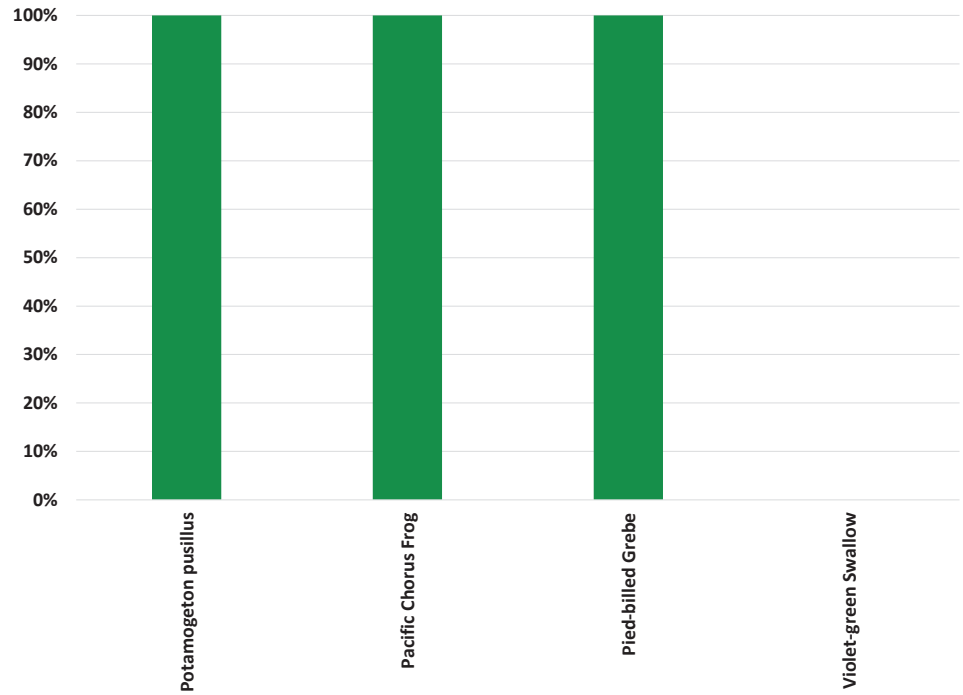


Figure 79: Proportion of Pond/Lake surrogate species observed by species

Map 30 shows the Pond/Lake site's poor, fair, or good ranking.

Map 30: Pond/Lake monitoring sites and the rating they received

Table 28 lists all of the surrogate species and sites for the Pond/Lake habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Pond/Lake Habitat Summary page.

Taxon Group	Surrogate Species	Mountain Lake
Plants	*Potamogeton pusillus*	X
Herps	Pacific Chorus Frog	X
Birds	Pied-billed Grebe	X
	Violet-green Swallow	

Table 28: List of Pond/Lake surrogate species and their presence or absence at each monitoring site

Oak Woodland habitat found in coastal California from Sonoma County south into Baja California. It is dominated by the Coast Live Oak tree which forms a semi-closed canopy. The understory consists of woody shrubs, grasses, and herbaceous plant species. The Oak Woodland habitat has a rich abundance of wildlife species in California and are able to sustain such abundant wildlife primarily because they produce acorns, a high quality and abundant food supply, and because they provide important shelter and nesting habitat.

The Oak Woodland UBIF habitat includes only 1 site and 15 surrogate species. This means there are a total of 15 possible surrogate species that may be observed throughout the habitat. Of the 15 possible surrogate species 12 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 80% which falls into the *good* range. This is same amount observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 80 shows the percentage of surrogate species observed versus those not observed for all sites in the Oak Woodland habitat.
Figure 81 shows proportion of surrogate species observed at each Oak Woodland site.

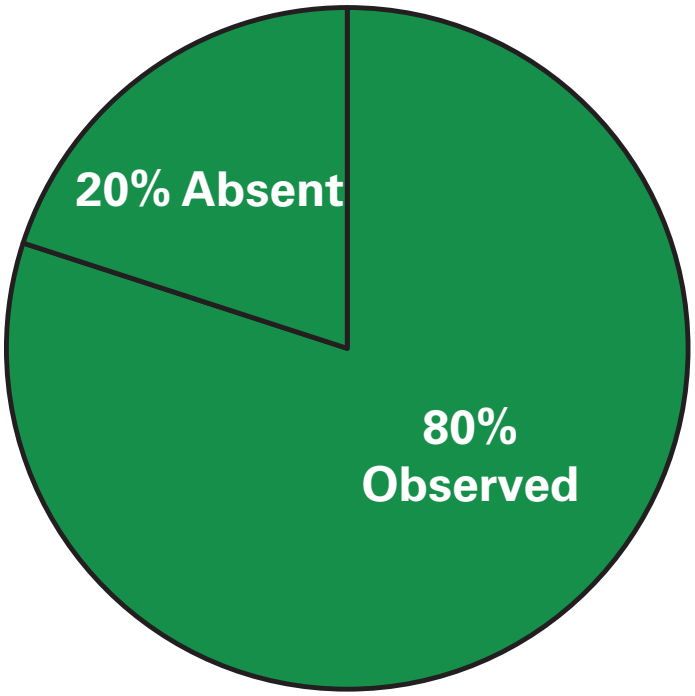


Figure 80: Good habitat rating based on 80% of Oak Woodland surrogate species observed

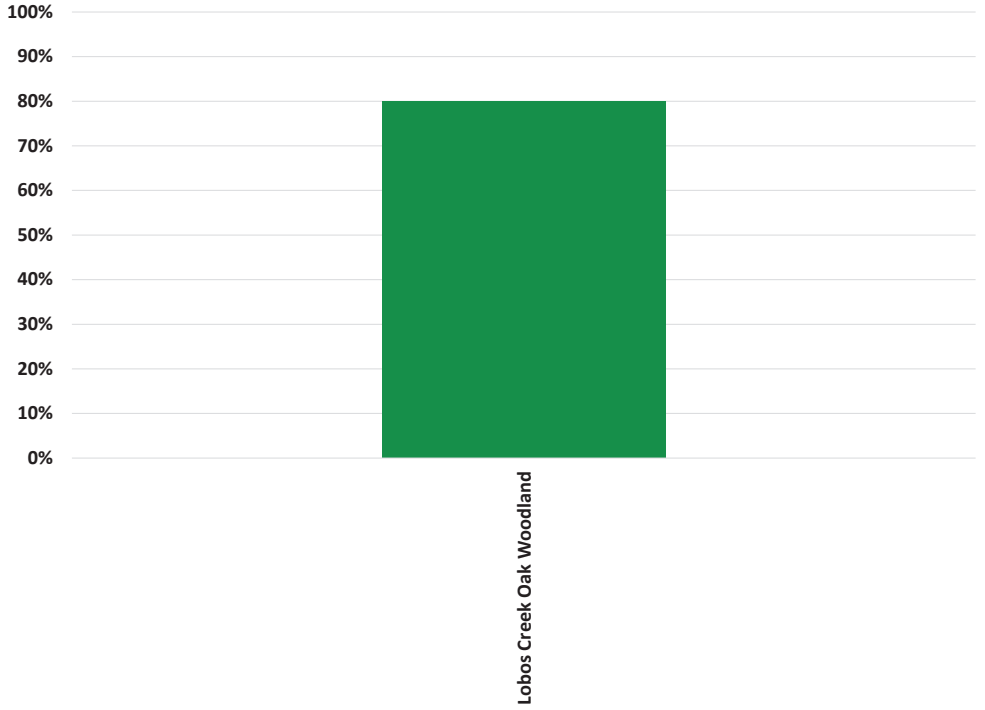


Figure 81: Proportion of Oak Woodland surrogate species observed by site

Figure 82 shows the proportion of surrogate species observed by taxa group for all sites in the Oak Woodland habitat.

Figure 83 shows the proportion of each surrogate species observed for all sites in the Oak Woodland habitat.

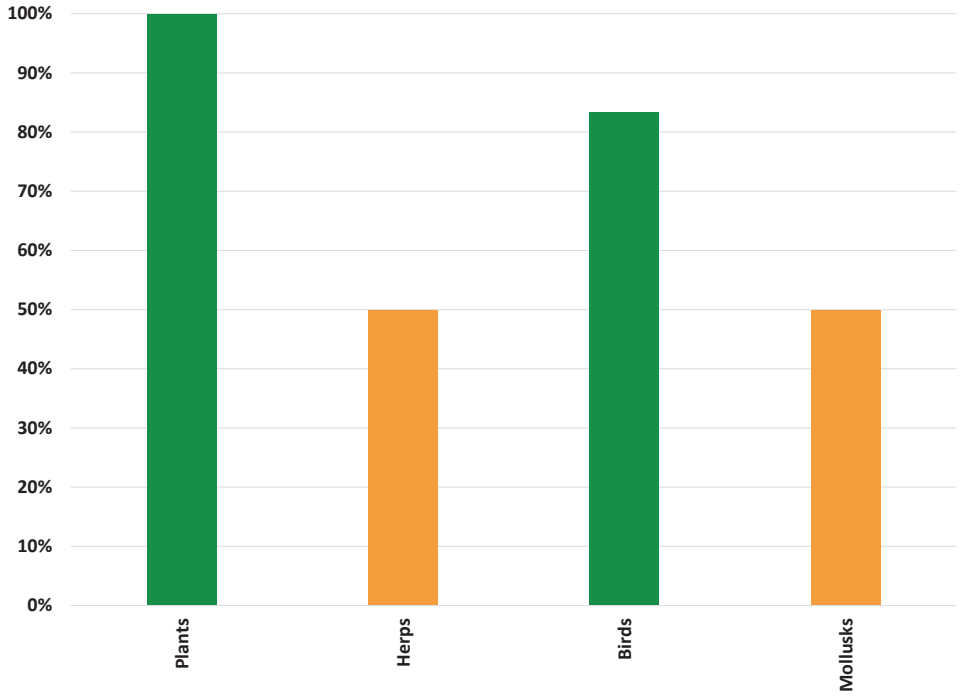


Figure 82: Proportion of Oak Woodland surrogate species observed by taxa group

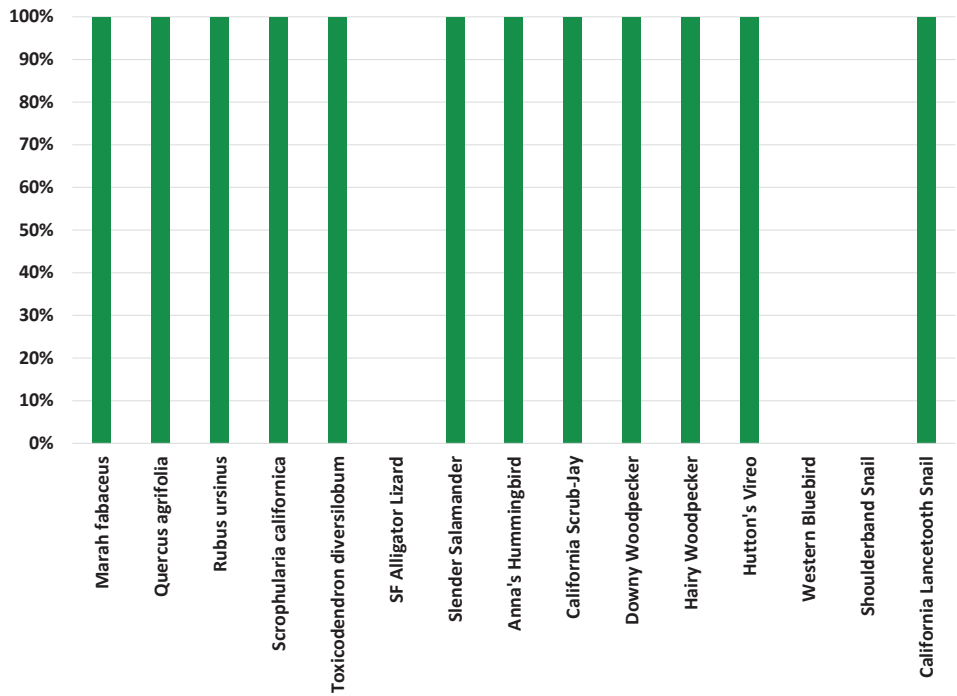


Figure 83: Proportion of Oak Woodland surrogate species observed by species

Map 31 shows the Oak Woodland site's poor, fair, or good ranking.

Map 31: Oak Woodland monitoring sites and the rating they received

Table 29 lists all of the surrogate species and sites for the Oak Woodland habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Oak Woodland Habitat Summary page.

Taxon Group	Surrogate Species	Lobos Creek Oak Woodland
Plants	*Marah fabaceus*	X
	Quercus agrifolia	X
	Rubus ursinus	X
	Scrophularia californica	X
	Toxicodendron diversilobum	X
Herps	Slender salamander	X
	SF Alligator Lizard	
Birds	Anna's Hummingbird	X
	California Scrub-Jay	X
	Downy Woodpecker	X
	Hairy Woodpecker	X
	Hutton's Vireo	
	Western Bluebird	
Mollusk	California Lancetooth Snail	X

Table 29: List of Oak Woodland surrogate species and their presence or absence at each monitoring site

Grassland habitat in coastal California are the most species-rich grassland types in North America. Roughly 24% of California coastal grasslands have been lost to development. Coastal grasslands are home to many grassland-dependent wildlife and provide excellent hunting ground for birds of prey.

The Grassland UBIF habitat includes 2 sites and 8 surrogate species. This means there are a total of 16 possible surrogate species that may be observed throughout the habitat. Of the 16 possible surrogate species 10 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 63% which falls into the *fair* range. This is same amount observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 84 shows the percentage of surrogate species observed versus those not observed for all sites in the Grassland habitat.
Figure 85 shows proportion of surrogate species observed at each Grassland site.

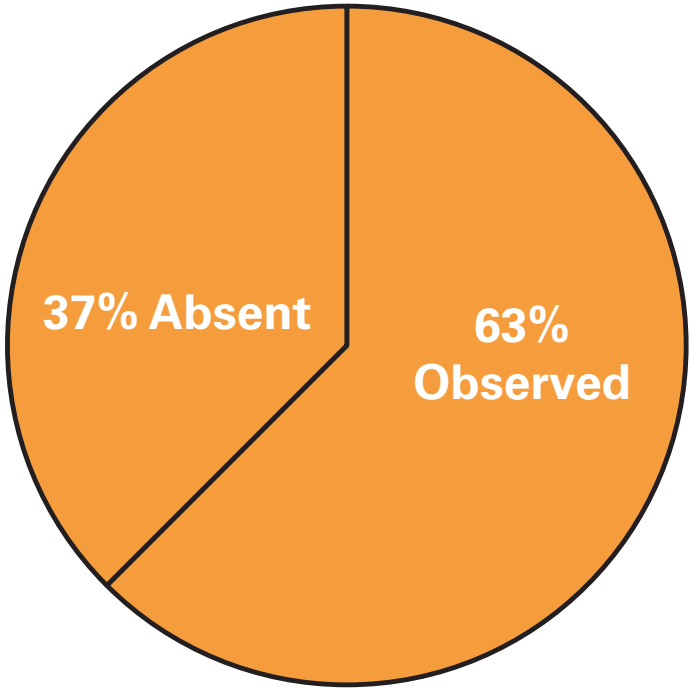


Figure 84: Fair habitat rating based on 63% of Grassland surrogate species observed

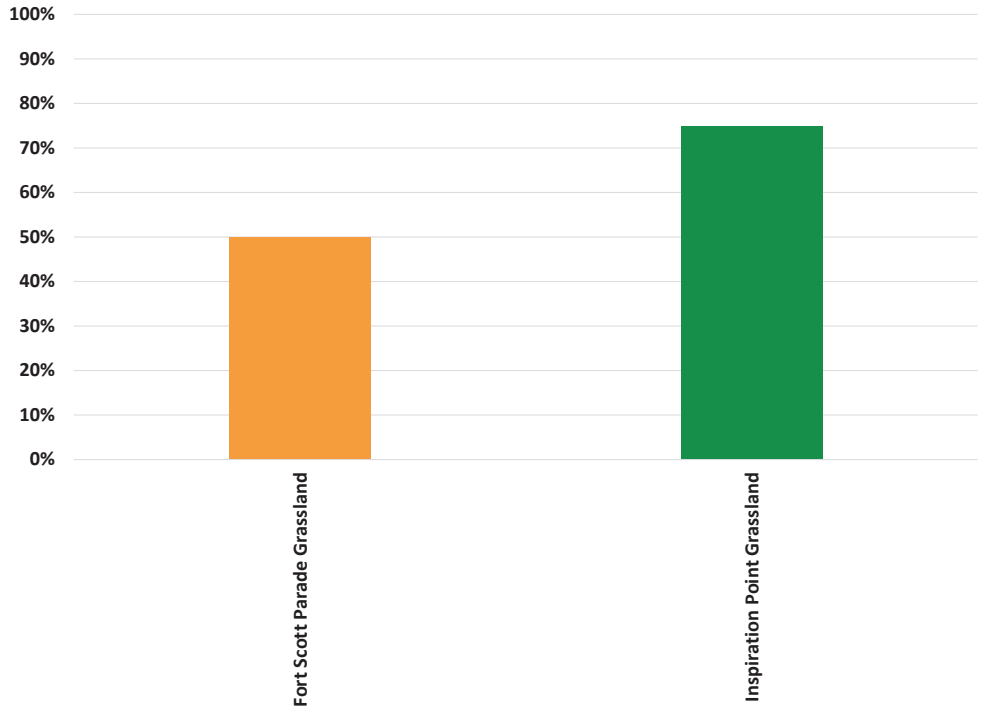


Figure 85: Proportion of Grassland surrogate species observed by site

Figure 86 shows the proportion of surrogate species observed by taxon group for all sites in the Grassland habitat.

Figure 87 shows the proportion of each surrogate species observed for all sites in the Grassland habitat.

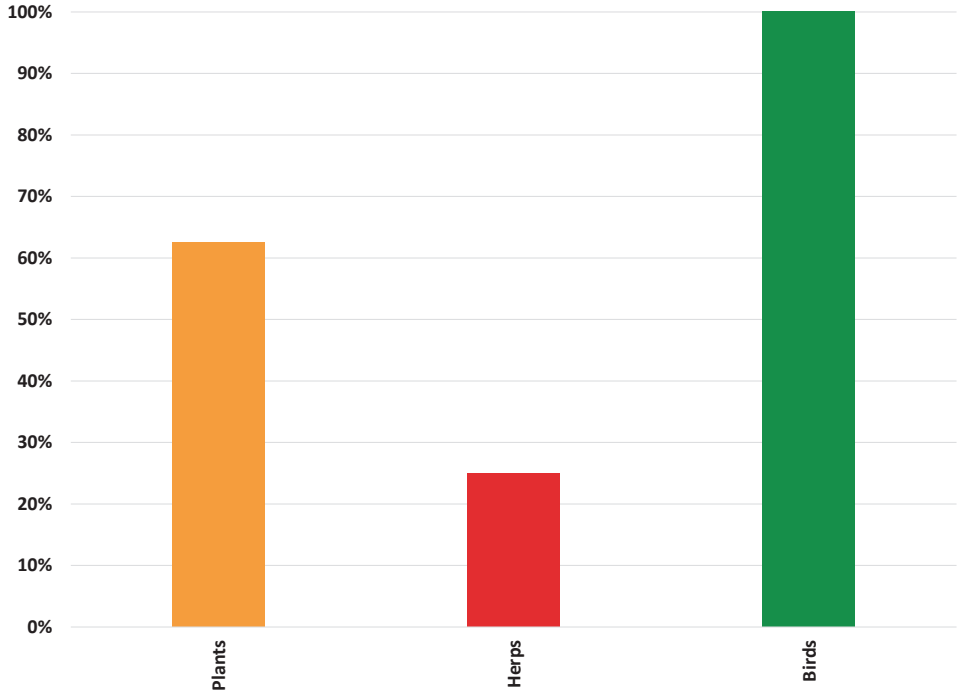


Figure 86: Proportion of Grassland surrogate species observed by taxa group

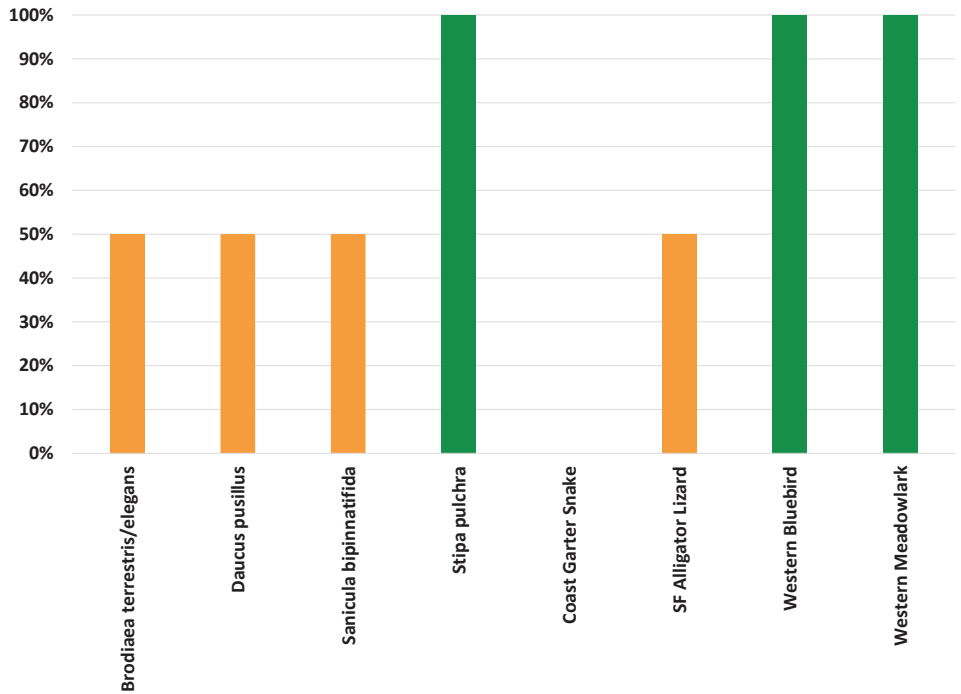


Figure 87: Proportion of Grassland surrogate species observed by species

Map 32 shows each Grassland UBIF sites poor, fair, or good ranking.

Map 32: Grassland monitoring sites and the rating they received

Table 30 lists all of the surrogate species and sites for the Grassland habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.

Click here to return to the Grassland Habitat Summary page.

Taxon Group	Surrogate Species	Inspiration Point Grassland	Fort Scott Parade Grassland
Plants	*Brodiaea terrestris/elegans*		X
	Daucus pusillus	X	
	Sanicula bipinnatifida	X	
	Stipa pulchra	X	X
Herps	SF Alligator Lizard	X	
	Coast Garter Snake		
Birds	Western Bluebird	X	X
	Western Meadowlark	X	X

Table 30: List of Grassland surrogate species and their presence or absence at each monitoring site

Dune Scrub habitat is found on inland dunes and is characterized by densely-packed shrubs interspersed with scattered areas of grasses, wildflowers, and open sand. Dune Scrub provides a safe resting place for dune creatures such as alligator lizards, voles, and insects. Urban encroachment and the introduction of non-native plants has greatly reduced the extent of the dune scrub community in San Francisco, where it once covered 14 square miles.

The Dune Scrub UBIF habitat includes 5 sites and 17 surrogate species. This means there are a total of 85 possible surrogate species that may be observed throughout the habitat. Of the 85 possible surrogate species 75 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 88% which falls into the *good* range. This is an increase of 13% from the 75% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 88 shows the percentage of surrogate species observed versus those not observed for all sites in the Dune Scrub habitat.
Figure 89 shows proportion of surrogate species observed at each Dune Scrub site.

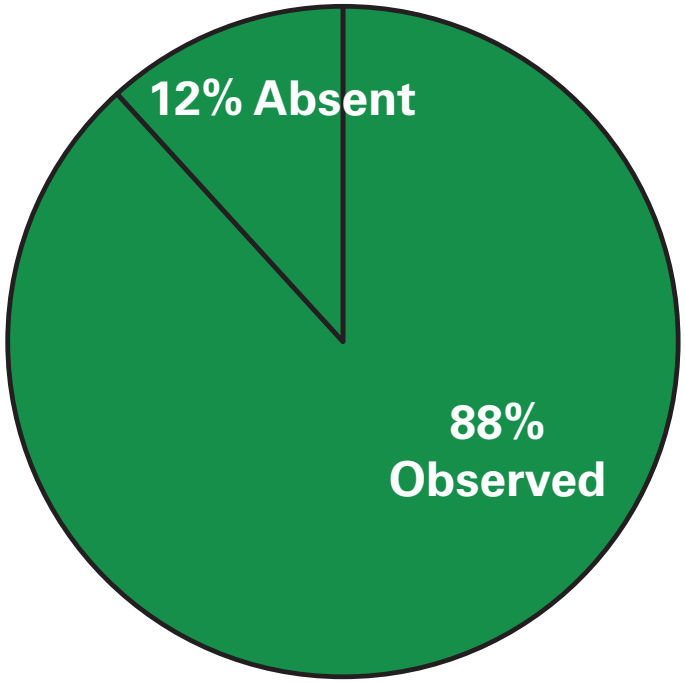


Figure 88: Fair habitat rating based on 88% of Dune Scrub surrogate species observed

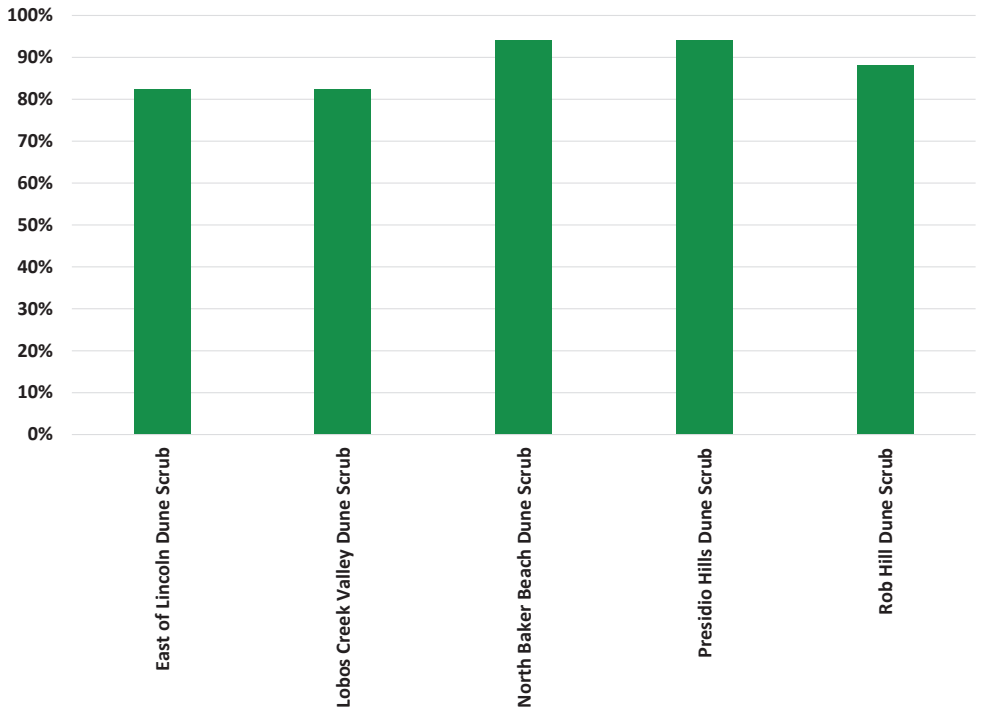


Figure 89: Proportion of Dune Scrub surrogate species observed by site

Figure 90 shows the proportion of surrogate species observed by taxa group for all sites in the Dune Scrub habitat.

Figure 91 shows the proportion of each surrogate species observed for all sites in the Dune Scrub habitat.

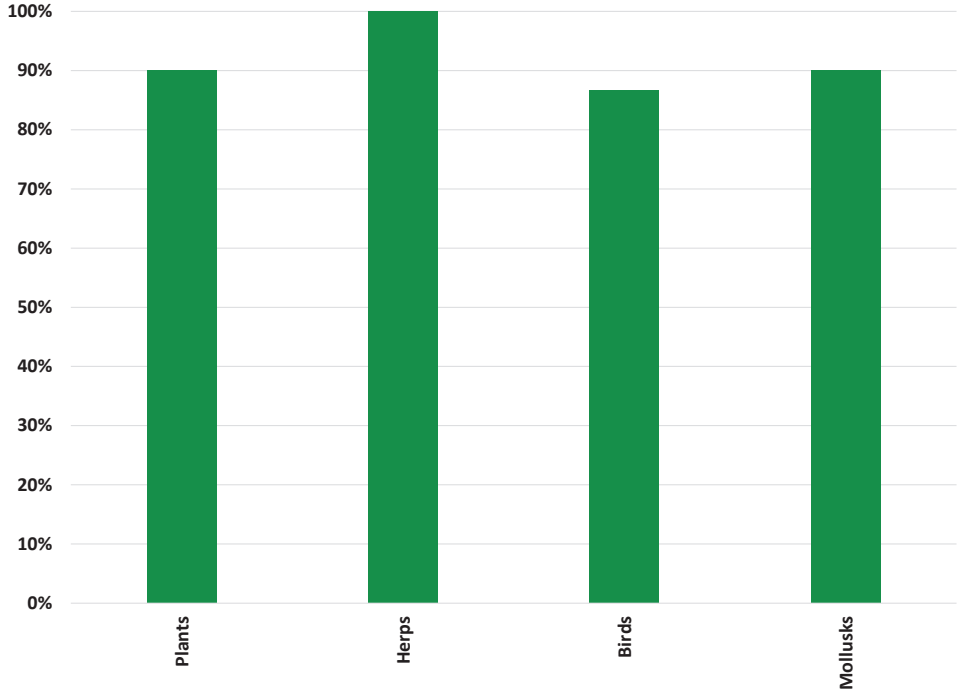
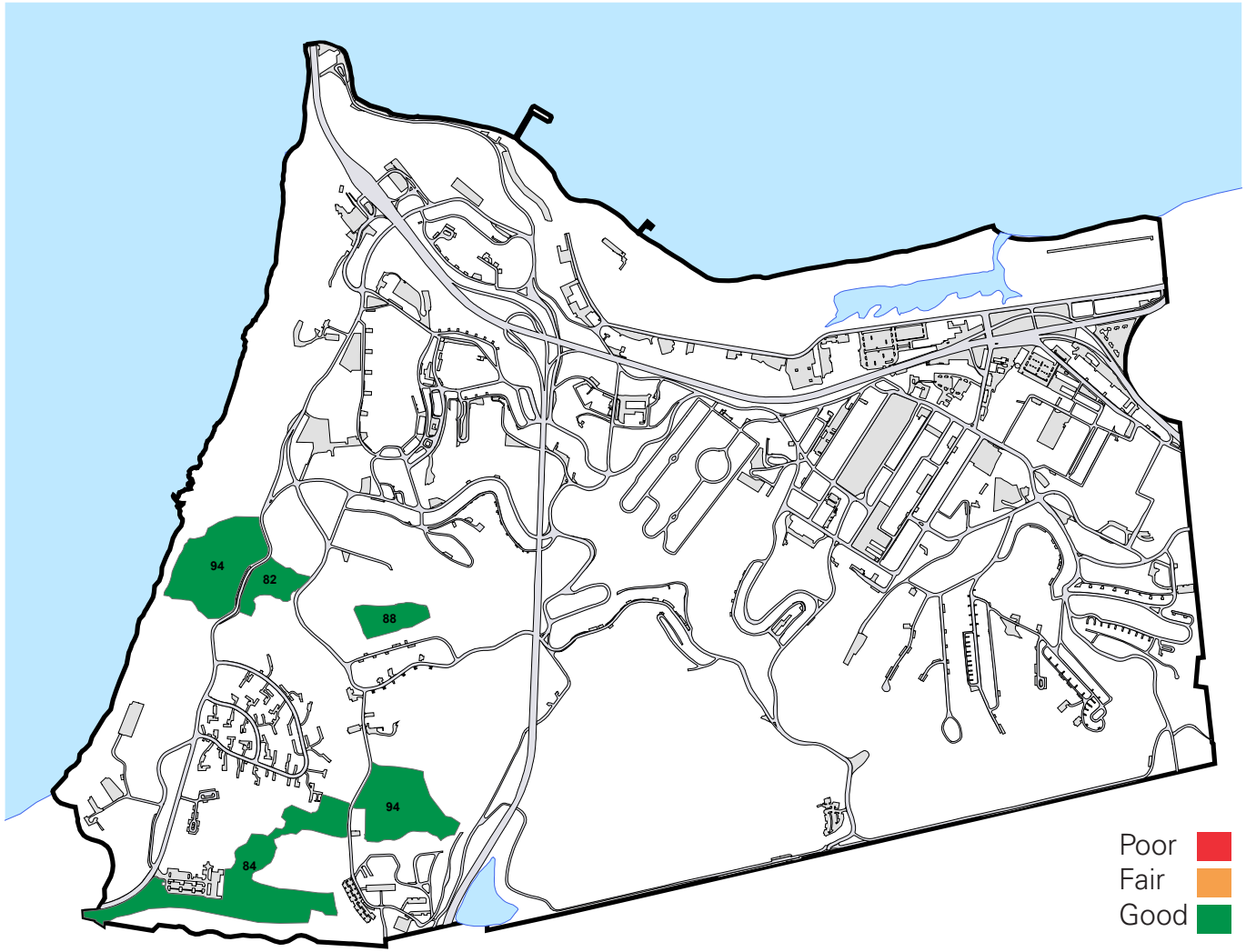


Figure 90: Proportion of Dune Scrub surrogate species observed by taxa group

Figure 91: Proportion of Dune Scrub surrogate species observed by species

Map 33 shows each Dune Scrub site's poor, fair, or good ranking.



Map 33: Dune Scrub monitoring sites and the rating they received

Table 31 lists all of the surrogate species and sites for the Dune Scrub habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.
Click here to return to the Dune Scrub Habitat Summary page.

Taxon Group	Surrogate Species	East of Lincoln Dune Scrub	Lobos Creek Valley Dune Scrub	North Baker Beach Dune Scrub	Presidio Hills Dune Scrub	Rob Hill Dunes Dune Scrub
Plants	*Ericameria ericodes*	X	X	X	X	X
	Gilia capitata		X	X	X	X
Herps	Western Fence Lizard	X	X	X	X	X
Birds	Allen's Hummingbird	X	X	X	X	X
	Bewick's wren	X	X	X	X	X
	California Quail					
	California Scrub-Jay	X	X	X	X	X
	California Towhee	X	X	X	X	X
	Golden-crowned Sparrow	X	X	X	X	X
	House Finch	X	X	X	X	X
	Ruby-crowned Kinglet	X	X	X	X	X
	Song Sparrow	X	X	X	X	X
	Spotted Towhee	X	X	X	X	X
	White-crowned Sparrow	X	X	X	X	X
	Wrentit			X	X	
Mollusks	California Lancetooth Snail	X		X	X	X
	Shoulderband Snail	X	X	X	X	X

Table 31: List of Dune Scrub surrogate species and their presence or absence at each monitoring site

Coastal Scrub habitat occurs along the Pacific Coast and is composed of dense, often low-growing, shrubs and occasional openings of grasslands.

The Coastal Scrub UBIF habitat includes 5 sites and 19 surrogate species. This means there are a total of 95 possible surrogate species that may be observed throughout the habitat. Of the 95 possible surrogate species 75 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 78% which falls into the *good* range. This is an increase of 12% from the 67% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 92 shows the percentage of surrogate species observed versus those not observed for all sites in the Coastal Scrub habitat.
Figure 93 shows proportion of surrogate species observed at each Coastal Scrub site.

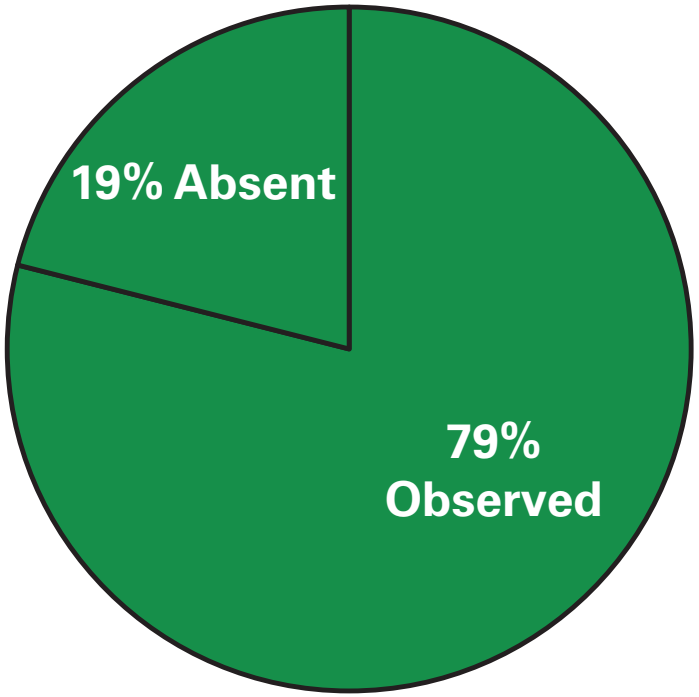


Figure 92: Fair habitat rating based on 79% of Coastal Scrub surrogate species observed

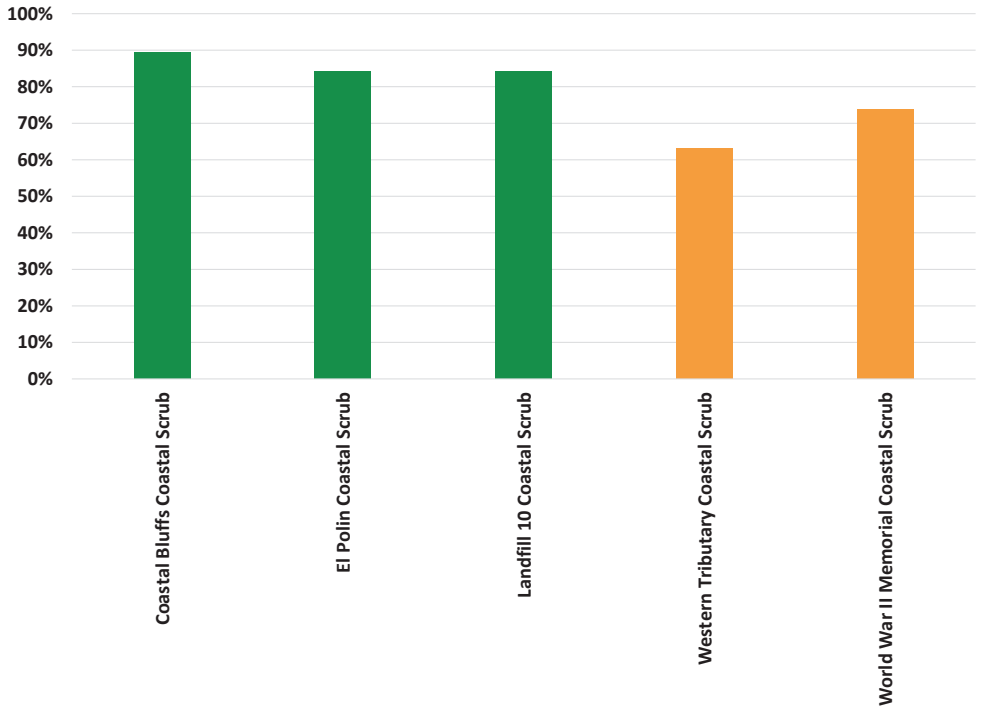


Figure 93: Proportion of Coastal Scrub surrogate species observed by site

Figure 94 shows the proportion of surrogate species observed by taxa group for all sites in the Coastal Scrub habitat.

Figure 95 shows the proportion of each surrogate species observed for all sites in the Coastal Scrub habitat.

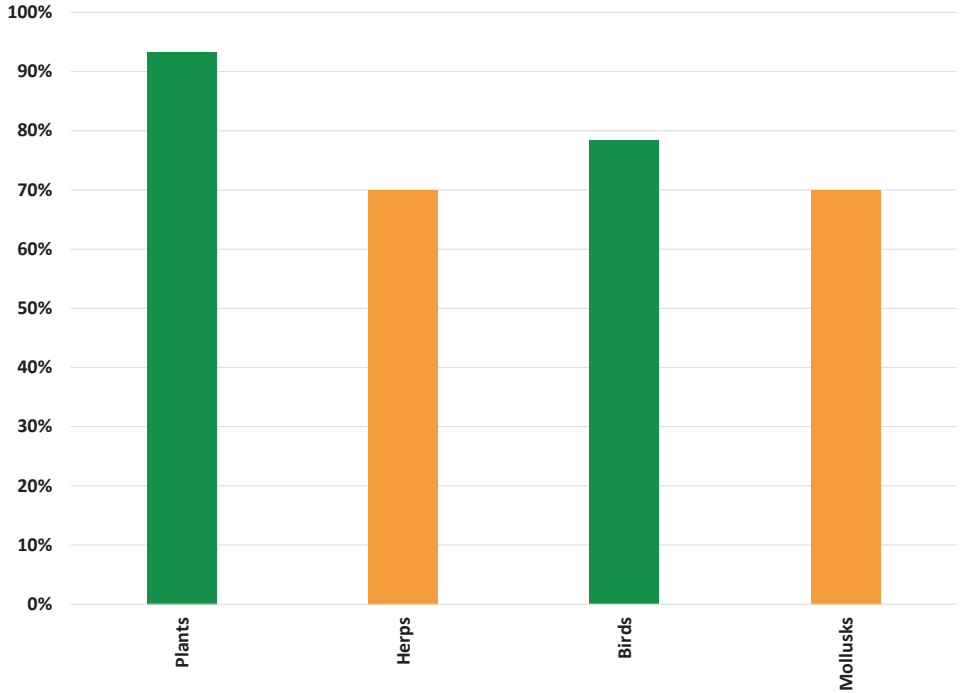


Figure 94: Proportion of Coastal Scrub surrogate species observed by taxa group

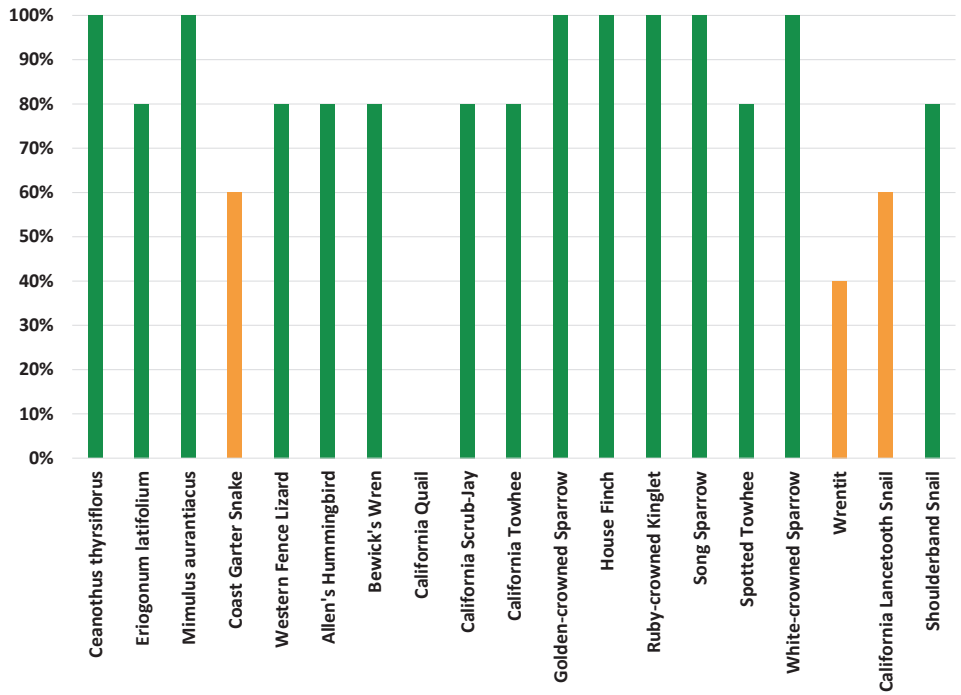


Figure 95: Proportion of Coastal Scrub surrogate species observed by species

Map 34 shows each Coastal Scrub UBIF site's poor, fair, or good ranking.

Map 34: Coastal Scrub monitoring sites and the rating they received

Table 33 lists all of the surrogate species and sites for the Coastal Scrub habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.
Click here to return to the Coastal Scrub Habitat Summary page.

Taxon Group	Surrogate Species	Coastal Bluffs Coastal Scrub	El Polin Coastal Scrub	Landfill 10 Coastal Scrub	Western Tributary Tennessee Hollow Coastal Scrub	World War II Memorial Coastal Scrub
Plants	*Ceanothus thyrsiflorus*	X	X	X	X	X
	Eriogonum latifolium	X	X	X		X
	Mimulus aurantiacus	X	X	X	X	X
Herps	Coast Garter Snake	X	X	X		
	Western Fence Lizard	X	X	X		X
Birds	Allen's Hummingbird	X	X	X	X	
	Bewick's Wren	X		X	X	X
	California Quail					
	California Scrub-Jay	X	X	X	X	
	California Towhee		X	X	X	X
	Golden-crowned Sparrow	X	X	X	X	X
	House Finch	X	X	X	X	X
	Ruby-crowned Kinglet	X	X	X	X	X
	Song Sparrow	X	X	X	X	X
	Spotted Towhee	X	X	X		X
	White-crowned Sparrow	X	X	X	X	X
	Wrentit	X				X
Mollusks	California Lancetooth Snail	X	X			X
	Shoulderband Snail	X	X	X	X	

Table 32: List of Coastal Scrub surrogate species and their presence or absence at each monitoring site

Historic Forest habitat found throughout the Presidio is composed of pine, cypress, eucalyptus and other non-native trees. The army planted these trees beginning in the 1880s in order to make the area appear larger and to limit visibility within the Presidio. Signature groves of the planted cultural forest are being maintained and replanted as the old trees die or blow over. Wildlife in the forest includes many birds dependent on forest species to nest in.

The Historic Forest UBIF habitat includes 5 sites and 21 surrogate species. This means there are a total of 105 possible surrogate species that may be observed throughout the habitat. Of the 105 possible surrogate species 76 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 72% which falls into the *fair* range. This is an increase of 2% from the 70% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 96 shows the percentage of surrogate species observed versus those not observed for all sites in the Historic Forest habitat.
Figure 97 shows proportion of surrogate species observed at each Historic Forest site.

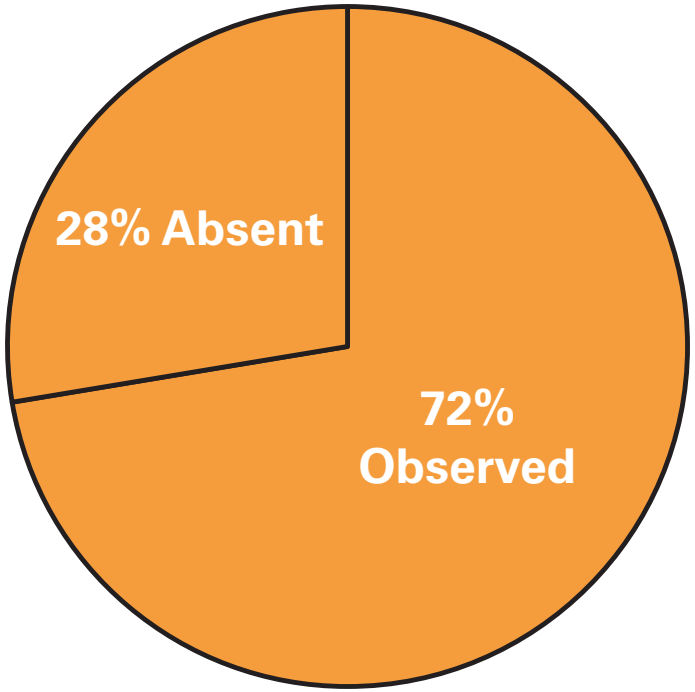


Figure 96: Fair Habitat Rating Based on 72% of Historic Surrogate Species Observed

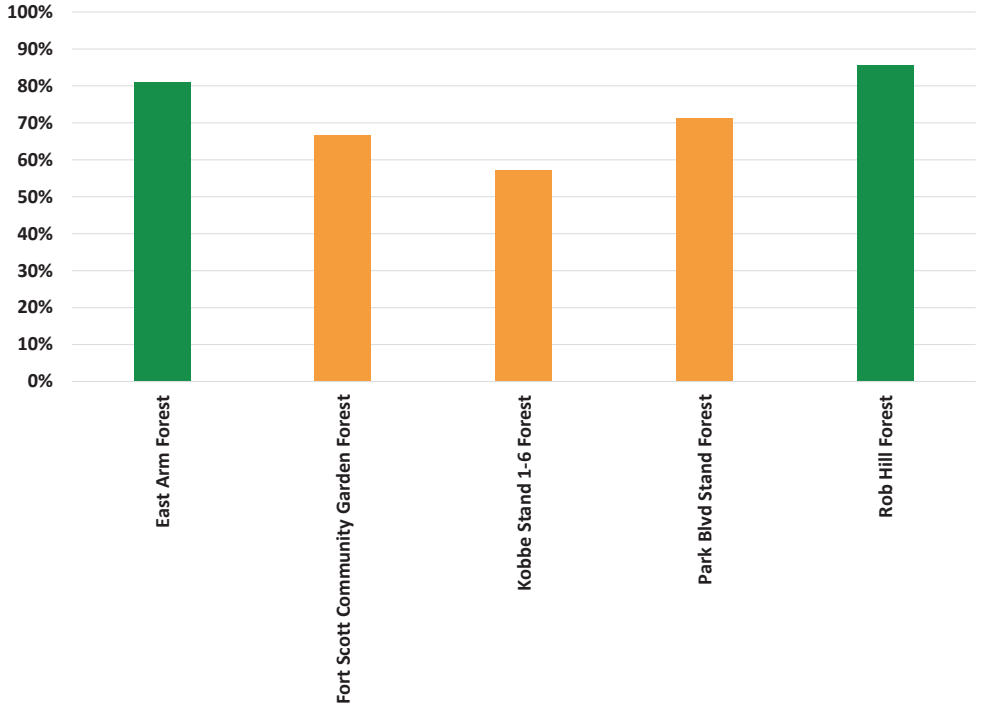


Figure 97: Proportion of Historic Forest Surrogate Species Observed by Site

Figure 98 shows the proportion of surrogate species observed by taxa group for all sites in the Historic Forest habitat.

Figure 99 shows the proportion of each surrogate species observed for all sites in the Historic Forest habitat.

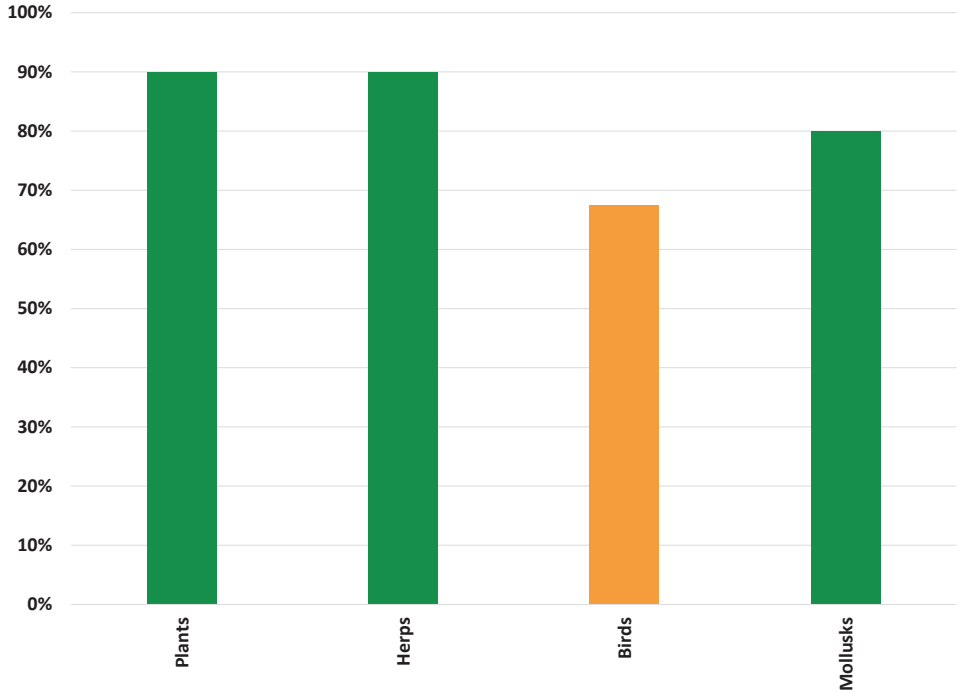


Figure 98: Proportion of Historic Forest surrogate species observed by taxa group

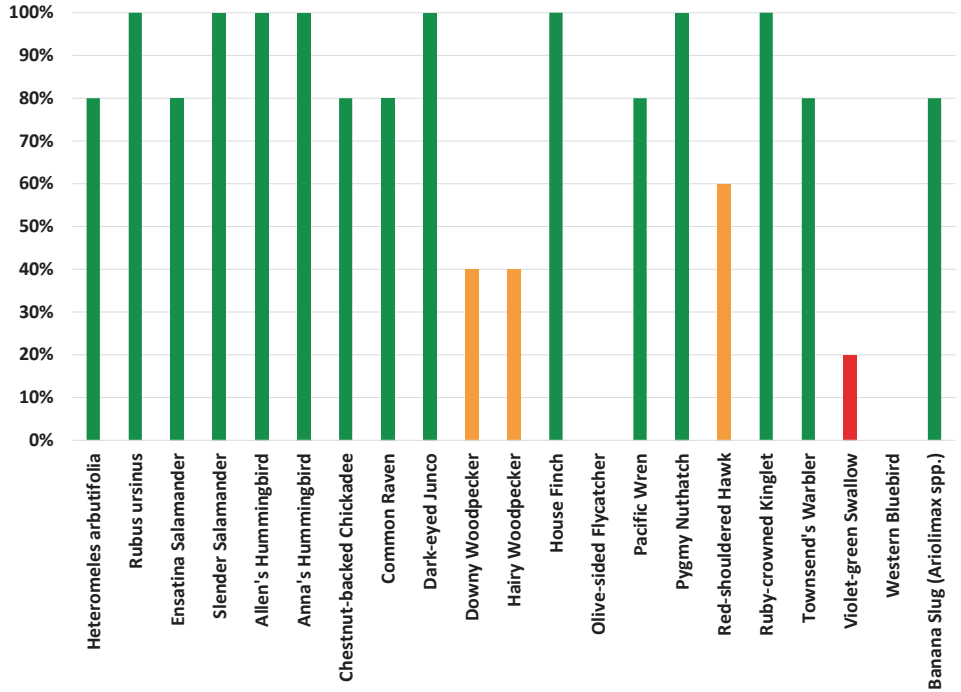
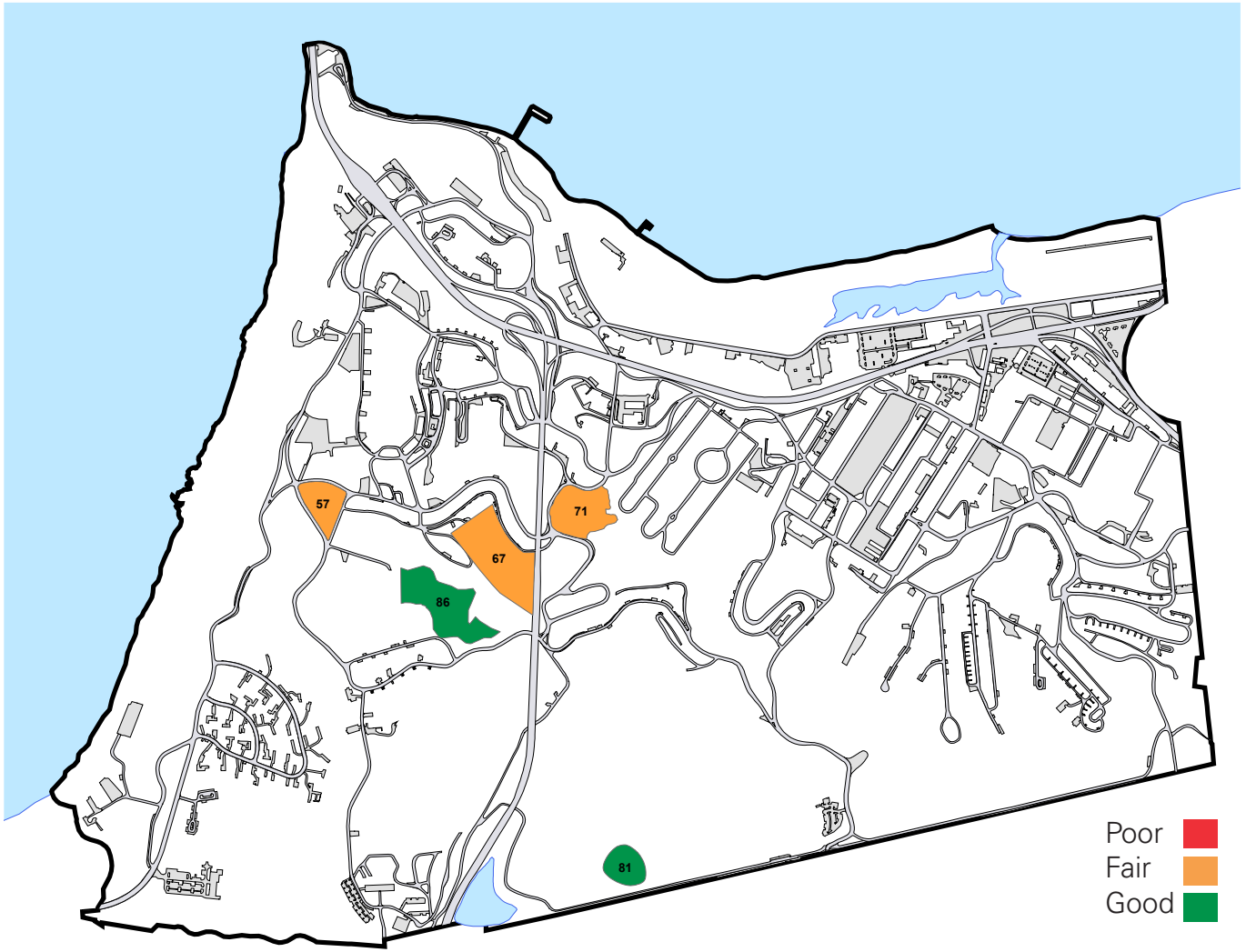


Figure 99: Proportion of Historic Forest surrogate species observed by species

Map 35 shows each Historic Forest UBIF site's poor, fair, or good ranking.



Map 35: Historic Forest monitoring sites and the rating they received

Table 33 lists all of the surrogate species and sites for the Historic Forest habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.
Click here to return to the Historic Forest Habitat Summary page.

Taxon Group	Surrogate Species	East Arm Forest	Fort Scott Community Garden Forest	Kobbe Stand 1-6 Forest	Park Blvd Stand Forest	Rob Hill Forest
Plants	*Heteromeles arbutifolia*	X		X	X	X
	Rubus ursinus	X	X	X	X	X
Herps	Ensatina Salamander	X		X	X	X
	Slender Salamander	X	X	X	X	X
Birds	Allen's Hummingbird	X	X	X	X	X
	Anna's HummingBird	X	X	X	X	X
	Chestnut-backed Chickadee	X	X	X		X
	Common Raven	X	X	X		X
	Dark-eyed Junco	X	X	X	X	X
	Downy Woodpecker	X				X
	Hairy Woodpecker				X	X
	House Finch	X	X	X	X	X
	Olive-sided Flycatcher					
	Pacific Wren	X	X		X	X
	Pygmy Nuthatch	X	X	X	X	X
	Red-shouldered Hawk	X			X	X
	Ruby-crowned Kinglet	X	X	X	X	X
	Townsend's Warbler	X	X		X	X
	Violet-green Swallow		X			
	Western Bluebird					
Mollusk	Banana Slug (Ariolimax spp.)	X	X		X	X

Table 33: List of Historic Forest surrogate species and their presence or absence at each monitoring site

Cultural Landscape habitat includes areas around buildings, residences, and roadsides.

The Cultural Landscape UBIF habitat includes 5 sites and 13 surrogate species. This means there are a total of 65 possible surrogate species that may be observed throughout the habitat. Of the 65 possible surrogate species 43 were observed. Therefore, the proportion of surrogate species observed from 2020 to 2022 was 66% which falls into the *fair* range. This is an increase of 8% from the 58% observed in 2018-2019. Click here to view a summary table of surrogate species and sites for this habitat.

Figure 100 shows the percentage of surrogate species observed versus those not observed for all sites in the Cultural Landscape habitat.
Figure 101 shows proportion of surrogate species observed at each Cultural Landscape site.

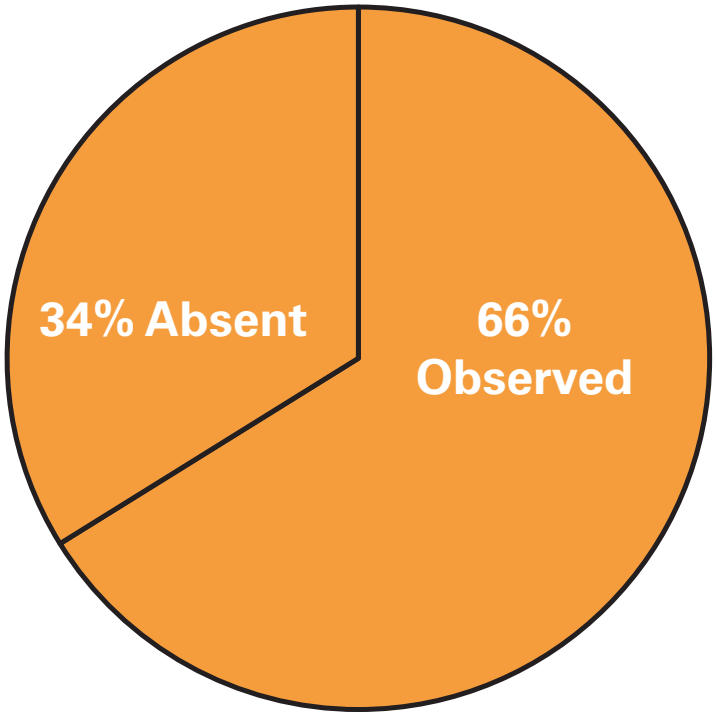


Figure 100: Fair habitat rating based on 66% of Cultural Landscape surrogate species observed

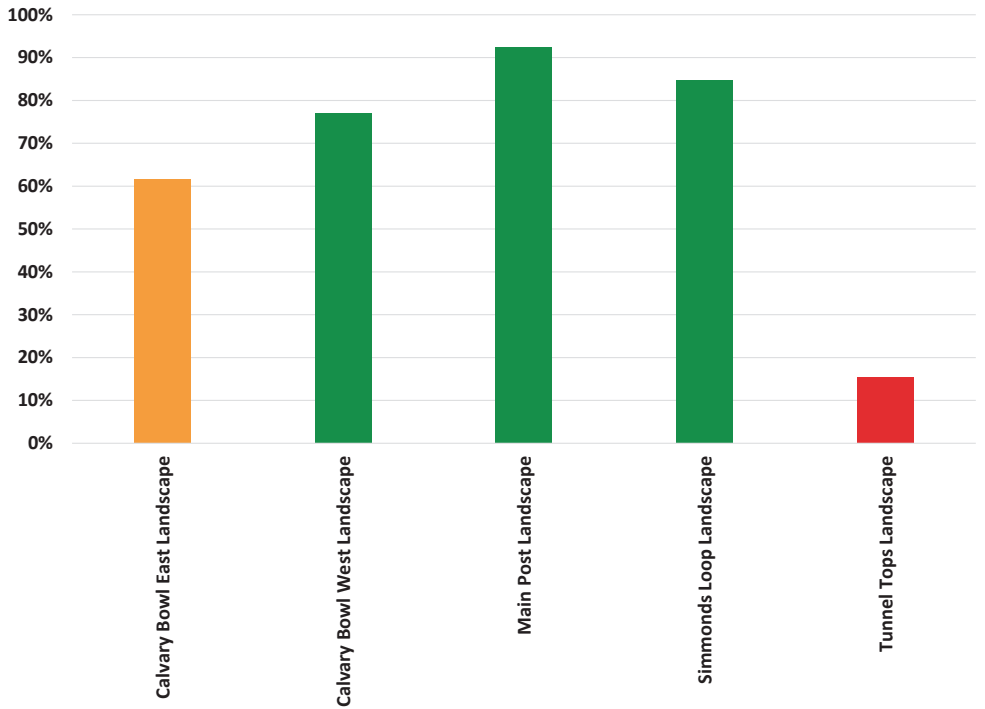


Figure 101: Proportion of Cultural Landscape surrogate species observed by site

Figure 102 shows the proportion of surrogate species observed by taxa group for all sites in the Cultural Landscape habitat.

Figure 103 shows the proportion of each surrogate species observed for all sites in the Cultural Landscape habitat.

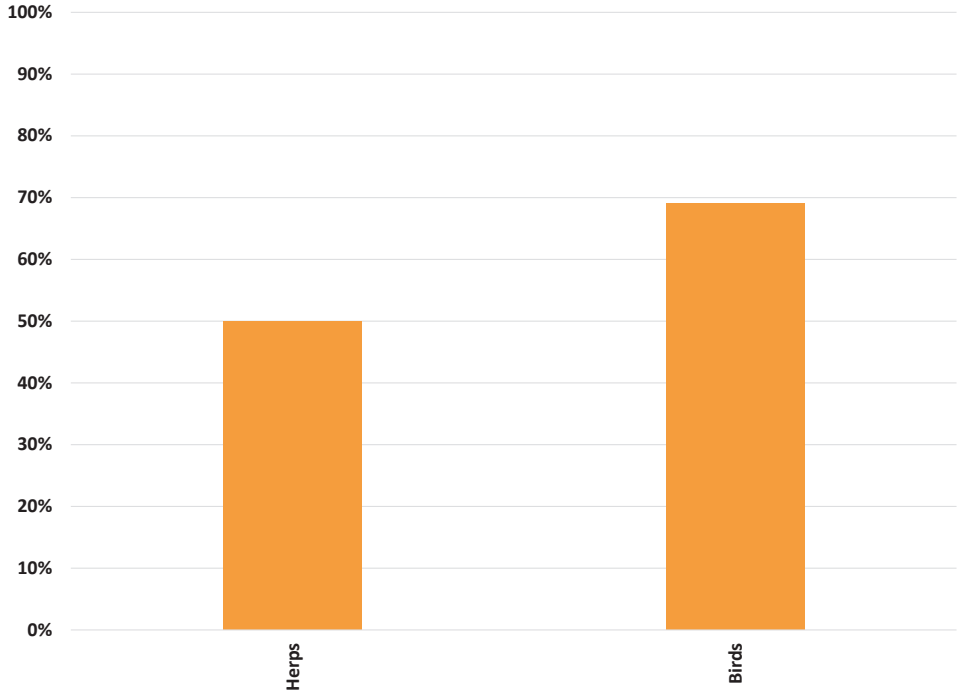


Figure 102: Proportion of Cultural Landscape surrogate species observed by taxa group

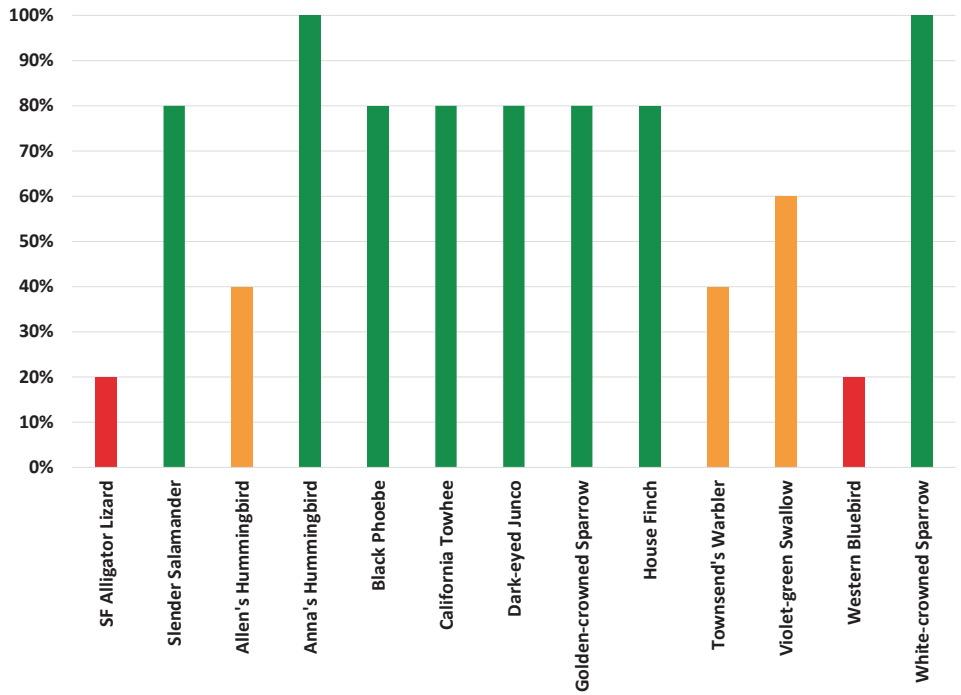
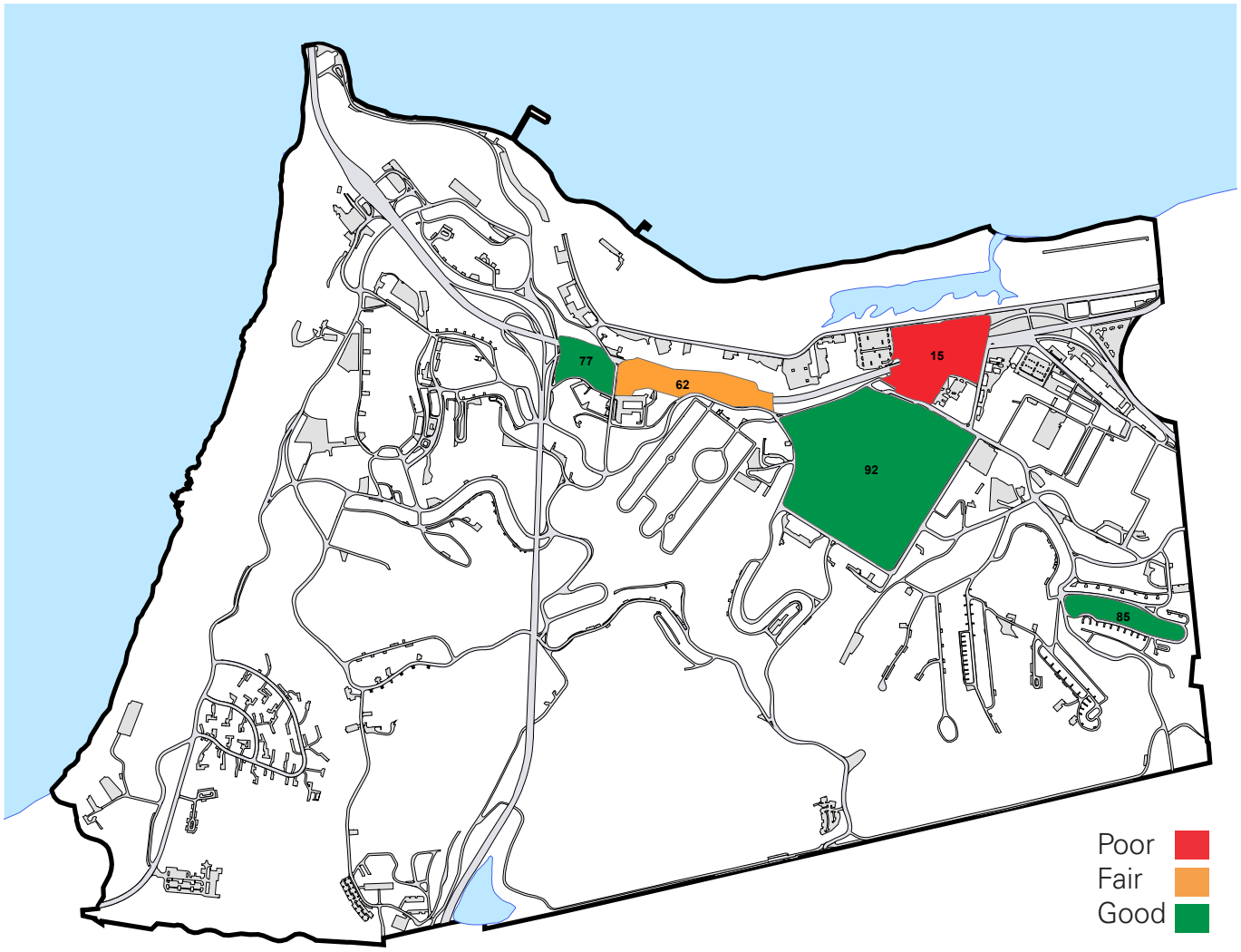


Figure 103: Proportion of Cultural Landscape surrogate species observed by species

Map 36 shows each Cultural Landscape UBIF site's poor, fair, or good ranking.



Map 36: Cultural Landscape monitoring sites and the rating they received

Table 34 lists all of the surrogate species and sites for the Cultural Landscape habitat. An "X" indicates that the species was observed at the corresponding site. Click on any of the species names for a species summary and any of the sites to view it's iNaturalist Project.
Click here to return to the Cultural Landscape Habitat Summary page.

Taxon Group	Surrogate Species	Calvary Bowl East Landscape	Calvary Bowl West Landscape	Main Post Cultural Landscape	Simonds Loop Landscape	Tunnel Tops Landscape
Herps	SF Alligator Lizard		X			
	Slender Salamander	X	X	X	X	
Birds	Allen's Hummingbird			X	X	
	Anna's hummingbird	X	X	X	X	X
	Black Phoebe	X	X	X	X	
	California Towhee	X	X	X	X	
	Dark-eyed Junco	X	X	X	X	
	Golden-crowned Sparrow	X	X	X	X	
	House Finch	X	X	X	X	
	Townsend's Warbler			X	X	
	Violet-green Swallow		X	X	X	
	Western Bluebird			X		
	White-crowned Sparrow	X	X	X	X	X

Table 34: List of Cultural Landscape surrogate species and their presence or absence at each monitoring site

Throughout the UBIF habitats there are 27 different plant surrogate species. Some of these plant species are used as surrogate species at multiple sites. For all of the UBIF sites there are 94 possible plant surrogate species that may be observed throughout the entire project. Of the 94 possible plant surrogate species 84 were observed. Therefore, the proportion of plant surrogate species observed from 2020 to 2022 was 89% which falls into the *good* range. This is a decrease of 2% from the 91% observed in 2018-2019. Click here to view a summary table of plant surrogate species and their habitats.

Figure 104 shows the percentage of plant surrogate species observed versus those not observed for all UBIF sites.

Figure 105 shows proportion of plant surrogate species observed at each UBIF habitat.

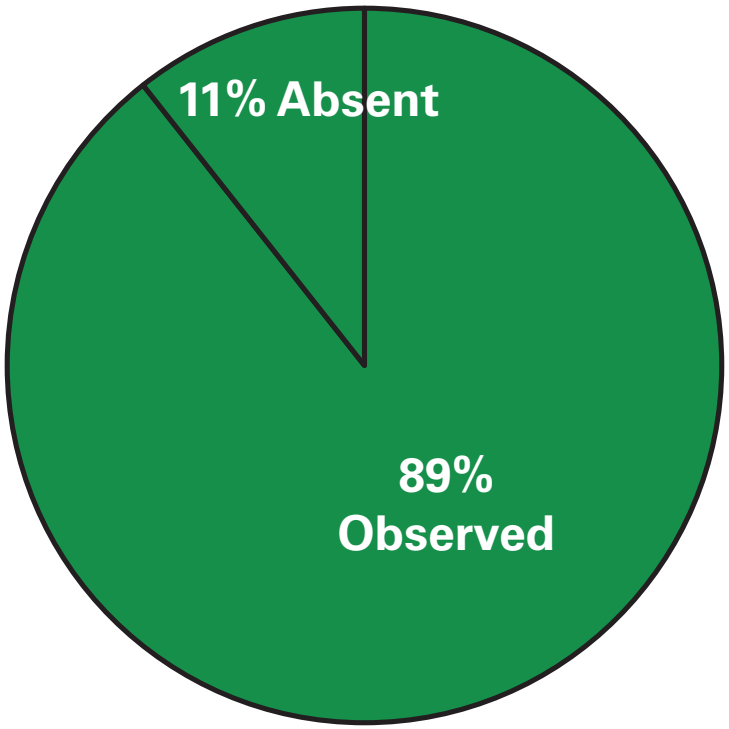


Figure 104: Good Presidio-wide taxon rating based on 89% of plant surrogate species observed

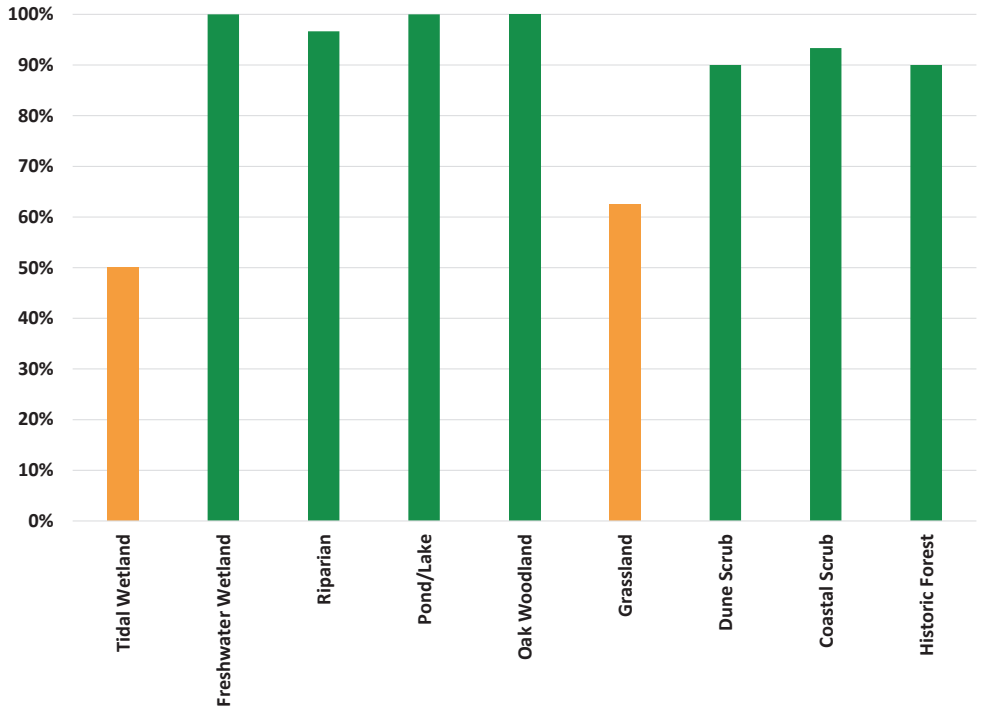
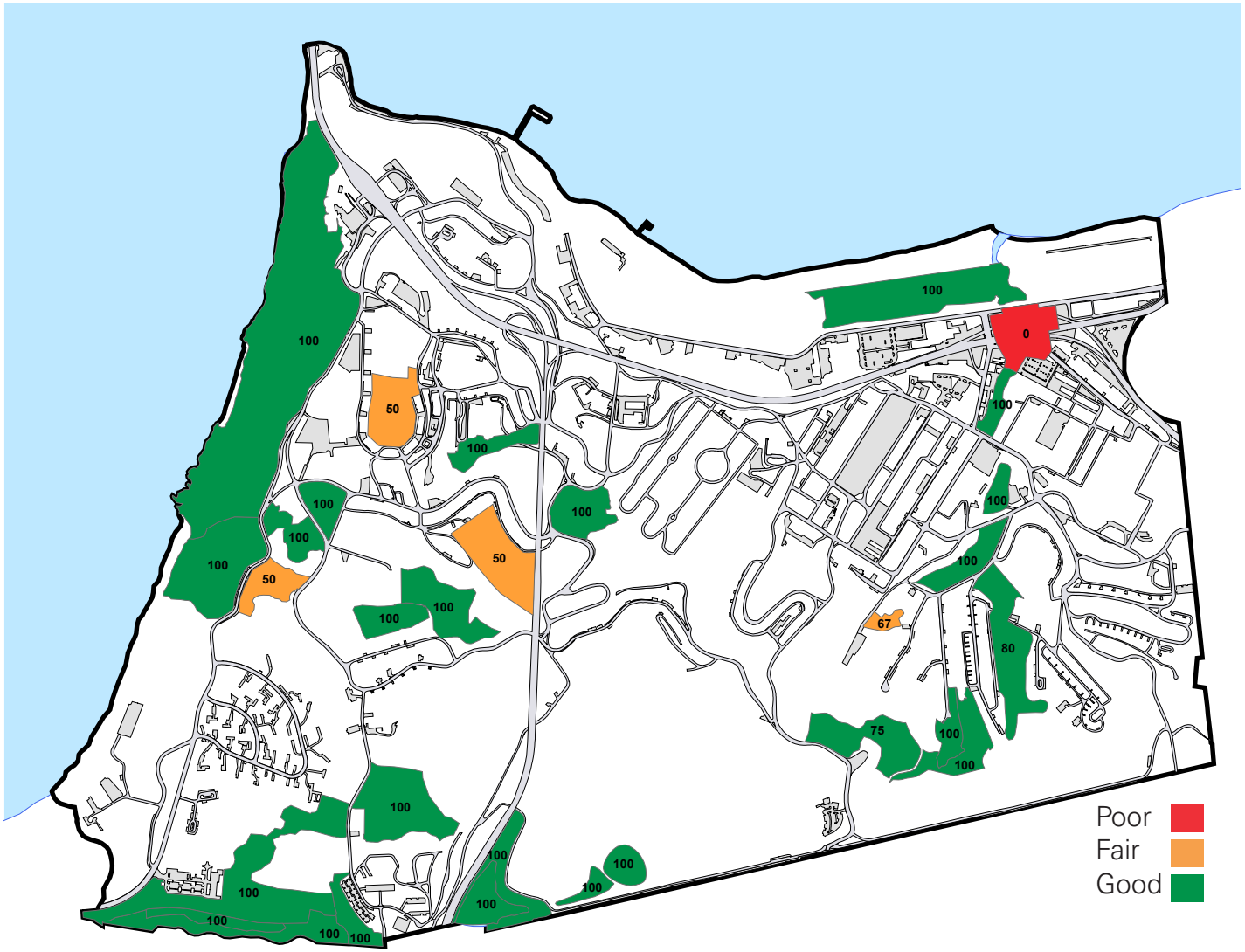


Figure 105: Proportion of plant surrogate species observed by habitat

Map 37 shows each UBIF site's poor, fair, or good ranking by plants.



Map 37: Plant ratings by monitoring sites

Table 35 lists all of the plant surrogate species. An "X" indicates that the species is a surrogate species for the corresponding habitat. Click on any of the species names for a species summary.

Click here to return to the Plant Surrogate Species Summary page.

Plant Surrogate Species	Tidal Wetland	Freshwater Wetland	Riparian	Pond/Lake	Oak Woodland	Grassland	Dune Scrub	Coastal Scrub	Historic Forest	Cultural Landscape
Alnus rubra			X							
Brodiaea terrestris/elegans						X				
Carex obnupta		X								
Ceanothus thyrsiflorus								X		
Cornus sericea			X							
Daucus pusillus						X				
Ericameria ericodes							X			
Eriogonum latifolium								X		
Gilia capitata							X			
Heteromeles arbutifolia									X	
Jaumea carnosa	X									
Juncus effusus		X								
Lonicera involucrata			X							
Marah fabaceus					X					
Mimulus aurantiacus								X		
Morella californica			X							
Oenanthe sarmentosa		X								
Potamogeton pusillus				X						
Quercus agrifolia					X					
Rubus ursinus					X				X	
Salicornia pacifica	X									
Salix lasiolepis			X							
Sanicula bipinnatifida						X				
Scrophularia californica					X					
Stipa pulchra						X				
Toxicodendron diversilobum					X					
Zostera marina	X									

Table 35: List of all plant surrogate species and their corresponding habitat

Throughout the UBIF habitats there are 35 different bird surrogate species. Some of these bird species are used as surrogate species at multiple sites. For all of the UBIF sites there are 368 possible bird surrogate species that may be observed throughout the entire project. Of the 368 possible bird surrogate species 281 were observed. Therefore, the proportion of bird surrogate species observed from 2020 to 2022 was 76% which falls into the *good* range. This is an increase of 10% from the 64% observed in 2018-2019. Click here to view a summary table of bird surrogate species and their habitats.

Figure 106 shows the percentage of bird surrogate species observed versus those not observed for all UBIF sites.

Figure 107 shows proportion of bird surrogate species observed at each UBIF habitat.

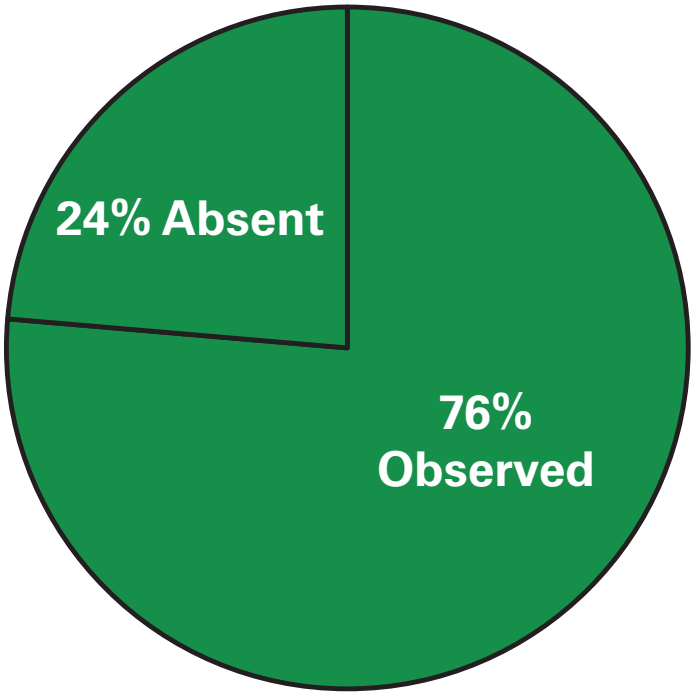


Figure 106: Good Presidio-wide taxon rating based on 76% of bird surrogate species observed

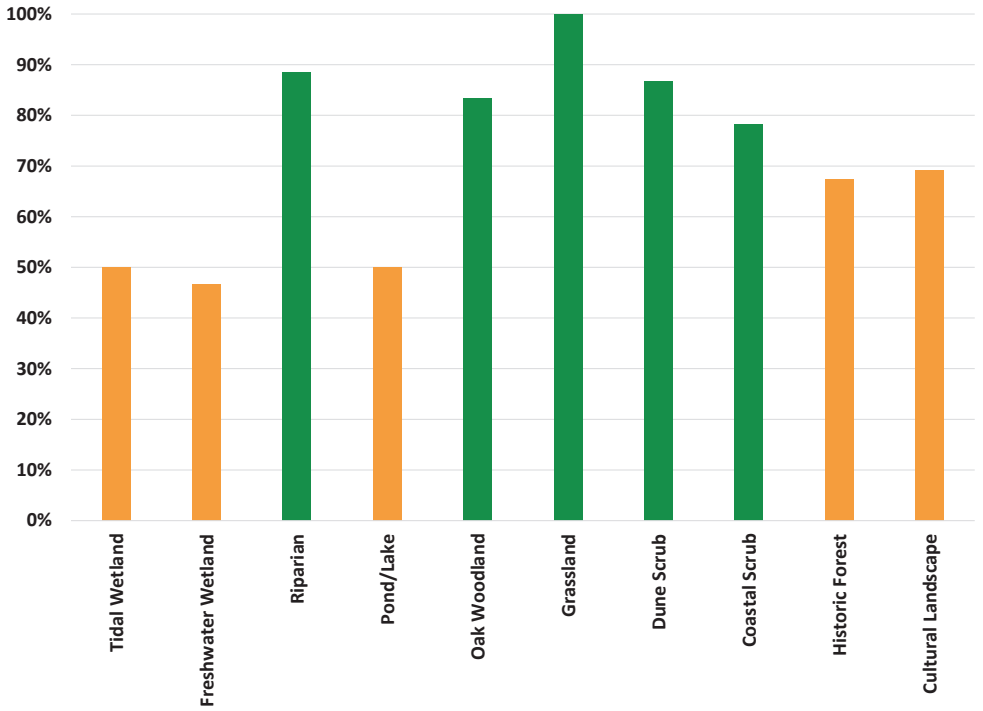
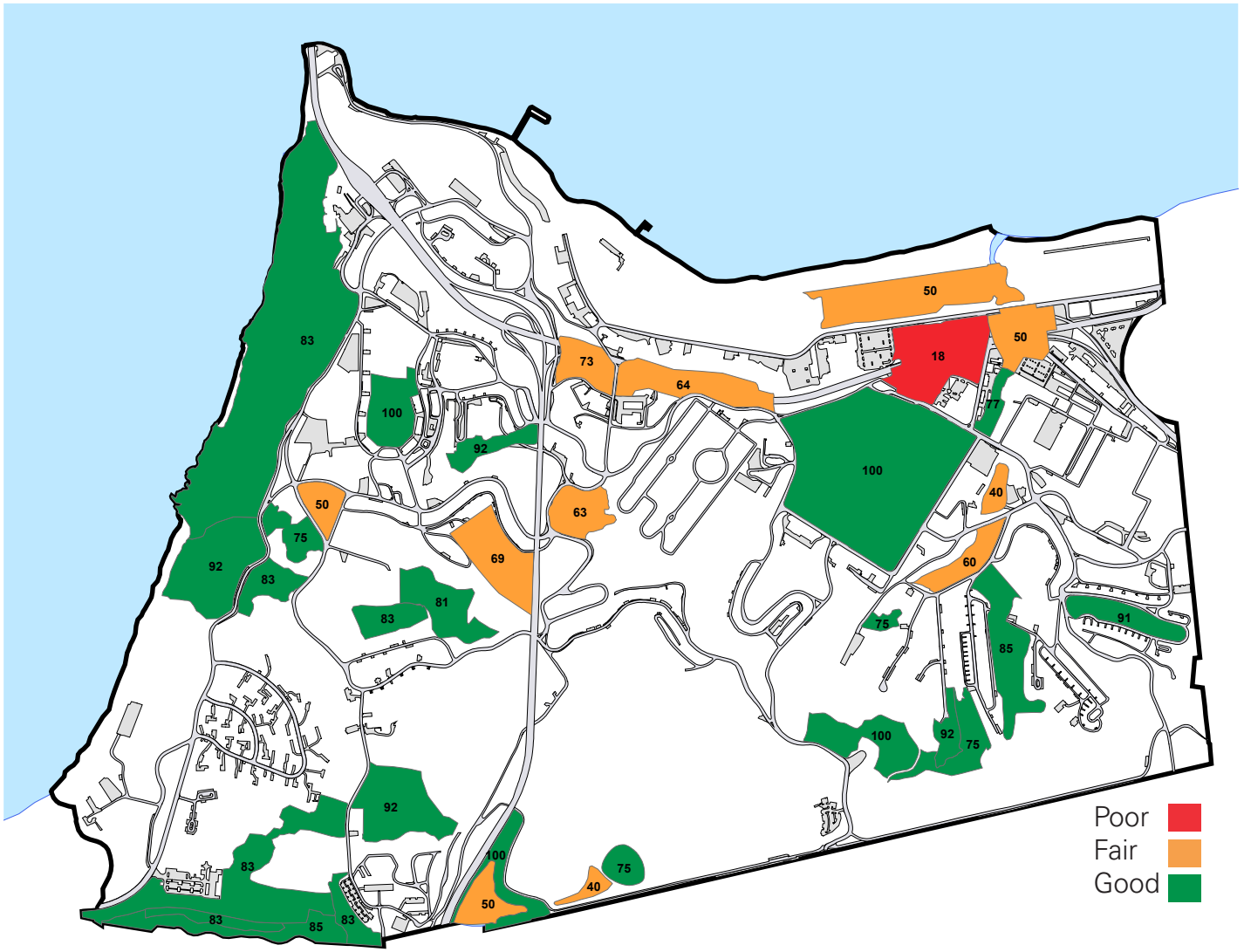


Figure 107: Proportion of bird surrogate species observed by habitat

Map 38 shows each UBIF site's poor, fair, or good ranking by birds.



Map 38: Bird ratings by monitoring sites

Table 36 lists all of the bird surrogate species. An "X" indicates that the species is a surrogate species for the corresponding habitat. Click on any of the species names for a species summary.

Click here to return to the Bird Surrogate Species Summary page.

Bird Surrogate Species	Tidal Wetland	Freshwater Wetland	Riparian	Pond/Lake	Oak Woodland	Grassland	Dune Scrub	Coastal Scrub	Historic Forest	Cultural Landscape
Allen's Hummingbird			X				X	X	X	X
American Coot		X								
Anna's Hummingbird			X		X				X	X
Bewick's wren							X	X		
Black Phoebe		X	X							X
California Quail							X	X		
California Scrub-Jay			X		X		X	X		
California Towhee							X	X		X
Chestnut-backed Chickadee			X						X	
Common Raven									X	
Common Yellowthroat	X	X	X							
Dark-eyed Junco									X	X
Downy Woodpecker			X		X				X	
Golden-crowned Sparrow			X				X	X		X
Hairy Woodpecker					X				X	
House Finch							X	X	X	X
Hutton's Vireo					X					
Marsh Wren	X									
Olive-sided Flycatcher									X	
Pacific Wren									X	
Pied-billed Grebe		X		X						
Pygmy Nuthatch									X	
Red-shouldered Hawk									X	
Ridgway's Rail	X									
Ruby-crowned Kinglet			X				X	X	X	
Song Sparrow	X		X				X	X		
Spotted Towhee			X				X	X		
Swainson's Thrush			X							
Townsend's Warbler									X	X
Violet-green Swallow		X		X					X	X
Western Bluebird					X	X			X	X
Western Meadowlark						X				
White-crowned Sparrow							X	X		X
Wilson's Warbler			X							
Wrentit							X	X		

Table 36: List of all bird surrogate species and their corresponding habitat

Throughout the UBIF habitats there are 6 different herpetofauna (or "herps") surrogate species. Some of these herpetofauna species are used as surrogate species at multiple sites. For all of the UBIF sites there are 54 possible herpetofauna surrogate species that may be observed throughout the entire project. Of the 54 possible herpetofauna surrogate species 41 were observed. Therefore, the proportion of herpetofauna surrogate species observed from 2020 to 2022 was 76% which falls into the *good* range. This is an increase of 77% from the 69% observed in 2018-2019. Click here to view a summary table of herpetofauna surrogate species and their habitats.

Figure 108 shows the percentage of herpetofauna surrogate species observed versus those not observed for all UBIF sites.

Figure 109 shows proportion of herpetofauna surrogate species observed at each UBIF habitat.

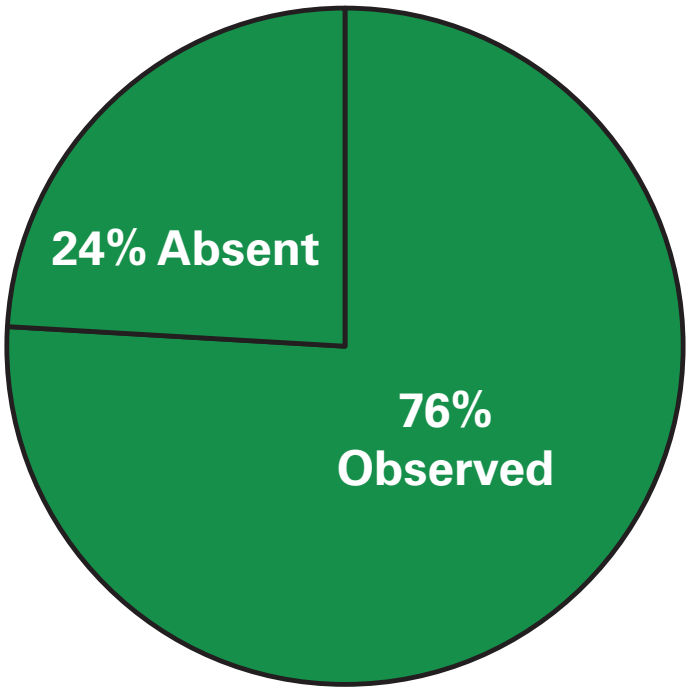


Figure 108: Good Presidio-wide taxon rating based on 69% of herpetofauna surrogate species observed

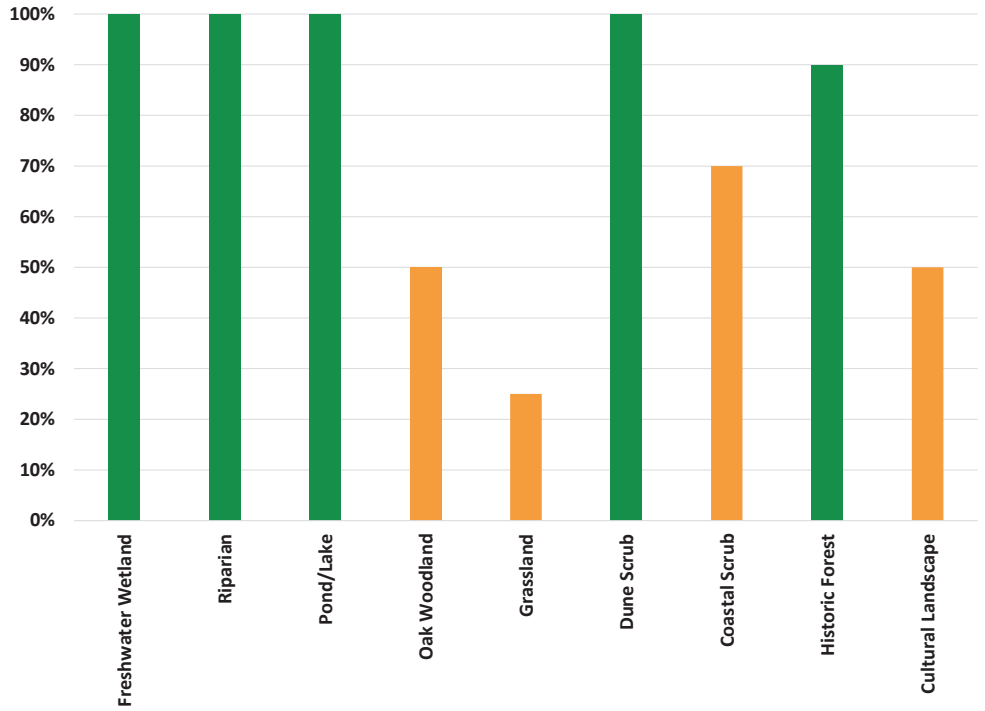
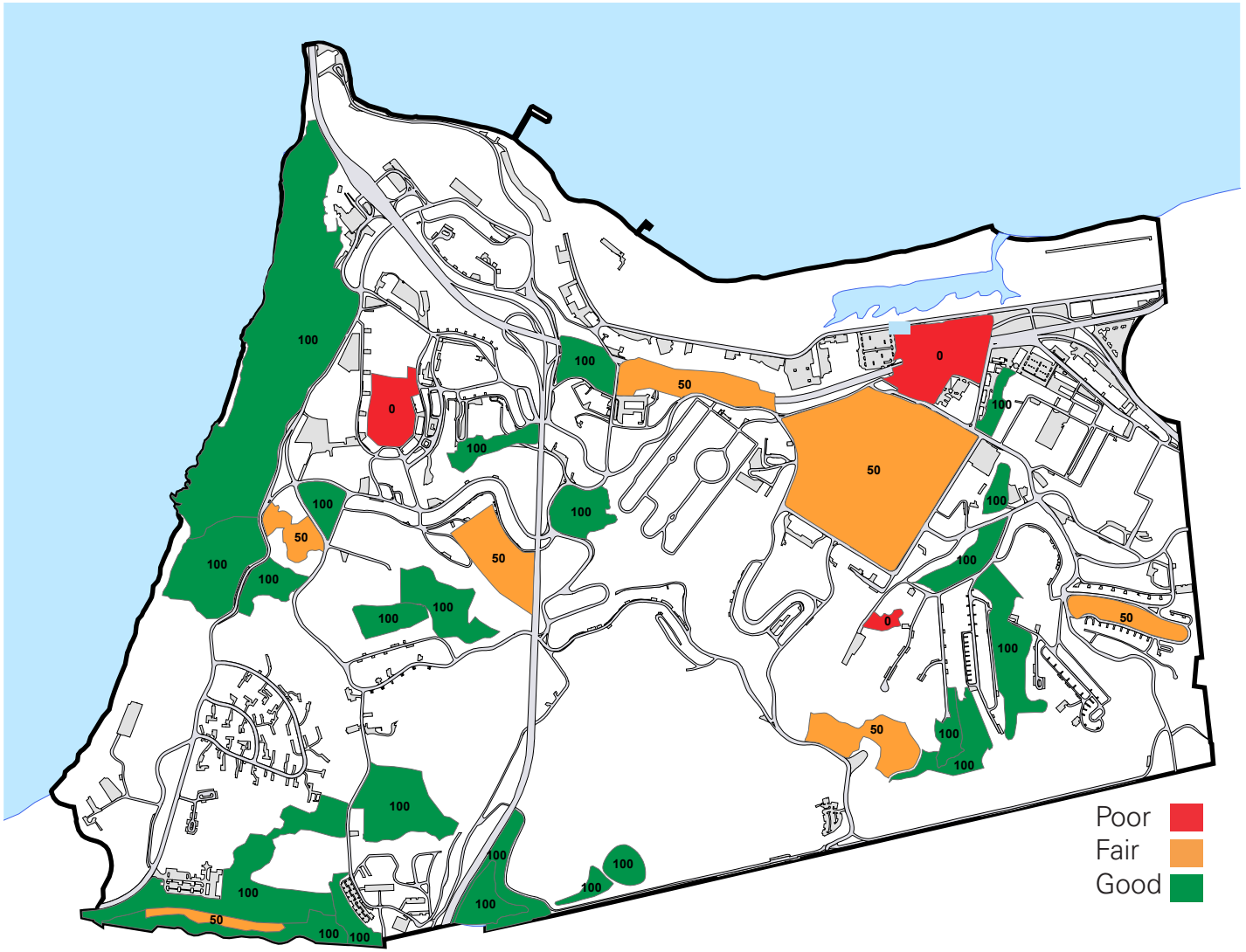


Figure 109: Proportion of herpetofauna surrogate species observed by habitat

Map 39 shows each UBIF site's poor, fair, or good ranking by herpetofauna.



Map 39: Herpetofauna ratings by monitoring sites

Table 37 lists all of the herpetofauna surrogate species. An "X" indicates that the species is a surrogate species for the corresponding habitat. Click on any of the species names for a species summary.

Click here to return to the Herpetofauna Surrogate Species Summary page.

Herpetofauna Surrogate Species	Tidal Wetland	Freshwater Wetland	Riparian	Pond/Lake	Oak Woodland	Grassland	Dune Scrub	Coastal Scrub	Historic Forest	Cultural Landscape
Coast Garter Snake						X		X		
Ensatina Salamander									X	
Pacific Chorus Frog		X		X						
SF Alligator Lizard					X	X				X
Slender Salamander		X	X		X				X	X
Western Fence Lizard							X	X		

Table 37: List of all herpetofauna surrogate species and their corresponding habitat

Throughout the UBIF habitats there are 4 different mollusk surrogate species. Some of these mollusk species are used as surrogate species at multiple sites. For all of the UBIF sites there are 35 possible mollusk surrogate species that may be observed throughout the entire project. Of the 35 possible mollusk surrogate species 8 were observed. Therefore, the proportion of mollusk surrogate species observed 2020 to 2022 was 77% which falls into the *good* range. This is a decrease of 12% from the 89% observed in 2018-2019. Click here to view a summary table of mollusk surrogate species and their habitats.

Figure 110 shows the percentage of mollusk surrogate species observed versus those not observed for all UBIF sites.

Figure 111 shows proportion of mollusk surrogate species observed at each UBIF habitat.

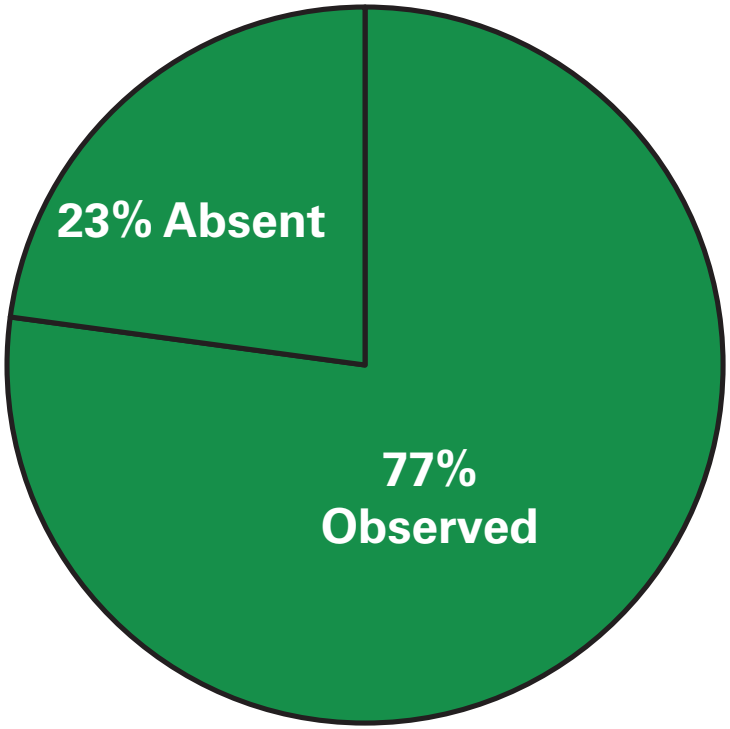


Figure 110: Good Presidio-wide taxon rating based on 77% of mollusk surrogate species observed

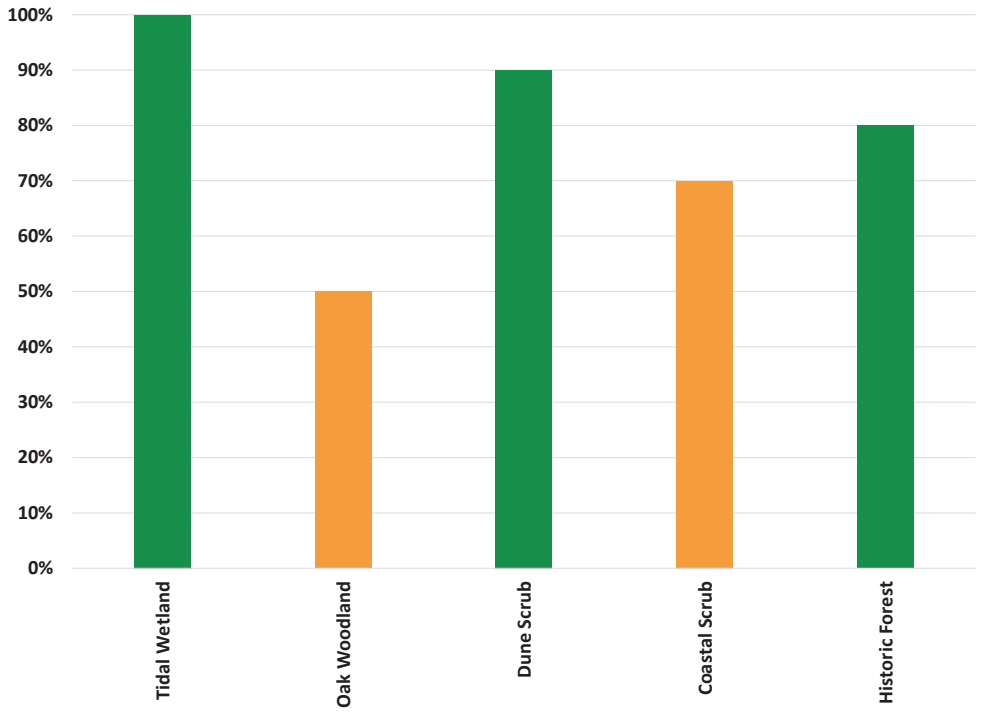
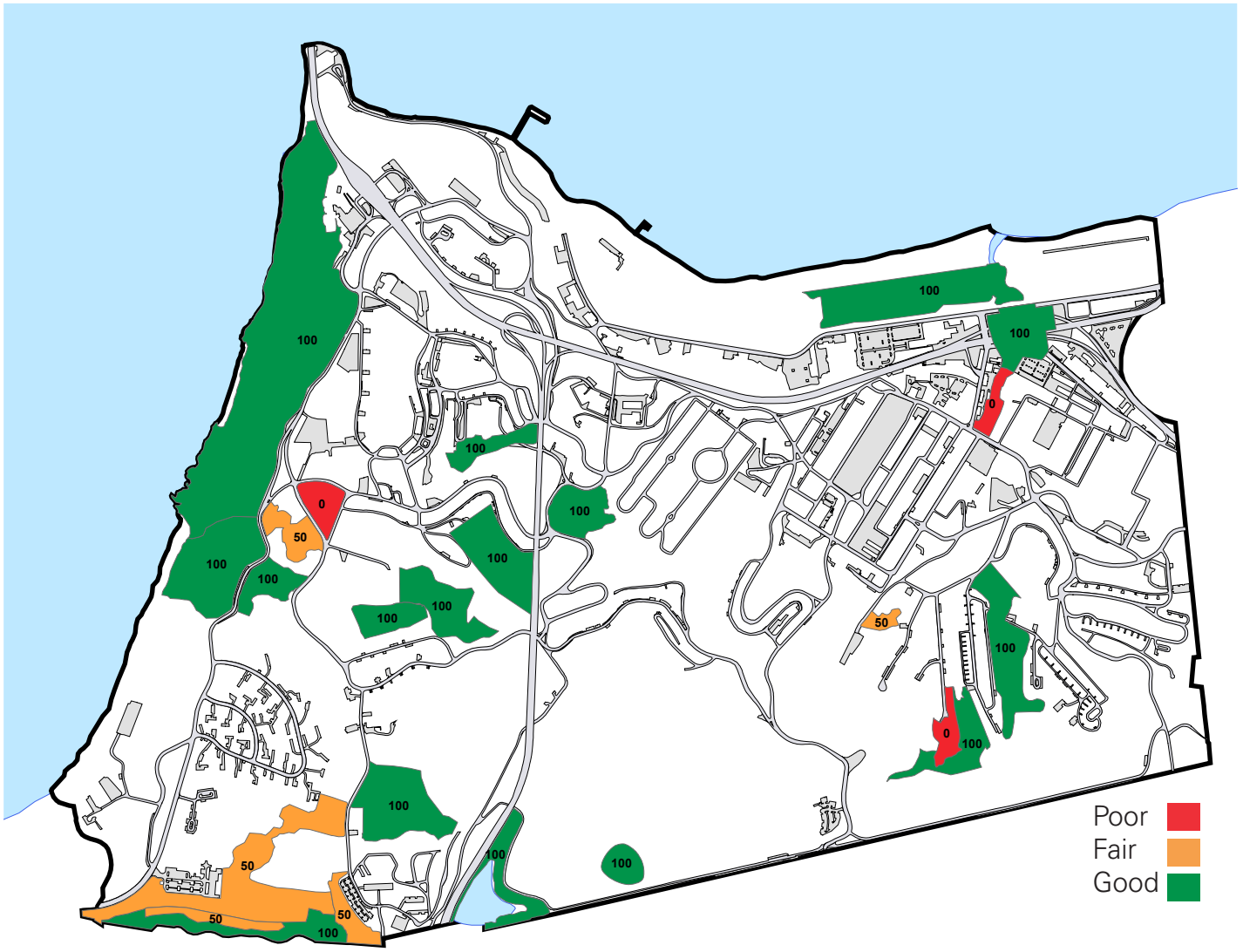


Figure 111: Proportion of mollusk surrogate species observed by habitat

Map 40 shows each UBIF site's poor, fair, or good ranking by mollusks.



Map 40: Mollusk ratings by monitoring sites

Table 38 lists all of the mollusk surrogate species. An "X" indicates that the species is a surrogate species for the corresponding habitat. Click on any of the species names for a species summary.

Click here to return to the Mollusk Surrogate Species Summary page.

Mollusk Surrogate Species	Tidal Wetland	Freshwater Wetland	Riparian	Pond/Lake	Oak Woodland	Grassland	Dune Scrub	Coastal Scrub	Historic Forest	Cultural Landscape
Banana Slug (Ariolimax spp.)									X	
California Lancetooth Snail			X		X		X	X		
Olympia Oysters	X									
Shoulderband Snail					X		X	X		

Table 38: List of all mollusk surrogate species and their corresponding habitat

Water Quality

FAIR
62%

Although many of the natural features of the Presidio of San Francisco have been altered by historical Army use and urbanization, several water bodies remain including seeps, springs, creeks, ponds, freshwater and tidal wetlands, and a lake. The quality of that water is an indicator of the condition of aquatic habitat and is also an important indicator of the overall health of watersheds. Freshwater quality has a direct impact on marine aquatic macroinvertebrates amphibians, reptiles, and fish that depend on these habitats, as well as human recreation and enjoyment.

In partnership with the National Park Service Inventory and Monitoring Program, staff conduct monthly water quality monitoring sampling at 18 sites in 4 watershed groups throughout the Presidio (see Map 41 of the monitoring sites). We assessed the health of the water bodies in the Presidio by comparing water quality monitoring results from water year 2018, which was analysed in our initial report, and the most recent data available water years 2019, 2020, and 2021. We compare key parameters to defined target thresholds (good and poor) and then aggregating results in various ways to determine good, fair, and poor ratings. Using this method of targets we assessed water quality at six different scales: sample ratings, aggregate of each parameter at each site, site ratings as an aggregate of all parameter samples at a monitoring site, watershed rating as an aggregate of all parameter samples in a watershed, overall parameter ratings, and an overall rating. These are lagging indicators of environmental health.

Five parameters were selected for this analysis including:
- **Dissolved oxygen (DO)**: a measure of how much oxygen is dissolved in the water. When dissolved oxygen becomes too low, fish and other aquatic organisms cannot survive.
- **Nitrate as N**: a measure of nitrates in the water which may come from fertilizers or sewage. The presence of nitrates usually does not have a direct effect on aquatic insects or fish, however excess levels can create conditions that make it difficult for them to survive.
- **Phosphate**: a measure of phosphates in the water which come largely from fertilizers. Excess phosphates can create water that's cloudy, low in oxygen, and create algal blooms.

Two additional biological parameters, *Escherichia coli* and total coliform, were measured but not included in this analysis due to their lack of correlation to ecological health.

Figure 112: NPS staff collecting water samples at MacArthur Meadow

Parameter targets for water quality samples were determined by guidelines set by the San Francisco Bay Regional Water Quality Control Board when available and with the guidance of the National Park Service Inventory and Monitoring Program staff. Individual sample ratings were determined by comparing results to the parameter targets listed in Table 39.

Water Quality Parameter	Parameter Target
Dissolved Oxygen	> 5mg/L
Nitrate as N	< 1.6 mg/L
Phosphate	<0.1 mg/L

Table 39: Water Quality Ratings Thresholds by Parameter

Score	Rating
≤ 25%	Poor
> 25% & < 75%	Fair
≥ 75%	Good

Table 40: Good, Fair, and Poor Rating Thresholds

The following examples illustrates how the various water quality ratings are determined based on the parameter target thresholds. All of the results of these ratings are given good, fair, or poor ratings based on the values listed in Table 40.

Site Parameter Rating

Rating of good (≥75%), fair (>25% and <75%), and poor (≤ 25%) based on percent of samples of each individual parameter at each individual monitoring site reaching their set target.

Dissolved Oxygen at Site A: 25/30 or 83% of Samples Reached Target = Good Rating

Site Rating

Rating of good (≥75%), fair (>25% and <75%), and poor (≤ 25%) based on the average of the site parameter ratings at each site.

Site A
Site Parameter Ratings
Dissolved Oxygen = 83%
Nitrate as N = 50%
Phosphate = 60%
→ Site Rating = (83%+50%+60%)/3= 64%= Fair Rating

Watershed Rating

Rating of good (≥75%), fair (>25% and <75%), and poor (≤ 25%) based on the average of all site parameter ratings of each site that falls within a watershed group.

Site A
Site Parameter Ratings
Dissolved Oxygen = 83%
Nitrate as N = 50%
Phosphate = 60%

Site B
Site Parameter Ratings
Dissolved Oxygen = 70%
Nitrate as N = 90%
Phosphate = 40%

Watershed Group Rating = (83%+50%+60%+70%+90%+40%)/6= 66%= Fair Rating

Overall Parameter Rating

Rating of good (≥75%), fair (>25% and <75%), and poor (≤ 25%) based on the average an individual parameter's site parameter ratings at all sites.

Site Parameter Ratings for DO
Site A Dissolved Oxygen = 83%
Site B Dissolved Oxygen = 70%
Site C Dissolved Oxygen = 90%
→ Overall DO Parameter Rating = (83%+70%+90%)/3= 81% = Good Rating

Overall Rating

Rating of good (≥75%), fair (>25% and <75%), and poor (≤ 25%) based on the average of the site parameter ratings of all parameter at all sites.

Site A
Site Parameter Ratings
Dissolved Oxygen = 83%
Nitrate as N = 50%
Phosphate = 60%

Site B
Site Parameter Ratings
Dissolved Oxygen = 70%
Nitrate as N = 90%
Phosphate = 40%

Site C
Site Parameter Ratings
Dissolved Oxygen = 90%
Nitrate as N = 30%
Phosphate = 20%

Overall Rating = (83%+50%+60%+70%+90%+40%+90%+30%+20%)/9= 59%= Fair Rating

Figure 113 shows that the average of all site parameter ratings for all assessed water quality data for the combined water year of 2019, 2020, and 2021 results in an overall score of 61% which receives an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is a slight decrease from the last report's score (water year 2018) of 64%. While overall the Presidio water quality received a fair rating, it is important to note that some key parameters, such as nitrate levels in Lobos Creek, continue to get failing scores and they should be addressed at specific sites. Solutions to improve denitrification and phosphate uptake should be considered to address some of these long term problems in Tennessee Hollow and Lobos Creek.

Figure 114 shows that of the 18 water quality monitoring sites throughout the Presidio 5 of the sites received good ratings, 12 received fair ratings, and 1 received a poor rating. The monitoring site the received a poor rating TH3 which is located at upper Thompson Reach. To see a further analysis of site specific results see Table 43 on page 137.

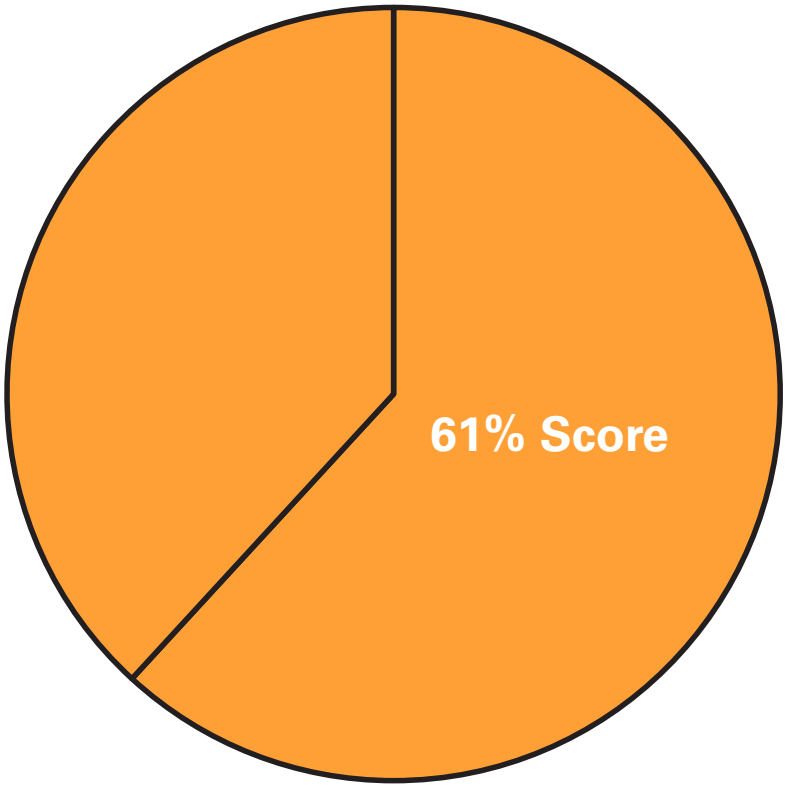


Figure 113: Fair overall rating based on 61% score

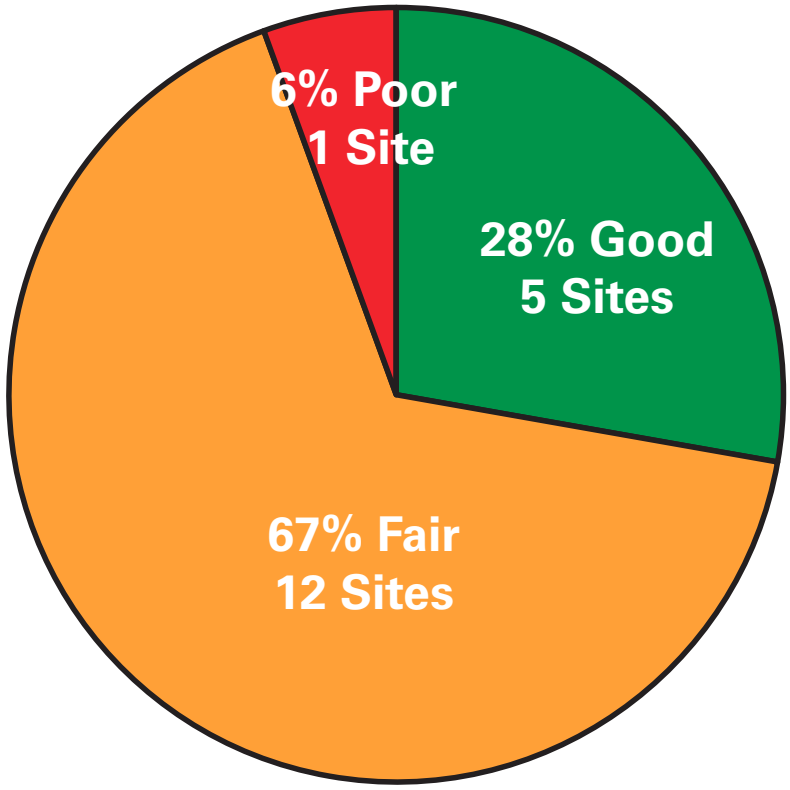


Figure 114: Water quality monitoring site's ratings

Figure 115 shows the overall parameter rating for Dissolved Oxygen received a score of 74% which is an an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is an increase from the last report's score of 70%.

Figure 116 shows overall parameter rating for Nitrate as N received a score of 56% which is an an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is a slight increase from the last report's score of 55%.

Figure 117 shows overall parameter rating for Phosphate received a score of 52% which is an an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is a decrease from the last report's score of 65%.

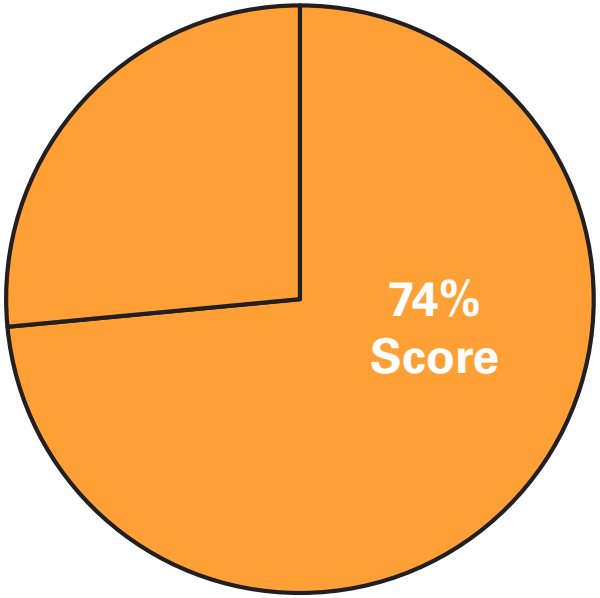


Figure 115: Fair overall parameter rating of Dissolved Oxygen based on 74% score

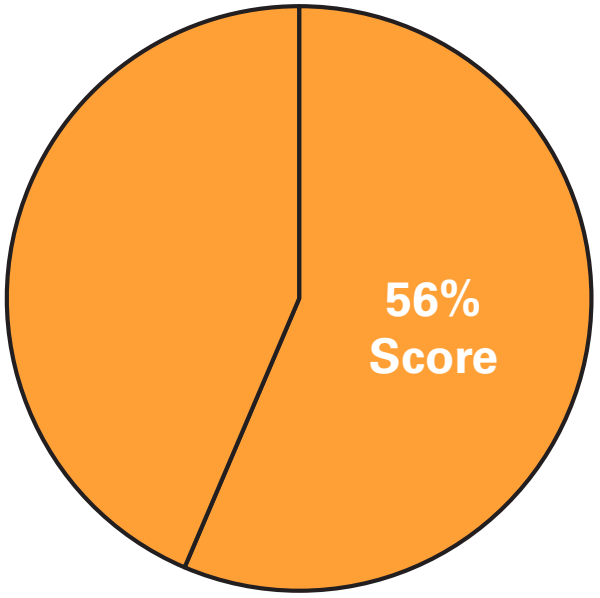


Figure 116: Fair overall parameter rating of Nitrate as N based on 56% score

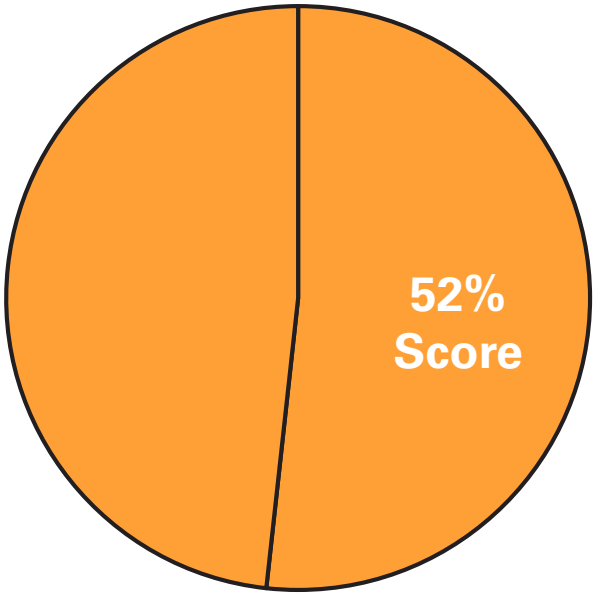


Figure 117: Fair overall parameter rating of Phosphate based on 52% score

Water Quality Scoreboard

Overall Score

Previous Year	Current Year
64%	61%

FAIR ↓

Dissolved Oxygen Score

Previous Year	Current Year
70%	74%

FAIR ↑

Nitrate as N Score

Previous Year	Current Year
55%	56%

FAIR ↑

Phosphate Score

Previous Year	Current Year
65%	52%

FAIR ↓

Dragonfly Creek Score

Previous Year	Current Year
100%	96%

GOOD ↓

Lobos Creek Score

Previous Year	Current Year
38%	46%

FAIR ↑

Mountain Lake Score

Previous Year	Current Year
65%	65%

FAIR ↔

Tennessee Hollow Score

Previous Year	Current Year
67%	60%

FAIR ↓

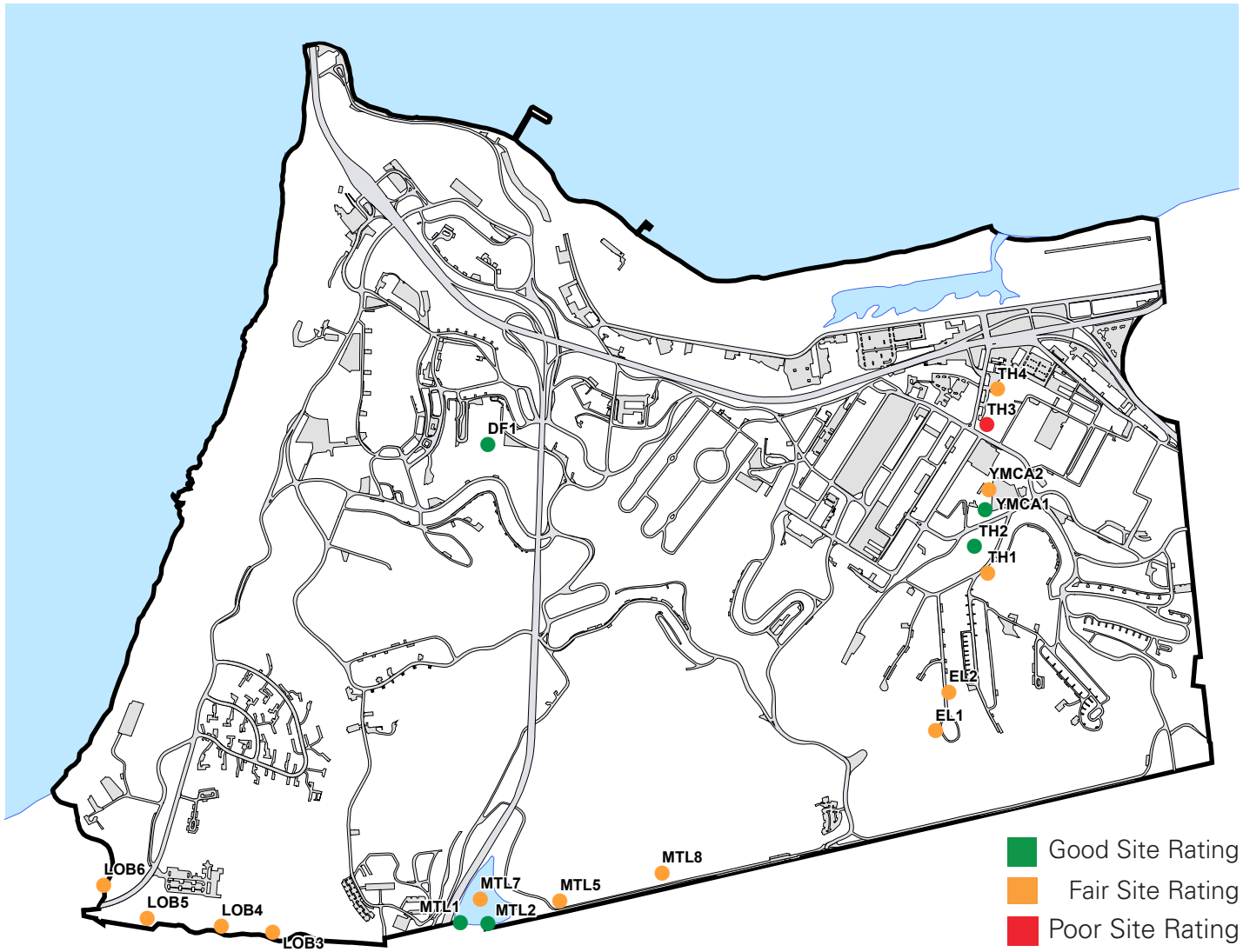
Figure 118: Water Quality Scoreboard

Table 41 shows each monitoring site within each watershed, the percent of the site's samples rated good, the rating it received, how the rating is trending compared to the previous report's results for each parameter and monitoring site.

Watershed Group/Rating	Monitoring Site	Overall			Dissolved Oxygen			Nitrate as N			Phosphate		
		Average of Percent of Site Parameters Rated Good	Site Rating	Trend From Previous Report	Percent of Samples Rated Good	Site Parameter Rating	Trend From Previous Report	Percent of Samples Rated Good	Site Parameter Rating	Trend From Previous Report	Percent of Samples Rated Good	Site Parameter Rating	Trend From Previous Report
Dragonfly Creek: Good	DF1	96%	Good	Declining	100%	Good	No Change	90%	Good	Declining	97%	Good	Declining
Lobos Creek: Fair	LOB3	72%	Fair	Improving	66%	Fair	Improving	78%	Good	Declining	N/A	N/A	N/A
	LOB4	27%	Fair	Improving	53%	Fair	Improving	0%	Poor	No Change	N/A	N/A	N/A
	LOB5	34%	Fair	Improving	69%	Fair	Improving	0%	Poor	No Change	N/A	N/A	N/A
	LOB6	52%	Fair	Improving	100%	Good	No Change	3%	Poor	Improving	N/A	N/A	N/A
Mountain Lake: Fair	MTL1	95%	Good	Declining	98%	Good	Declining	100%	Good	No Change	86%	Good	Declining
	MTL2	92%	Good	Declining	100%	Good	Improving	100%	Good	No Change	75%	Good	Declining
	MTL5	38%	Fair	Improving	29%	Fair	Improving	71%	Fair	Improving	14%	Poor	Improving
	MTL7	67%	Fair	Declining	99%	Good	Declining	100%	Good	N/A	3%	Poor	N/A
	MTL8	33%	Fair	No Change	86%	Good	Declining	13%	Poor	Improving	0%	Poor	No Change
Tennessee Hollow: Fair	EL1	56%	Fair	Declining	100%	Good	No Change	10%	Poor	Improving	59%	Fair	Declining
	EL2	49%	Fair	Declining	35%	Fair	Declining	95%	Good	Declining	16%	Poor	Declining
	TH1	71%	Fair	Improving	47%	Fair	Improving	76%	Good	Declining	88%	Good	Improving
	TH2	87%	Good	Declining	92%	Good	Declining	92%	Good	Declining	77%	Good	Declining
	TH3	16%	Poor	Declining	23%	Poor	Declining	10%	Poor	Improving	16%	Poor	Improving
	TH4	52%	Fair	Declining	81%	Good	Declining	0%	Poor	No Change	75%	Good	Declining
	YMCA1	80%	Good	Declining	82%	Good	Declining	94%	Good	Declining	65%	Fair	Declining
	YMCA2	67%	Fair	Declining	64%	Fair	Improving	82%	Good	Declining	55%	Fair	Declining

Table 41: Water quality results for all monitoring sites and parameters

Map 41 shows the site ratings each water quality station received.



Map 41: Water quality site rating results

Dragonfly Creek watershed consists of only one monitoring site. Figure 119 shows the Dragonfly Creek watershed received a score of 96% which is an overall g*ood rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is a slight decrease from the 100% score the watershed received in the last report.

On the following page Table 42 breaks down the ratings of all samples taken at the monitoring sites in the Dragonfly Creek watershed. Every single sample taken in our analysis received a good rating.

On the following page Figure 120 shows dissolved oxygen in Dragonfly Creek received a 100% score which is a *good rating*. Figure 121 shows nitrate as N in Dragonfly Creek received a 90% score which is a *good rating.* Figure 122 shows phosphate in Dragonfly Creek received a 97% score which is a *good rating.*

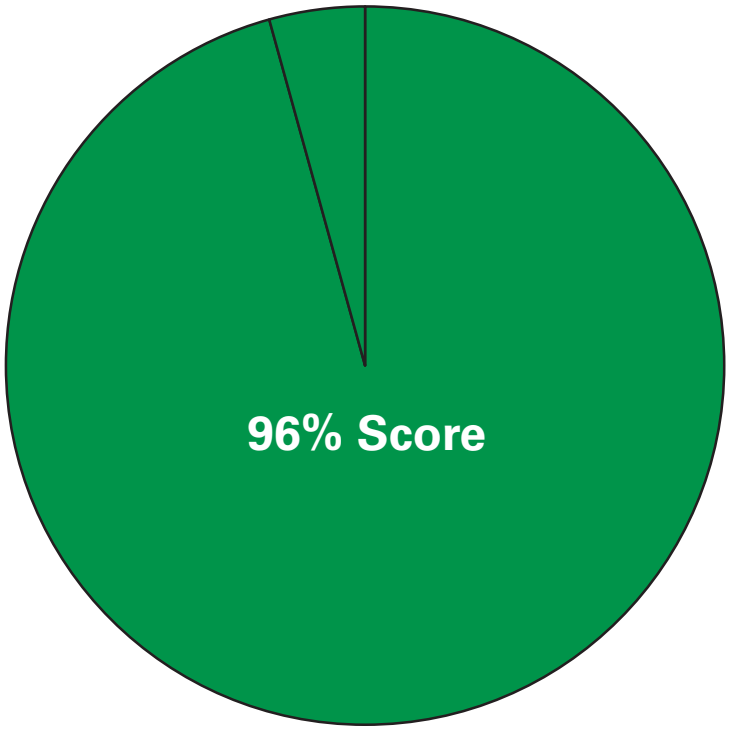
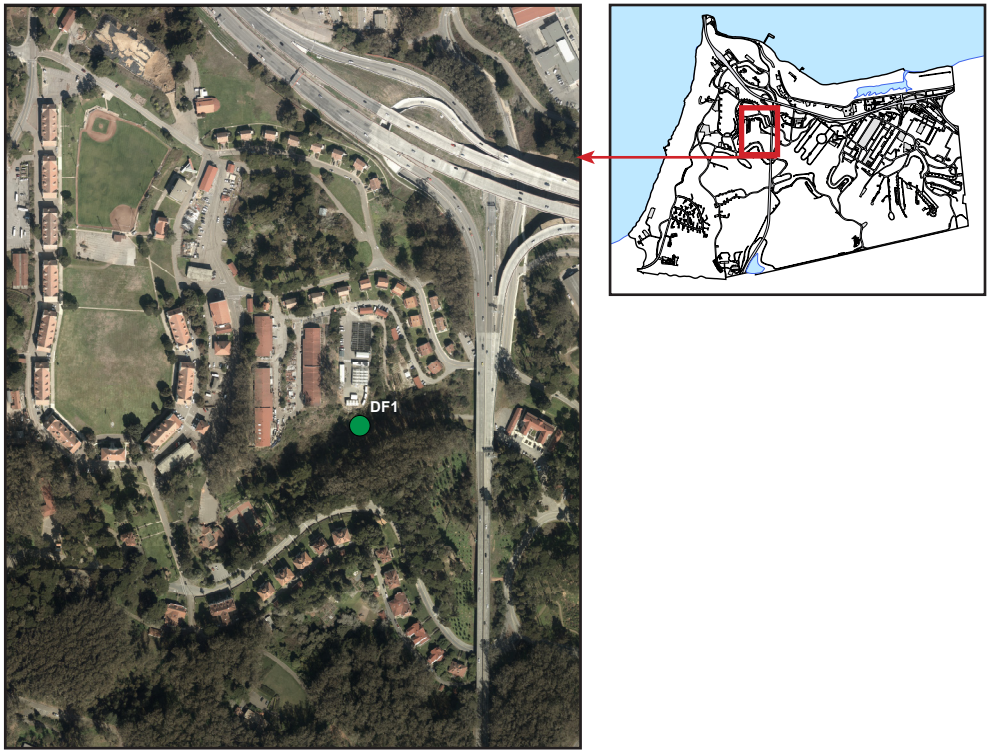


Figure 119: Good overall watershed rating for Dragonfly Creek



Map 42: Map of Dragonfly Creek water quality monitoring sites and their rating

Watershed Group	Monitoring Site	Overall		Dissolved Oxygen Concentration				Nitrate as N				Phosphate			
		Average of Percent of Monitoring Site Parameters Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating
Dragonfly Creek	DF1	96%	Good	34	0	100%	Good	28	3	90%	Good	90	1	97%	Good

Table 42: Water quality results for Dragonfly Creek Watershed

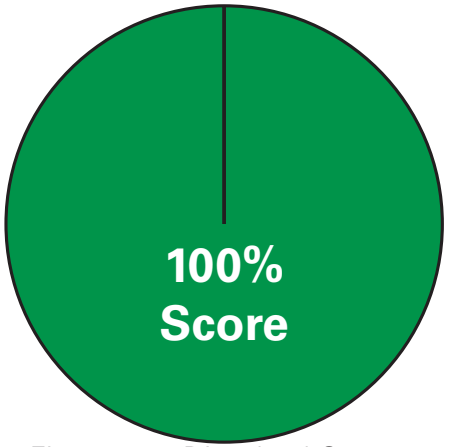


Figure 120: Dissolved Oxygen good rating for Dragonfly Creek

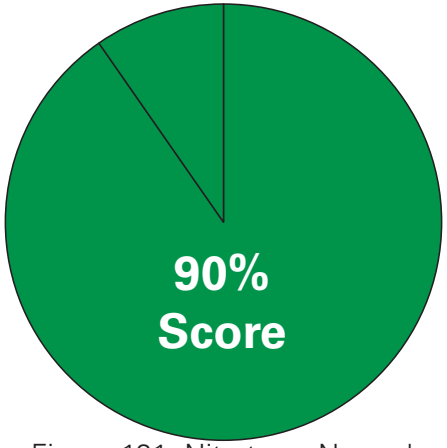


Figure 121: Nitrate as N good rating for Dragonfly Creek

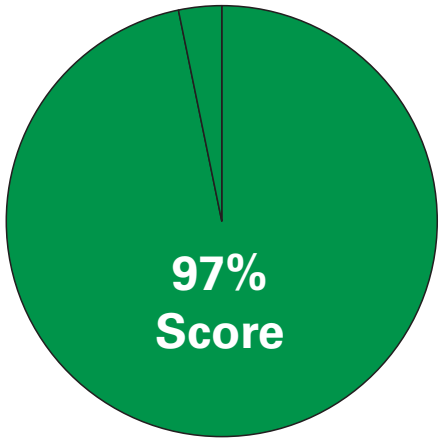


Figure 122: Phosphate good rating for Dragonfly Creek

Lobos Creek watershed consists of four monitoring sites. Figure 6 shows the Lobos Creek watershed received a score of 46% which is an an overall fair *rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is an increase from the 38% score the watershed received in the last report.

On the following page Table 43 breaks down the ratings of all samples taken at the monitoring sites in the Lobos Creek watershed. While overall the watershed received a fair rating it's important to point out the consistently poor rating of nitrate as N at LOB4, LOB5, and LOB6. Solutions to improve denitrification should be considered to address some of these long term problems in Lobos Creek.

On the following page Figure 124 shows dissolved oxygen in Lobos Creek received a 72% score which is a *fair rating*. Figure 125 shows nitrate as N in Lobos Creek received a 20% score which is a *poor rating.* No phosphate samples were taken in the Lobos Creek watershed.

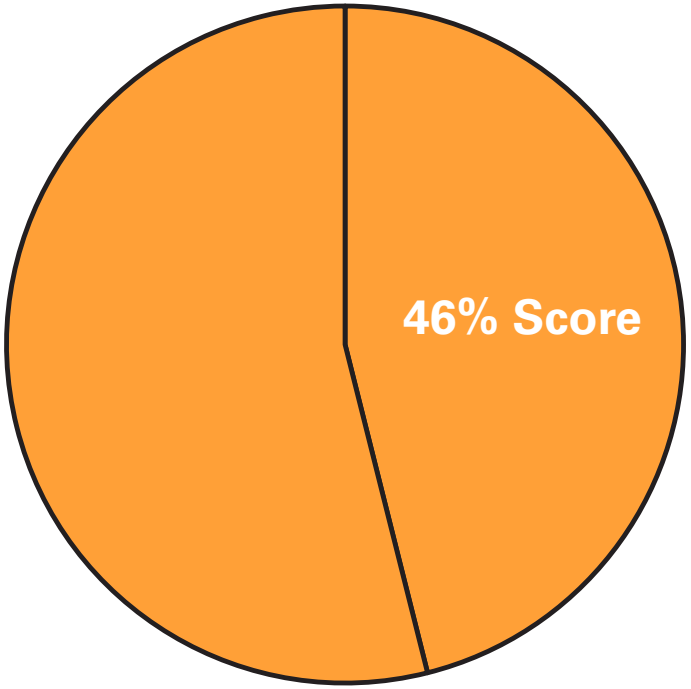


Figure 123: Fair overall watershed rating for Lobos Creek

Map 43: Map of Lobos Creek water quality monitoring sites and their rating

Watershed Group	Monitoring Site	Overall		Dissolved Oxygen Concentration				Nitrate as N				Phosphate			
		Average of Percent of Monitoring Site Parameters Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating
Lobos Creek	LOB3	72%	Fair	21	11	66%	Fair	25	7	78%	Good	0	0	N/A	N/A
	LOB4	27%	Fair	17	15	53%	Fair	0	32	0%	Poor	0	0	N/A	N/A
	LOB5	34%	Fair	22	10	69%	Fair	0	32	0%	Poor	0	0	N/A	N/A
	LOB6	52%	Fair	33	0	100%	Good	1	32	3%	Poor	0	0	N/A	N/A

Table 43: Water quality results for Lobos Creek Watershed Group

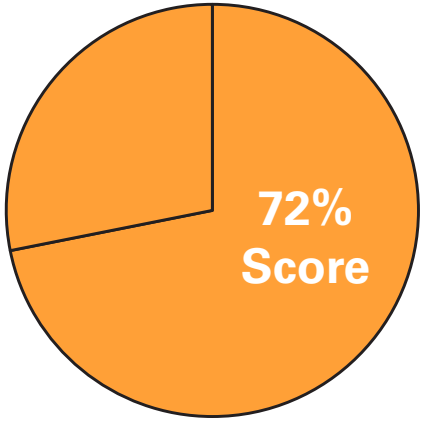


Figure 124: Dissolved Oxygen fair rating for Lobos Creek

Figure 125: Nitrate as N poor rating for Lobos Creek

Mountain Lake watershed consists of five monitoring sites. Figure 126 shows the Mountain Lake watershed received a score of 65% which is an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is the same score the watershed received in the last report.

On the following page Table 44 breaks down the ratings of all samples taken at the monitoring sites in the Mountain Lake watershed. While overall the watershed received a fair rating it's important to point out the consistently poor rating of nitrate as N at MTL5 as well as the poor rating of phosphate at MTL5 and MTL8. Solutions to improve denitrification and phophate uptake should be considered to address some of these long term problems in Mountain Lake.

On the following page Figure 127 shows dissolved oxygen in Mountain Lake received a 82% score which is a *good rating*. Figure 128 shows nitrate as N in Mountain Lake received a 77% score which is a *good rating.* Figure 129 shows phosphate in Mountain Lake received a 36% score which is a *fair rating.*

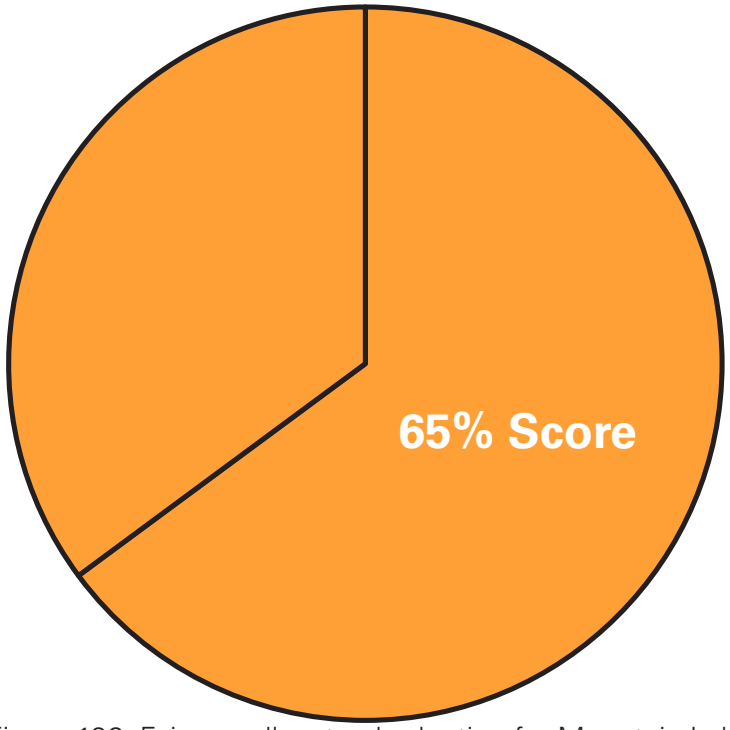


Figure 126: Fair overall watershed rating for Mountain Lake

Map 44: Map of Mountain Lake water quality monitoring sites and their rating

Watershed Group	Monitoring Site	Overall		Dissolved Oxygen Concentration				Nitrate as N				Phosphate			
		Average of Percent of Monitoring Site Parameters Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating
Mountain Lake	MTL1	95%	Good	46	1	98%	Good	23	0	100%	Good	6	1	86%	Good
	MTL2	92%	Good	47	0	100%	Good	28	0	100%	Good	6	2	75%	Good
	MTL5	38%	Fair	2	5	29%	Fair	5	2	71%	Fair	1	6	14%	Poor
	MTL7	67%	Fair	161	1	99%	Good	38	0	100%	Good	1	37	3%	Poor
	MTL8	33%	Fair	6	1	86%	Good	1	7	13%	Poor	0	8	0%	Poor

Table 44: Water quality results for Mountain Lake Watershed Group

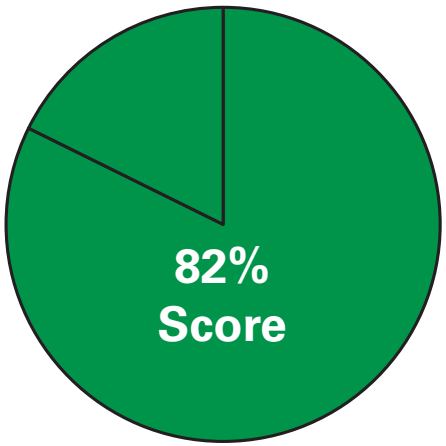


Figure 127: Dissolved Oxygen good rating for Mountain Lake

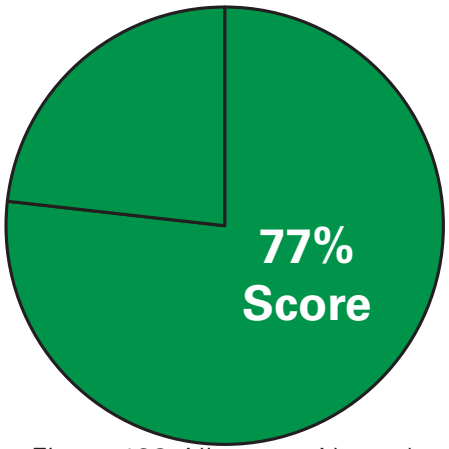


Figure 128: Nitrate as N good rating for Mountain Lake

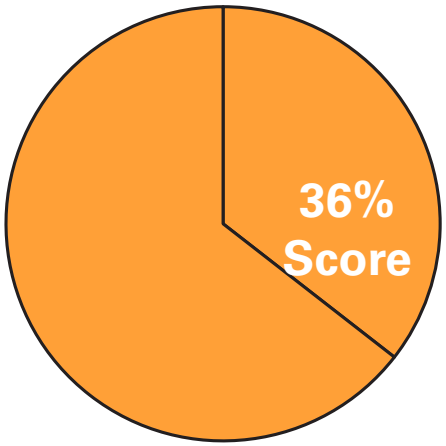


Figure 129: Phosphate fair rating for Mountain Lake

Tennessee Hollow watershed consists of eight monitoring sites. Figure 130 shows the Tennssee Hollow watershed received a score of 60% which is an overall *fair rating* when applied to the thresholds of poor being less than or equal to 25%, fair being greater than 25% and less than 75%, and good being greater than or equal to 75%. This is a decrease from last year's score of 67%.

On the following page Table 45 breaks down the ratings of all samples taken at the monitoring sites in the Tennessee Hollow watershed. While overall the watershed received a fair rating it's important to point out the consistently poor rating of nitrate as N at EL1, TH3, and TH4. Solutions to improve denitrification should be considered to address some of these long term problems in Tennessee Hollow.

On the following page Figure 131 shows dissolved oxygen in Tennessee Hollow received a 65% score which is a *fair rating*. Figure 132 shows nitrate as N in Tennessee Hollow received a 57% score which is a *fair rating.* Figure 133 shows phosphate in Tennessee Hollow received a 56% score which is a *fair rating.*

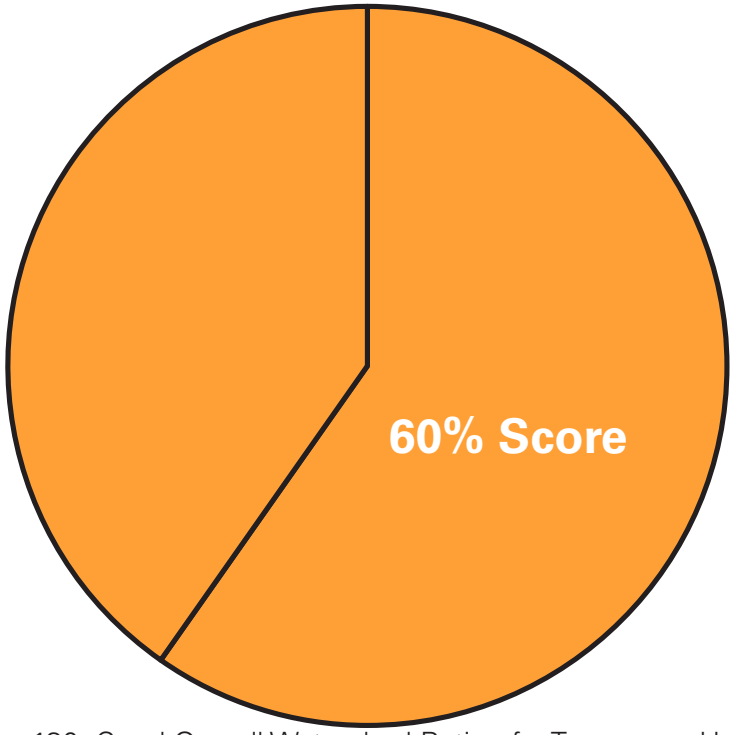
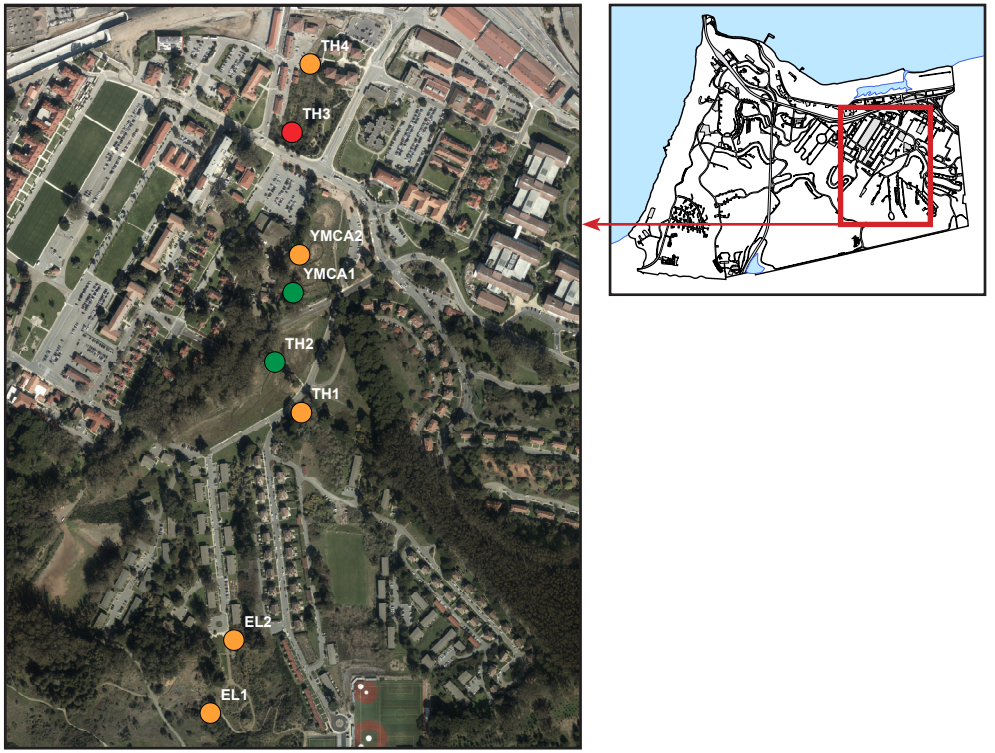


Figure 130: Good Overall Watershed Rating for Tennessee Hollow



Map 45: Map of Tennessee Hollow water quality monitoring sites and their rating

Watershed Group	Monitoring Site	Overall		Dissolved Oxygen Concentration				Nitrate as N				Phosphate			
		Average of Percent of Monitoring Site Parameters Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating	Samples Rated Good	Samples Rated Poor	Percent of Samples Rated Good	Rating
Tennessee Hollow	EL1	56%	Fair	40	0	100%	Good	4	36	10%	Poor	23	16	59%	Fair
	EL2	49%	Fair	7	13	35%	Fair	19	1	95%	Good	3	16	16%	Poor
	TH1	71%	Fair	8	9	47%	Fair	13	4	76%	Good	15	2	88%	Good
	TH2	87%	Good	12	1	92%	Good	12	1	92%	Good	10	3	77%	Good
	TH3	16%	Poor	9	30	23%	Poor	4	35	10%	Poor	6	32	16%	Poor
	TH4	52%	Fair	29	7	81%	Good	0	37	0%	Poor	27	9	75%	Good
	YMCA1	80%	Good	14	3	82%	Good	16	1	94%	Good	11	6	65%	Fair
	YMCA2	67%	Fair	7	4	64%	Fair	9	2	82%	Good	6	5	55%	Fair

Table 45: Water quality results for Tennessee Hollow Watershed Group

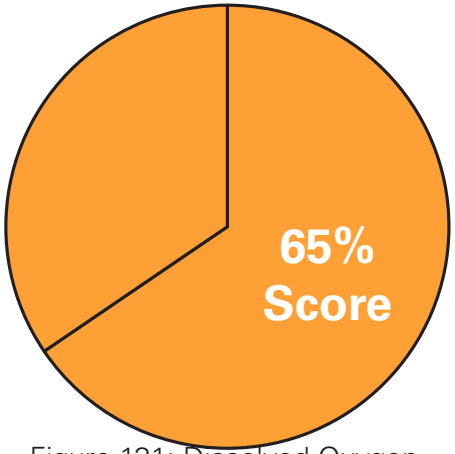


Figure 131: Dissolved Oxygen Rating for Tennessee Hollow

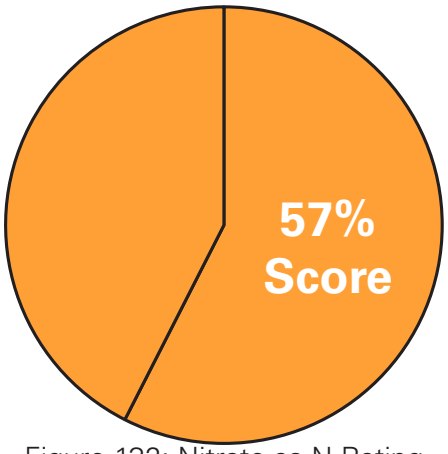


Figure 132: Nitrate as N Rating for Tennessee Hollow

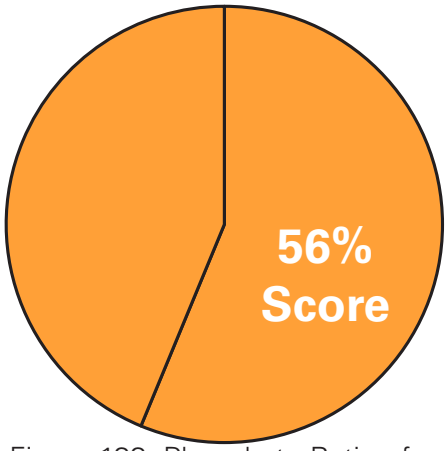


Figure 133: Phosphate Rating for Tennessee Hollow