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Application of the Restoration Rapid Assessment Tool to Selected Disturbed Sites on Santa Rosa Island, Channel Islands National Park, California

Setting Priorities for Restoration

Natural Resource Technical Report NPS/CHIS/NRTR—2012/583



ON THE COVER
Island Oak at Radar Peak (Site #16) showing drip line from fog capture
Photograph by: Trey Demmond

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Executive Summary

The National Park Service, Biological Resources Division, sponsored the development of a Restoration Rapid Assessment Tool (RRAT), an objective and transparent process for prioritizing sites for restoration in parks and other preserves. The RRAT was patterned after the system to assess rangeland health developed by Pellant et al. (2005). Pam Benjamin drafted the first version in 2004, which was reviewed by a team of experts. It was then tested in 48 sites in four North American eco-regions with involvement of park staff and managers. Based upon this experience, the RRAT was further modified and the visible indicators were validated with field measurements (Richey 2005). As Golden Gate National Seashore has a very active restoration program and had prioritized sites through the use of a traditional expert opinion exercise, a comparison test was completed to see if the RRAT could produce comparable results. There was a fair to good match between the two processes. The RRAT was then further tested to evaluate the knowledge/experience level required for application of the tool and to determine the repeatability of results among users. As is the case with many tools, the more ecological and site knowledge held by the user, the higher the utility of the tool.

The RRAT has been programmed as a Microsoft Access database and is available on-line at http://www.npwrc.usgs.gov/resource/methods/rrat/index.htm. It is designed to conduct rapid assessments of potential restoration sites in 45 minutes or less. The purpose is to rank or categorize sites by their ecological restoration potential, potential site value, and the effort required for restoration. The sites to compare can be within a unit of a park, a park, or a group of parks or preserves. It is not intended to be used to set priorities for funding for sites at a regional or national level. The system relies upon visible indicators of departure from a desired reference (natural) condition and from a feasible management goal. All indices are scaled 0 to100: a value nearer 0 is less natural or valuable or easy, and a value nearer 100 is more natural or valuable or easy. Logistical considerations include site size, accessibility and wilderness status. The departures of the current condition or stated management goal from natural condition is based upon 40 ecological indicators in the categories of hydrology and landform, soils and water quality, non-native and native plants, and non-native and native animals. The potential site value is based upon 8 site values. Also, the stressors to the site are enumerated and the difficulty of removal of each stressor is assessed. The output generated includes a site profile and scores for logistics, ecological condition, site value, a list of stressors and the ability to remove the stressors. Sites can be sorted by one or all of the variables.

The true test of the value of an assessment tool is to apply it to a real situation and see if it aids in setting wise priorities and strategies for restoration of a particular set of sites. A select group of national parks were asked if they were interested in having the system applied to their area. Channel Islands National Park showed the highest interest, with the added opportunity to apply the system to Santa Rosa Island where cattle were removed in 1998, and deer and elk were removed in 2011. Santa Rosa Island also provided the opportunity to test how the system could be adapted to vegetation types other than riparian areas, for which it was designed.

In 2009, the team of Sarah Chaney (Channel Islands National Park), Ken Niessen (La Luna Biological Consulting) and Ron Hiebert (Northern Arizona University) assessed 43 sites on Santa Rosa Island. In 2011, a team of Ken Niessen, Ron Hiebert, and Trey Demmond reassessed

18 sites and assessed an additional 3 for a total of 46 sites. This is only a fraction of the sites that could benefit from active restoration but they represent a cross-section of types of disturbed sites ranging from riparian areas to uplands. Besides applying the RRAT to each site, locations were recorded with a GPS and multiple repeatable photos were taken.

The 43 sites were compared island-wide, by vegetation type, and within an example watershed, for several indices: Gain for Effort (GE), Potential Site Value (PSV), and Ecological Restoration Potential (ERP) to natural condition and ERP to management goal. Although Gain for Effort was hoped to be a useful summary statistic to identify where restoration would give the biggest bang for buck, only 4 sites had a GE value higher than 10 for restoration to management goal. Island-wide comparisons showed a wide range of PSV (13–94), ERP to natural condition (35–78) and ERP to management goal (67–95). Riparian site (9 sites) scores ranged from 50 to 81 for PSV and ERI to natural from 41 to 78 and to management goal (76–95). PSV scores for Coastal Sage Scrub were relatively low (13–72), and the same was true for ERP to natural condition (36–60). As management goals were basically curbing further erosion and increasing vegetation cover, ERP scores to management goal were high (75–95). Only 3 Pine Chaparral sites were assessed, and PSV and ERP to management goal scores were all moderate. The Chaparral sites (8 sites) had moderate PSV scores (66–75), low ERP scores to natural condition (42–67), and moderate scores for ERP to management goal (74–87). The 13 Island Oak Chaparral sites had a wide range of PSV scores (44–94). ERP scores to natural condition were low (42–67) and moderate to high for ERP to management goal (67–88).

A watershed approach was evaluated with the thought of efficient logistics and that the restoration of sites high in the watershed may contribute to passive restoration of sites below. The range of PSV values was 88–13, with a strong pattern of decreasing values from the top to the bottom of the watershed. This pattern did not hold true for ERP scores to natural (47–69) or to management goal (74–93). In summary, the tool did provide information that could be applied to transparent prioritization of sites for restoration on Santa Rosa Island.

A draft report was prepared by the first author and shared with the field team and Kathryn McEachern, U.S. Geological Survey (USGS) Channel Islands Field Station. Subsequently, the findings were presented to the Channel Islands National Park leadership on August 5, 2010. Three scenarios for site prioritization were presented: evaluating sites island-wide, within vegetation types, and by watershed. Park leadership found merit in the watershed approach but did not decide on a particular approach.

Concurrently and independently, the USGS and the park had formed a multi-disciplinary team to assess the contribution of fog drip to island hydrology and plan restoration of the important fog drip capture function of vegetation in upland chaparral stands. This led to a second RRAT Santa Rosa Island data collection trip, during which Chaney and McEachern selected 18 of the sites assessed in 2009 and chose 3 additional sites to evaluate for their potential for restoration of the fog capture function and their possible contribution as research sites. A team of Hiebert, Niessen, and Trey Demmond visited these 21 sites in June 2011, conducting a more detailed assessment specifically taking fog drip effects into consideration. More detail was provided on current condition and recommendations on what would be required for restoration. Also, the site boundaries were delineated and multiple photographs were taken of each site. The RRAT was

run again, and comparisons were made among the 43 sites island-wide, by vegetation type, using a watershed approach, and within fog-capture sites.

The RRAT helped distinguish 4 groups of fog drip sites: the Black Mountain area, sites of the high ridges, the lower southern slopes, and the lower northeast pine-chaparral sites. Among these, it is apparent that the high ridge sites with remnant island oak and the Black Mountain area sites should be given top priority for restoration trials. The 2 sites near the main Torrey pine stand also have potential for restoration of fog capture as well as providing educational opportunities for visitors.

As far as the utility of the system, we found it important to make assessment scores based explicitly on the RRAT Manual definitions. We found it easy to adapt the system from riparian to upland sites by omitting some indicators and modifying others. The RRAT was effective at recording expert knowledge about island ecology, site history and restoration objectives for archival, and it provided an excellent platform for discussing restoration scenarios with management. Finally, we were able to re-assess sites in 2011 against new restoration goals that emerged from discussions based on the initial RRAT assessments made in 2009.

Acknowledgments

The team wishes to acknowledge funding for this project from the National Park Service Fees Program. We also wish to acknowledge all that contributed to the development of the RRAT. Co-developers include Diane Larson and Kathryn K. Thomas, both with the USGS. We wish to acknowledge the support in the development of RRAT of Linda Drees, NPS. We are also thankful for technical assistance from Talise Dow, Amy Richey, and Nicole Tancreto. We also wish to thank Trey Demmond for his support and photography on the 2011 visit of fog capture sites. Finally, we wish to thank Channel Islands National Park for their general and logistical support of the project. This project was supported by National Park Service Fee Funds.

1 Introduction

Although U.S. national park lands contain some of the least disturbed natural areas in the country, many have been subjected to major disturbances before their designation, have ongoing disturbance (including stressors such as livestock grazing grandfathered for numerous years) after designation, and may have had ineffective management to deal with the problems. Managers routinely have to make hard decisions as to where to place restoration priority for use of limited resources. A broad range of approaches are used to make management decisions including gut feeling, well researched expert opinions, site visits, and data collection and analysis. Standardized approaches, including an analytical assessment of site characteristics, based upon consistent criteria with electronic records of all steps of the process, make comparisons among a group of sites easier and lend credibility through use of a documented process (Hiebert et al. 2009).

The Restoration Rapid Assessment Tool (RRAT), using a Microsoft Access database, has been developed to efficiently assess the degree and type of disturbance a site has experienced, along with the feasibility of restoration to natural or management goals, logistics, and the potential site value. The purpose of the RRAT is not to make management decisions or prescribe specific restoration methods, but to provide a systematic framework to capture knowledge and facilitate the comparison of disturbed sites.

The system was designed specifically for riparian sites as they have great value and are heavily disturbed in the United States. However, we have found the system can be easily adapted for upland sites. A description of the system can be found in Hiebert et al. (2009a). The user's manual for the system and the downloadable tool can be found at http://www.npwrc.usgs.gov/resource/methods/rrat/index.htm. The developers of the system anticipate that the system will be improved and refined based upon application on the ground.

A first step in applying the system is to define a conceptual model of what the natural condition of the site would be and its desired future management condition. These can be one and the same but often differ in that it is not possible to remove all stressors or repair significant elements (e.g., all top soil is gone). The next steps are to assess indicators of site condition, and rate the difficulty of removing stressors. Finally, the logistical requirements to restore a site are considered. The RRAT uses the indicators to produce site index scores that are used to facilitate comparisons among sites. The user's manual (Hiebert et al. 2009b) fully describes how the indices are calculated.

To insure that the system is rapid, all indicators are visible in the field and well defined. Site indicators are arranged into 6 modules: hydrology and landform, soil and water quality, non-native animals, non-native plants, native animals, and native plants. The 40 indicators in these modules have undergone expert review and field testing and refinement. Hydrology, landform, and soil indicators are from or modified from Pellant et al. (2005). Field testing of indicators was conducted (Richey 2005), analysis of indicator correlation was done, and those highly correlated were combined for the final version of RRAT.

Indicators are scored against two standards—the perceived natural condition and the management goal condition. Although often hard to define due to the lack of reference sites, the

concept of "natural" is an important starting point. As it is often difficult to impossible to remove a stressor, it is also important to fully define what is believed to be a feasible management goal. Thus, indicators are scored as to their departure from natural and departure from the stated management goal. However, the team found it easier to define natural condition and management goal. Then, we estimated the difference between natural and current condition and between natural and management goal conditions. Then, to score to fit the current design of the tool, the difference between natural and management goals was subtracted from the difference between natural and current. This allows for the differentiation between a site that has a modest management goal (e.g., remove bull thistle—see Appendix B for a list of all plant names used in this document) from a site that can feasibly be restored to a near natural state.

Potential site value is more inherently subjective, and this is one reason for separating it from the more objective indicators of the site's current condition. Potential site value components include animal and plant community diversity, threatened and endangered species habitat, recreation or aesthetic values, emblematic features, landscape rarity or importance, and cultural or historic values. The site is scored as to the potential value when restored rather than the current condition (see Appendix A for Field Data Form). Output includes a site profile (see Appendix C for site profiles for this paper), which includes the site name and location, site size, description of current condition and natural and management goals, values assigned to the 40 indicators and site value categories, and index scores. Definitions of indices are found in Table 1.

Table 1. Restoration Rapid Assessment Tool (RRAT) index explanations.

Index	Explanation
Potential Site Value	indicates the user's estimate of the potential value of the site
Convergence	indicates the user's assessment of the degree to which the current condition of the site departs from natural or management goal conditions
Stressor Removal Potential	indicates the combined difficulty of removing all the stressors impacting the site
Ecological Restoration Potential	combines Convergence and Stressor Removal Potential
Restoration Logistics	combines the disturbance size, site accessibility, and wilderness status
Ease of Restoration	combines Convergence, Stressor Removal Potential and Restoration Logistics to give an estimate of how difficult the site will be to restore
Gain for Effort	indicates the amount of restoration that would likely be accomplished at the site for the amount of effort expended on the restoration

The true test of the utility of the system towards aiding parks in setting site restoration priorities and developing restoration strategies is to apply the system to a real situation. We applied the system to both riparian and upland disturbed sites on Santa Rosa Island, Channel Islands National Park, in a pilot test project.

Santa Rosa Island was a home to island Chumash for nearly 5000 years, followed by ranching beginning in the middle 1800's (Livingston 2006). Sheep ranching began on Santa Rosa in 1844, shifting to a cattle operation in 1905. Pigs were introduced for hunting around 1850, followed by deer in 1881 and elk in the 1930s. The National Park Service purchased the island in 1986, and removal of non-native mammals soon began. Pigs were removed in 1993, cattle in 1998, and elk and deer remained until 2011 (McEachern 2004). Stocking rates were high, with severe effects on native vegetation. The composition and distribution of the original vegetation is largely

unknown, but the presumed pre-ranching land cover of upland scrub and woodland, riparian woodlands, and coastal bluff and dune scrub was converted into a landscape dominated by non-native annual grasses (Halvorson et al. 1992). This widespread reduction in plant cover, plant height, and vegetation structure has had significant negative effects on fog capture, a likely major source of moisture for island vegetation, especially scrub and woodland. Many riparian areas were denuded of native vegetation and became dominated by non-native forbs. Steep slopes have been heavily eroded, in some cases down to bedrock. Many rare and endemic plants and animals were driven to near extinction on the island. Yet remnants of native plant communities and species remain on steep slopes and other refugia. Natural revegetation of riparian areas and increased cover of some native species has been observed since the removal of cattle in 1998. However, many areas will require active restoration. Channel Islands National Park management wishes to set priorities for restoration based upon consistent application of a science-based assessment system. Thus, the primary purpose of this project was to aid this process. A secondary purpose was to test the utility of the RRAT Version 1.l and to make revisions as indicated.

A team of Sarah Chaney (Channel Islands National Park), Ken Niessen (La Luna Biological Consulting) and Ron Hiebert (Northern Arizona University) used the RRAT to assess 43 disturbed sites June 28–July 6, 2009. These sites included both upland and riparian areas, and were identified as candidates for restoration by Chaney, based upon her extensive knowledge of the island. We are well aware that these 43 sites do not represent all of the sites in need of active restoration on the island. However, they represent a cross section of types and levels of disturbance and potential ecological types. Besides completing the assessment datasheet for each site visited, a site reference location was recorded and georeferenced photographs were taken. Results of the assessment are applied island-wide, by coarse grain vegetation types, and by watershed. Potential site value was estimated based upon a 20–30 year post restoration period.

A draft report was discussed with Channel Islands National Park Superintendent and the Chief of Resources Management on August 5, 2010. The report presented different ways of applying the assessment results to setting priorities. These included island-wide application, prioritization by watershed, and by vegetation types. There was interest in the watershed approach, but a high priority for Santa Rosa Island is restoration of fog capture capacity. Thus, 18 chaparral sites were revisited, along with 3 new sites, by Hiebert, Niessen, and Trey Demmond on June 21–28, 2011. These sites were assessed using RRAT with the management goal of restoration of fog capture by vegetation and their potential as research sites. This report presents combined results of both the 2009 and the 2011 assessments.

2 Methods

2.1 Site Assessments

A preliminary shake-down of the assessment process was conducted on Santa Cruz Island, Channel Islands National Park, April 25–26, 2009, to prepare for the Santa Rosa Island project. The system was applied at 3 sites in Scorpion Canyon. The main difficulty the team had was scoring the difference (Convergence) between a site's current condition and the stated management goal. The team found it much easier to score the difference between natural condition and management goal, and the difference between natural condition and current condition, and then subtract the former from the latter to get the difference between current condition and management goal. The team also determined that a site assessment would take between 45 minutes to one hour. Of course, travel between sites was predicted to consume approximately equal time to the site assessment. Thus a goal was set to assess a minimum of 30 sites on Santa Rosa Island in the time available. A goal of 50 was set and thought possibly attainable with good prior planning to minimize travel time between sites.

The field test was followed by a day of planning for the actual field work on Santa Rosa. Kathryn McEachern, USGS, participated in the planning process. It was agreed that broad coverage of the island, representation of disturbed sites in a range of potential vegetation types, and multiple sites in a given watershed would be desirable. Chaney was assigned the task of choosing sites that fit the above criteria and that resulted in efficient travel between sites.

Site assessments were conducted by Sarah Chaney, Ken Niessen, and Ron Hiebert from June 29 to July 6, 2009, and 3 additional sites were assessed in 2011. In all, 46 sites were assessed (Figure 1, Table 2). Location coordinates (with accuracy) were recorded from a Garmin GPS at each site. The size of the site was estimated and placed in one of 6 size categories (<0.5 ac, 0.6–1 ac, 1.1–5 ac, 5.1–10 ac, 10.1–25 ac, or >25 ac). Sufficient photographs were taken to document the site. GPS location and compass direction were recorded for each photograph. As Chaney and Niessen are the island ecology experts, they described the sites' locations, current conditions, conceptual descriptions of natural (pristine) condition, and realistic descriptions of the management (restoration) goal. This was followed by application of the RRAT system, playing close attention to the definitions for each element. Notes were taken as to how definitions could be refined, and any other problems or suggestions for improvement were noted. Field data was checked and verified daily.

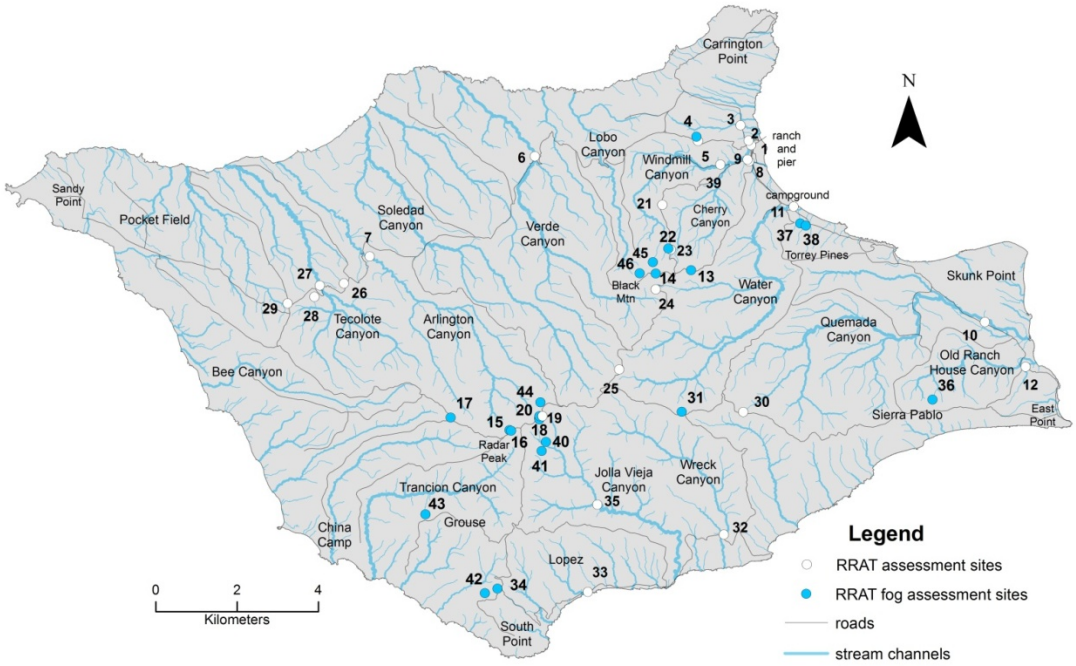


Figure 1. Map of sites assessed using the Restoration Rapid Assessment Tool (RRAT), on Santa Rosa Island.

Table 2. Key to Santa Rosa Island sites assessed using the Restoration Rapid Assessment Tool. Sites #1–#43 were initially assessed in 2009, Sites #44–#46 were initially assessed in 2011, and all fog sites were visited in 2011.

Site Number and Name	Vegetation Type	Fog Assessment Site
#1-Old Road Crossing-House Creek	coastal sage scrub	no
#2-North Side of House Creek Crossing	coastal sage scrub	no
#3-Backdoor Road to Carrington	coastal sage scrub	no
#4-Smith Highway Bishop Pines	pine chaparral	yes
#5-Smith Highway ½ Mile East of Carrington Road	coastal sage scrub	no
#6-Verde Canyon Below Crossing	riparian	no
#7-Arlington Canyon Upstream from Smith Highway	riparian	no
#8-Old Ditch	coastal sage scrub	no
#9-Old Creek Crossing	coastal sage scrub	no
#10-Old Ranch Canyon Lower Section	riparian	no
#11-Water Canyon Crossing	coastal sage scrub	no
#12-Old Ranch House Salt Marsh	riparian	no
#13-Telephone Road	chaparral	yes
#14-Black Mountain Road	island oak chaparral	yes
#15-Radar Peak Road Reroute	island oak chaparral	yes
#16-Radar Peak Below Road (Oaks)	island oak chaparral	yes
#17-Burma Oaks	island oak chaparral	yes
#18-Jolla Vieja Oaks	island oak chaparral	yes
#19-Seed Source Nursery	island oak chaparral	no
#20-Bare Knoll Near Jolla Vieja Oaks	island oak chaparral	yes
#21-Cherry Canyon Chaparral	chaparral	no
#22-Black Mountain Northeast Spur	pine chaparral	yes
#23-Cherry Canyon #2	pine chaparral	no
#24-Black Mountain Corral	coastal sage scrub	no
#25-Mustard Road	coastal sage scrub	no
#26-Vernal Pool #1	vernal pool	no
#27-Tecolote Canyon	riparian	no
#28-Vernal Pool #2	vernal pool	no
#29-Vernal Pool #3	vernal pool	no
#30-Clapp Spring	riparian	no
#31-Oakless Ridge Southeast of Quinn Knob	island oak chaparral	yes
#32-Wreck Canyon	riparian	no
#33-South Side Road Trail	coastal sage scrub	no
#34-South Point Road	chaparral	yes
#35-Jolla Vieja	riparian	no
#36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	chaparral	yes
#37-North Edge Torrey Pines-*Mimulus flemingii* Site	chaparral	yes
#38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site	chaparral	yes
#39-Windmill Canyon Reroute	coastal sage scrub	no
#40-Below Grove #7: *Quercus pacifica* Gullies	island oak chaparral	yes
#41-Bald Hill #1	island oak chaparral	yes
#42-South Point Chaparral	chaparral	yes
#43-Trancion *Ribes*	chaparral	yes
#44-Soledad Oaks	island oak chaparral	yes
#45-Black Mountain Below Main Oak Grove	island oak chaparral	yes
#46-Black Mountain Finger Ridges	island oak chaparral	yes

Upon return to the mainland, data were entered into the RRAT program and the analysis was run for all sites. The output is a site profile for each site (Appendix C), which includes a number of site indices, of which the most important for this paper are Gain for Effort, Potential Site Value, and Ecological Restoration Potential. Separate values were generated for comparisons of current condition to natural condition and current condition to management goal for Gain for Effort and Ecological Restoration Potential; Potential Site Value is always the same for both natural and management goal. Comparisons among sites were made island-wide; sites were also stratified and evaluated within vegetation type and within watersheds for Windmill/Cherry Canyon and Jolla Vieja Canyon.

2.2 Relevance to Management

A draft report was prepared for discussion with the Channel Islands National Park management team. This report presented site scores grouped either island-wide, or by vegetation types of Riparian, Coastal Sage Scrub, Pine Chaparral, Chaparral, Island Oak Chaparral, and Vernal Pool. A watershed analysis approach was presented as an alternative. The authors met with the Channel Islands National Park management team on August 5, 2010, to get feedback on the site ranks and the utility of grouping sites into broad categories for discussion. The watershed approach was highly favored because it grouped sites into geographically structured management units easy to visualize and practical for logistical restoration work. However, upon discussion, it became clear that the system could also be useful for planning restoration of the fog capture function of upland vegetation, a high management priority for the island. This management feedback represented a refinement in the management goals for upland chaparral sites.

As a result, Chaney and McEachern selected 18 sites to be revisited, and 3 new sites to be assessed, to gather detailed information on current site condition, the feasibility of restoring the fog drip function to each site, and the utility for fog drip research at each site. The 21 sites are shown in Figure 1 and listed in Table 2. In June 2011, Hiebert and Niessen returned to Santa Rosa Island with Trey Demmond. The 3 new sites were assessed using RRAT, and #4-Smith Highway Bishop Pines was reassessed because it was early among 2009 sites and we felt that the initial assessment may have been inadequate. A description of the current vegetation with a list of prominent species was generated based upon walk throughs of each site. Also, notes were taken on erosion, soil condition, and the potential of the site to be restored to a chaparral that is efficient at capturing fog for a moisture source. Multiple photos were taken to show site characteristics and plant species within the site. Site descriptions for sites revisited were annotated as needed. The boundaries of the 21 sites were mapped as polygon shapefiles on aerial photos in ArcGIS. Finally, the RRAT program was run for the updated and new sites.

3 Results

The RRAT provides a structured process for articulating site-level management goals and capturing expert knowledge about restoration potential towards those goals. An objective of the tool is to reduce complexity so that restoration options can be more easily discussed. The RRAT output is expressed as a set of 7 index scores (Table 1) ranging from 0 to 100, reflecting site conditions and restoration potential. These scores can be used to compare and contrast sites within landscape units relevant to management or ecological concerns.

In addition to helping categorize and prioritize sites for restoration, RRAT is designed to eliminate sites from further consideration that have a low Potential Site Value and/or a low Ecological Restoration Potential. Thus sites with Potential Site Value (PSV) scores of less than 50 (Table 3) and sites with an Ecological Restoration Potential (ERP) for restoration to management goal below 76 (Table 4) were screened from further consideration, and these sites could be eliminated from consideration by the park if they so desired. This would reduce the number of sites being considered for restoration from 46 to 31. For this paper, however, we leave all sites in the analysis.

Table 3. Sites with a Potential Site Value of less than 50 that could be eliminated from further consideration for active restoration.

Site Number and Name	Potential Site Value
#3-Backdoor Road to Carrington	46
#41-Bald Hill #1	44
#1-Old Road Crossing-House Creek	44
#5-Smith Highway ½ Mile East of Carrington Road	41
#2-North Side of House Creek Crossing	38
#25-Mustard Road	31
#39-Windmill Canyon Reroute	28
#24-Black Mountain Corral	25
#9-Old Creek Crossing	13

Table 4. Sites with an Ecological Restoration Potential to management goal less than 76 that could be eliminated from further consideration for active restoration.

Site Number and Name	Ecological Restoration Potential
#8-Old Ditch	75
#1-Old Road Crossing-House Creek	75
#13-Telephone Road	74
#43-Trancion *Ribes*	74
#44-Soledad Oaks	71
#16-Radar Peak Below Road (Oaks)	67
#15-Radar Peak Road Reroute	67

3.1 Site Comparisons Island-Wide

Gain for Effort (GE) can be thought of as “bang for the buck.” Sites that rank highly for GE should take little effort to have a significant positive effect on the site. It should be noted that the GE values drop off quickly. Sites with GE greater than 3.0 are given in Table 5. Note the sizable

difference in values between management goal and natural condition scores for sites with the higher scores. This indicates a large difference between restoration goals and the site's perceived "pristine", undisturbed natural ecological state. It should also be noted that 6 of these sites have Potential Site Values below 50, meaning that while little effort is needed to restore them, they have a low intrinsic value to overall Santa Rosa Island management goals.

Table 5. Sites, sorted by Gain for Effort scores, for comparisons of restoration to natural condition or management goal for Santa Rosa Island. Only sites with a value of 3.0 or higher for management goal are listed.

Site Number and Name	Gain for Effort	
	Natural Condition	Management Goal
#30-Clapp Spring	37.7	64.7
#9-Old Creek Crossing	15.8	23.6
#29-Vernal Pool #3	9.3	12.4
#26-Vernal Pool #1	6.1	10.9
#3-Backdoor Road to Carrington	4.2	5.9
#24-Black Mountain Corral	2.6	4.7
#44-Soledad Oaks	3.0	4.3
#39-Windmill Canyon Reroute	2.2	4.3
#22-Black Mountain Northeast Spur	2.1	4.3
#2-North Side of House Creek Crossing	2.9	4.2
#12-Old Ranch House Salt Marsh	2.5	4.2
#5-Smith Highway ½ Mile East of Carrington Road	2.0	4.2
#28-Vernal Pool #2	3.0	3.8
#17-Burma Oaks	2.9	3.8
#19-Seed Source Nursery	2.7	3.6
#14-Black Mountain Road	2.4	3.4
#45-Black Mountain Below Main Oak Grove	2.3	3.2
#6-Verde Canyon Below Crossing	2.8	3.1

Table 6 shows all sites ranked by Potential Site Value and displays the ERP to both natural condition and management goal for the site. One could place priorities based upon PSV alone or a combination of PSV and ERP. Also, when the ERP scores for natural condition and management goal are close, it indicates that it is believed that the site can be returned to a near natural condition. For example, #10-Old Ranch Canyon Lower Section has a moderate PSV but also has a relatively high score for ERP to management goal. Of note is the consistent pattern that the scores for ERP are much higher for restoration to management goal compared to natural condition, indicating a large difference between natural condition and stated management goal.

Table 6. RRAT sites on Santa Rosa Island sorted by Potential Site Value score, with Ecological Restoration Potential scores given for natural condition and management goal.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#16-Radar Peak Below Road (Oaks)	94	35	67
#15-Radar Peak Road Reroute	94	35	67
#45-Black Mountain Below Main Oak Grove	88	58	81
#46-Black Mountain Finger Ridges	88	37	78
#17-Burma Oaks	84	58	81
#31-Oakless Ridge Southeast of Quinn Knob	84	60	88
#14-Black Mountain Road	84	52	78
#44-Soledad Oaks	84	35	71
#23-Cherry Canyon #2	81	69	93
#20-Bare Knoll Near Jolla Vieja Oaks	81	39	80
#22-Black Mountain Northeast Spur	81	50	80
#35-Jolla Vieja	81	57	79
#40-Below Grove #7: *Quercus pacifica* Gullies	78	39	84
#4-Smith Highway Bishop Pines	78	42	76
#12-Old Ranch House Salt Marsh	78	60	82
#18-Jolla Vieja Oaks	78	42	76
#38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site	75	42	82
#37-North Edge Torrey Pines-*Mimulus flemingii* Site	75	40	82
#13-Telephone Road	72	54	74
#21-Cherry Canyon Chaparral	72	47	85
#11-Water Canyon Crossing	72	41	79
#34-South Point Road	69	48	87
#29-Vernal Pool #3	69	56	84
#28-Vernal Pool #2	69	57	83
#36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	69	35	76
#6-Verde Canyon Below Crossing	69	75	83
#43-Trancion *Ribes*	66	45	74
#10-Old Ranch Canyon Lower Section	66	78	84
#26-Vernal Pool #1	66	45	85
#42-South Point Chaparral	66	67	82
#30-Clapp Spring	63	72	95
#32-Wreck Canyon	63	55	76
#27-Telecolote Canyon	59	41	79
#19-Seed Source Nursery	56	48	86
#8-Old Ditch	50	52	75
#33-South Side Road Trail	50	36	84
#7-Arlington Canyon Upstream from Smith Highway	50	75	86
#3-Backdoor Road to Carrington	46	57	80
#41-Bald Hill #1	44	44	85
#1-Old Road Crossing-House Creek	44	53	75

Table 6 (*continued*)

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#5-Smith Highway ½ Mile East of Carrington Road	41	52	84
#2-North Side of House Creek Crossing	38	65	80
#25-Mustard Road	31	47	94
#39-Windmill Canyon Reroute	28	57	83
#24-Black Mountain Corral	25	52	95
#9-Old Creek Crossing	13	60	78

3.2 Site Comparisons by Vegetation Type

3.2.1 Riparian

Eight Riparian sites were assessed. Seven of the sites visited are representative of Riparian areas across the island. The eighth site, #30-Clapp Spring, is a unique restoration site.

The Clapp Spring site has a stock tank sited on a ridge between the St. Augustine and Old Ranch watersheds. The water for the tank is diverted from St. Augustine, and the outflow runs into Old Ranch. Because the management goal is to return the outflow to St. Augustine, which is relatively easy, Gain for Effort is the highest of any of the assessed sites on the island.

The remaining 7 Riparian sites have shown significant increases in vegetation cover and a decrease in exotic plant species since cattle were removed from the island in 1998 (S. Chaney, pers. obs.). Riparian areas were heavily enriched with feces and trampled when cattle were present. However, elk and deer continued to impact Riparian areas in 2009, but not to the extent before livestock removal. Sites were scored in 2009 as if all deer and elk would be removed from the island in 2011 and nutrient levels would return to pre-livestock and cervid grazing conditions. If elk and deer had remained, it was predicted that many Riparian areas would have become dominated by cattails, as seen in Figure 2. Management goals usually include an increase in willows.

The 7 Riparian sites all have low GE scores. Table 7 shows the PSV and the ERP scores for return to natural or management goal. Of note are the relatively high scores for both ERP to natural and management goal for Verde Canyon, Lower Old Ranch Canyon, and Arlington Canyon. This indicates that the sites have the potential to be returned to a near natural condition. However, the sites have only moderate PSV values, indicating that they have few rare species, are not unique or rare communities, or do not have high cultural significance.

Table 7. Potential Site Value scores and Ecological Restoration Potential scores for Riparian sites on Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#35-Jolla Vieja	81	57	79
#12-Old Ranch House Salt Marsh	78	60	82
#6-Verde Canyon Below Crossing	69	75	83
#10-Old Ranch Canyon Lower Section	66	78	84
#30-Clapp Spring	63	72	95
#32-Wreck Canyon	63	55	76
#27-Tecolote Canyon	59	41	79
#7-Arlington Canyon Upstream from Smith Highway	50	75	86



Figure 2. Site #32-Wreck Canyon showing dense cattails in stream bed.

3.2.2 Coastal Sage Scrub

Coastal Sage Scrub was likely one of the most widespread vegetation types on Santa Rosa Island. Now, it is one of the most highly altered vegetation types. The 11 sites assessed are listed in Table 8. Many sites are highly eroded, and in many cases the top soil is gone, making restoration to a natural condition next to impossible (Figure 3). Flatter areas are dominated by exotic annual grasses. Thus, Potential Site Value scores are low. Management goals are curbing

erosion, restoring natural contours, and revegetating. For others such as the Black Mountain Corral, the management goal was simply to control the *Cirsium vulgare*. Only 3 of the sites have a PSV score of 50 or higher, so if the park were to decide to eliminate sites with PSV scores lower than 50, only 3 sites would be given consideration in the Coastal Sage Scrub. The scores for ERP to natural condition are generally low, and scores for ERP to management goal are generally high. Also, the ERP score for management goal for Mustard Road is inaccurately high. The management goal was to eradicate *Hirschfeldia incana,* which was initially believed to have a very limited distribution, but further travels around the island showed it to be much more widespread.

Table 8. Potential Site Value scores and Ecological Restoration Potential scores for Coastal Sage Scrub sites on Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#11-Water Canyon Crossing	72	41	79
#8-Old Ditch	50	52	75
#33-South Side Road Trail	50	36	84
#3-Backdoor Road to Carrington	46	57	80
#1-Old Road Crossing-House Creek	44	53	75
#5-Smith Highway ½ Mile East of Carrington Road	41	52	84
#2-North Side of House Creek Crossing	38	65	80
#25-Mustard Road	31	47	94
#39-Windmill Canyon Reroute	28	57	83
#24-Black Mountain Corral	25	52	95
#9-Old Creek Crossing	13	60	78

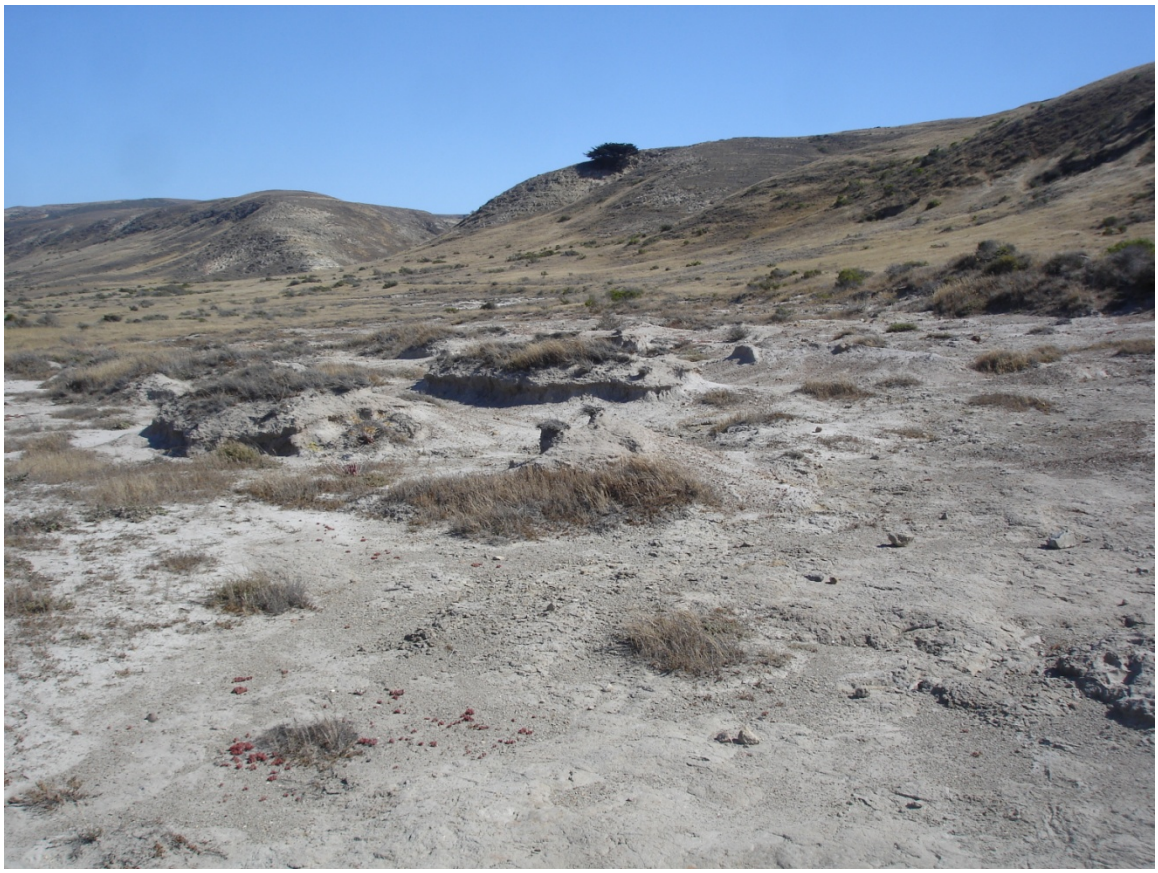


Figure 3. Eroded Coastal Sage Scrub (Site #8-Old Ditch).

3.2.3 Pine Chaparral

Pine Chaparral is a relatively rare vegetation type on Santa Rosa Island. The pine component could be the endemic Torrey pine (*Pinus torreyana* ssp. *insularis*) or bishop pine (*Pinus muricata*)—a bishop pine site is shown in Figure 4. The 3 sites assessed are listed in Table 9. All 3 have very high PSV scores and high ERP to management goal scores. ERP to natural condition scores are moderate to low.

Table 9. Potential Site Value scores and Ecological Restoration Potential scores for Pine Chaparral sites on Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#23-Cherry Canyon #2	81	69	93
#22-Black Mountain Northeast Spur	81	50	87
#4-Smith Highway Bishop Pines	78	42	76



Figure 4. Bishop pine at Site #4-Smith Highway Bishop Pines.

3.2.4 Chaparral

Chaparral was likely the dominant vegetation cover on the uplands prior to ranching on Santa Rosa Island, forming the understory matrix for emerging groves of trees. The chaparral shrubs provided woody structure for condensation of fog as it enveloped the island, providing late spring and summer moisture for growing plants and hydrologic recharge. Restoration of this ecosystem service is a primary management goal for the island. There were 8 sites assessed in Chaparral (Table 10)—11 if the 3 sites classified as Pine Chaparral (Table 9) are included. All have high to moderate PSV scores, low ERP scores relative to natural condition and high to medium ERP scores to management goal. Most sites had elements of the native chaparral vegetation but were characterized by numerous gullies, livestock and game trails, and more bare ground than desired for future conditions (e.g., Site #42 South Point Chaparral as shown in Figure 5). Management goals include curbing erosion and revegetation with native shrubs. Sign of heavy deer and elk browse was evident.

Table 10. Potential Site Value scores and Ecological Restoration Potential scores for Chaparral sites on Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site	75	42	82
#37-North Edge Torrey Pines-*Mimulus flemingii* Site	75	40	82
#13-Telephone Road	72	54	74
#21-Cherry Canyon Chaparral #1	72	47	85
#34-South Point Road	69	48	87
#36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	69	35	76
#42-South Point Chaparral	66	67	82
#43-Trancion *Ribes*	66	45	74

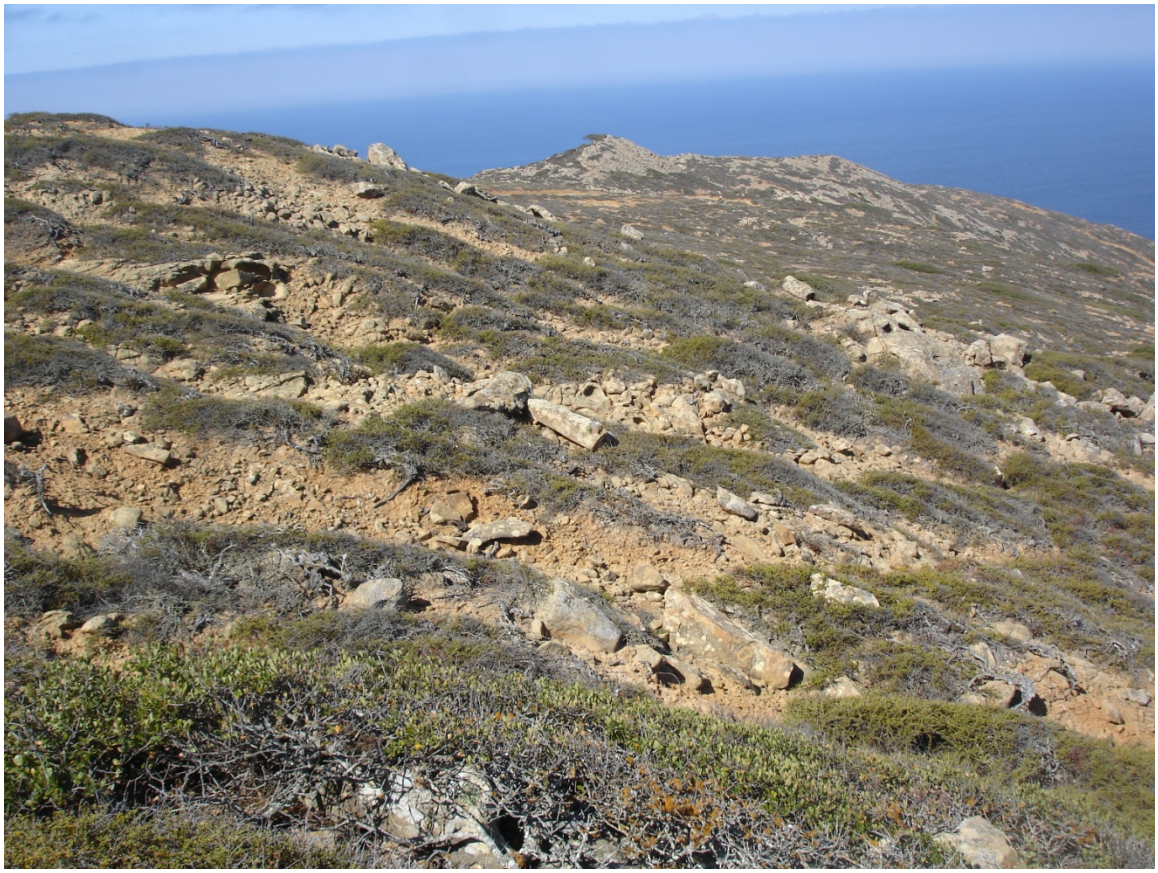


Figure 5. South Point Chaparral showing erosion gullies (#42-South Point Chaparral).

3.2.5 Island Oak Chaparral

Recovery of the endemic island oak (*Quercus tomentella*) is a priority for Channel Islands National Park. Thus, 13 oak-chaparral sites were assessed (Table 11). At least historically, this chaparral type played a major role in the capture of fog as a source of moisture in upland areas. Eleven of the 13 received high scores for PSV. ERP to a natural condition scored low for all sites. However, the ERP scores to the stated management goal for 11 of the 13 sites was high. The Radar Peak Road Reroute site is pictured in Figure 6.

Table 11. Potential Site Value scores and Ecological Restoration Potential scores for Island Oak Chaparral sites on Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#15-Radar Peak Road Reroute	94	35	67
#16-Radar Peak Below Road (Oaks)	94	35	67
#45-Black Mountain Below Main Oak Grove	88	58	81
#46-Black Mountain Finger Ridges	88	37	78
#17-Burma Oaks	84	58	81
#14-Black Mountain Road	84	52	78
#31-Oakless Ridge Southeast of Quinn Knob	84	46	88
#44-Soledad Oaks	84	35	71
#20-Bare Knoll Near Jolla Vieja Oaks	81	39	80
#18-Jolla Vieja Oaks	78	42	76
#40-Below Grove #7: *Quercus pacifica* Gullies	78	39	84
#19-Seed Source Nursery	56	48	86
#41-Bald Hill #1	44	44	85



Figure 6. Island oak at Radar Peak (Site #15-Radar Peak Road Reroute).

3.2.6 Vernal Pools

The team looked at 3 Vernal Pools on the west end of the island (Sites #26-Vernal Pool #1, #27-Vernal Pool #2, and #28-Vernal Pool #3). They were dry and all of the vegetation was dead or

dormant in July. Due to the conditions and lack of personal expertise, none of us felt comfortable with our assessment. Thus, we do not present specific data or make recommendations concerning restoration of Vernal Pools here.

3.3 Watershed Approach: Windmill/Cherry Canyon

An effective and efficient approach to a large restoration effort for Santa Rosa Island may be a watershed approach. Not only would a watershed approach result in logistical efficiency, the restoration of sites in the upper reaches of a watershed could contribute to the passive or active restoration of sites downstream. For example, eradication of invasive plant populations from the top reaches of the watershed should eliminate the seed source for subsequent invasions below. Our assessments in 2009 did not take a watershed approach. We do have a sufficient number of sites in the Windmill/Cherry Canyon watershed (Figure 1) for a preliminary look at the watershed approach. Table 12 shows that sites at the upper reaches of the watershed (between Sites #45 and #21) (Figure 7) have high PSV scores. Sites between #39 and #2 (Figure 8) are in the lower reaches and have low ERP scores to natural condition, with ERP to management goal moderate to high. The lowest sites are in the area of the park fuel barn and the ranch buildings, and the poor condition of these sites is likely due to high past and present intense human use in addition to their position at the bottom of the watershed.

Table 12. Potential Site Value and Ecological Restoration Potential for sites sorted by relative position in watershed (higher to lower) in the Windmill/Cherry Canyon watershed, Santa Rosa Island.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#45-Black Mountain Below Main Oak Grove	88	58	81
#14-Black Mountain Road	84	52	78
#13-Telephone Road	72	54	74
#22-Black Mountain Northeast Spur	81	50	87
#23-Cherry Canyon #2	81	69	93
#21-Cherry Canyon Chaparral	72	47	85
#39-Windmill Canyon Reroute	28	57	83
#8-Old Ditch	50	52	75
#9-Old Creek Crossing	13	60	78
#1-Old Road Crossing-House Creek	44	53	75
#2-North Side of House Creek Crossing	38	65	82



Figure 7. Black Mountain Road near the top of the Windmill/Cherry Canyon Watershed (Site #14-Black Mountain Road).



Figure 8. Erosion associated with road at Site #2-North Side of House Creek Crossing.

3.4 Fog Capture Sites

Table 13 lists the 18 Fog Capture sites assessed with RRAT in 2009 and revisited in 2011, along with the 3 new sites assessed in 2011 (see Figure 1 for location). The only 2009 site, #4-Smith Highway Bishop Pines, was fully reassessed in 2011. The specific 2011 goals were to evaluate the potential for restoration of the fog drip capture function—a new management goal not articulated in 2009—and to guide future research by the interdisciplinary fog drip team. PSV scores ranged from low to high (44–94). All ERP scores to natural condition were low, and ERP to management goal scores were much higher but moderate (67–88).

Table 13. Prospective sites on Santa Rosa Island to restore the fog capture function, sorted by Potential Site Value.

Site Number and Name	Potential Site Value	Ecological Restoration Potential	
		Natural Condition	Management Goal
#15-Radar Peak Road Reroute	94	35	67
#16-Radar Peak Below Road (Oaks)	94	35	67
#45-Black Mountain Below Main Oak Grove	88	58	81
#46-Black Mountain Finger Ridges	88	37	78
#17-Burma Oaks	84	58	81
#14-Black Mt Road	84	52	78
#44-Soledad Oaks	84	35	71
#31-Oakless Ridge Southeast of Quinn Knob	84	46	88
#22-Black Mountain Northeast Spur	81	50	87
#20-Bare Knoll Near Jolla Vieja Oaks	81	39	80
#18-Jolla Vieja Oaks	78	42	76
#4-Smith Highway Bishop Pines	78	50	82
#40-Below Grove #7: *Quercus pacifica* Gullies	78	39	84
#37-North Edge Torrey Pines-*Mimulus flemingii* Site	75	40	82
#38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site	75	42	82
#13-Telephone Road	72	54	74
#36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	69	35	76
#34-South Point Road	69	48	87
#42-South Point Chaparral	66	67	82
#43-Trancion *Ribes*	66	45	74
#41-Bald Hill #1	44	44	85

All sites can be classified as a type of island chaparral or as having once been chaparral (Table 2). The sites can be placed in 4 groups: 1) sites in the Black Mountain area, 2) sites on the high central ridges, 3) the lower sites on the southern edge of the island, and 4) and the lower northeast sites. The clusters of sites around Black Mountain and the high ridges provide opportunities for integrated restoration. Some of the more scattered sites may better contribute to the fog capture research effort until restoration methods are tested at the clustered sites.

3.4.1 Black Mountain (Sites #13, #14, #22, #45, and #46)

These sites are integrated in that Telephone Road (#13) and the Black Mountain NE spur Site (#22) lead to Black Mountain Road (Site #14), which accesses 2 island oak groves (Sites #45 and #46) on Black Mountain. The Cherry Canyon Trail from the campground joins with Telephone Road making the trip to Black Mountain a popular day hike. The conversion of Telephone Road to a hiking trail would provide an excellent interpretive opportunity along the gradient of elevation and vegetation types up to the island oaks adjacent to Black Mountain.

The conversion of the road to a trail should involve revegetation using plant species that match the immediate area. For example, at the lower elevations, *Quercus pacifica* and *Adenostoma fasciculatum* should be used to fill in the eroded tracks. Higher up, the area is presently grassland dominated by non-native Mediterranean annual grasses. Here *Achnatherum diegonse* and *Baccharis pilularis* should be increased to capture fog. The bulk of the restoration effort should

be placed on curbing erosion below the main island oak stand on Black Mountain, and installing fog capture devices to provide moisture to island oak and other chaparral plantings.

Site #45 is directly below the *Quercus tomentella* stand at the peak of Black Mountain, on a ridge down to a steep north-facing drop-off. Much of the area is now eroded down to bedrock, with dead burls indicating that the area supported chaparral vegetation in the past. There are islands of well-developed soils with soil crusts. These islands support *Quercus pacifica, Arctostaphylos confertiflora, Adenostoma fasciculatum, Heteromeles arbutifolia,* and *Vaccinium ovatum.* The management goal is to curb erosion, encourage soil accumulation and development in the gullies, and increase ground cover to near 50% with plantings currently found on the soil islands.

Site #46 consists of fingers of *Q. pacifica, Adenostoma fasciculatum, Arctostaphylos confertiflora,* and *Q. tomentella* between ridges to the north of Black Mountain Road, west of the peak. The aspect is optimum for regular dense fog. The ridges are about 50% bare soil with areas eroded to bedrock. Where soil remains on the ridges, annual grasses dominate. There are numerous game and livestock trails. The restoration goal here is to reduce bare ground by encouraging recruitment of the above listed chaparral and fog capture species. This can be encouraged by installment of fabric to capture soil and organic matter and fog capture structures with planting seedlings of island oak, *Arctostaphylos confertiflora,* and *Adenostoma fasciculatum.*

3.4.2 High Ridges with Island Oaks (Sites #15, #16, #17, #18, #20, #31, #40, #41 and #44)

The long range goal for the high island oak ridges of the island is to establish chaparral shrubs, grasses and forbs that can foster development of self-sustaining populations of island oak. The first step towards reaching this goal has to be curbing the erosion, and rebuilding and stabilizing the soil.

Sites #15 and #16 are at Radar Peak, the site of a radar tracking station established in the 1940s (Livingston 2006). Site #15 is upslope and upwind of Site #16, which is below the existing road at the head of the Trancion watershed. Much (largely futile) effort has been expended on curbing erosion and saving the few large island oaks on Site #16. Concentrated erosion from the existing road and culverts needs to be stopped. We recommend that the existing road be abandoned and brought to grade. Erosion should be dispersed by use of coco fiber rolls and other materials. The road should be moved to the top of the ridge (Site #15). Native vegetation, including *Baccharis pilularis, Achnatherum diegoense,* and *Bromus carinatus,* should be planted to help stabilize the slope and to capture fog. Water tanks could be placed just below the new road to water new plantings. As much of the existing vegetation as possible should be left intact. Fog capture structures can be used to enhance the establishment of plantings, which should also be placed to take advantage of the existing vegetation drip line moisture. Cages and fences should be removed.

The sites (Sites #18, #20, #40, #41, and #44) centered on the Jolla Vieja Oaks (Site #18; previously known as the Soledad Oaks, and also known as Grove 7) are relatively close to one another. The prevailing wind blows approximately from Site #20 through Sites #18, #40 and #41. Coordinated restoration among this group of sites could have a substantial impact in the Jolla Vieja drainage downhill and downwind. Site #20 is on the ridge at the top of the Jolla Vieja

watershed (downwind) and the Arlington watershed (upwind) just north of Main Road, and is fairly barren. It could have both fog capture structures and trucked-in water to irrigate seeds and plantings, and could develop into a nursery location for downwind and downslope locations.

Site #19, although not targeted as a potential fog capture site, is located between Sites #18 and #20. It is already more vegetated with grasses and *Baccharis pilularis*, and could quickly become a nursery site with diverse supplemental plantings of chaparral shrubs and island oaks.

Downwind and downslope is Site #18, mostly barren except for the large oaks. It would benefit from any seed produced in Site #20 (and Site #19), and can also have fog capture structures constructed throughout. The top part of Site #18 is adjacent to the road and suitable for supplemental watering of plantings using a system of hoses. The lower part of the site should be generally seeded without supplemental hosed water. Since the large trees already trap and drip lots of fog moisture, plantings could be planted on the lower, downwind, south facing edge of the dripline where they receive both sun and water. With time, the drip shadow of established plantings can be used to extend the plantings further downhill and downwind. Site #40 is directly downslope on the same spur and downwind of Site #18, and can be expected to get an input of seed from sites above and upwind. Site #41 is across a drainage southwest from Sites #18 and #40, and is likely to get a comparatively small benefit from recovery at the higher sites. Possible better restoration sites are the barren spurs to the east and west of Sites #18 and #40. They can be treated similarly to Sites #18 and #40 (except that there currently are no oaks at these sites). They could have some trucked supplemental water near the road, and any plantings would be able to disperse seed over a broader swath of the watershed (including potentially onto Site #41).

In close proximity to the Jolla Vieja Oaks is Site #44-Soledad Oaks (also known as Grove 8). This is a small stand of mature trees (~25) on a steep southwest facing slope. The trees have been shown to be a single clone, probably derived from root sprouts. The stand is surrounded by annual grasses above and to each side with a steep eroded slope below. The site has high potential for fog capture as evidenced by high soil moisture and moss below the stand. Several island oaks have been completely destroyed by erosion on the downhill edge of the site. The understory consists of *Lolium multiflorum, Rafinesquia californica*, and *Rumex* sp. Erosion could be controlled below the stand with the use of coconut fiber rolls or drift fences. Above the stand, fog capture devices could be installed and island oak plants placed at the drip zone. The area could potentially serve as a nursery for the Jolla Vieja Oak sites, as a layer of soil remains.

The Burma Oaks site (Site #17) is in the general vicinity of these other sites, but is far enough away that restoration would be a stand-alone effort. It contains 4 stands of island oak on a steep north facing slope. Location and aspect make it an excellent fog capture site. There is substantial recruitment occurring at the upper edge of the 2 highest elevation stands. Attempts could be made to increase island oak numbers by planting *Quercus tomentella* and *Baccharis pilularis* at the upper edge of the stands. We see restoration here as a lower priority than at the Radar Peak and Jolla Vieja Oak sites.

Site #31-Oakless Ridge Southeast of Quinn Knob is several kilometers east of the other high ridge island oak sites. While it is similar in elevation and substrate to the Jolla Vieja Oaks area, it is sparsely vegetated, with no chaparral shrubs or tree species currently present. Site value is

high, but as a research site for testing restoration methods using fog capture rather than as a restoration site.

3.4.3 Southern Low Elevation Sites (Sites #34, #36, #42, and #43)

Sites #34-South Point Road and #42-South Point Chaparral were re-evaluated in 2011 as fog capture sites. However, they are leeward of the high central ridges of the island, out of the zone of heavy fog. Thus, these sites have little potential for fog capture, and conditions at these sites do not appear to be governed by fog inouts. Both sites are highly eroded. Much of the erosion in Site #42 is from runoff from the road in Site #34. In order to recover, the road needs to be closed, graded to contour, and replaced with a trail. If erosion can be reduced and gullies restored to grade, the site has potential for restoration of chaparral.

Site #43-Trancion *Ribes* is in an area of formerly dense chaparral on a northwest-facing slope of Trancion Canyon. The site is denuded in the upslope areas, grading into more dense *Quercus pacifica* downslope. Abundant lichens on some of the dead chaparral stems indicate fog in the upslope portion that might be harvested for restoration. Site #43 has several individuals of the uncommon *Ribes malvaceum,* contributing to a relatively high Potential Site Value.

The #36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site has some high quality chaparral and some rare species, including *Arabis hoffmanii, Helianthemum greenei* and *Arctostaphylos confertiflora.* There is evidence that erosion has caused the chaparral to move down slope to be replaced by annual grasslands. It was not apparent at the time of our visit that this site has potential as a fog capture site but weather station instrumentation already installed should answer that question. Also, due to the remoteness of this site and the difficultly in transporting materials and water from the road, this site does not have high potential as a restoration site.

3.4.4 Northeastern Low Elevation Sites (Sites #4, #37, and #38)

Site #4-Smith Highway Bishop Pines is a small stand of *Pinus muricata* on a steep north facing slope. Fog was dense when visited. The site is highly eroded with deep gulleys. Within the gullies, where some soil has accumulated, there is a rich flora including *Achnatherum diegoense, Arctostaphylos confertiflora, Carex* sp., *Calystegia macrostegia, Dudleya greenei, Heteromeles abutifolia, Kohleria macranthra, Mimulus flemmingii, and Opuntia* sp. There are numerous small Bishop pines in a krumholtz form. Despite high species richness, nearly 90% of the ground is bare, much of it eroded to bedrock.

Restoration of Site #4 would be difficult. Erosion control rolls could be used to catch soil in gullies. There may be adequate plant propagules available for passive restoration. The site certainly has the necessary physical character for fog capture. However, at this time, we feel the site lends itself best as a research site.

#37-North Edge Torrey Pines-*Mimulus flemingii* Site and #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site are located on adjacent ridges and west of the stand of the endemic *Pinus torreyana* ssp. *insularis.* Both ridges are highly eroded with deep gullies, and much of the topsoil is gone. Pockets of soil have accumulated in gullies and support a rich assemblage of chaparral species including scattered *P. torreyana* and large clumps of *Arctostaphylos confertiflora*. Other species observed include *Adenostoma fasciculatum, Artemisia californica, Achnatherum diegoense, Baccharis pilularis, Cardionema ramosissima,*

Eriogonum grande, Galium angustifolium, Helianthumum scoparium, Lessingia filaginifolia, and *Mimulus flemingii.*

The first step in restoration of these sites has to be curbing the erosion. This can be done by placing sediment trapping structures in the major gullies. The next step would be to increase vegetation cover by planting in the soil captured by the structures. Efforts should also be made to increase *Pinus torreyana* towards the top of the ridges.

These sister sites can serve three purposes: testing methods to curb erosion; testing fog capture devices and planting methods; and, as it is close to the Torrey Pine trail, providing interpretation of research and restoration of the fog drip function.

4 Discussion

The output from the Restoration Rapid Assessment Tool does not make the decision of where Channel Islands National Park should place their priorities for active restoration. It will aid the park in making decisions based upon sound and transparent criteria. In this case, the assessment of disturbed sites was not comprehensive for Santa Rosa Island due to time constraints. However, the sites assessed are representative of the types and degrees of disturbance and the ecological restoration potential. Below we discuss the RRAT metrics and the merits and possible shortcomings of the various restoration strategies and site groupings presented in the results.

4.1 Gain for Effort (GE)

Gain for Effort provides a measure of the functional change needed to restore a site for the effort expended. A value of 100 represents a high GE and 0 no GE. As can be seen in Table 5, only 4 sites had a GE score above 10 to management goal and only 2 sites had a GE score above 10 to natural condition. One of these sites (#9-Old Creek Crossing) has a Potential Site Value of only 13. Conversely, Clapp Springs ranks high in GE, and thus would require less effort to restore to a management goal than many other island sites. However, we found that metric to have minimal value for the assessment on Santa Rosa Island.

4.2 Potential Site Value (PSV)

We present comparisons of sites sorted by Potential Site Value island-wide, by vegetation type, by watershed, and among fog drip sites. A second metric we consider important to consider in conjunction with PSV was ERP. For Santa Rosa Island, the only real variation in Restoration Logistics is the size of the site, so Restoration Logistics is not as useful an index. Finally, the Stressor Removal Potential is not useful because it was basically the same island-wide—the effect of deer and elk. We made the assumption that the last remaining major stressor (deer and elk) would be removed in 2011, and at the time of this report, the elk and deer are indeed gone from the island.

4.2.1 Site Comparisons Island-Wide

Although it could be argued that sites should not be compared across different vegetation or ecological types, this approach has merit for Santa Rosa Island. If the park were to give priority to restoration of sites with a PSV above 70, twenty one of the 43 sites would be considered for active restoration (Table 6). Seven of the 21 sites have an ERP score to natural above 50, including Site #17-Burma Oaks, Site #31-Ridge SE of Quinn Knob, Site #14-Black Mountain Rd, Site #23-Cherry Canyon #2, Site #35-Jolla Vieja, Site #12-Old Ranch House Salt Marsh, and Site #13-Telephone Rd. If the park gives weight to how close to natural a site can become, this could be an important metric. Conveniently, most of the 21 sites form 2 rather tight geographic clusters: one of 7 sites close to Radar Peak and 7 sites towards the top of the Windmill/Cherry Canyon watershed. This would reduce the logistical cost of restoring multiple high priority sites and the restoration of one site may very well contribute to the restoration of nearby sites. We feel this approach deserves serious consideration by the park.

4.2.2 Site Comparison by Vegetation Type

This approach has the value of comparing sites of similar ecology.

Riparian

Riparian areas, in general, have changed rapidly since the cessation of grazing by cattle in 1998. Before 1998, many riparian areas were nearly denuded of vegetation, both native and weedy non-native. Soon after cattle removal, once bare and nitrogen enriched soil became dominated by exotic species such as cocklebur and thistles. These species are now in decline and some native species have returned. However, many riparian areas remain enriched from heavy use by deer and elk with many of the waterways choked with cattails. Active restoration of riparian areas will be difficult until a few years following the removal of deer and elk. Efforts to reestablish seed sources for woody species such as *Salix lasiolepis* along the streams should speed recovery. After removal of deer and elk, management actions to speed the recovery of riparian systems should be relatively easy with high potential of success. Six of the 7 riparian areas have a PSV score of over 50. The same 6 sites have relatively high ERP scores for both restoration to natural and to management goal.

Coastal Sage Scrub

As a vegetation type, Coastal Sage Scrub is highly impacted and generally type-converted to an exotic annual grassland. There is sign of some increase in native perennial grasses and shrubs. Our assessment showed each site to have a low Potential Site Value, and, for most sites, restoration to a management goal close to the natural condition is not deemed feasible.

Pine Chaparral

This is a rare vegetation type which is found close to the heaviest visitor activity at the present time. All 3 sites evaluated (as well as #37-North Edge Torrey Pines-*Mimulus flemingii* Site and #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site) have PSV scores above 75. ERP scores to management goal are high for all these sites. We recommend that the park give serious consideration to restoring disturbed sites in this vegetation type.

Chaparral and Island Oak Chaparral

These are signature vegetation types for Santa Rosa Island, already considered a top priority for restoration by park management. Since 9 of the 13 Island Oak Chaparral sites assessed had PSV scores of over 80, and 7 of the 13 ERP scores were above 80 for restoration to management goal, there is strong justification for the park keeping Island Oak Chaparral a top restoration priority.

4.2.3 Watershed Approach: Windmill/Cherry Canyon

If one accepts the notion that restoration of sites at the top of a watershed will contribute to the restoration of sites lower in the watershed, this is an approach that warrants serious consideration. The only watershed for which we assessed a significant number of sites was Windmill/Cherry Canyon. Also, this is the watershed that ends at the highly developed and impacted ranch headquarters and at the pier, where most visitors arrive. Sites towards the top of the watershed have high PSV scores and high ERP to management goal scores. Sites close to the ranch and park maintenance facilities have very low PSV scores.

However, the ranch area is the part of the island that each visitor sees first. The stabilization of key historic structures along with restoration of the surroundings to some level of ecological integrity seems prudent. The Black Mountain Road could be converted to a hiking trail, easily accessible from the campground. We feel that the watershed approach has merit.

4.2.4 Concentration on Restoring the Fog Drip Capture Function to Chaparral Sites

The leadership of Channel Islands National Park has placed priority on restoration of the fog capture function through the restoration of chaparral vegetation structure and composition. Thus, 21 sites were selected for RRAT assessment with this goal in mind. Although it will require major efforts, the cluster of sites on the high ridges and in the area of Black Mountain should be given top priority for restoration. Efforts will require realigning roads, changing roads to trails, curbing erosion, and active use of constructed fog capture structures to provide moisture for plantings. All of this is now more feasible with the removal of all ungulates from the island. This restoration effort should employ an active adaptive management approach. Restoration on Santa Rosa Island focused on fog capture can eventually be applied to other islands in the Channel Islands and the nearby coastal mainland.

5 Conclusions and Recommendations

The Restoration Rapid Assessment Tool and our subsequent analysis provide a structured decision framework that should help Channel Islands National Park management focus on restoration activities with a high potential for improving the ecological integrity of selected areas of Santa Rosa Island and result in an enhanced visitor experience. This assessment did not include all disturbed sites on the island. Thus, one action the park may wish to consider is an expanded and more systematic assessment of disturbed areas on the island. However, we feel informed management decisions on what and where to initiate active restoration activities can be made from the current rapid assessment.

We present 4 alternatives for consideration, focused on logical groupings of sites. The first is the restoration of two clusters of sites with high Potential Site Values and high Ecological Restoration Potential to the stated management goals. These are a cluster of 7 sites around Radar Peak and another cluster of 5 sites at the top of the Windmill/Cherry Canyon watershed. The second alternative is a group of 13 sites in the Island Oak Chaparral. The third is 3 sites in Pine Chaparral. The fourth is sites in the Windmill/Cherry Canyon watershed. There is an overlap of sites in the 4 alternatives. Once the park selects an alternative(s) or a combination thereof, more detailed assessments should be performed for the sites assessed using the RRAT, along with additional sites within the area, vegetation type, or watershed.

Upon discussion with the park management team, the selected alternative was to restore the fog drip capture function to chaparral sites. This includes many of the sites in the two clusters, the island oak chaparral sites, the pine chaparral sites, and the chaparral sites. The information from this assessment provides a baseline for these efforts. The site profiles along with the numerous photographs should prove valuable in developing a plan.

This beta test of the RRAT identified some changes needed to the tool for use in upland settings and some of the indicator definitions. It did demonstrate that the tool facilitates separation of disturbed sites for restoration prioritization, across settings as diverse as lowland riparian areas and upland ridges. Perhaps most importantly, the RRAT process systematically captured expert site-specific knowledge and summarized it in a format that was transparent and comprehensible. As a result, meaningful discussions were held informally and formally with managers, resulting in further analyses focused on restoration of fog capture, a high priority for Channel Islands National Park.

6 Literature Cited

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Appendix A: Field Data Sheet

Page 1- RRAT Field Data Sheet

Restoration Rapid Assessment Tool Data Sheet

Mgmt Area _____ Latitude _____
Site Name _____ Longitude _____
Observer _____ Datum _____
Date _____ GPS File _____

Photo	GPS Loc	Comp Dir

Location Description

Description of Current Condition

Description of Natural Condition

Description of Management Goal

Appendix A (*continued*)

Page 2- RRAT Field Data Sheet

Disturbance Size: ☐ <0.5ac ☐ 0.6-1ac ☐ 1.1-5ac ☐ 5.1-10ac ☐ 10.1-25ac ☐ >25ac ☐ Unknown
Site accessibility: ☐ Completely accessible by road ☐ <1 mile ☐ 1-5 mile ☐ >5 mi ☐ Unknown
In Wilderness: ☐ Yes ☐ No

Difference: Severe=4, High=3, Moderate=2, Low = 1, None = 0, NA=Not Applicable, U=Unknown

Hydrology/Landform Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Rills		
Gullies		
Bare ground		
Pedestals/terracettes		
Wind scours		
Litter/debris/thatch		
Surface water flow		
Channel morphology		
Impervious surfaces		

Soil Quality Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Soil surface erosion potential		
Soil loss/degradation		
Soil chemistry/nutrient alteration		
Soil contamination		
Sediment supply/transport		

Non-Native Animal Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Presence (Past/Current)		
Herbivory		
Trampling/Trails		
Bioturbation		
Ecosystem engineering		
Waste (urine, feces..)		
Microbial pathogens		

Non-Native Plant Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Presence		
Availability of areas for coloniz.		
Seedbank		
External Source		

Native Animal Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Presence keystone sp.		
Herbivory		
Trampling/Trails		
Bioturbation		
Ecosystem engineering		
Waste (urine, feces..)		
Microbial pathogens		

Appendix A (*continued*)

Page 3- RRAT Field Data Sheet

Native Plant Indicators	Difference between Current Condition and Natural Condition	Difference between Current Condition and Management Goal
Dom. plant comp. & cover		
Presence of uncommon spp.		
Biological soil crusts		
Other non-vascular plant cover		
Age class, recruitment		
Seedbank		
External source		

Stressor	Difficulty to Remove	Stressor	Difficulty to Remove
Altered hydrology		Irrigation	
Channelization		Land grading	
Climate change		Levees	
Construction		Non-native fauna	
Culverts		Pesticides/herbicides	
Dams		Piped discharge	
Deposition: atmospheric		Plowing, tilling, harvesting, etc.	
Deposition: water-carried		River/streambank armoring	
Disease		Salinity	
Drainage		Soil contamination/pollution	
Fertilizer: nitrogen		Soil disturbance	
Fertilizer: phosphorous		Stormwater inputs	
Hard surfacing		Trails	
Herbivory: insects		Transportation of products	
Herbivory: mammals		Tree removal	
Inappropriate fire management		Waste disposal	
Inappropriate wildlife management		Water diversion structure	
Instream modifications		Water removal	
Invasive non-native plant presence		Woody debris removal	
Invasive non-native plant seedbank			
Invasive non-native plant external source			

I = Impossible to remove
D = Difficult to remove
M = Moderately difficult to remove
E = Easy to remove

AR = Already removed
U = Unknown
NA = Not applicable to the site

Site Characteristics	Potential Site Value
Animal community biodiversity	
Plant community biodiversity	
Threatened, endangered or species of concern	
Recreation or aesthetics	
Emblematic natural features	
Landscape	
Habitat or ecosystem rarity in landscape	
Historical, cultural or archeological values	

Ex = Extremely valuable
Hi = Highly valuable
Mod = Moderately valuable
Min = Minimally valuable

Not = Not valuable
Unk = Unknown
NA = Not applicable

Appendix B: Plant Taxa

Below are codes and names for all plant (and lichen and moss) taxa mentioned in the report or in the Site Profiles (Appendix C). Species code, common name, and status are those used by Channel Islands National Park and the USGS, Biological Resources Division, Western Ecological Research Center, Channel Islands Field Station in their databases. Species and family name are from Hickman, JC (editor), 1993, The Jepson Manual: Higher Plants of California, University of California Press, Berkeley CA. In the "Status" column, CI = California Channel Islands, CI* = CI and Mexican Islands, and SRI = Santa Rosa Island.

Species Code	Species	Family	Common Name	Status
ACMI	*Achillea millefolium*	Asteraceae	yarrow	native
ADFA	*Adenostoma fasciculatum* var. *fasciculatum*	Rosaceae	chamise	native
AGOX	*Agoseris* sp.	Asteraceae	mountain dandelion	native
ARHO	*Arabis hoffmannii*	Brassicaceae	Hoffmann's rock cress	endemic CI, Federally Endangered
ARXX	*Arctostaphylos* sp.	Ericaceae	manzanita	native
ARCO	*Arctostaphylos confertiflora*	Ericaceae	Santa Rosa Island manzanita	endemic SRI, Federally Endangered
ARMA	*Armeria maritima* ssp. *californica*	Plumbaginaceae	sea pink	native
ARCA	*Artemisia californica*	Asteraceae	California sagebrush	native
ATCO	*Atriplex coulteri*	Chenopodiaceae	Coulter's saltbush	native
ATSE	*Atriplex semibaccata*	Chenopodiaceae	Australian saltbush	non-native
AVBA	*Avena barbata*	Poaceae	slender wild oat	non-native
AVXX	*Avena* sp.	Poaceae	wild oat	non-native
BADO	*Baccharis douglasii*	Asteraceae	marsh baccharis	native
BAPI	*Baccharis pilularis*	Asteraceae	coyote brush	native
BASA	*Baccharis salicifolia*	Asteraceae	mule fat	native
BRCA	*Bromus carinatus* var. *carinatus*	Poaceae	California brome	native
BRDI	*Bromus diandrus*	Poaceae	ripgut brome	non-native
CAAL	*Calochortus albus*	Liliaceae	fairy lantern	native
CAMA	*Calystegia macrostegia* ssp. *macrostegia*	Convolvulaceae	northern island morning glory	native
CARA	*Cardionema ramosissimum*	Caryophyllaceae	sandmat	native
CXXX	*Carex* sp.	Cyperaceae	sedge	native
CEAR	*Ceanothus arboreus*	Rhamnaceae	feltleaf ceanothus	endemic CI*
CEMG	*Ceanothus megacarpus* ssp. *insularis*	Rhamnaceae	bigpod ceanothus	endemic CI
CIVU	*Cirsium vulgare*	Asteraceae	bull thistle	non-native

Appendix B (*continued*)

Species Code	Species	Family	Common Name	Status
DERI	*Dendromecon harfordii*	Papaveraceae	northern island bush poppy	endemic CI
DISP	*Distichlis spicata* var. *stolonifera*	Poaceae	salt grass	native
DUGR	*Dudleya greenei*	Crassulaceae	Greene's dudleya	endemic CI
ERGR	*Eriogonum grande* var. *rubescens*	Polygonaceae	red buckwheat	endemic CI
ERCI	*Erodium cicutarium*	Geraniaceae	redstem filaree	non-native
FEAR	*Festuca arundinacea*	Poaceae	tall fescue	non-native
FRSA	*Frankenia salina*	Frankeniaceae	alkali-heath	native
GAAN	*Galium angustifolium* ssp. *foliosum*	Rubiaceae	narrow-leaved bedstraw	endemic CI
GAXX	*Galium* sp.	Rubiaceae	bedstraw	native
GNPU	*Gnaphalium purpureum*	Asteraceae	purple cudweed	native
GRXX	*Grindelia* sp.	Asteraceae	gumplant	native
HEGE	*Helianthemum greenei*	Cistaceae	island rushrose	endemic CI, Federally Threatened
HESC	*Helianthemum scoparium*	Cistaceae	common rushrose	native
HECU	*Heliotropium curassavicum*	Boraginaceae	heliotrope	native
HEFA	*Hemizonia fasciculata*	Asteraceae	common tarweed	native
HEAR	*Heteromeles arbutifolia*	Rosaceae	toyon	native
HIIN	*Hirschfeldia incana*	Brassicaceae	summer mustard	non-native
HOMU	*Hordeum murinum*	Poaceae	foxtail	non-native
HOXX	*Hordeum* sp.	Poaceae	foxtail	non-native
HYGL	*Hypochaeris glabra*	Asteraceae	smooth cat's ear	non-native
ISME	*Isocoma menziesii*	Asteraceae	goldenbush	native
JACA	*Jaumea carnosa*	Asteraceae	jaumea	native
KOMA	*Koeleria macrantha*	Poaceae	June grass	native
LEFR	*Lepechinia fragrans*	Lamiaceae	fragrant pitcher-sage	native
LEFI	*Lessingia filaginifolia* var. *filaginifolia*	Asteraceae	cudweed-aster	native
LECO	*Leymus condensatus*	Poaceae	giant wild rye	native
LODE	*Lotus dendroideus*	Fabaceae	island deerweed	endemic CI
LOMU	*Lolium multiflorum*	Poaceae	Italian ryegrass	non-native
LOXX	*Lolium* sp.	Poaceae	ryegrass	non-native
LUAL	*Lupinus albifrons*	Fabaceae	silver lupine	native
LYFL	*Lyonothamnus floribundus* ssp. *aspleniifolius*	Rosaceae	Santa Cruz Island ironwood	endemic CI
MAPA	*Malva parviflora*	Malvaceae	cheeseweed	non-native
MALE	*Malvella leprosa*	Malvaceae	alkali mallow	native
MAVU	*Marrubium vulgare*	Lamiaceae	horehound	non-native

Appendix B (*continued*)

Species Code	Species	Family	Common Name	Status
MEPO	*Medicago polymorpha*	Fabaceae	bur-clover	non-native
MIFL	*Mimulus flemingii*	Scrophulariaceae	island monkeyflower	endemic CI
MOSS	moss		moss	native
NAPU	*Nasella pulchra*	Poaceae	purple needlegrass	native
NAXX	*Nasella* sp.	Poaceae	needlegrass	native
NIXX	*Niebla* sp.	Ramalinaceae	lichen	native
OPXX	*Opuntia* sp.	Cactaceae	prickly pear	native
PAIN	*Parapholis incurva*	Poaceae	sickle grass	non-native
PECL	*Pennisetum clandestinum*	Poaceae	kikuyu grass	non-native
PIMU	*Pinus muricata*	Pinaceae	Bishop pine	native
PITO	*Pinus torreyana* ssp. *insularis*	Pinaceae	Santa Rosa Island Torrey pine	endemic SRI
PIXX	*Piperia* sp.	Orchidaceae	rein orchid	native
PIMI	*Piptatherum miliaceum*	Poaceae	smilo grass	non-native
POAR	*Polygonum arenastrum*	Polygonaceae	common knotweed	non-native
POMO	*Polypogon monspeliensis*	Poaceae	rabbitsfoot grass	non-native
QUPA	*Quercus pacifica*	Fagaceae	island scrub oak	endemic CI
QUTO	*Quercus tomentella*	Fagaceae	island oak	endemic CI*
RACL	*Rafinesquia californica*	Asteraceae	California chicory	native
RHIN	*Rhus integrifolia*	Anacardiaceae	lemonade berry	native
RIMA	*Ribes malvaceum* var. *malvaceum*	Grossulariaceae	chaparral currant	native
RUAC	*Rumex acetosella*	Polygonaceae	sheep sorrel	non-native
RUCR	*Rumex crispus*	Polygonaceae	curly dock	non-native
SALA	*Salix lasiolepis*	Salicaceae	arroyo willow	native
SABR	*Salvia brandegeei*	Lamiaceae	Brandegee's sage	native
SAME	*Sambucus mexicana*	Caprifoliaceae	elderberry	native
SIMB	*Silybum marianum*	Asteraceae	milk thistle	non-native
SPMA	*Spergularia macrotheca* var. *macrotheca*	Caryophyllaceae	sand spurrey	native
TYDO	*Typha domingensis*	Typhaceae	narrow-leaved cattail	native
VAOV	*Vaccinium ovatum*	Ericaceae	California huckleberry	native
WOFI	*Woodwardia fimbriata*	Blechnaceae	giant chain fern	native
XASP	*Xanthium spinosum*	Asteraceae	spiny clotbur	non-native

Appendix C: Site Photographs and Profiles

In this appendix, field assessments, location data, a site photograph, and a table of RRAT Index scores are given for each site. Also given are tables of Potential Site Value Components and Site Stressors. For each Fog Site, an additional aerial photograph showing the site boundaries is given.

Below are RRAT Index definitions that apply to all sites. Note that "Natural Condition Scores" consider what it takes to restore a site from its current condition to the user's best guess of what the site's "pristine" condition should be; "Management Goal Scores" consider what it takes to bring the site from its current condition to the written "Management Goal", which is somewhat less than "pristine".

Convergence is based on the user's assessment of the degree to which the site departs from natural and from the management goal. A value close to 100 indicates the site is similar to natural or to the management goal; a value close to 0 indicates the site is very different from natural or from the management goal.

Ecological Restoration Potential combines Convergence and Stressor Removal Potential (below). A value close to 100 indicates the site has high potential for ecological restoration; a value close to 0 indicates a low potential for ecological restoration.

Restoration Logistics combines the disturbance size, site accessibility, and wilderness status. A value close to 100 indicates a site that presents relatively few logistical challenges; a value close to 0 will be logistically very challenging to restore.

Ease of Restoration combines Convergence and Stressor Removal Potential with Restoration Logistics to give a composite estimate of how difficult the site will be to restore. A value close to 100 indicates a site that will be logistically and ecologically relatively easy to restore; a value close to 0 indicates a site that will be both logistically and ecologically very difficult to restore.

Potential Site Value indicates the user's estimate of the potential value of the site. It is a simple average of the values for each of the 8 site value categories evaluated. A value closer to 100 indicates a site that has many highly valued site Components; a value closer to 0 indicates a site with little value in terms of the Components evaluated. We recommend the user consider their management goals with respect to the individual site value Components.

Stressor Removal Potential indicates the combined difficulty of removing all the stressors impacting the site, depending on the removal difficulty assigned to each stressor by the user. A value closer to 100 indicates that stressors can be removed relatively easily; a value closer to 0 indicates that the stressors will be very difficult to remove. Stressor Removal Potential takes into account only those stressors that have a removal effort of "Difficult", "Moderate", or "Easy; "Impossible" or "Unknown" are not scored. Consider carefully whether the goals of the restoration can be achieved if these stressors are not removed.

Gain for Effort indicates the amount of restoration that would likely be accomplished at the site for the amount of effort expended on the restoration. The closer the score to 100, the greater will be the return on the effort expended. A score of 999 indicates that there were no stressors to remove and the site was small, fully accessible by road, and not in a wilderness area. Therefore, there were no obstacles to full restoration, and indeed no apparent reason to restore the site, since no stressors were identified that needed to be removed.

Number of Unknowns indicates the number of indicators for which the response could not be scored. Responses of "Unknown" quickly reduce the validity of values used in site comparisons. If there are more than 2 "Unknown" responses, they will be listed. The user is encouraged to research the indicator so an appropriate response can be made, or to make their best guess.

Site Stressors—The RRAT data sheet (Appendix A) lists 40 stressors that could potentially affect a site. Seventeen of these apply to the Santa Rosa Island sites, and are explained below.

Stressor	Explanation
Altered hydrology	Changes in hydrology are reflected in surface water or groundwater flow, availability, seasonal changes, and flashiness that influence habitat for plants and animals.
Channelization	Straightening of streams or rivers, sometimes in association with river/streambank armoring, drastically changes river hydrology and geomorphology.
Climate change	Change in the local climate may be manifest as changes in phenology or seasonality of abiotic or biotic components.
Construction	Activities focused on land clearing and subsequent construction of buildings, structures, roads, etc., permanently destroy or alter habitat.
Culverts	Culverts are drainage structures, especially used under roadways, that focus water flow, therefore changing water velocity and rates of flow.
Deposition/water-carried	Silt or other material can be carried by water and deposited, typically due to reduction of water velocity. Siltation can reduce or change invertebrate habitat as well as safe sites for germination of aquatic vegetation.
Herbivory – mammals	Inappropriate levels of herbivory, either higher or lower than expected, alter the plant species cover and composition.
Instream modifications	Structures such as artificial riffles, pools, deflectors, barriers, etc., can result in changes in habitat for fish, invertebrates, and vegetation.
Invasive non-native plant presence	Invasive plants can impact native flora and fauna and potentially impact ecosystem processes.
Invasive non-native plant seedbank	The invasive seedbank provides future opportunities for germination and growth of invasive plants for as long as the seedbank is viable.
Invasive non-native plants: external source	Adjacent infestations provide propagules that can invade or re-invade from adjacent areas.
Land grading	Grading removes vegetation and topsoil and encourages erosion.
Non-native fauna	Non-native fauna can impact native flora and fauna and potentially ecosystem processes; consider ability to eradicate and effects of continued occupancy.
Soil contamination/pollution	Does the site have evidence (e.g., empty barrels, mining debris) or a known history of activity that would have produced contamination that is responsible for current departure from desired condition?
Soil disturbance	Soil disturbance, resulting from either anthropogenic or natural causes, can result in erosion, establishment of invasive plants, and loss of habitat.
Trails	Hiking, horse, bike, ATV, and snowmobile trails cause soil compaction, disturb wildlife, and can be routes for invasive non-native plant introduction.
Transportation of products	Roads, railroads, barges, and other corridors for movement of people and goods create air, noise, and/or water pollution, and provide access routes for invasive species.
Water diversion structure	Diversion structures are designed for river/water regulation; depending on who has control of the structure, they may hinder or help restoration efforts.

#1-Old Road Crossing-House Creek
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #1-Old Road Crossing-House Creek

Longitude (DD): -120.05120 **Latitude (DD):** 34.00652 **Datum:** WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Starts at old crossing down to fire hydrant. Includes parallel road that should be abandoned. Includes parallel road to main ranch house.

Current Condition: Raw bleeding slopes. Actively eroding slopes associated(?) = roads, redundant parallel roads, + maintained channel. Classic examples of rills, + pedestals, + gullies. Exotics include ripgut brome, kikuyu grass at edge of stream. Many native species present between gullies. BAPI, ISME, ARCA, LEFI, RHIN, ACMI, GRXX.

Natural Condition: Sagebrush scrub with native components above (see "Current Conditions"). Also LODE. Intrinsically erodible soils. Recent marine deposits. Annual grass replaced by native perennials. Smooth + even slopes. Vegetated to 90% cover.

Management Goal: Slightly lower cover of shrubs. Stabilize erosion. Restore more

natural hydrological flow. Restore gullies to smooth surface. Accept annual grass ground cover. Decompact roads and revegetate.

RRAT Indices and Scores: #1-Old Road Crossing-House Creek		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	34	53
Ecological Restoration Potential	53	75
Restoration Logistics	73	73
Ease of Restoration	68	74
Potential Site Value	44	44
Stressor Removal Potential	96	96
Gain for Effort	1.1	1.7
Number of Unknowns	0	0

RRAT Potential Site Value Components: #1-Old Road Crossing-House Creek	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Moderately valuable
Emblematic natural features	Minimally valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #1-Old Road Crossing-House Creek	
Stressor	**Effort to Remove**
Channelization	Moderate
Altered hydrology	Moderate
Culverts	Easy
Soil contamination/pollution	Easy
Land grading	Easy

#2-North Side of House Creek Crossing
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #2-North Side of House Creek Crossing

Longitude (DD): -120.05186 **Latitude (DD):** 34.00754 **Datum:** WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Rd from corner post, 275 deg from fork. Eroded corners at rd bend. Water bars on steep slope.

Current Condition: Includes highly impacted road segment. Severe erosion on both sides of road fork. Extreme siltation into stream.

Natural Condition: Sagebrush scrub with native components above (see "Current Conditions"). Also LODE. Intrinsically erodible soils. Recent marine deposits. Annual grass replaced by native perennials. Smooth + even slopes. Vegetated to 90% cover.

Management Goal: Slightly lower cover of shrubs. Stabilize erosion. Restore more natural hydrological flow. Restore gullies to smooth surface. Accept annual grass ground cover. Decompact roads and revegetate.

RRAT Indices and Scores: #2-North Side of House Creek Crossing		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	44	63
Ecological Restoration Potential	65	80
Restoration Logistics	87	87
Ease of Restoration	76	82
Potential Site Value	38	38
Stressor Removal Potential	98	98
Gain for Effort	2.9	4.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #2-North Side of House Creek Crossing	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Minimally valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Minimally valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #2-North Side of House Creek Crossing	
Stressor	**Effort to Remove**
Altered hydrology	Moderate
Soil disturbance	Easy

#3-Backdoor Road to Carrington
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #3-Backdoor Road to Carrington

Longitude (DD): -120.05388 **Latitude (DD):** 34.01098 **Datum:** WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Road section and sidecuts; borrow pit. On 'Back Door to Carrington' road. Leads into creek bottom.

Current Condition: Incised road, heavily compacted with high banks. Borrow pit at bottom of this road section. Deep but vegetated on inside of curve feeds water onto exposed toe of borrow pit and silt into creek.

Natural Condition: Gently sloping marine terrace deeply incised by stream channels. Thickly vegetated with CSS.

Management Goal: Remove road and lessen side bank steepness by filling roadbed with bank material. Stabilize borrow pit. Create swale out of roadbed; protect against erosion with barrier materials (wattles, etc.). Revegetate.

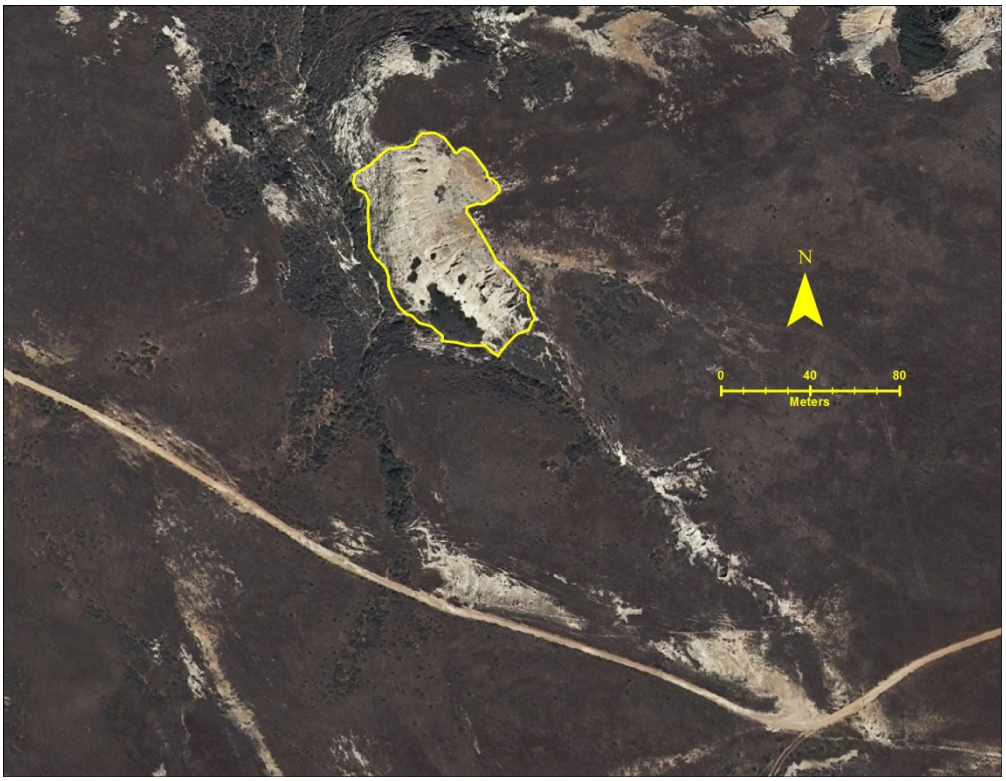
RRAT Indices and Scores: #3-Backdoor Road to Carrington		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	45	65
Ecological Restoration Potential	57	80
Restoration Logistics	93	93
Ease of Restoration	78	85
Potential Site Value	46	46
Stressor Removal Potential	96	96
Gain for Effort	4.2	5.9
Number of Unknowns	0	0

RRAT Potential Site Value Components: #3-Backdoor Road to Carrington	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Moderately valuable
Emblematic natural features	Minimally valuable
Threatened or endangered species	Moderately valuable
Recreation or aesthetics	Not applicable

RRAT Site Stressors: #3-Backdoor Road to Carrington	
Stressor	**Effort to Remove**
Land grading	Moderate
Channelization	Moderate
Altered hydrology	Moderate
Soil disturbance	Easy

#4-Smith Highway Bishop Pines
Pine Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #4-Smith Highway Bishop Pines

Longitude (DD): -120.06572 **Latitude (DD):** 34.00877 **Datum:** WGS84

Date: 6/29/2009, update 6/22/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: 250 m north of Smith Highway. Disjunct stand of Bishop pines.

Current Condition: Extremely depauperate chaparral reduced to scattered individuals of pine, ARCO, HESC, MIFL. Deeply rilled, gullied, eroded as result of overgrazing/browsing. This chaparral extends onto surface of this 'peninsula' and down on N facing slope where there are ARCO, QUTO, MIFL, chain fern. 6/22/11: No ADFA, ARCO seen at site, may be lower in canyon. RHIN, PIMU, HEAR recent recruits. Scattered LODE. LEFI fairly common. LEFR (chamise indicator?) toward top of slope. NAXX here there is soil left, such as on soil islands (also with *Carex*, DUGR, one KOMA.

Natural Condition: Extremely dense cover of Chamise, QUPA, ARCO, with occasional emergent PIMU (& QUTO).

Management Goal: Halt soil loss and erosion enough to protect existing individual plants and facilitate recruitment of "anything" (new individuals). Consider augmentation of PIMU population in adjacent suitable areas. 6/22/11: As old but add augmentation of fog capture vegetation, starting with NAXX and BAPI. Halt erosion with a combination of plants and erosion control materials—cloth, wattles, etc. May not be practical for supplemental water, therefore use seed rather than plants for pine reveg.

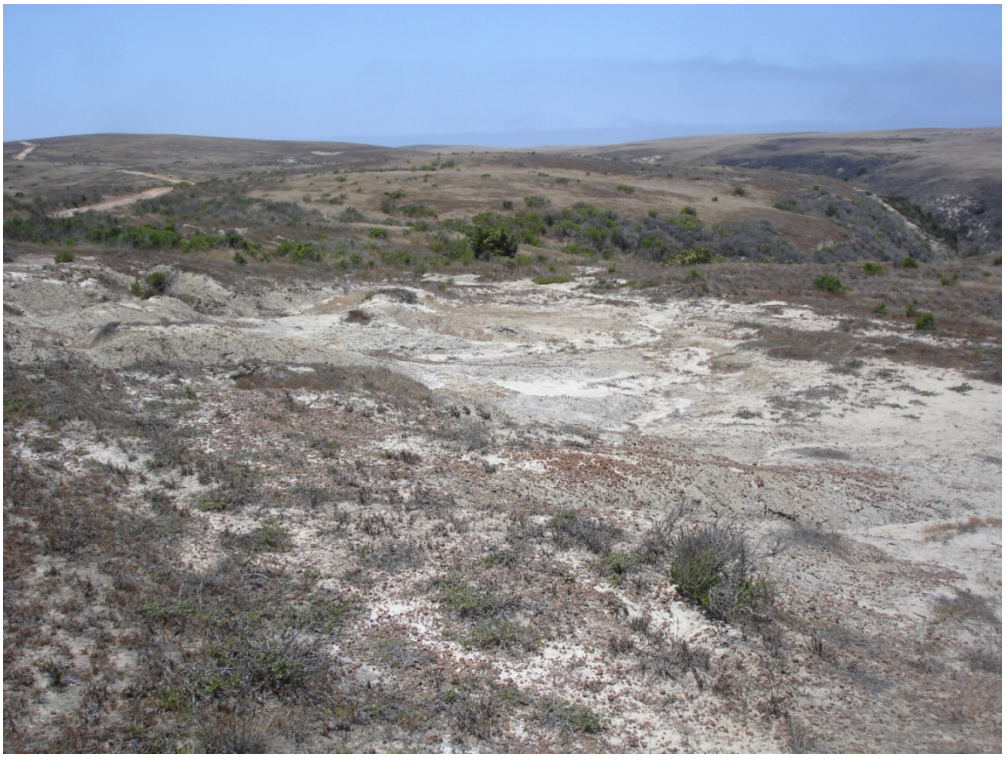
RRAT Indices and Scores: #4-Smith Highway Bishop Pines

Index	Natural Condition Score	Management Goal Score
Convergence	48	73
Ecological Restoration Potential	50	83
Restoration Logistics	77	77
Ease of Restoration	73	81
Potential Site Value	78	78
Stressor Removal Potential	94	94
Gain for Effort	1.6	2.5
Number of Unknowns	0	0

RRAT Potential Site Value Components: #4-Smith Highway Bishop Pines	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #4-Smith Highway Bishop Pines	
Stressor	**Effort to Remove**
Invasive non-native plants: external source	Impossible
Invasive non-native plant presence	Difficult
Altered hydrology	Difficult
Climate change	Difficult
Trails	Easy
Soil disturbance	Easy
Herbivory - mammals	Already removed
Non-native fauna	Easy

#5-Smith Highway ½ Mile East of Carrington Road
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #5-Smith Highway ½ Mile East of Carrington Road

Longitude (DD): -120.06529 **Latitude (DD):** 34.00777 **Datum:** WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Just N of Smith Hwy. Across drainage form Bishop pine remnant. East of Carrington Rd junction 0.5 mi. Sarah has GPS pts for ends along rd.

Current Condition: Road runoff caused erosion. Largely denuded. Soil surface washed away leaving small rounded rocks (chaparral indicators). Some deposition of sediments on terrace below road. One gully formation at west end of site and two originating from E end. 3 bare areas (about 20% of total site area) need active restoration within larger total site. Road needs water control structures.

Natural Condition: Probably originally a mix of chaparral and coastal sage scrub. Probably a gentle slope.

Management Goal: Prevent downhill movement of silt by managing runoff from road and existing off road bare areas already denuded by road runoff. Revegetate at least

with *Nasella* and BAPI.

RRAT Indices and Scores: #5-Smith Highway ½ Mile East of Carrington Road		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	35	71
Ecological Restoration Potential	52	84
Restoration Logistics	87	87
Ease of Restoration	73	85
Potential Site Value	41	41
Stressor Removal Potential	96	96
Gain for Effort	2.0	4.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #5-Smith Highway ½ Mile East of Carrington Road	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Minimally valuable
Plant community biodiversity	Moderately valuable
Emblematic natural features	Highly valuable
Threatened or endangered species	Moderately valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #5-Smith Highway ½ Mile East of Carrington Road	
Stressor	**Effort to Remove**
Land grading	Difficult
Altered hydrology	Moderate

#6-Verde Canyon Below Crossing
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #6-Verde Canyon Below Crossing

Longitude (DD): -120.10885

Latitude (DD): 34.00544

Datum: WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Verde (Green) Cyn, from road downstream about 100 m, until 1st protruding terrace remnant from East.

Current Condition: Stabilized stream bottom, herbaceous vegetation, beginning to degrade. Canyon deeply incised into Late Pleistocene/Early Holocene sediments. Severe tracking, trampling, trailing by deer and elk. Severe browsing of caged and naturally recruited willows. Perennial water. Pile of possibly treated lumber.

Natural Condition: Flat-bottomed meandering stream, with mosaic of willows and cattails. Water table at or near surface; perennial flow. Storm flow peaks moderated

by vegetation, which will also aggrade sediment.

Management Goal: Restore reproductive population of willows (25–50 individuals) to serve as a source of propagules for other parts of the stream. Expect that will choke stream and accumulate sediment.

RRAT Indices and Scores: #6-Verde Canyon Below Crossing		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	61	67
Ecological Restoration Potential	75	83
Restoration Logistics	80	80
Ease of Restoration	80	82
Potential Site Value	69	69
Stressor Removal Potential	98	98
Gain for Effort	2.8	3.1
Number of Unknowns	0	0

RRAT Potential Site Value Components: #6-Verde Canyon Below Crossing	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Moderately valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Minimally valuable

RRAT Site Stressors: #6-Verde Canyon Below Crossing	
Stressor	**Effort to Remove**
Non-native fauna	Easy
Soil contamination/pollution	Easy
Soil disturbance	Easy
Herbivory - mammals	Easy

#7-Arlington Canyon Upstream from Smith Highway Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #7-Arlington Canyon Upstream from Smith Highway

Longitude (DD): -120.15356 **Latitude (DD):** 33.98427 **Datum:** WGS84

Date: 6/29/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Stream bottom in Arlington Canyon, from Smith Hwy to ~1/2 mi upstream.

Current Condition: "Upland" vegetation of BAPI and LUAL on stabilized streambed.

Water is currently confined to linear channels and small pools. Cobbly, bouldery substrate. This status could be a result of several low flow years. Vegetation could be expected to wash out occasionally.

Natural Condition: Occasional heavy floods spread silt on bottom recreating more open stream bottom habitat and more open water. Willows would occur in scattered stands.

Management Goal: Restore willows to various locations along length of stream to serve as seed sources for natural recruitment.

RRAT Indices and Scores: #7-Arlington Canyon Upstream from Smith Highway		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	66	74
Ecological Restoration Potential	75	86
Restoration Logistics	77	77
Ease of Restoration	80	83
Potential Site Value	50	50
Stressor Removal Potential	98	98
Gain for Effort	2.6	2.9
Number of Unknowns	0	0

RRAT Potential Site Value Components: #7-Arlington Canyon Upstream from Smith Highway	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Moderately valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #7-Arlington Canyon Upstream from Smith Highway	
Stressor	**Effort to Remove**
Soil disturbance	Easy
Herbivory - mammals	Easy
Soil contamination/pollution	Easy
Climate change	Easy
Non-native fauna	Easy

#8-Old Ditch
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #8-Old Ditch

Longitude (DD): -120.05181 **Latitude (DD):** 34.00291 **Datum:** WGS84

Date: 6/28/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Just south across road from generator. Area which had topsoil removed to create catch ditch goes toward ranch house in 1920s.

Current Condition: Active sheet erosion. Sparse vegetation. Eroded at places to bedrock. Little revegetation in 80+ years. Spots of exotic annual grasses and perennial *Nasella*. *Isocoma*. Should be coastal sage scrub. Ditch channel's unnatural flow rate and amount of flow downstream = siltation.

Natural Condition: Should be coastal sage scrub merging into chaparral. Vegetation cover of 70–90% with litter.

Management Goal: Short term goal—remove channel. Restore natural hydrological regime. Revegetate to *Nasella*, *Baccharis*. Semi-natural.

RRAT Indices and Scores: #8-Old Ditch		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	33	55
Ecological Restoration Potential	52	75
Restoration Logistics	80	80
Ease of Restoration	70	77
Potential Site Value	50	50
Stressor Removal Potential	96	96
Gain for Effort	1.4	2.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #8-Old Ditch	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Moderately valuable
Emblematic natural features	Moderately valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Moderately valuable

RRAT Site Stressors: #8-Old Ditch	
Stressor	**Effort to Remove**
Water diversion structure	Moderate
Altered hydrology	Moderate
Land grading	Moderate

#9-Old Creek Crossing
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #9-Old Creek Crossing

Longitude (DD): -120.05227 **Latitude (DD):** 34.00335 **Datum:** WGS84

Date: 6/28/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Abandoned creek crossing just N of main road by NPS restrooms. Ranch area.

Current Condition: Deeply incised gullies. Exacerbated stream flow eroding steep cliffs with unstable Quaternary sediments. Lower gradient portions are revegetating except for portion still actively eroding, ~ 50% of site

Natural Condition: Meandering stream/cobble sand, stream bank slopes 10 – 30 degrees, dense CSS. RHIN & HEAR, SALA & BASA in streambed.

Management Goal: Control soil erosion from bare areas, facilitate natural revegetation by preventing sheet flow.

RRAT Indices and Scores: #9-Old Creek Crossing		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	39	59
Ecological Restoration Potential	60	78
Restoration Logistics	100	100
Ease of Restoration	79	86
Potential Site Value	13	13
Stressor Removal Potential	98	98
Gain for Effort	15.8	23.6
Number of Unknowns	0	0

RRAT Potential Site Value Components: #9-Old Creek Crossing	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Minimally valuable
Habitat or ecosystem rarity in the landscape	Minimally valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Not valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Not valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #9-Old Creek Crossing	
Stressor	**Effort to Remove**
Land grading	Moderate
Altered hydrology	Moderate

#10-Old Ranch Canyon Lower Section
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #10-Old Ranch Canyon Lower Section

Longitude (DD): -119.99036 **Latitude (DD):** 33.96583 **Datum:** WGS84

Date: 6/30/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Creek bed of Old Ranch Canyon—section between road crossing and beginning of marine influence.

Current Condition: Densely vegetated w. herbaceous riparian veg—*Typha*, *Salicornia*, saltgrass, *Jaumea*, BAPI and BADO. Formerly steep banks & flat denuded floor? have developed channels and are 'laying-back' somewhat.

Natural Condition: As in "Current Condition", plus woody riparian vegetation: i.e., willows and mulefat. Possibly elderberry. Streambanks lower; stream much less incised than current.

Management Goal: Restore native woody vegetation. Allow natural re-contouring of stream channel to continue.

RRAT Indices and Scores: #10-Old Ranch Canyon Lower Section		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	62	68
Ecological Restoration Potential	78	84
Restoration Logistics	70	70
Ease of Restoration	77	79
Potential Site Value	66	66
Stressor Removal Potential	99	99
Gain for Effort	2.0	2.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #10-Old Ranch Canyon Lower Section	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Highly valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #10-Old Ranch Canyon Lower Section	
Stressor	**Effort to Remove**
Altered hydrology	Easy
Climate change	Easy

#11-Water Canyon Crossing
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #11-Water Canyon Crossing

Longitude (DD): -120.04038 **Latitude (DD):** 33.99261 **Datum:** WGS84

Date: 6/30/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Both sides of Water Canyon crossing & former roads and approach roads.

Current Condition: Road is at least 3rd successive within location (south side of crossing) and is deeply incised and steep. Near close to limit of safe drivability. Northern approach road—all road surfaces eroding rapidly into stream and marine environment. Nature of soil leads to episodic large erosion events. Location is frequently used by public—it's bad, and an eyesore and dangerous.

Natural Condition: Creek not impacted by vehicle crossing. Vegetated coastal terrace, producing minimal and natural erosion only.

Management Goal: No driving through creek. No erosion off banks and road surfaces. Restore coastal terrace habitat. Minimal road repair/maintenance required, therefore

'high bridge' recommended upstream.

RRAT Indices and Scores: #11-Water Canyon Crossing		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	31	66
Ecological Restoration Potential	41	79
Restoration Logistics	80	80
Ease of Restoration	68	79
Potential Site Value	72	72
Stressor Removal Potential	93	93
Gain for Effort	1.1	2.4
Number of Unknowns	0	0

RRAT Potential Site Value Components: #11-Water Canyon Crossing	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Moderately valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Highly valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #11-Water Canyon Crossing	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Channelization	Difficult
Land grading	Difficult

#12-Old Ranch House Salt Marsh
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #12-Old Ranch House Salt Marsh

Longitude (DD): -119.97986 **Latitude (DD):** 33.95560 **Datum:** WGS84

Date: 6/30/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Saltmarsh and BAPI flats at mouth of Old Ranch House Creek, encompassing both 'forks' of marsh and the road passing through and the east terminus of the Sierra Pablo Rd.

Current Condition: Saltmarsh/BAPI scrub mosaic. Impacted by roads passing through and into site. Erosion occurring from steep sections of roads, causing siltation of marsh. Headcutting resulting from runoff. Majority of site appears intact, dominated by native marsh and facultative wetland.

Natural Condition: Saltmarsh dom by FRSA, JACA, DISP, SXXX, with BAPI on higher areas.

Management Goal: Goal is a facultative wetland. Saltmarsh unimpeded by road compaction and siltation; area not further reduced by current headcutting into marsh segment. Protect existing saltmarsh.

RRAT Indices and Scores: #12-Old Ranch House Salt Marsh

Index	Natural Condition Score	Management Goal Score
Convergence	40	67
Ecological Restoration Potential	60	82
Restoration Logistics	87	87
Ease of Restoration	75	84
Potential Site Value	78	78
Stressor Removal Potential	98	98
Gain for Effort	2.5	4.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #12-Old Ranch House Salt Marsh

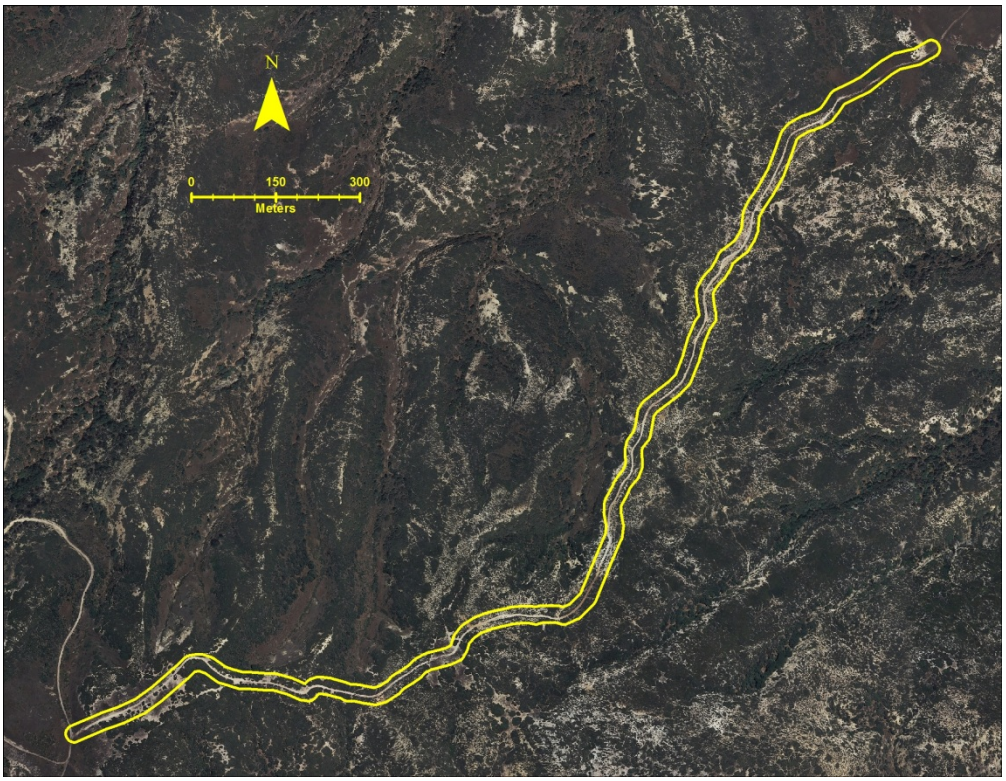
Component	Value Chosen by Observers
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Highly valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #12-Old Ranch House Salt Marsh

Stressor	Effort to Remove
Land grading	Moderate
Altered hydrology	Moderate

#13-Telephone Road: Fog Site
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #13-Telephone Road

Longitude (DD): -120.06817 **Latitude (DD):** 33.97919 **Datum:** WGS84

Date: 7/1/2009, update 6/22/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Unimproved road, occasionally deeply eroded on steep areas. Most of length is on lower-angle slopes. Cuts through dense chamise—ARCO-QUPA chaparral. Used as trail from campground to Black Mountain. Road use to be discontinued.

Current Condition: Occasional deep erosion. Med-large cobbles–small boulders. Good vegetation up to margin most places, so only track needs to be restored. Heavily browsed by deer/elk.

Natural Condition: Dense unbroken chaparral (except for occasional natural event—plant death, lightning strike, etc.). Unbrowsed, untrailed.

Management Goal: Decommission road; design and install trail, improvements in road bed. Restore native vegetation on portions not used for trail. Restore pops of currently rare chap plants such as DERI, CEAR, CEMG. 6/22/2011: A great opportunity for interpretive trail from campground to Black Mtn emphasizing change in vegetation related to changing moisture availability from fog.

RRAT Indices and Scores: #13-Telephone Road

Index	Natural Condition Score	Management Goal Score
Convergence	37	52
Ecological Restoration Potential	54	74
Restoration Logistics	73	73
Ease of Restoration	69	74
Potential Site Value	72	72
Stressor Removal Potential	96	96
Gain for Effort	1.2	1.7
Number of Unknowns	0	0

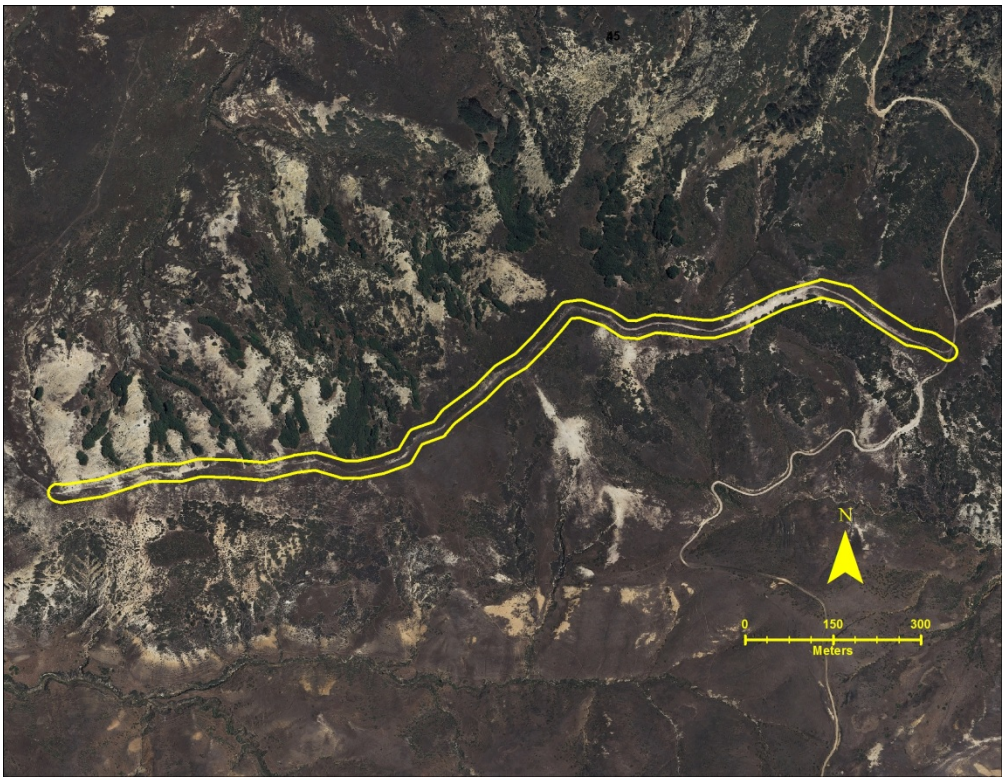
RRAT Potential Site Value Components: #13-Telephone Road

Component	Value Chosen by Observers
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #13-Telephone Road	
Stressor	**Effort to Remove**
Climate change	Moderate
Land grading	Moderate
Altered hydrology	Moderate

#14-Black Mountain Road
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #14-Black Mountain Road

Longitude (DD): -120.07757 **Latitude (DD):** 33.97866 **Datum:** WGS84

Date: 7/1/2009, update 23/6/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Short road section between Main Rd at Black Mtn Saddle to top of Black Mtn and beyond peak along ridge to west to first steep descent to Lobo Cyn.

Current Condition: Road along ridge top incised in places +- deeply. Steep straight section has parallel old tracks. Ridge top impacts have widened over breadth of ridge. 23/6/11: Sections are in areas of distinct vegetation: one section in middle in good NAXX grassland, above and below that mixes with BAPI scrub, above near weather station QUTO chaparral.

Natural Condition: Oaks (QUTO) embedded in island chaparral with +- BAPI also. Possibly Bishop pine also.

Management Goal: Remove road and restore appropriate veg, leaving part as a trail. Entirely remove steep lower section and reroute a walking trail in switchbacks. 23/6/11: Revegetate appropriately within current vegetation zones. Retain NAXX grassland. Plant more chaparral shrubs toward top. No PIMU planting. Maybe QUTO towards top. BAPI could be utilized for fog capture to enhance survival of other shrubs.

RRAT Indices and Scores: #14-Black Mountain Road

Index	Natural Condition Score	Management Goal Score
Convergence	45	61
Ecological Restoration Potential	52	78
Restoration Logistics	87	87
Ease of Restoration	75	81
Potential Site Value	84	84
Stressor Removal Potential	95	95
Gain for Effort	2.4	3.4
Number of Unknowns	0	0

RRAT Potential Site Value Components: #14-Black Mountain Road	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #14-Black Mountain Road	
Stressor	**Effort to Remove**
Climate change	Difficult
Land grading	Moderate
Altered hydrology	Moderate

#15-Radar Peak Road Reroute
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #15-Radar Peak Road Reroute

Longitude (DD): -120.11768 **Latitude (DD):** 33.94485 **Datum:** WGS84

Date: 7/1/2009, update 6/24/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: From edge of pad on Radar Peak to lower side of current road. Includes road.

Current Condition: Top of peak lowered 15–30 ft. Spoil dozed downhill creates unstable eroding slope. 150 years of graze/browse removed most woody veg (chap & oak & pine) leaving nearly 100% bare ground in most areas. 6/24/11: BAPI, LEFI, CARA, *Agoseris*, AVXX, BRCA. BAPI is capturing much fog—resulting in wet soil and puddling.

Natural Condition: Dense cover of woody shrubs interrupted w various trees, resulting in 75–100% cover along ridge tops. No road(s). 6/24/11. Veg includes BAPI, NAXX, and BRCA. QUTO, PIMU, ARCO, HEAR, RHIN, VAOV, MIFL. May not include ARMA and ERGR.

Management Goal: Protect and restore island oak groves on Radar Peak. Realign current road to location which does not impact oak groves. Restore old road bed and stabilize slopes above and below new road bed. Revegetate with native perennial grasses and shrubs and trees suitable to the site such as *Nasella*, BAPI, QUTO, ARCO, HEAR, VAOV, RHIN, PIMU, MIFL, ARMA, ERGR, etc., etc. Modify microclimate on site. Increase fog catchment. 6/24/11: Use artificial fog capture structures. Main goal of restoration at site is not really to restore the vegetation, but to lessen the impacts on existing oaks below the current location of Burma Rd. Keep as much current BAPI as possible since well established. Keep some existing flat areas (historic value).

RRAT Indices and Scores: #15-Radar Peak Road Reroute

Index	Natural Condition Score	Management Goal Score
Convergence	30	43
Ecological Restoration Potential	35	67
Restoration Logistics	87	87
Ease of Restoration	69	74
Potential Site Value	94	94
Stressor Removal Potential	91	91
Gain for Effort	1.3	2.0
Number of Unknowns	0	0

RRAT Potential Site Value Components: #15-Radar Peak Road Reroute	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Highly valuable

RRAT Site Stressors: #15-Radar Peak Road Reroute	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Soil disturbance	Difficult
Climate change	Difficult
Land grading	Moderate

#16-Radar Peak Below Road (Oaks)
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #16-Radar Peak Below Road (Oaks)

Longitude (DD): -120.11723 **Latitude (DD):** 33.94473 **Datum:** WGS84

Date: 7/1/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Radar Peak—slopes below road crossing. South slope of peak, including all QUTO. 6/24/11: Area between 2 drainages below road crossing. Most active restoration will be concentrated on upper part of slope.

Current Condition: Deeply eroding; rapid erosion continuing. Roots exposed 2–3 ft, topsoil and subsoil mostly gone. Extreme and deep gullies. Widespread rills. 6/24/11: Large established QUTO. Multiple planting efforts with fairly low overall success. Previously installed erosion control structures have had limited success. Culvert under existing road concentrates flow. Besides oaks, mostly bare ground with scattered patches of BAPI and annual grasses.

Natural Condition: Dense cover of woody shrubs interrupted w various trees, resulting in 75–100% cover along ridge tops. No road(s). 6/24/11. Veg includes BAPI, NAXX, and BRCA. QUTO, PIMU, ARCO, HEAR, RHIN, VAOV, MIFL. May not include ARMA and ERGR.

Management Goal: After road is moved and repaired, deconcentrate surface drainage. Repair/fill/silt dam gullies; some surface grading of rills and shallow gullies. Goals: 1) control erosion, 2) protect roots and stability of trees, 3) encourage accumulation of seed and org matls, 4) reestablish cover veg such as NAXX, BAPI, etc., 5) reestablish shrub/tree flora such as QUTO, ARCO, etc., 6) create viable stand age structure for QUTO. 6/24/11: Very important to integrate with restoration of site #15. Plant PIMU using seed that S. Chaney has collected from site in past. Will need geomorphology and engineering expertise to refine restoration plan. Concentrate restoration at top at sites, expect that will contribute to some passive restoration below. BAPI and NAXX used for initial soil stabilization and fog interception to get more woody shrubs going.

RRAT Indices and Scores: #16-Radar Peak Below Road (Oaks)

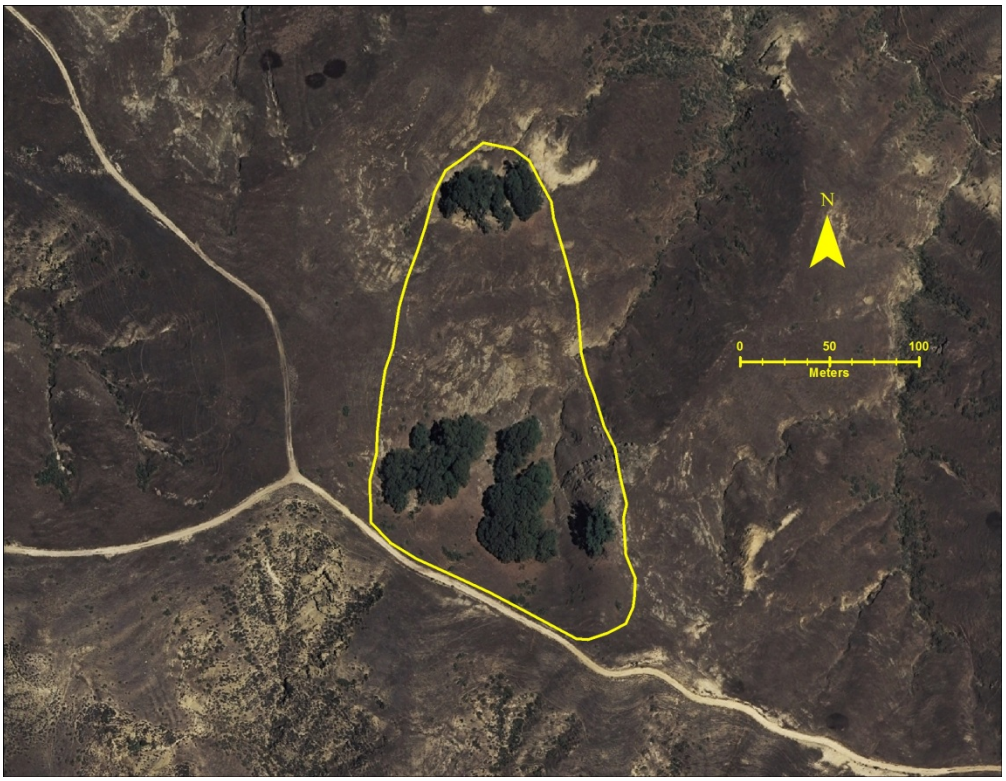
Index	Natural Condition Score	Management Goal Score
Convergence	30	43
Ecological Restoration Potential	35	67
Restoration Logistics	80	80
Ease of Restoration	67	71
Potential Site Value	94	94
Stressor Removal Potential	91	91
Gain for Effort	1.0	1.5
Number of Unknowns	0	0

RRAT Potential Site Value Components: #16-Radar Peak Below Road (Oaks)	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Highly valuable

RRAT Site Stressors: #16-Radar Peak Below Road (Oaks)	
Stressor	**Effort to Remove**
Soil disturbance	Difficult
Climate change	Difficult
Altered hydrology	Difficult
Land grading	Moderate

#17-Burma Oaks
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #17-Burma Oaks

Longitude (DD): -120.13327 **Latitude (DD):** 33.94802 **Datum:** WGS84

Date: 7/1/2009, update 6/24/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: 'Burma' oak groves at junction of Burma and China Camp roads. Site includes slopes above existing trees in a band along upper ridge-face.

Current Condition: Steep slopes w apparently intact soils, dom by annual grasses w occ BAPI. Oaks occur as distinct isolated stands with little or no recruitment. Expected shrub cover on slopes is conspicuously missing. 6/24/11: Good recruitment at upper edge of upper stands—more than 100 2–4 yr old plants.

Natural Condition: Healthy reproducing stands of QUTO, varied shrub cover clothing upper north faces of ridges.

Management Goal: Establish protective cover of BAPI and NAXX and plant numerous young oaks among these, above established groves. Establish connectivity between isolated groves. 6/24/11: Establish BAPI and QUTO above existing stands. Keep exotic grass cover to hold soil until natives are established. Could work with supplemental water at this site.

RRAT Indices and Scores: #17-Burma Oaks

Index	Natural Condition Score	Management Goal Score
Convergence	51	67
Ecological Restoration Potential	58	81
Restoration Logistics	87	87
Ease of Restoration	78	83
Potential Site Value	84	84
Stressor Removal Potential	96	96
Gain for Effort	2.9	3.8
Number of Unknowns	0	0

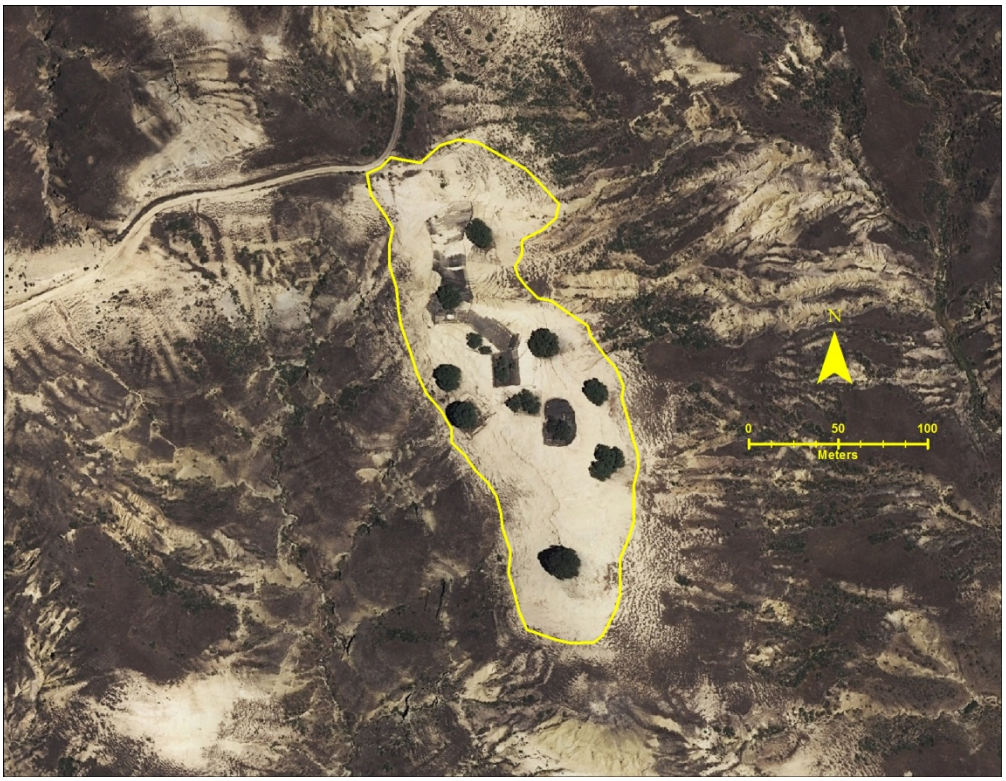
RRAT Potential Site Value Components: #17-Burma Oaks

Component	Value Chosen by Observers
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #17-Burma Oaks	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Moderate
Soil disturbance	Easy

#18-Jolla Vieja Oaks
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #18-Jolla Vieja Oaks

Longitude (DD): -120.10966 **Latitude (DD):** 33.94708 **Datum:** WGS84

Date: 7/1/2009, update 6/24/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Broad ridge top, 1/2 mi le east of Johnsons Lee road junction with Main road. Ridge extends S from main ridge. See GPS location (Sarah's previous Trimbleing?). In the Jolla Vieja drainage. In the past Site 18 was also called "Soledad Oaks" (after Soledad Peak—"Soledad Oaks" is now used for Site 44 oaks in the Soledad drainage) and "Grove 7".

Current Condition: Mature, very old QUTO (about 12 indiv) surviving on bare ridge top. Roots exposed 3–4 ft bec 150+ years of grazing, browsing, and erosion. Very little reproduction; most seedlings browsed away. Expected dense understory shrubs gone. 6/24/11: Intensive effort to curb erosion and trap soil has had mixed success. Coco matting mostly gone, leaving carpeting of plastic mesh. Jute netting on soil surface has worn away in large areas, but where it remains it has done a good job of capturing wind-blown soil/small rocks. Wattles along contour lines have done well at capturing soil and forming small terraces. However, there is still very little establishment of vegetation. Appears to high predation of acorns by mice.

Natural Condition: Dense cover of woody shrubs interrupted w various trees, resulting in 75–100% cover along ridge tops. No road(s).

Management Goal: 1) Control erosion, 2) Reestablish soil, 3) Capture fog moisture, 4) Establishment of viable populations of QUTO, ARXX, other chap shrubs, per grasses. 6/24/11: Concentrate planting of BAPI and QUTO on wet spots on periphery of drip zones. BAPI can be nurse for QUTO. Should remove fences in 2012. Do planting in terraces above wattles. Good site for delivery of supplemental water via hose system. Effort should be concentrated at upper part of slope and allow increasing passive restoration below.

RRAT Indices and Scores: #18-Jolla Vieja Oaks

Index	Natural Condition Score	Management Goal Score
Convergence	25	58
Ecological Restoration Potential	42	76
Restoration Logistics	80	80
Ease of Restoration	67	78
Potential Site Value	78	78
Stressor Removal Potential	95	95
Gain for Effort	1.0	2.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #18-Jolla Vieja Oaks	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #18-Jolla Vieja Oaks	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Difficult
Soil disturbance	Easy

#19-Seed Source Nursery
Island Oak Chaparral



Site Data

Management Area: CHIS-SRI

Site Name: #19-Seed Source Nursery

Longitude (DD): -120.10969 **Latitude (DD):** 33.94733 **Datum:** WGS84

Date: 7/1/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Across and above road from Jolla Vieja oaks site.

Current Condition: Partial canopy of tall mature BAPI, in annual grass matrix w scattered NAXX. Undisturbed except for hypothetically absent missing shrubs/trees.

Natural Condition: Dense canopy of shrubs w emergent trees. Shrubs incl toyon, QUPA, RHIN, etc. QUTO.

Management Goal: Use this area to establish reproductive pops of: QUTO, RHIN, HEAR, etc. and NAXX to provide seed source for local area.

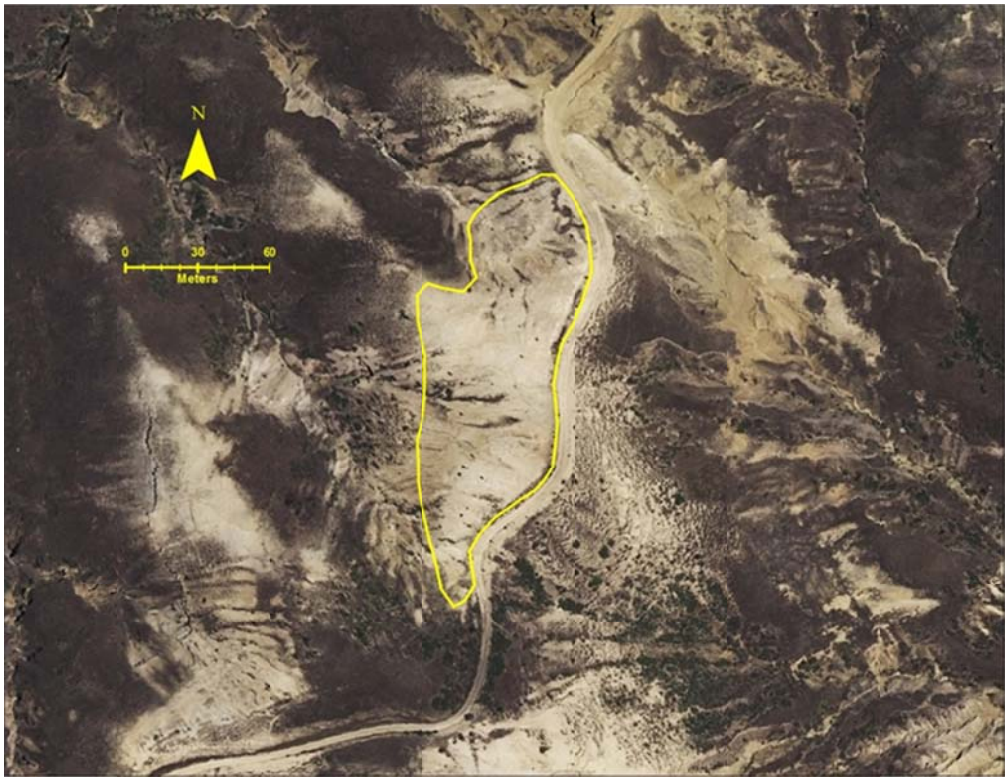
RRAT Indices and Scores: #19-Seed Source Nursery		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	62	82
Ecological Restoration Potential	48	86
Restoration Logistics	87	87
Ease of Restoration	80	86
Potential Site Value	56	56
Stressor Removal Potential	90	90
Gain for Effort	2.7	3.6
Number of Unknowns	0	0

RRAT Potential Site Value Components: #19-Seed Source Nursery	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Highly valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #19-Seed Source Nursery	
Stressor	**Effort to Remove**
Invasive non-native plant presence	Difficult
Invasive non-native plants: external source	Difficult
Invasive non-native plant seedbank	Difficult
Climate change	Moderate
Herbivory - mammals	Easy
Non-native fauna	Easy

#20-Bare Knoll Near Jolla Vieja Oaks
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #20-Bare Knoll Near Jolla Vieja Oaks

Longitude (DD): -120.10962 **Latitude (DD):** 33.94781 **Datum:** WGS84

Date: 7/1/2009, update 6/24/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Bare knoll midway between Soledad and Jolla Vieja Oaks on N side of road.

Current Condition: Wind scoured +- denuded slope, very sparse vegetation. All plants affected by the wind. CARA dominant; BAPI, LEFI, BRCA, AVBA, GNPU. Topsoil gone. 6/24/11: Topsoil not totally gone; not the most denuded site.

Natural Condition: Cloaked with chaparral, with emergent oak and pine. Soil. Fog intercepted moisture would be important, making it mesic.

Management Goal: Collect fog moisture. Establish BAPI, per grasses, oaks and shrubs. Purpose to reestablish more natural vegetation and start a functional fog forest. 6/24/11: Close to road so could supply supplemental water to aid plant establishment. Good area to place fog capture devices to provide moisture for seeds and seedlings. Could serve as propagule source for Jolla Vieja slopes.

RRAT Indices and Scores: #20-Bare knoll near 'Jolla Vieja Oaks'

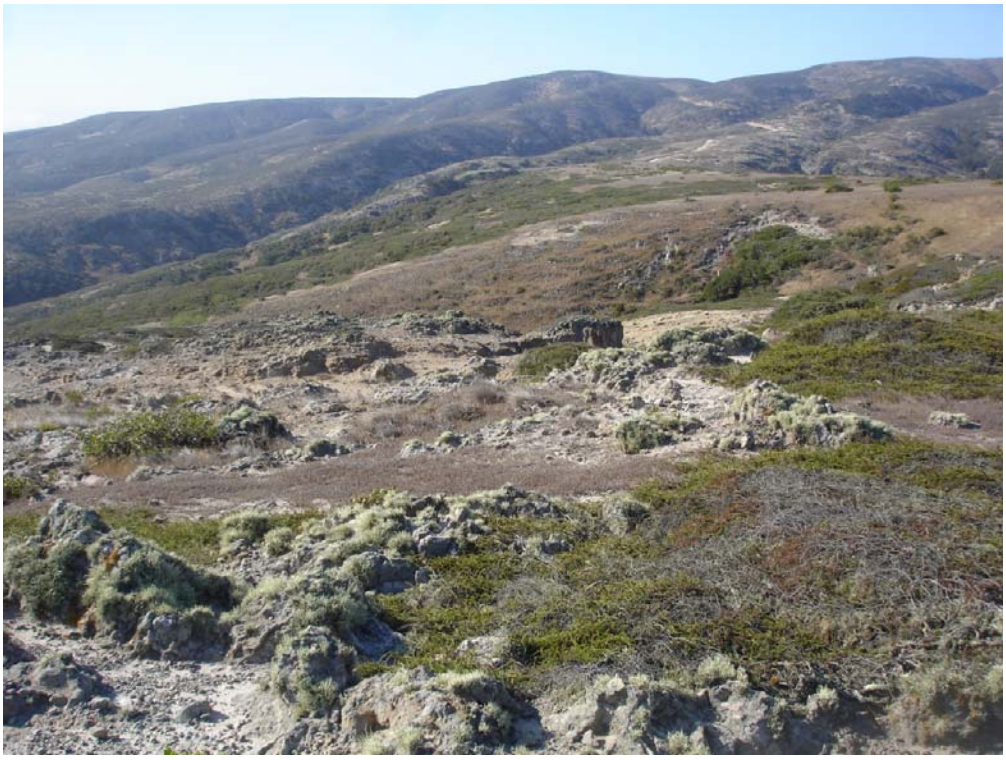
Index	Natural Condition Score	Management Goal Score
Convergence	33	69
Ecological Restoration Potential	39	80
Restoration Logistics	87	87
Ease of Restoration	71	82
Potential Site Value	81	81
Stressor Removal Potential	92	92
Gain for Effort	1.5	3.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #20-Bare knoll near 'Jolla Vieja Oaks'

Component	Value Chosen by Observers
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #20-Bare knoll near 'Jolla Vieja Oaks'	
Stressor	**Effort to Remove**
Soil disturbance	Difficult
Climate change	Difficult
Altered hydrology	Difficult
Herbivory - mammals	Easy
Non-native fauna	Easy

#21-Cherry Canyon Chaparral
Chaparral



Site Data

Management Area: CHIS-SRI

Site Name: #21-Cherry Canyon Chaparral

Longitude (DD): -120.07530 **Latitude (DD):** 33.99388 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Near top of broad ridge forming NW rim of Cherry Canyon ~ 1/2 up road from housing. SW facing slope.

Current Condition: Heavily grazed/browsed since 1850's and ongoing. Chamise chaparral spp present: ADFA, ARCO, LODE, LEFI, QUPA, SPMA. Much *Niebla* on rocks. Some crust. Occasional BAPI, NAPU. Deeply eroded to rock 25–50%. Main cover of ADFA 10–25%. Scattered ARCO, lichen cover 5–10%.

Natural Condition: Like current but 75–100% cover of combined species. 90–100% presence soil crust and/or lichens. Soils intact—probably 12–18". Contours rounded; gullies minimal.

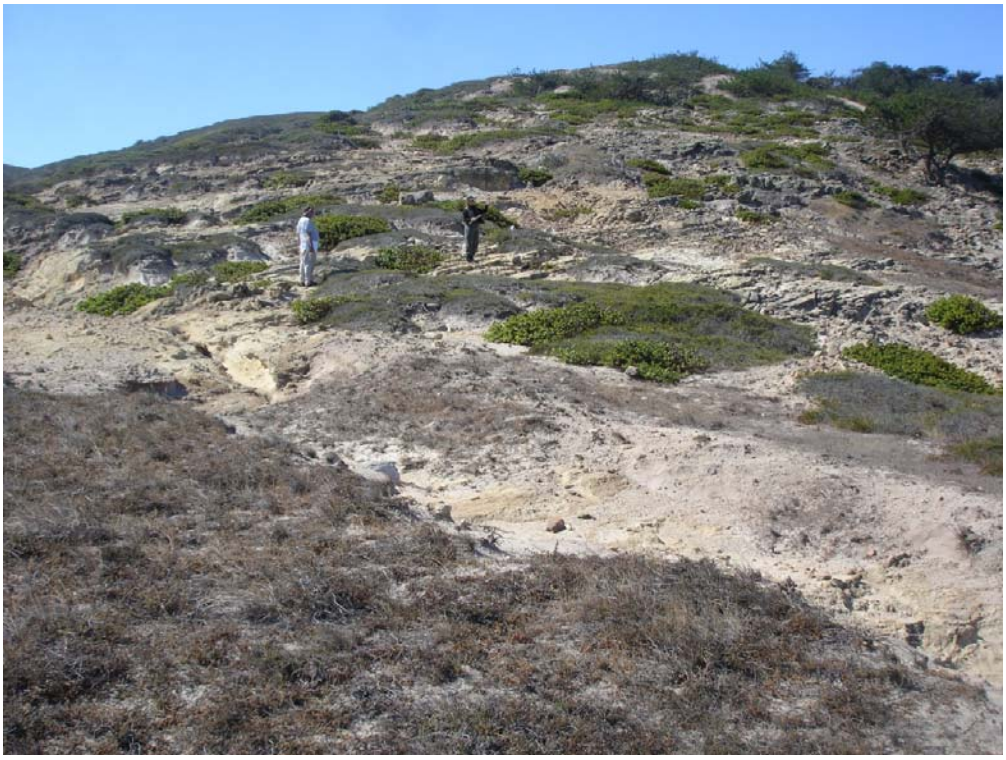
Management Goal: Approach natural condition of vegetation. Control further erosion; let plants do this. Remove all grazing pressure ASAP.

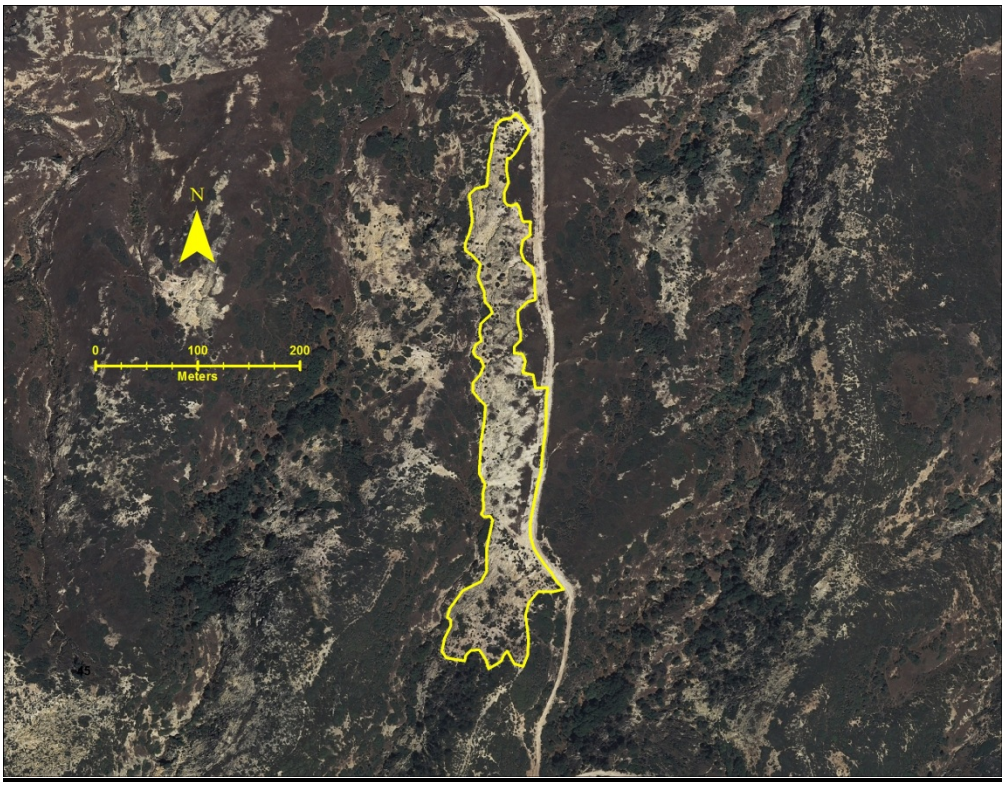
RRAT Indices and Scores: #21-Cherry Canyon Chaparral		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	36	75
Ecological Restoration Potential	47	85
Restoration Logistics	80	80
Ease of Restoration	70	83
Potential Site Value	72	72
Stressor Removal Potential	94	94
Gain for Effort	1.4	2.9
Number of Unknowns	0	0

RRAT Potential Site Value Components: #21-Cherry Canyon Chaparral	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Minimally valuable

RRAT Site Stressors: #21-Cherry Canyon Chaparral	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Difficult
Non-native fauna	Easy
Herbivory - mammals	Easy

#22-Black Mountain Northeast Spur
Pine Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #22-Black Mountain Northeast Spur

Longitude (DD): -120.07402 **Latitude (DD):** 33.98415 **Datum:** WGS84

Date: 7/2/2009, update 6/23/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: NE spur of Black Mtn where Main Rd crosses from ridgeline to Cherry Cyn. 6/23/11: Include linear area along road.

Current Condition: 60% bare rock due to extreme graze/browse + trampling. Large cobbles/small boulders cover much of the little remaining sandy soil. Large expanse of rock—with cracks. ADFA and ARCO form large isolated cushions. 6/23/11: QUPA cushions also present. Much litter trapped in islands of ARCA and ADFA. Many rare plants (see USGS rare plant remapping)—DUGR, PIXX, CAAL, etc. NAXX. Vegetation patches seem to be increasing in size on downslope edge and are being colonized.

Natural Condition: 75–100% cover ARCO, ADFA, incl occ pine and QUTO. Veg relatively dominated by ARCO due to NW exposure. 2" Pleistocene-age soil capped with veg/thick soil crust. No gullies. This area may be a local 'fog-shadow' manifested at ground level by relative lack of lichens.

Management Goal: Facilitate relative ongoing recovery of existing vegetation by removing all non-native animals. Increase cover by 50%. Install temporary artificial fog collection structure to test this hypothesis. Establish additional pines on site. Control soil loss by installing catchment materials. 6/23/11: Soil catchment rock dams (single shrub size) and cracks in rock are good planting sites here. NAXX plugs and seeds and ARCO, ADFA and QUPA seeds.

RRAT Indices and Scores: #22-Black Mountain Northeast Spur

Index	Natural Condition Score	Management Goal Score
Convergence	39	80
Ecological Restoration Potential	50	87
Restoration Logistics	87	87
Ease of Restoration	74	87
Potential Site Value	81	81
Stressor Removal Potential	95	95
Gain for Effort	2.1	4.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #22-Black Mountain Northeast Spur	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #22-Black Mountain Northeast Spur	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Difficult
Herbivory - mammals	Easy

#23-Cherry Canyon #2
Pine Chaparral



Site Data

Management Area: CHIS-SRI

Site Name: #23-Cherry Canyon #2

Longitude (DD): -120.07338 **Latitude (DD):** 33.98387 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Broad N-NE trending ridge extending from Black Mtn into Cherry Canyon. Next to Main Rd.

Current Condition: Good—soils intact, little erosion. Large patches scrub oak (40% cover), some ARCO, some ADFA. Spaces between patches with native and exotic annual grasses and herbs.

Natural Condition: Dense cover of mixed chaparral, dominated by QUPA, with lesser amounts of ARCO and even less of ADFA. Occasional individual and small stands of PIMU and QUTO.

Management Goal: Establish stands of PIMU, QUTO, and ARCO throughout the site to reestablish physical connectivity between unnaturally disjunct stands.

RRAT Indices and Scores: #23-Cherry Canyon #2		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	65	89
Ecological Restoration Potential	69	93
Restoration Logistics	63	63
Ease of Restoration	75	83
Potential Site Value	81	81
Stressor Removal Potential	97	97
Gain for Effort	1.6	2.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #23-Cherry Canyon #2	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #23-Cherry Canyon #2	
Stressor	**Effort to Remove**
Climate change	Difficult
Herbivory - mammals	Easy
Non-native fauna	Easy

#24-Black Mountain Corral
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #24-Black Mountain Corral

Longitude (DD): -120.07768 **Latitude (DD):** 33.97517 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Black Mountain Corral and environs.

Current Condition: Abandoned since 1998. Veg by annual grasses (BRDI, AVBA) with SIMB, MAVU, CIVU, RUCR, MAPA.

Natural Condition: *Baccharis* grassland?, depauperate coastal sage scrub. *Bromus carinatus*?

Management Goal: Weed eradication/control.

RRAT Indices and Scores: #24-Black Mountain Corral		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	55	98
Ecological Restoration Potential	52	95
Restoration Logistics	87	87
Ease of Restoration	78	92
Potential Site Value	25	25
Stressor Removal Potential	93	93
Gain for Effort	2.6	4.7
Number of Unknowns	0	0

RRAT Potential Site Value Components: #24-Black Mountain Corral	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Minimally valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Not valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #24-Black Mountain Corral	
Stressor	**Effort to Remove**
Invasive non-native plants: external source	Difficult
Invasive non-native plant presence	Difficult
Invasive non-native plant seedbank	Difficult

#25-Mustard Road
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #25-Mustard Road

Longitude (DD): -120.08801 **Latitude (DD):** 33.95765 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Main Road, from about Black Mtn Corral to Signal Rd, continuing down Signal Rd. Down slope into several major canyons—Water, Verde, etc. Down Johnstons Lee Rd, to South Pt Rd Junction.

Current Condition: Mustard (*Hirschfeldia incana*) is growing in annual grassland/scattered BAPI. At road edge, then spilling downslope. Most concentrated at road edges.

Natural Condition: *Baccharis* scrub, coastal sage scrub?, but without *Hirschfeldia incana*.

Management Goal: Control further spread along roads. Control in 20' buffer from edge of roads.

RRAT Indices and Scores: #25-Mustard Road		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	55	98
Ecological Restoration Potential	47	94
Restoration Logistics	67	67
Ease of Restoration	70	85
Potential Site Value	31	31
Stressor Removal Potential	90	90
Gain for Effort	1.3	2.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #25-Mustard Road	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Minimally valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Not valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #25-Mustard Road	
Stressor	**Effort to Remove**
Invasive non-native plant seedbank	Difficult
Invasive non-native plants: external source	Difficult
Invasive non-native plant presence	Difficult
Transportation of products	Difficult

#26-Vernal Pool #1
Vernal Pool



Site Data

Management Area: CHIS-SRI

Site Name: #26-Vernal Pool #1

Longitude (DD): -120.16064 **Latitude (DD):** 33.97844 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Small pool shallow (seasonal) somewhat enlarged by very low dam. Just west of western Arlington Trap fence. Between Arlington and Tecolote Cyns, N of Smith Hwy.

Current Condition: Heavily trampled, profile flattened. Only plants are non-natives: ATSE, XASP, MAPA, MENO, HOXX, POAR, BRDI. Edges w SPMA, HOMU.

Natural Condition: Smaller natural seasonal pool, shallow with possible unknown suite of species. Check VP inventory report for animal presence.

Management Goal: Make it better. Try a reconstruction project after determining if any animals are present. Recontour bottom, do weed control, wait. Do seedbank studies.

RRAT Indices and Scores: #26-Vernal Pool #1		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	44	78
Ecological Restoration Potential	45	85
Restoration Logistics	100	100
Ease of Restoration	79	90
Potential Site Value	66	66
Stressor Removal Potential	93	93
Gain for Effort	6.1	10.9
Number of Unknowns	0	0

RRAT Potential Site Value Components: #26-Vernal Pool #1	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Minimally valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #26-Vernal Pool #1	
Stressor	**Effort to Remove**
Invasive non-native plants: external source	Impossible
Invasive non-native plant presence	Difficult
Invasive non-native plant seedbank	Difficult
Altered hydrology	Moderate
Non-native fauna	Easy
Land grading	Easy

#27-Tecolote Canyon
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #27-Tecolote Canyon

Longitude (DD): -120.16708 **Latitude (DD):** 33.97812 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Broad flat bottom of Tecolote Cyn, from road crossing almost? to shore.

Current Condition: Recently stabilized by herbaceous riparian vegetation with removal of the pigs and cattle by 1998. Lacking woody species SALA, BASA. Infested with FEAR and thick all way to shore. Don't know how far upstream—at least 1/4 mi. Very much animal activity (deer/elk), very munched-up bottom. Smells of eutrophication. No pools or channels.

Natural Condition: Occasional stands of woody veg interspersed with open herbaceous veg; pools and channels developed.

Management Goal: Control/eradicate Festuca arundinacea. Eliminate animal trampling and wastes. Reestablish woody vegetation—willow and mulefat—to

encourage natural stream bottom.

RRAT Indices and Scores: #27-Tecolote Canyon		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	51	67
Ecological Restoration Potential	41	79
Restoration Logistics	57	57
Ease of Restoration	66	71
Potential Site Value	59	59
Stressor Removal Potential	90	90
Gain for Effort	1.0	1.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #27-Tecolote Canyon	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Minimally valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #27-Tecolote Canyon	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Invasive non-native plant seedbank	Difficult
Invasive non-native plants: external source	Difficult
Invasive non-native plant presence	Moderate
Soil disturbance	Easy
Herbivory - mammals	Easy
Climate change	Easy

#28-Vernal Pool #2
Vernal Pool



Site Data

Management Area: CHIS-SRI

Site Name: #28-Vernal Pool #2

Longitude (DD): -120.16859 **Latitude (DD):** 33.97565 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Big pool W of Tecolote Cyn and W of Smith Hwy. Between Tecolote and Garonon.

Current Condition: Large shallow vernal pool in annual grass/BAPI dominated location. 95% bare mudflat, dried. Extensive trampling. Deer and elk shed antlers. *Malvella leprosa*, *Hemizonia fasciculata*, HOXX, ATSE, AVBA, *Parapholis*, dead XASP (last year's), *Erodium* ?*cicutrium*, MEPO.

Natural Condition: Vernal pool, concentric veg rings. Native vernal pool plant spp (if ever present). Undisturbed bottom. Fairy shrimp, etc.

Management Goal: Remove tramplers. Some weed control, especially *Atriplex*. This area is less weedy than Vernal Pool #1. Do not do any grading at this pt, but wait and see.

RRAT Indices and Scores: #28-Vernal Pool #2		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	57	73
Ecological Restoration Potential	57	83
Restoration Logistics	87	87
Ease of Restoration	79	84
Potential Site Value	69	69
Stressor Removal Potential	94	94
Gain for Effort	3.0	3.8
Number of Unknowns	0	0

RRAT Potential Site Value Components: #28-Vernal Pool #2	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Moderately valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #28-Vernal Pool #2	
Stressor	**Effort to Remove**
Invasive non-native plants: external source	Impossible
Invasive non-native plant presence	Difficult
Invasive non-native plant seedbank	Difficult
Soil disturbance	Easy
Non-native fauna	Easy

#29-Vernal Pool #3
Vernal Pool



Site Data

Management Area: CHIS-SRI

Site Name: #29-Vernal Pool #3

Longitude (DD): -120.17578 **Latitude (DD):** 33.97431 **Datum:** WGS84

Date: 7/2/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Pool at junction of Garanon Spur and Smith Hwy.

Current Condition: HECU, XASP, CIVU, ATSE, HOMU, POAR, DISP, SMPA. Crumbly yet blocky soil, light brown (vs. dark brown heavy clay of VP # 2). Heavily worked by hooves.

Natural Condition: Like Vernal Pool #1—Smaller natural seasonal pool, shallow with possible unknown suite of species. Check VP inventory report for animal presence.

Management Goal: Like Vernal Pool # 1—Make it better. Ty a reconstruction project after determining if any animals are present. Recontour bottom, do weed control, wait. Do seedbank studies.

RRAT Indices and Scores: #29-Vernal Pool #3		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	55	73
Ecological Restoration Potential	56	84
Restoration Logistics	100	100
Ease of Restoration	83	89
Potential Site Value	69	69
Stressor Removal Potential	94	94
Gain for Effort	9.3	12.4
Number of Unknowns	0	0

RRAT Potential Site Value Components: #29-Vernal Pool #3	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Moderately valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Moderately valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #29-Vernal Pool #3	
Stressor	**Effort to Remove**
Invasive non-native plants: external source	Impossible
Invasive non-native plant presence	Difficult
Invasive non-native plant seedbank	Difficult
Soil disturbance	Easy
Non-native fauna	Easy

#30-Clapp Spring
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #30-Clapp Spring

Longitude (DD): -120.05534 **Latitude (DD):** 33.94743 **Datum:** WGS84

Date: 7/3/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Clapp Spring tank.

Current Condition: Small year-round spring flow is collected and diverted to tank on divide btwn St. Augustine and Old Ranch Cyns. Spring is in upper St. Augustine Cyn, but outflow of tank is diverted into Old Ranch Cyn. Outflow has formed a small riparian herbaceous community to develop around its course. Starved cyn is depauperate in riparian spp (depending on % of flow that is diverted.) (n.b.- it appears that the amount of water draining from the tank is greater than the amount of water not caught at the spring —at least half the water is diverted to the tank, without accounting for leaks.)

Natural Condition: Ridge and hillsides with a *Baccharis*-CSS-*Nasella* mix. This includes current and possible new drainages from stock tank. St. Augustine Cyn bottom may have been more riparian, depending on flow taken. Old Ranch Cyn tributary bottom

may have been less riparian.

Management Goal: Return water to canyon of origin, because the impact of taking water from the small St. Augustine drainage is probably greater than the effects of removing the currently added water to the large Old Ranch drainage.

POSSIBLE WATER INFLOW OPTIONS:
1. cut off flow to tank completely
2. leave flow as is
3. faucet only
4. stock pond float for some flow
5. timer
6. adjustable (locked to public) valve to allow limited constant flow to tank, with spring closing faucet for public use
7. put faucet closer to spring box

RRAT Indices and Scores: #30-Clapp Spring

Index	Natural Condition Score	Management Goal Score
Convergence	53	91
Ecological Restoration Potential	72	95
Restoration Logistics	100	100
Ease of Restoration	84	97
Potential Site Value	63	63
Stressor Removal Potential	99	99
Gain for Effort	37.7	64.7
Number of Unknowns	0	0

RRAT Potential Site Value Components: #30-Clapp Spring

Component	Value Chosen by Observers
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #30-Clapp Spring

Stressor	Effort to Remove
Water diversion structure	Easy
Altered hydrology	Easy
Instream modifications	Easy

#31-Oakless Ridge Southeast of Quinn Knob
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #31-Oakless Ridge Southeast of Quinn Knob

Longitude (DD): -120.07170 **Latitude (DD):** 33.94784 **Datum:** WGS84

Date: 7/3/2009, update 6/26/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Ridge leading SE from Quinn Knob, broad flat ridge top of exposed white/light brown Monterey shales.

Current Condition: 90%+ bare. Sloping to NW. Slightly lower but otherwise similar to JV oaks (grove 7) location. Exposed Monterey shale. Patches of AG (annual grass) and NAXX where soil; occ BAPI, scattered LEFI. ATSE, ATCO. 6/26/11: Even on light fog day, much fog and fog drip around herbs, grasses, and BAPI.

Natural Condition: Hypothetically— +/- dense shrub cover—possibly BAPI/LEFI up to and including chaparral species, and Island Oak. 6/26/11: substrate similar to Jolla Vieja Oaks area.

Management Goal: Establish fog weather monitoring station. Establish research plots—fog collection structures. Examine closely or remnant soil and vegetation. Reestablish vegetation. Slow/control continuing erosion. 6/26/11: Excellent site to add to fog study. Probably not a high priority restoration site, but a prime research site.

RRAT Indices and Scores: #31-Oakless Ridge Southeast of Quinn Knob		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	28	80
Ecological Restoration Potential	46	88
Restoration Logistics	57	57
Ease of Restoration	60	77
Potential Site Value	84	84
Stressor Removal Potential	95	95
Gain for Effort	0.6	1.7
Number of Unknowns	0	0

RRAT Potential Site Value Components: #31-Oakless Ridge Southeast of Quinn Knob	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #31-Oakless Ridge Southeast of Quinn Knob	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Difficult

#32-Wreck Canyon
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #32-Wreck Canyon

Longitude (DD): -120.06144 **Latitude (DD):** 33.92036 **Datum:** WGS84

Date: 7/3/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Wreck Cyn, from road crossing to 1/2 mi upstream.

Current Condition: Heavily used by elk and deer. Heavily vegetated by Typha, with extensive DISP in more open areas that are not heavily trampled. Trampling and trailing extensive. At least 1 willow about 1/2 mi upstream. Stream cross-section generally flattened by combo of trampling and cattail. Wet road crossing. Eutrophic.

Natural Condition: Stream w/ meanders, pools, channels. Fewer cattails because willows common. More of a mosaic of existing plant species rather than domination by cattails.

Management Goal: Get rid of deer and elk. Establish more willow. Plant fairly densely above road to try to dry the crossing, and to decrease some *Typha* by shading. Increase heterogeneity in stream channel morphology (willows will do that as well).

Possibly dredge cattails to remove them and to unflatten streambed. Experiment with cattail removal.

RRAT Indices and Scores: #32-Wreck Canyon		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	47	56
Ecological Restoration Potential	55	76
Restoration Logistics	70	70
Ease of Restoration	71	74
Potential Site Value	63	63
Stressor Removal Potential	95	95
Gain for Effort	1.4	1.6
Number of Unknowns	0	0

RRAT Potential Site Value Components: #32-Wreck Canyon	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #32-Wreck Canyon	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Deposition: water-carried	Moderate
Climate change	Easy
Non-native fauna	Easy

#33-South Side Road Trail
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #33-South Side Road Trail

Longitude (DD): -120.09806 **Latitude (DD):** 33.90851 **Datum:** WGS84

Date: 7/3/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: South Side Road between Jolla Vieja Canyon crossing and Johnsons Lee.

Current Condition: Coastal terrace close to ocean,10–30 ft elev. Loosely consolidated marine sediments form terrace. Somewhat depauperate CSS. Co-dominant w annual grass.

Natural Condition: Dense CSS across terrace and lower adjacent hillslope. Drainages small with lining veg +/- intact.

Management Goal: Restore road, leaving well designed tail. Minimize soil erosion and loss. Maximize vegetation recovery.

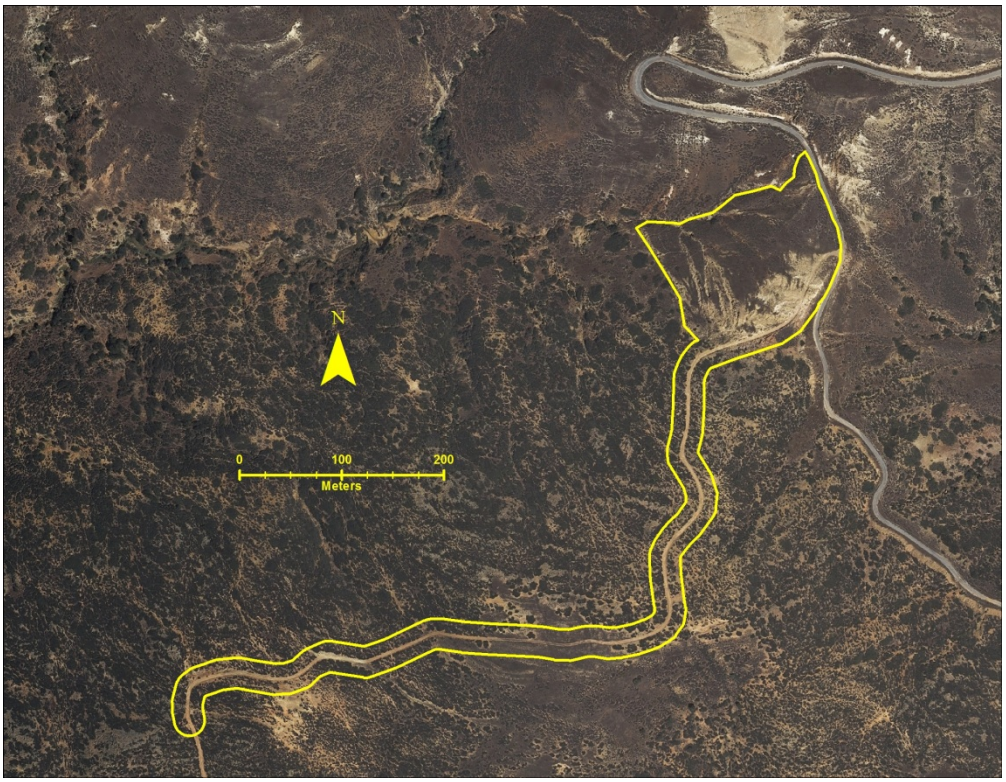
RRAT Indices and Scores: #33-South Side Road Trail		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	38	76
Ecological Restoration Potential	36	84
Restoration Logistics	73	73
Ease of Restoration	67	80
Potential Site Value	50	50
Stressor Removal Potential	91	91
Gain for Effort	1.1	2.1
Number of Unknowns	0	0

RRAT Potential Site Value Components: #33-South Side Road Trail	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Moderately valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Highly valuable

RRAT Site Stressors: #33-South Side Road Trail	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Land grading	Difficult
Invasive non-native plants: external source	Moderate
Invasive non-native plant seedbank	Moderate
Invasive non-native plant presence	Moderate

#34-South Point Road
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #34-South Point Road

Longitude (DD): -120.12205 **Latitude (DD):** 33.90979 **Datum:** WGS84

Date: 7/3/2009, update 6/25/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: South Point Rd steep sections. 6/25/11 include heavily eroded gullies on N facing slope between chaparral and paved road.

Current Condition: Steep deep gullies have resulted from poorly designed road's runoff. Chaparral veg impacted for most of length.

Natural Condition: Mosaic of chamise chaparral and CSS on steep NW-N facing slope. No road crossing it. 6/25/11: Apparently not a good location for fog (check fog station data), and thus fog capture, because it is in the lee of main ridge. Probably no QUTO.

Management Goal: Close and rehabilitate road so that water flows controlled and existing gullies do not enlarge and soil loss is minimal. New trail will be established away from old roadbed to facilitate full road rehab. Use boulders from slope to stabilize fill. 6/25/11: Plant palette includes ARCO, ADFA, QUPA, ARCA. Restoration of deep gullies extremely difficult. Should be done before restoration of chaparral on slope below (Site #42).

RRAT Indices and Scores: #34-South Point Road

Index	Natural Condition Score	Management Goal Score
Convergence	33	79
Ecological Restoration Potential	48	87
Restoration Logistics	73	73
Ease of Restoration	67	82
Potential Site Value	69	69
Stressor Removal Potential	95	95
Gain for Effort	1.1	2.5
Number of Unknowns	0	0

RRAT Potential Site Value Components: #34-South Point Road

Component	Value Chosen by Observers
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #34-South Point Road	
Stressor	**Effort to Remove**
Land grading	Difficult
Altered hydrology	Difficult

#35-Jolla Vieja
Riparian



Site Data

Management Area: CHIS-SRI

Site Name: #35-Jolla Vieja

Longitude (DD): -120.09486 **Latitude (DD):** 33.92781 **Datum:** WGS84

Date: 7/3/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Inner canyon bottom, Jolla Vieja Cyn. Centered at confluence of main tributaries.

Current Condition: Channel deeply incised into previous pre-grazing terrace level. 'New' bottom now well-stabilized with native herb veg. Willows not present on site but are upstream in protected locs high in heads of tribs. PIMI infests areas of bottom.

Natural Condition: As above, with willows and possibly mulefat, without PIMI. Sharp edges of eroded terrace softened and vegetated, creating 'new' stream profile.

Management Goal: Establish occ patches of willows throughout site to serve as seed source for further willow colonization. Enhance rate of recovery from graze/browse.

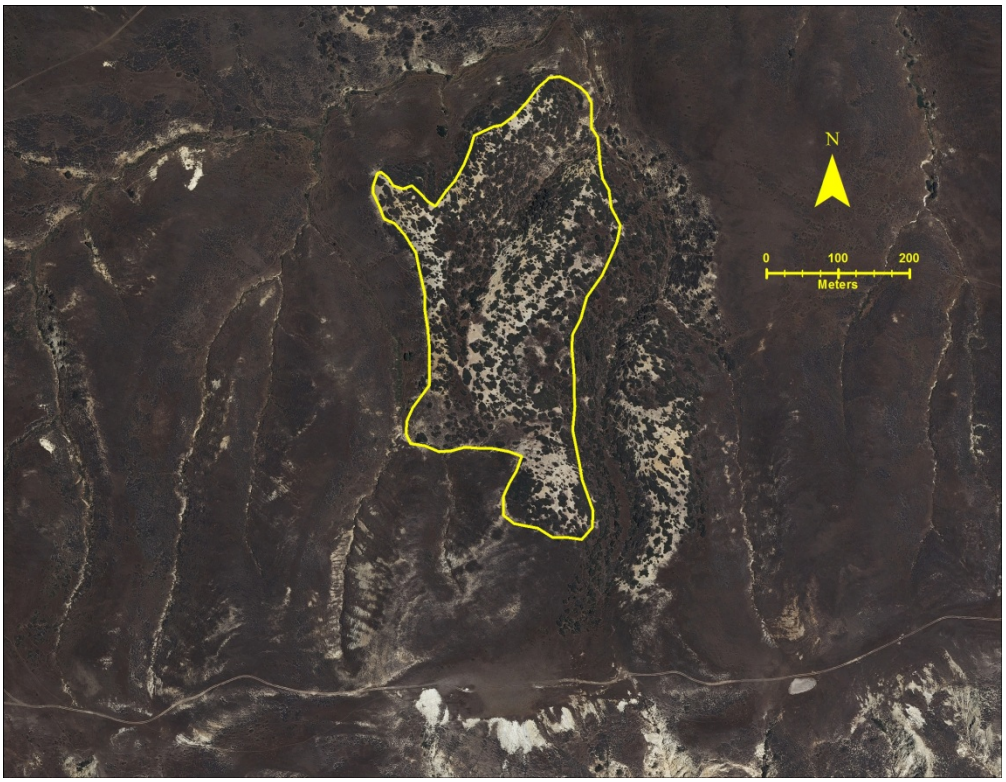
RRAT Indices and Scores: #35-Jolla Vieja		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	39	61
Ecological Restoration Potential	57	79
Restoration Logistics	57	57
Ease of Restoration	64	71
Potential Site Value	81	81
Stressor Removal Potential	97	97
Gain for Effort	0.8	1.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #35-Jolla Vieja	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Highly valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Highly valuable
Recreation or aesthetics	Highly valuable

RRAT Site Stressors: #35-Jolla Vieja	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Easy

#36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site

Longitude (DD): -120.00491 **Latitude (DD):** 33.94895 **Datum:** WGS84

Date: 7/4/2009, update 6/26/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Sierra Pablo Chaparral—ARHO site. 6/26/11: Does not include ADFA chaparral on parallel ridge to east.

Current Condition: 2 of 3 dominant plants missing. Highly eroded slope, with remaining pedestals of QUPA, down to mostly rock elsewhere. Lots of browsing, trailing, scat. 6/26/11: fairly diverse, including ACDI, ARCO, ARHO, HESC and HEGE. Evidence that chaparral was at one time higher on slope than it is now (dead wood), and has been replaced by annual grassland. Hypothesize that fog and fog capture inputs are low, but fog station data should verify this conjecture. Bare ground erosion mostly on steep slopes—on less steep slopes QUPA plant canopies can be contiguous.

Natural Condition: Intact soil, with mostly unbroken canopy of QUPA, ADFA, ARCO. No gullies, pedestals.

Management Goal: Stabilize erosion by slowing down sheet and gully flow. Retain soil and accumulate soil behind installed barriers. Reveg in areas of accumulated soil. 6/26/11: Use ACDI instead of NAXX within this chaparral. Due to the remoteness of this site, not a prime restoration site. However, for the same reasons, it is a good fog research site.

RRAT Indices and Scores: #36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site

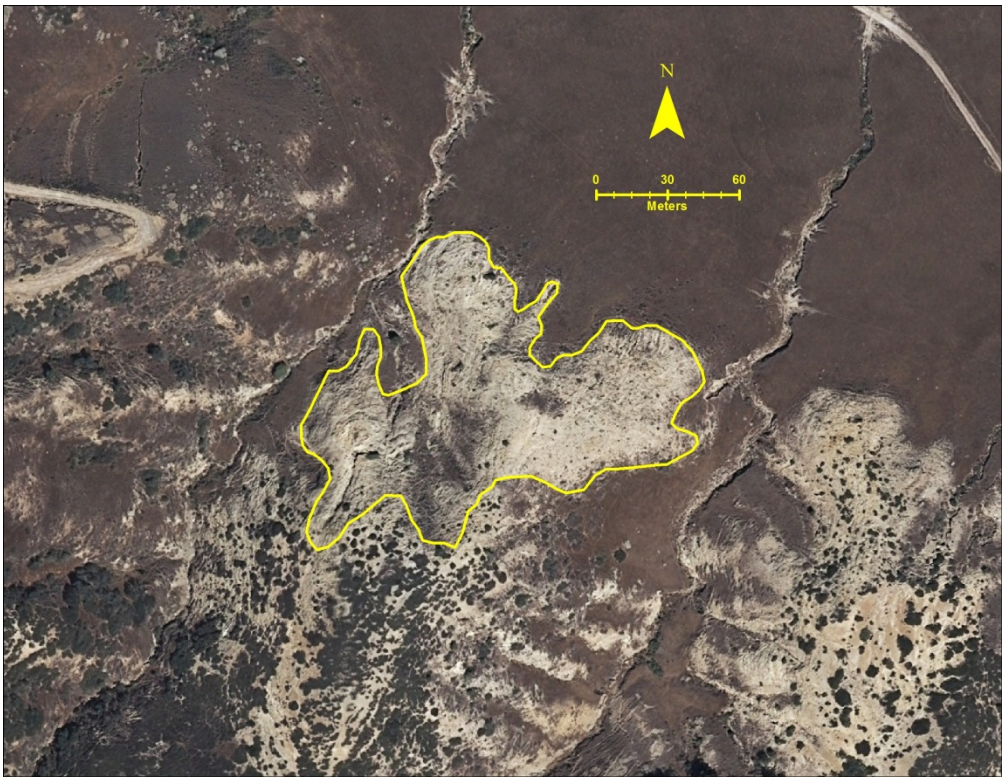
Index	Natural Condition Score	Management Goal Score
Convergence	26	60
Ecological Restoration Potential	35	76
Restoration Logistics	70	70
Ease of Restoration	62	74
Potential Site Value	69	69
Stressor Removal Potential	92	92
Gain for Effort	0.7	1.6
Number of Unknowns	0	0

RRAT Potential Site Value Components: #36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #36-Sierra Pablo Chaparral-*Arabis hoffmannii* Site	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Difficult
Soil disturbance	Difficult
Non-native fauna	Easy
Herbivory - mammals	Easy

#37-North Edge Torrey Pines-*Mimulus flemingii* Site
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #37-North Edge Torrey Pines-*Mimulus flemingii* Site

Longitude (DD): -120.03873 **Latitude (DD):** 33.98888 **Datum:** WGS84

Date: 7/4/2009, update 6/22/2011

Observers: Sarah Chaney, Ken Niessen, Ron Hiebert

Location Description: Steep rocky slope between canyons "Water Cyn 1" and 'Water Cyn 2".

Current Condition: Eroded to nearly bare rock with occasional patches of remaining relatively stable soil surface. 6/22/11: Areas of severe erosion, large gullies, some areas of bare rock—pockets of soil between rocks. Some areas with intact soil with diverse cover. MIFL, LODE, LUAL, ARCO, GAAN, LEFI, BAPI, ERGR, NAXX, ACDI.

Natural Condition: Dense chaparral of chamise, ARCO, with RHIN, HEAR. Much MIFL, LODE. Chaparral extended to head of slope at coastal terrace scattered Torrey pines.

Management Goal: 5–10 yrs. Stabilize major gullies and partially stabilize slopes with 'biobags' and short coir rolls. 25 yrs. See Torrey pines and chaparral establish on slope. 50% increase in veg cover. 6/22/11: Increase PITO, ARCO, ADFA, RHIN by 50%. Increased vegetative cover should lead to increased fog capture and soil moisture. Encourage establishment of PITO down toward coastal terrace, starting from upper part of restoration area.

RRAT Indices and Scores: #37-North Edge Torrey Pines-*Mimulus flemingii* Site

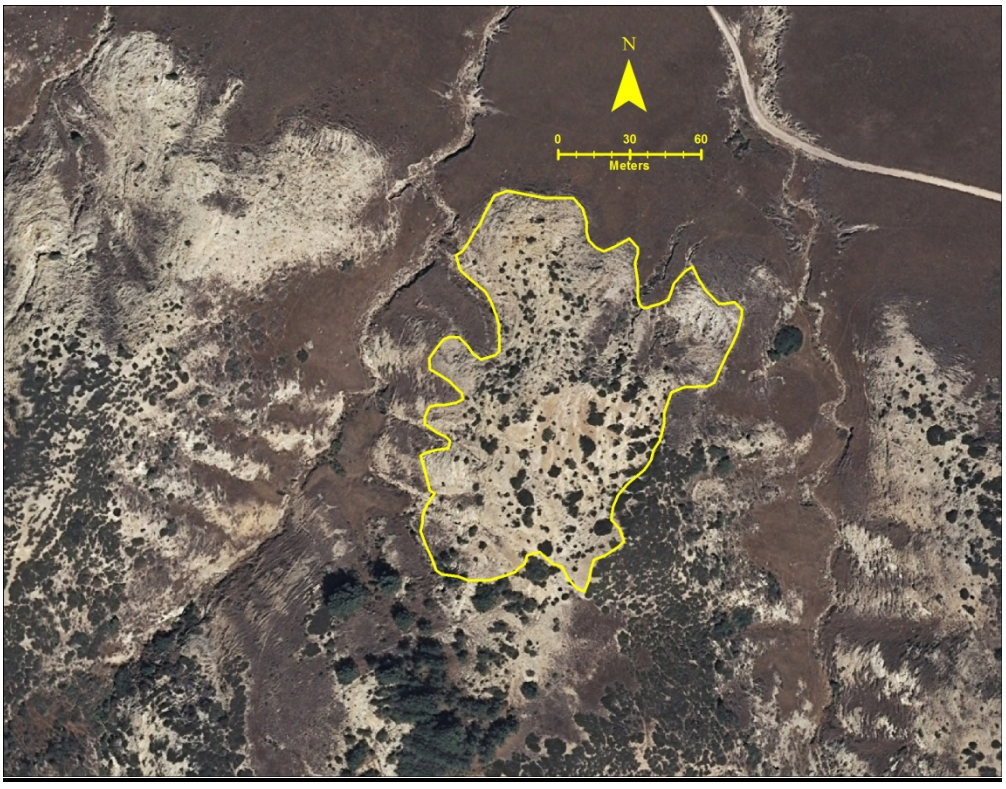
Index	Natural Condition Score	Management Goal Score
Convergence	20	70
Ecological Restoration Potential	40	82
Restoration Logistics	77	77
Ease of Restoration	64	80
Potential Site Value	75	75
Stressor Removal Potential	95	95
Gain for Effort	0.7	2.4
Number of Unknowns	0	0

RRAT Potential Site Value Components: #37-North Edge Torrey Pines-*Mimulus flemingii* Site	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #37-North Edge Torrey Pines-*Mimulus flemingii* Site	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Difficult
Non-native fauna	Easy

#38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site

Longitude (DD): -120.03727 **Latitude (DD):** 33.98833 **Datum:** WGS84

Date: 7/4/2009, update 6/22/2011

Observers: Sarah Chaney, Ken Niessen, Ron Hiebert

Location Description: Steep rocky slope between canyon "Water Cyn 2" and "Water Cyn 3". 6/22/11: Site concept expanded to include eastern part of hill (see GIS poly).

Current Condition: Eroded to nearly bare rock but without notable gullies. Many individuals of ARCO surviving. Occ HEAR. Scattered MIFL. 6/22/11: Low diversity-mainly large ARCO, occasional MIFL, LEFI, some HESC and ACDI. Large gullies in eastern half. Some PITO getting established below the PITO stand above site. Much erosion to bare rock between ARCO clumps.

Natural Condition: Relatively unbroken canopy of ARCO chaparral with occ toyon, PITO, even LYFL (poss) emergent.

Management Goal: 5 yrs. Allow ARCO to produce fruit by removing animals. Interplant ARCO seeds and occasional PITO seed and HEAR seed to encourage recruitment in openings. Control gully development using biobags and plants. 25 yrs. 50% cover increase and 50% diversity increase. 6/22/11: Restore fog capture function.

RRAT Indices and Scores: #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site

Index	Natural Condition Score	Management Goal Score
Convergence	27	70
Ecological Restoration Potential	42	82
Restoration Logistics	77	77
Ease of Restoration	66	80
Potential Site Value	75	75
Stressor Removal Potential	94	94
Gain for Effort	0.9	2.4
Number of Unknowns	0	0

RRAT Potential Site Value Components: #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site

Component	Value Chosen by Observers
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Minimally valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable

Recreation or aesthetics	Not valuable

RRAT Site Stressors: #38-North Edge Torrey Pines-*Arctostaphylos confertiflora* Site	
Stressor	**Effort to Remove**
Climate change	Difficult
Altered hydrology	Difficult
Non-native fauna	Easy
Herbivory - mammals	Easy

#39-Windmill Canyon Reroute
Coastal Sage Scrub



Site Data

Management Area: CHIS-SRI

Site Name: #39-Windmill Canyon Reroute

Longitude (DD): -120.05957 **Latitude (DD):** 34.00243 **Datum:** WGS84

Date: 7/4/2009

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Windmill Canyon Rd, from nursery up past storage/parking

Current Condition: Road, currently in use, compacted, and becoming unsafely undercut. Undercut and associated gully down-hill to Windmill Creek are caused by runoff from road.

Natural Condition: Hillside coastal sage scrub with BAPI, HEAR, ARCA, etc. No gully. No road. *Dudleya greenei* present on slope (near current erosion gully).

Management Goal: Close and rehabilitate current road, reroute through existing area currently used for storage/parking. Restore slope contour at road, protect from erosion, and revegetate. Stabilize gully and install sediment retaining structures and vegetation as needed. Manage water flow from area of old road.

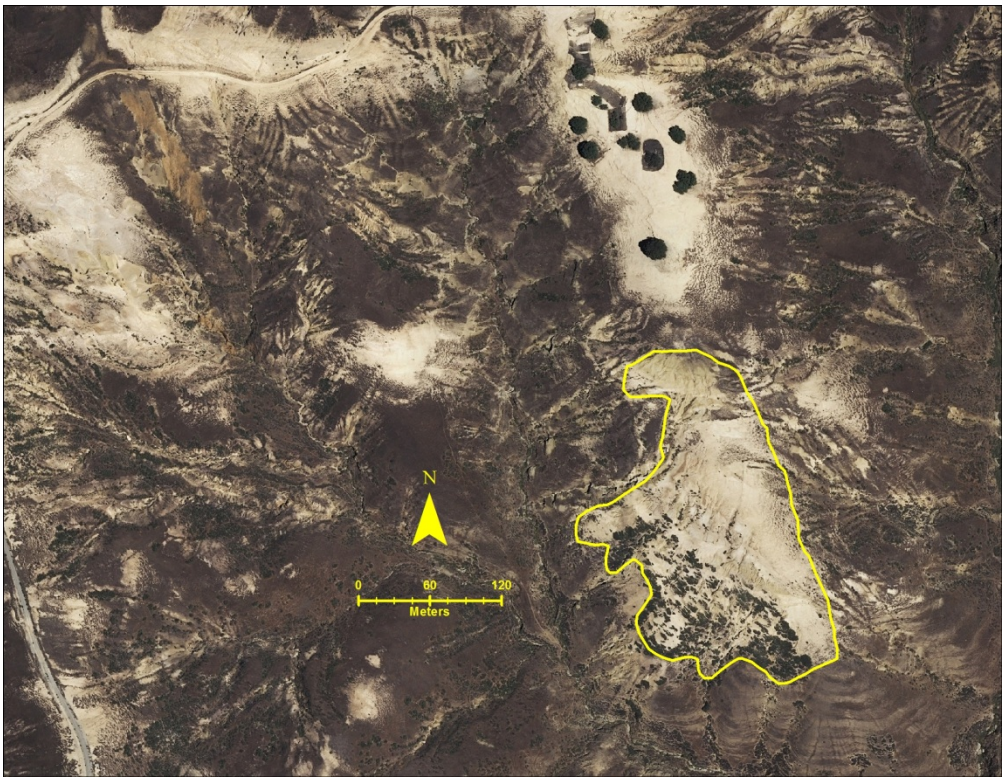
RRAT Indices and Scores: #39-Windmill Canyon Reroute		
Index	**Natural Condition Score**	**Management Goal Score**
Convergence	34	68
Ecological Restoration Potential	57	83
Restoration Logistics	87	87
Ease of Restoration	73	84
Potential Site Value	28	28
Stressor Removal Potential	98	98
Gain for Effort	2.2	4.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #39-Windmill Canyon Reroute	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Not valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Minimally valuable
Emblematic natural features	Moderately valuable
Threatened or endangered species	Minimally valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #39-Windmill Canyon Reroute	
Stressor	**Effort to Remove**
Altered hydrology	Moderate
Land grading	Moderate

#40-Below Grove #7: *Quercus pacifica* Gullies
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #40-Below Grove #7: *Quercus pacifica* Gullies

Longitude (DD): -120.10806 **Latitude (DD):** 33.94203 **Datum:** WGS84

Date: 7/5/2009, update 6/25/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Toe of ridge leading from Main Ridge. Trending NW to SE. Grove #7 on this ridge. This site is down ridge on steep toe.

Current Condition: Upper part of area bare exc for minimal AG (annual grass), CARA, LEFI. Lower part (gullies) has scrub QUPA w a little annual grass.

Natural Condition: +/- complete cover QUPA/ prob chamise chaparral with occ QUTO, ARCO scattered (hypothetical).

Management Goal: Control erosion on upper flatter part—e.g., wattles. Implement fog collection here, e.g., fog fences. Stabilize heads of gullies. 6/25/11: Landscape fabric would be useful. Fog fences should be kept short (about 1 m long) and various fabrics should be tested for longevity and effectiveness. Encourage/ plant BAPI and NAXX to help collect moisture. Plants/seed planted in stabilized soil pockets. No supplemental watering, therefore plant mostly seed rather than small plants. Effort should be less than upslope site 18 (Jolla Vieja Oaks, Grove 7). Given wind direction and gravity, expect restoration at site 18 will have positive effects at site 40.

RRAT Indices and Scores: #40-Below Grove #7: *Quercus pacifica* Gullies

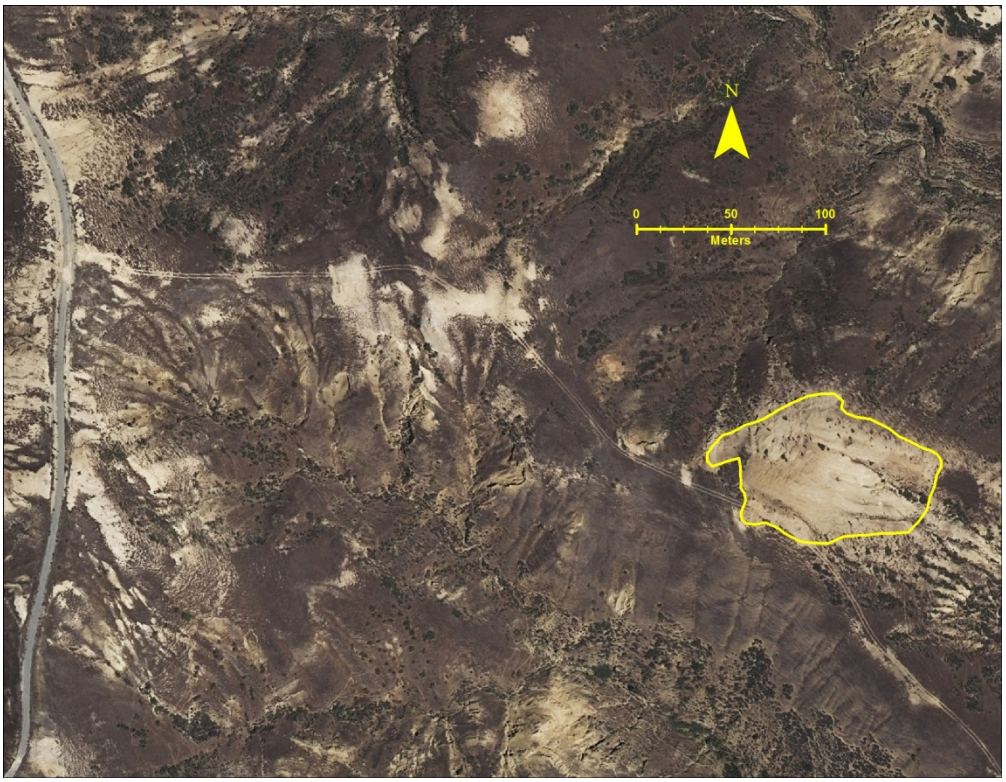
Index	Natural Condition Score	Management Goal Score
Convergence	33	77
Ecological Restoration Potential	39	84
Restoration Logistics	70	70
Ease of Restoration	65	80
Potential Site Value	78	78
Stressor Removal Potential	92	92
Gain for Effort	0.9	2.0
Number of Unknowns	0	0

RRAT Potential Site Value Components: #40-Below Grove #7: *Quercus pacifica* Gullies	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Highly valuable
Historical cultural and archeological features	Highly valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #40-Below Grove #7: *Quercus pacifica* Gullies	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Difficult
Soil disturbance	Difficult
Herbivory - mammals	Easy
Non-native fauna	Easy

#41-Bald Hill #1
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #41-Bald Hill #1

Longitude (DD): -120.10928 **Latitude (DD):** 33.94003 **Datum:** WGS84

Date: 7/5/2009, update 6/25/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Ridge top leading se from Johnsons Lee Rd; bald area of reddish soil across cyn from Grove 7 restoration site.

Current Condition: Nearly devoid of vegetation. Low slope angle; fractured rock/coarse soil. One large gully; extreme rills. Annual grass (AVXX), BAPI, BRCA (occ), CARA. 6/25/11: also LEFI.

Natural Condition: Hypothetically; QUPA/ADFA, possibly even QUTO occasionally. Probably ARCO occ. Dense fine leaved veg would capture much fog moisture. 6/25/11: question whether ADFA would be at site—too high?

Management Goal: 2 yr: control erosion. 5 yr: set up artificial fog collection structures. Plant BAPI, NAPU, BRCA. 10 yr: QUTO, QUPA, ADFA. 25 yr goal: Revegetation has occurred—BAPI, AG (annual grass) and perennial grasses.

1. Some revegetation implemented. 2.Erosion controlled. 3.Fog moisture collected. 6/25/11: Not a high priority if funds limited. Other similar sites with higher priority could be bald ridges east and west of site 18 (grove 7). Site 40 would probably be eliminated from potential restoration because of low Potential Site Value.

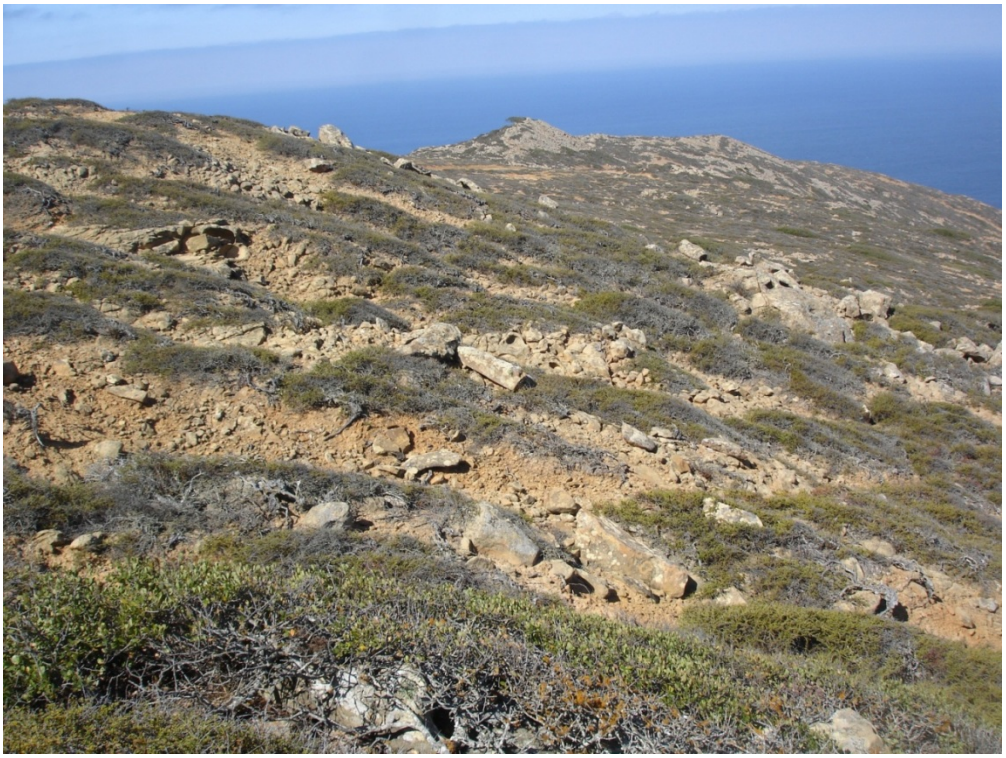
RRAT Indices and Scores: #41-Bald Hill #1

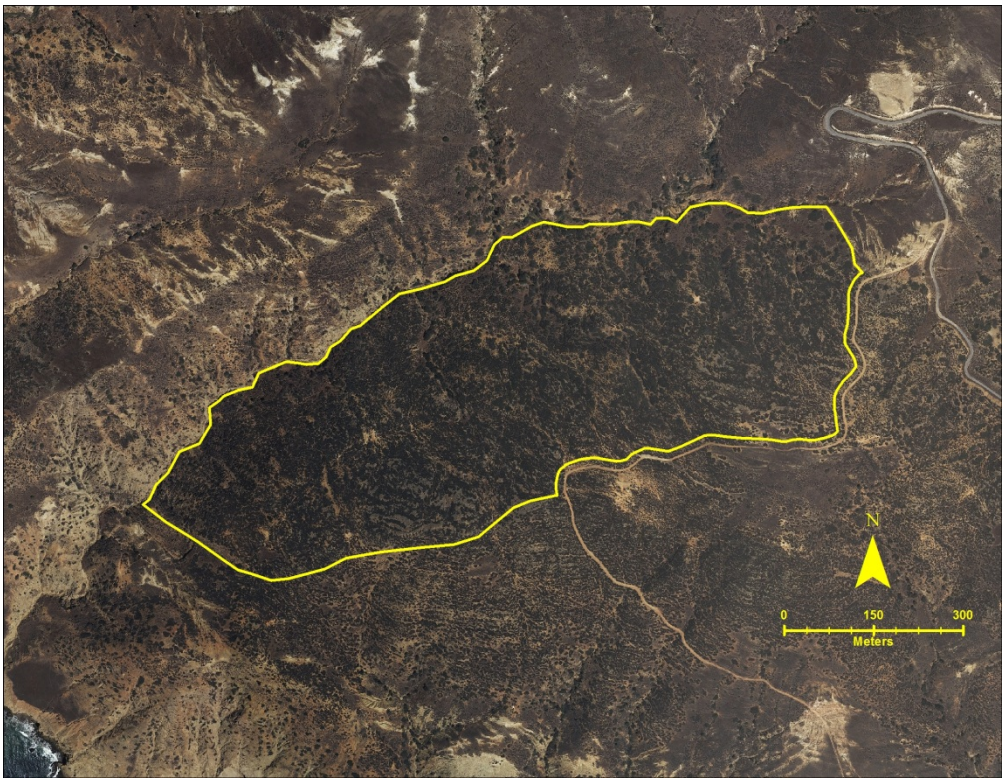
Index	Natural Condition Score	Management Goal Score
Convergence	31	75
Ecological Restoration Potential	44	85
Restoration Logistics	77	77
Ease of Restoration	67	82
Potential Site Value	44	44
Stressor Removal Potential	94	94
Gain for Effort	1.1	2.6
Number of Unknowns	0	0

RRAT Potential Site Value Components: #41-Bald Hill #1	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Minimally valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Moderately valuable
Plant community biodiversity	Moderately valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Moderately valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #41-Bald Hill #1	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Difficult
Soil disturbance	Easy
Non-native fauna	Easy

#42-South Point Chaparral
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #42-South Point Chaparral

Longitude (DD): -120.12546 **Latitude (DD):** 33.90885**Datum:** WGS84

Date: 7/5/2009, update 6/25/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Central reference point uphill from South Pt Exclosure. Site includes select portions of entire expanse of NNW facing chaparral.

Current Condition: Deeply dissected trails interwoven through otherwise dense and extensive cover of ADFA, ARCO, QUPA with MIFL, GAXX, occ SABR, ARCA. Lichen presence and apparent diversity high. Heavy deer/elk usage evident. 6/25/11: Large gullies enhanced by road runoff. ARHO found in USGS rare plant resurveys in 2010.

Natural Condition: As above without livestock and game trails. Fewer less extreme gullies.

Management Goal: Allow est chap shrubs to continue recovery to reform dense cover and cover existing trails. Expect this regrowth to initiate refilling and healing of small trail scars. Actively restore certain areas where gullies are deep/extreme where natural recovery is not expected. Restore populations of ARCO in locations between existing disjuncts to re-establish connected population. Restore LYFL habitat. 6/25/11: Also see site 34. Restoration should depend on restoration of South Point Road to lessen effects of runoff. Seems not to be a good fog capture site (check fog station data), but is high quality site with numerous rare species, as documented by USGS 2011 rare plant surveys.

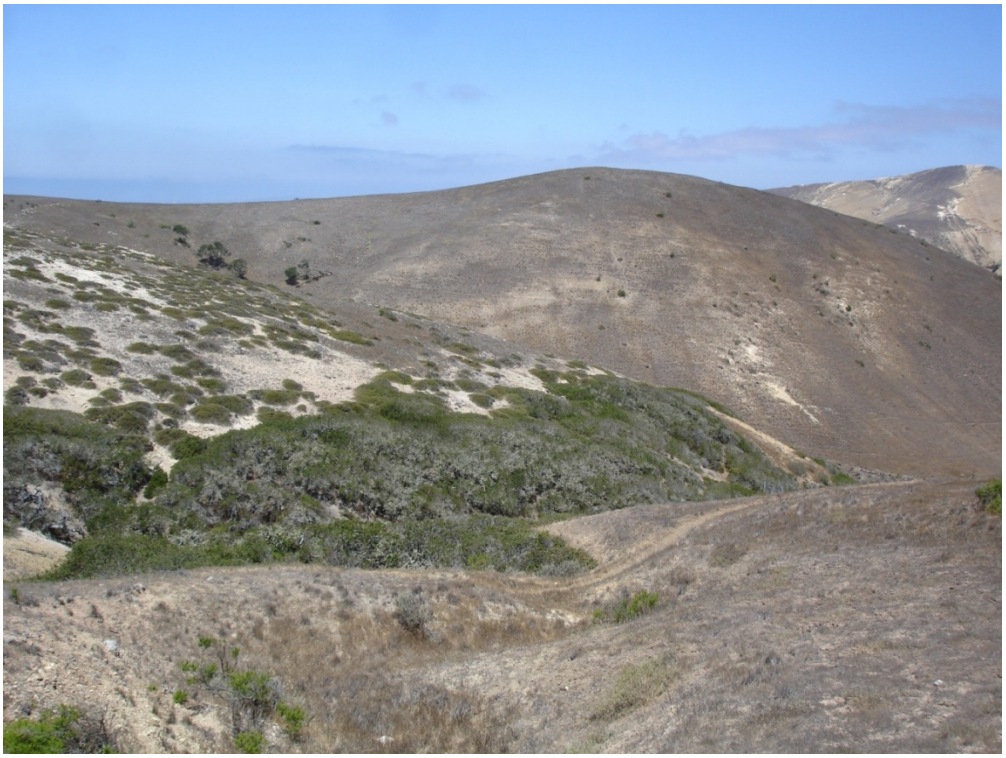
RRAT Indices and Scores: #42-South Point Chaparral

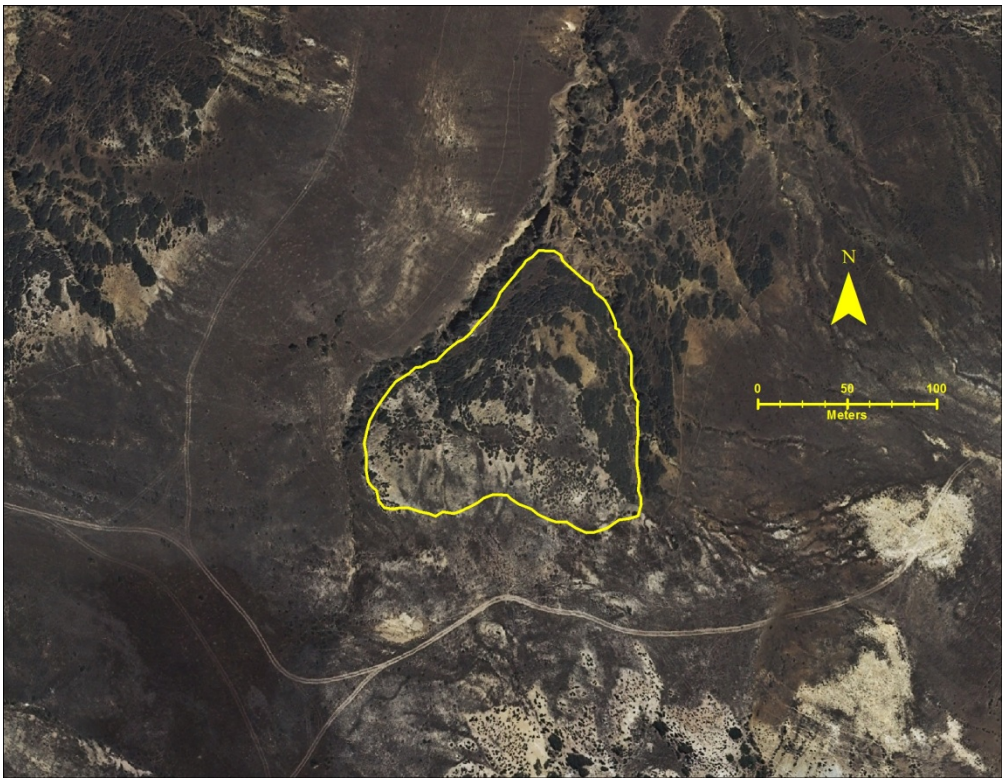
Index	Natural Condition Score	Management Goal Score
Convergence	53	67
Ecological Restoration Potential	67	82
Restoration Logistics	57	57
Ease of Restoration	69	74
Potential Site Value	66	66
Stressor Removal Potential	97	97
Gain for Effort	1.2	1.5
Number of Unknowns	0	0

RRAT Potential Site Value Components: #42-South Point Chaparral	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #42-South Point Chaparral	
Stressor	**Effort to Remove**
Altered hydrology	Moderate
Soil disturbance	Easy
Herbivory - mammals	Easy
Non-native fauna	Easy

#43-Trancion *Ribes*
Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #43-Trancion *Ribes*

Longitude (DD): -120.14066 **Latitude (DD):** 33.92673 **Datum:** WGS84

Date: 7/5/2009, update 6/25/2011

Observers: Sarah Chaney, Ron Hiebert, Ken Niessen

Location Description: Trancion Ridge, NW facing side, first remnant chaparral area west of Grouse Peak.

Current Condition: Denuded slope of formerly dense ADFA/QUPA chaparral. ADFA individs remain upslope; QUPA thickets downslope. 4 *Ribes malvaceum* plants protected in QUPA. Much deer/elk activity into/through area. Soils actively eroding. Remnant wood of older bigger plants remains. 6/25/11: Substantial foliose lichens on dead stems indicate this is a fog site. Native bunch grasses are present among QUPA: ACDI, LECO, BRCA. Dense shrub cover lower down, less than 50% cover on upper slope. NAXX is between ADFA plants at top, ACDI is prominent among QUPA below. SABR on W facing slope E of E drainage.

Natural Condition: Dense QUPA-ADFA chaparral, +/- continuous. Maybe 2–3 m high cover naturally, little or no trailing, that only by native animals. Thin layer of soil continuous over surface (not just under shrubs) well stabilized by biocrust and revegetation. No gullies.

Management Goal: Allow regrowth of shrubs to re-cover much area. Active measures to control erosion/establish planting pockets in selected areas. Planting of individuals of CEAR, CEMG, RIMA, ARCO possibly LFYL (LYFL) for local seed source and local recruitment. 6/25/11: Efforts should be made to quantify the intensity and frequency of fog, if fog moisture capture reveg techniques are to be used. Remove fencing around *Ribes*.

RRAT Indices and Scores: #43-Trancion *Ribes*

Index	Natural Condition Score	Management Goal Score
Convergence	33	53
Ecological Restoration Potential	45	74
Restoration Logistics	70	70
Ease of Restoration	66	72
Potential Site Value	66	66
Stressor Removal Potential	94	94
Gain for Effort	0.9	1.5
Number of Unknowns	0	0

RRAT Potential Site Value Components: #43-Trancion *Ribes*	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Moderately valuable
Historical cultural and archeological features	Not valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Not valuable

RRAT Site Stressors: #43-Trancion *Ribes*	
Stressor	**Effort to Remove**
Soil disturbance	Difficult
Altered hydrology	Difficult
Herbivory - mammals	Easy
Non-native fauna	Easy

#44-Soledad Oaks
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #44-Soledad Oaks

Longitude (DD): -120.10925 **Latitude (DD):** 33.95084 **Datum:** WGS84

Date: 6/24/2011

Observers: Ron Hiebert, Ken Niessen

Location Description: In the Soledad drainage. SW facing slope, including the Soledad Oak clone. Previously called Grove 8. Slope below is bare ground. Extends upslope to hunt road.

Current Condition: Eroded bare ground below oaks, and erosion is continuing at downhill side of lowest trunks. Erosion is stabilized within trees, with material accumulated against uphill sides of trunks. Roots exposed within grove, but no active erosion to expose more within grove. Upper slope is soil stabilized by non-native grasses. Under oaks have POMO, BRCA, *Lolium*, moss, HYGL, *Rumex acetosella*, RACL. Around upper edge GNPU. Slope above dominated by non-native annual grasses and forbs, especially *Avena* sp, and NAXX.

Natural Condition: Roots not exposed. Surrounding vegetation may contain BAPI and NAXX, but largely dominated by chaparral shrubs (ARCO, QUPA, etc.) and emergent QUTO and PIMU.

Management Goal: Plant/encourage recruitment of oaks above stand. Currently high fog capture—green grasses and herbs in June. Good soil development. Plant some BAPI to encourage fog capture to serve as nurse plants for oaks. Hard to mitigate eroding lower end, just try to keep grove expanding to top and sides.

RRAT Indices and Scores: #44-Soledad Oaks

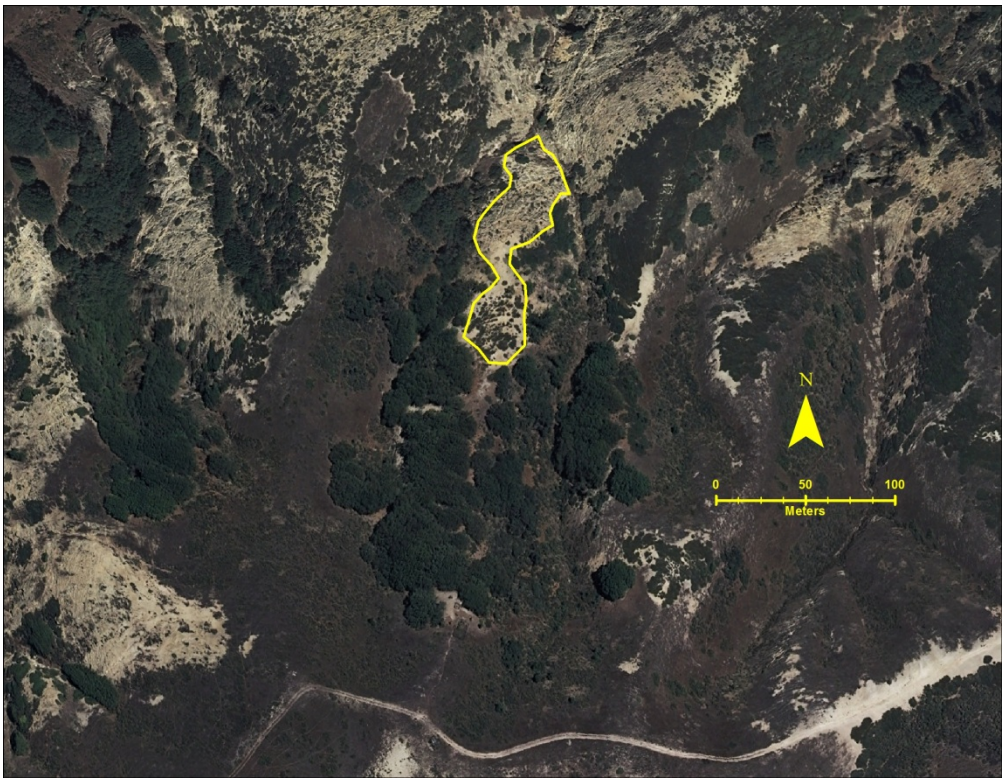
Index	Natural Condition Score	Management Goal Score
Convergence	38	54
Ecological Restoration Potential	35	71
Restoration Logistics	100	100
Ease of Restoration	75	80
Potential Site Value	84	84
Stressor Removal Potential	88	88
Gain for Effort	3.0	4.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #44-Soledad Oaks	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Extremely valuable
Habitat or ecosystem rarity in the landscape	Minimally valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Extremely valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Moderately valuable

RRAT Site Stressors: #44-Soledad Oaks	
Stressor	**Effort to Remove**
Invasive non-native plant presence	Difficult
Invasive non-native plants: external source	Difficult
Altered hydrology	Difficult
Invasive non-native plant seedbank	Difficult
Climate change	Difficult
Non-native fauna	Already removed
Herbivory - mammals	Already removed

#45-Black Mountain Below Main Oak Grove
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #45-Black Mountain Below Main Oak Grove

Longitude (DD): -120.07825 **Latitude (DD):** 33.98122 **Datum:** WGS84

Date: 6/23/2011

Observers: Ron Hiebert, Ken Niessen

Location Description: More open area directly below Black Mountain Island Oak stand on trail down from weather station. Between grove and steep drop-off on finger ridge to north.

Current Condition: Exposed ridge and slopes below arborescent QUTO. Bare eroding rock and soil, with many dead burls of chaparral shrubs. Well-developed soil crusts on shrub islands where there is some soil. Existing shrubs include ARCO, ADFA, QUPA, VAOV, HEAR, and prostrate QUTO.

Natural Condition: Continuous cover of chaparral—ADFA, QUPA, ARCO etc., and QUTO as shrubs and becoming emergent.

Management Goal: Curb erosion and stabilize soil, using wattles, dams, fabric, etc. Create organic layer and soil pockets. Plant oaks, ARCO, etc., with goal of 50% cover in about 20 yrs. Rely on extensive fog dip inputs to help plants along. Passive restoration of steeper slopes downhill and downwind should follow after establishment and expansion of planted shrubs.

RRAT Indices and Scores: #45-Black Mountain Below Main Oak Grove

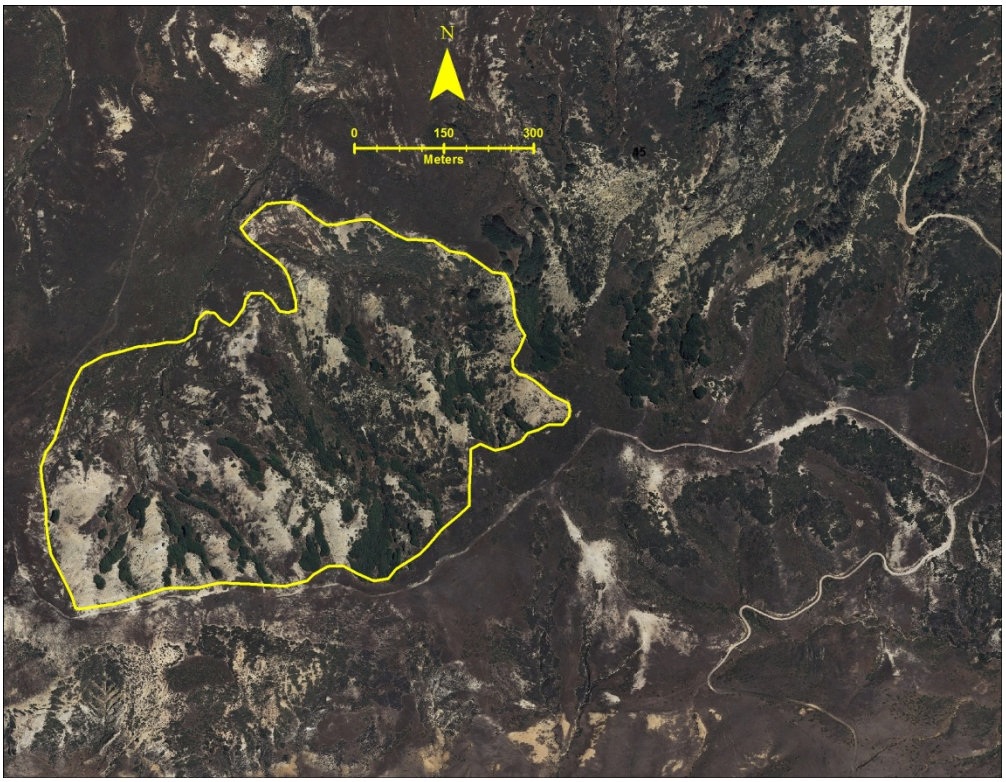
Index	Natural Condition Score	Management Goal Score
Convergence	48	65
Ecological Restoration Potential	58	81
Restoration Logistics	83	83
Ease of Restoration	76	82
Potential Site Value	88	88
Stressor Removal Potential	96	96
Gain for Effort	2.3	3.2
Number of Unknowns	0	0

RRAT Potential Site Value Components: #45-Black Mountain Below Main Oak Grove	
Component	**Value Chosen by Observers**
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Moderately valuable

RRAT Site Stressors: #45-Black Mountain Below Main Oak Grove	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Moderate
Non-native fauna	Already removed
Herbivory - mammals	Already removed

#46-Black Mountain Finger Ridges
Island Oak Chaparral: Fog Site





Site Data

Management Area: CHIS-SRI

Site Name: #46-Black Mountain Finger Ridges

Longitude (DD): -120.08185 **Latitude (DD):** 33.97884 **Datum:** WGS84

Date: 6/23/2011

Observers: Ron Hiebert, Ken Niessen

Location Description: North trending bare finger ridges from main Black Mtn ridge. Separated from each other by valleys filled with mostly arborescent QUTO. Top of main ridge down to more or less continuous chaparral/oaks. GIS polygon includes both target non-vegetated areas and non-target vegetated areas.

Current Condition: Ridges are bare rock and soil to 50% plus of patches of ADFA and QUPA (and less ARCO, QUTO, and HEAR). Numerous trails. Where soil remains, covered by annual grasses and herbs of short stature. Many rills, few deep gullies.

Natural Condition: Continuous cover of ADFA and QUPA, and less ARCO and QUTO. Some of the prostrate QUTO becoming emergent, with possible scattered small groves.

Management Goal: Reduce bare ground by encouraging recruitment of ADFA, QUPA, ARCO, HEAR, QUTO. Overplant seeds in cracks in rocky substrate. Construct fog capture structures as needed at young plants (explore types of structure/fabric). Good project for mass of seed planting volunteers.

RRAT Indices and Scores: #46-Black Mountain Finger Ridges

Index	Natural Condition Score	Management Goal Score
Convergence	39	65
Ecological Restoration Potential	37	78
Restoration Logistics	57	57
Ease of Restoration	62	71
Potential Site Value	88	88
Stressor Removal Potential	91	91
Gain for Effort	0.8	1.3
Number of Unknowns	0	0

RRAT Potential Site Value Components: #46-Black Mountain Finger Ridges

Component	Value Chosen by Observers
Relation to surrounding landscape	Highly valuable
Habitat or ecosystem rarity in the landscape	Extremely valuable
Historical cultural and archeological features	Extremely valuable
Animal community biodiversity	Highly valuable
Plant community biodiversity	Extremely valuable
Emblematic natural features	Extremely valuable
Threatened or endangered species	Extremely valuable
Recreation or aesthetics	Moderately valuable

RRAT Site Stressors: #46-Black Mountain Finger Ridges	
Stressor	**Effort to Remove**
Altered hydrology	Difficult
Climate change	Difficult
Invasive non-native plant seedbank	Moderate
Invasive non-native plants: external source	Moderate
Invasive non-native plant presence	Moderate
Non-native fauna	Already removed
Herbivory - mammals	Already removed

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 159/114385, May 2012

National Park Service
U.S. Department of the Interior

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