

**Summary of 2010
Marbled Murrelet Monitoring Surveys
In the Santa Cruz Mountains**

**Prepared For:
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INTRODUCTION

This report covers the results of Marbled Murrelet (*Brachyramphus marmoratus*) monitoring surveys completed in 2010 for the Santa Cruz District of the California State Parks, and is the first of a three-year monitoring effort for the seabird. The surveys took place at Big Trees State Park, Portola Redwood State Park, Butano State Park and San Mateo County Memorial Park. These surveys are carried out in support of and to follow-up similar data taken by previous similar studies completed here in the during 2003 and in previous years. It also continues an ongoing effort to study murrelet populations after the oil spill that occurred nearby in 1988.

METHODOLOGY

In previous years, California Department of Fish and Game (DFG) has funded this work; at Portola and Big Basin since 1992 and 1995. At Portola, monitoring years included 1992-1995, 1998, as well as in 2001-2003 and included only one murrelet observation station. The study has been carried out at Big Basin at five survey stations over the years of 1995-1996, 1998, and 2001-2003. During the 1995-1996, and 1998 the monitoring at Big Basin consisted of five surveys at each station during the protocol period. Coverage was minimized during the 2001-2003 years, with just three surveys annually completed at each observing station from mid-June to late-July, with two in July. During the current 2010 year and over the next two years (2011-2012) the surveys consist of three visits to each survey station at Butano, Big Basin and Memorial, and two stations at Portola having 5 surveys.

LOCATION OF SURVEY STATIONS

Protocol survey station placement is critical to allow for the ability of the certified surveyor to hear or see murrelets (O'Donnell 1995, Pacific Seabird Group Protocol (PSG), 2003) and landscape scale topography may also affect murrelet activity at a given location (Miller and Ralph 1995). Criteria were established to guide selection of new monitoring stations. Criteria for appropriate murrelet monitoring are listed below, in "primary criteria" and "secondary criteria".

Primary Criteria

- 1) A station should be in suitable murrelet nesting habitat in an area known to support murrelet activity. In some cases, depending on patterns of murrelet activity at a site, the nature of available habitat and access, a station might be located adjacent to suitable nesting habitat or in forest with residual old growth trees that is not optimal habitat. Existing knowledge of murrelet occurrence in the parks provided the information necessary information for appropriate murrelet station placement within the four parks, originally placed in previous years to the 2010-2012 study period.
- 2) A station should be within a significant canopy gap that provides a large view of the sky overhead. Gaps might be created naturally (stream corridor, landslide, clearcut, large tree fall, etc) or by humans (campground, road).
- 3) A station should be near a stream, in a valley bottom, or relatively low on a side slope, as murrelets use these corridors as flyways to their inland possible nesting locations. Ridgeline locations should be avoided. Although, if a station is too near a strongly flowing stream, the noise from this can cause missed murrelet detections. Thus, care should be taken to place

these creek-bottom stations in a location along the stream that is less acoustically disturbed by creek noise (Shaw, pers obs).

4) At least one station in each park should be within or immediately adjacent to a main campground as the study coordinators may propose a project to conduct covid management activities at campgrounds in the future. Survey stations close to campgrounds may help document the presence of marbled murrelets in the area and prioritize which campgrounds may need predatory control. Predatory control is now occurring in some of the parks within and near campgrounds.

Secondary Criteria

6) A station should be at least 500 meters from another station. This serves to improve independence between stations and to sample more broadly within each park.

7) A station should be relatively easy to access in the dark before the survey station begins. Locations requiring extensive “cross country” access have been avoided, as were those requiring long hikes, and areas accessed by driving on dirt roads that might have limited access following some winters or wet weather.

The five station at Big Basin State Park (Redwood Meadow, 100 acre woods, Blooms Creek, Huckleberry 17, and Sempevirons) were established in 1995 in a dispersed pattern in the upper watershed of the East Fork of Waddle Creek. They met the selection criteria, except the Sempevirons and Huckleberry 17, which have only mediocre sky views. Huckleberry 17 is located in the campground and Redwood Meadow and Blooms Creek are located about 400 meters from campgrounds.

The Peters Creek bridge station at Portola State Park was established in 1992 and met the survey criteria and is located adjacent to the park’s main campground. A new station, Iverson was established in 2001 where Iverson Trail crosses Pescadero Creek, west of the park headquarters.

The Ben Ries station at Butano State Park is on the main park road immediately before the entrance to the Ben Ries Campground and is adjacent (just east) to campsite #1. Little Butano Creek survey station is alongside a large upslope landslide along a park service road that begins at the entrance to the campground.

The Sequoia station at Memorial County Park is in the Sequoia Flat Campground where the main camp road enters the “D” sections of the camp. Memorial survey station is located at Pescadero Creek, adjacent to the Tan Oak Flat picnic area and is at the site of the old “swimming pool” that was in previous years created seasonally within the creek itself.

DAWN MURRELET SURVEYS

Dawn murrelet surveys followed the standard protocol for audio-visual surveys in coniferous dominated forests found within the Pacific Seabird Group, 2003 protocol. Brian Shaw, Myriah Fernandez and Shane Strahs completed all of the surveys during the 2010 survey year. All three surveyors were appropriately trained and certified by certifying murrelet biologists within the Mad River Biologists yearly training program conducted at Redwood National Forest in northern Humboldt County where high murrelet activity rates are nearly

always a certainty. In addition to murrelet surveys, all bird species that were detected were counted and are reported here. Also, immediately following each dawn completed murrelet survey, a corvid survey was completed at or near many of the survey stations. All of these data are discussed and analyzed below.

Seasonal Timing of Surveys

2010 survey dates at each park are found on Tables 1, 3, 5 and 6. Surveys were focused as per protocol, during the peak July activity period. However, also suggested within the protocol, is to complete surveys through the survey period. Thus, surveys were completed from mid-June through early August, with a focus on surveys being completed during the peak mid- to late-July dates.

Big Basin Redwoods State Park

Murrelet activity during the 2010 survey season overall at the five survey stations (surveyed 3 times each) combined show that the total detections (62) and the average total number of detections (4.2) fall in line with the stable average detection number since the original dramatic drop in average detects that occurred between years 2001 and 2002. See **Table 1** for average detection totals and comparison. The lowest single year average detection number was 0.6 detections per morning in 2009. This is a far cry from the 55 detections per morning that were found per morning in the peak of the 1995 survey year. Although, detections have not considerably decreased between the seven years since 2002 surveys were completed. Thus this is at the very least, a stabilizing statistic. There were also ten occupied flight behaviors during the 2010 survey year, which compares in a similar fashion to previous years.

The *Redwood Meadow* station continues to be the center of the highest level of murrelet activity as 46 of all 62 detections at all of the five survey stations (74%) took place here. Please note here though, that the viewshed is by far better than any of the other four survey stations located within the park. Thus, detection rates would be expected to be better here through any given year based on this fact alone. Detection rates ranged from 2 to 37 (average 15.3/survey), with the peak naturally occurring during the known most-active middle July survey date. This average of 15.3 detections/morning closely matches the average number of detections per morning over the 2002 to 2009 years, which is at 14.3 detections per morning. It should be noted here that this 37 detection morning was during a nearly perfect survey morning with a nice low cloud layer and nearly no wind, and it was during the peak murrelet activity period. This is just further proof that at least one survey needs to be conducted during this period. These 2010 detection totals would indicate a “moderate” level of murrelet activity.

100 Acre Woods yielded 6 total detections in 2010, with no subcanopy flights (occupied behavior) observed. Total detections ranged from 0 to 5 over the three-survey period. The average number of detections over the three surveys was 2.0, with one morning of no detections. These numbers are slightly lower than the average number of detections that were received during the 2001-2009 survey period, which had an average of 4.1 detections per morning.

Huckleberry 17 activity was very low again, which was expected when compared to previous years. This was the first year detections were received at all since the 2007 year. There was one detection received through the three-visit 2010 survey year. This matches closely with the combined 2001-2009 average detection total of 1.7 detects per morning.

The *Blooms Creek* survey station yielded a total of 8 detections with one observed occupied behavior. This is an average of 2.7 detections per morning, which is the highest detection average since the 2006 year. This total is just above the average total of detections received across surveys conducted from 2002 to 2009, which is 2.1 detections per morning.

Sempevirons received two detections in 2010. These are the first detections received at this station since 2001, a span of 9 years. This is a good sign, and shows that on very good “murrelet weather” survey mornings (2.0-2.5 canopy level cloud cover and nearly no wind) that even at the least traveled sites, but still within decent habitat, murrelets can be detected.

Big Basin State Park Murrelet Activity - Trends

An important note mentioned above is that during the middle July period, if a survey is completed during very good morning survey conditions, and within decent to good habitat that surveys should be able to be received even at the least traveled murrelet survey station. In this instance, the mornings of 7/20 to 7/22 were near perfect survey conditions at the park. Thus, weather monitoring, or just plain good luck regarding weather conditions can play a huge role over a survey season in total number of detections received through a three-survey season. This shows at Big Basin SP within the Redwood Meadow (and all other stations surveyed that morning) survey station, as on the best survey morning (37 detections, on 7/21), detection rates were far higher than during the other two visits (7 detects on 6/22 and 2 detections on 8/4). The importance of weather and seasonal timing cannot be emphasized enough when conducting any type of comparative analyses within a single survey season and when compared to previous years, for the marbled murrelet population trends.

Overall within the park, the peak survey time again was during the typical high-detection mid-late July period. All of the five survey stations received their highest detections during this time.

The overall and single station trend as far as seasonal murrelet detection totals is concerned compares very similarly to the 2001-2009 survey years at Big Basin State Park. Thus, although it appears that if there was a decline in numbers during the 1990's, that this trend may have flattened out and a possible stabilization in the population trend is now occurring. This needs to be obviously further proven over the next two murrelet survey seasons. The fact that detections were again received at the *Sempevirons* station is encouraging after eight years of no activity at this location.

See Table 1, Figures 2, 6-11 for representations of data for Big Basin SP.

Portola Redwoods State Park

Murrelet activity during the 2010 surveys at Portola Redwoods State Park is summarized in **Table 2**. Activity at the Iverson Creek survey station was the highest, although there was plenty of activity at Peters Creek survey station (16-41 detect range, average 33). Activity at Iverson Creek was the second highest (Little Butano station was highest) activity of all of the survey stations within any of the parks. Activity at Iverson Station over the five surveys ranged from 23 to 82 detections (average of 40), with the mid-July survey date naturally being the busiest detection morning. There were also a good amount of occupied behaviors (subcanopy flights) during all five surveys, with 2 to 13 of these type detections observed. As was stated in early versions of this report, this station is located just downstream of one of

the parks larger contiguous areas of old-growth redwood forest, thus receives an abundance of murrelet flight traffic both in and out (eastward early in the morning and westward towards the end of the survey morning). As was the case in previous surveys here, there are many very low flying murrelet detections found here, just above Pescadero Creek. Several detections were seen at below 0.5 canopy directly above the creek. Subcanopy flights at Peters Creek averaged 6 per visit, with a range of 1 to 9.

Detection numbers from the 2010 survey year to previous years compare similarly to the 2003-2004 survey years, with 33 and 40 average detects received at Peters Creek and Iverson, respectively in 2010. This compares to 33/35 detections received at Peters Creek in 2003/2004 and 59/39 detects at received Iverson Creek in 2003-2004 years. Thus the Iverson detect number average (40) compares a bit low to the 2003 year (59), but the average detect total of 40 is still a great number for any murrelet stand. But the Peters Creek number is exactly at the two year 2003-2004 average. Additionally, at Peters Creek, the 2002-2004 and 2010 years all compare very low to the mid-1990 average detect data. There is no other comparative data for Iverson earlier than the 2003 survey year, as the station was established in that year. For the Peters Creek station, detection totals have remained somewhat constant through the eight-year survey period, with a downturn in detections in years 2005-2006, 2008 and an anomalous low year in 2009. However over that time period, four of the eight years have had totals averaging over 30 detections per year. The Iverson Creek has also shown a similar set of ups and downs in total average detections over that time period, with 2003-2004 averaging 49 detections/year, with a downturn in detections from 2005-2009, and a 2010 upturn year with 40 detections, which matches more similarly to detections in years past (2003-3004).

The habitat at both survey stations is very good, with large areas of great habitat and many available nesting trees typical of an old-growth redwood forest, and as is typical throughout all of the four parks within this study area.

See Table 2, Figures 3, 12-13 for representations of data for Portola Redwoods SP.

Butano State Park

Murrelet activity during the 2010 surveys at Butano Redwoods State Park is summarized in **Table 3**. Murrelet activity during the 2010 survey year at the Ben Reis survey station ranged from 12-52 detections, with an average of 26. At Little Butano, the total ranged from 22-122 (average of 62), with the 122 detections being by far the highest number of single morning detections received than at any of the park's survey stations during the 2010 survey year. The average of 62 detections is also the highest of any of the four parks survey stations. When compared to the 2003-2009 detection data, the 2010 26 detection/morning average at Ben Reis are between the peak totals in 2003/2004 of 23/48 detections on average, respectively. As for Little Butano, the average in 2010 mirrored this same trend, with 62 average detections in 2010 totaling between the 2003 and 2004 year totals. The 122 detection "peak period" total was by far the highest single station morning total of any survey at any of the survey areas.

The number of subcanopy flights was also healthy at Little Butano, with an average of 20 occupied behaviors. The low number of 1.3 subcanopy detections received at Ben Reis in 2010 closely mirrors the eight-year average subcanopy detection total at the station. This number is at least partly a result of the small visual window above and because many of the subcanopy behaviors are probably found at the creek bottom, which is 100-150 feet below

the survey station. There also is a thick wall of tanoak and small Douglas-fir to the immediate north of the call point, which disallows visuals that could be eye-level above the creek. Thus, this low number of occupied detections could be expected here. In contrast, the Little Butano station is located with a nice viewshed out and above the creek bottom as well as straight overhead.

Trends over the eight-year survey period show, similarly to the Portola detection totals, that a downturn in detections occurred at the Ben Reis station during the 2005-2009 years, with a low in 2009 (5 detects/morning), and an upturn again in 2010 (26 detects/morning) more reminiscent of the 2003-2004 survey years (25 detects/morning). However, detection totals over that time have remained somewhat constant at the Little Butano station, with the 62 detections somewhat above the eight year average of 41 detections and nearing the high detection total of 68 detects/morning in 2004.

See Table 3, Figures 4, 14-15 for representations of data for Butano Redwoods SP.

Memorial Park – San Mateo County

Murrelet activity during the 2010 surveys at San Mateo County Memorial Park is summarized on **Table 4**. The lowest overall numbers of murrelets were found in Memorial Park, with two call stations in the park yielding an average of 11 detections at the Memorial station and 4 detections the average at the Sequoia station. Subcanopy detections also were very low, with 1 average detect at Memorial and less than 1 average detection at Sequoia. These numbers compare fairly similarly to the 2003 year surveys, which averaged 4 detections at Memorial and 10 at Sequoia. The numbers seemed to have flip-flopped from 2003 to 2010, with Sequoia having more detections in 2003 than in 2010 and Memorial having fewer detections in 2003 than in 2010. One reason for this is that in 2010, the survey station at Memorial was moved just slightly to get away from the noisy creek. The station should not have been placed where it was at the volleyball court/old swim area due to a falls over the old cement structure at that location within the creek creating unnecessary noise, which is disruptive to possible detections. Thus, by simply moving the survey point just 100 meters north to just up and on the road gained more of all types of detections. The original reason for placing the station on the creek was to gain access to “flyway” subcanopy detections. However, this is counter-productive, because while the surveyor might gain a few extra flyway occupied behaviors, you lose nearly all but the loudest “keer” detections which can direct your eyes towards visual detections you could be receiving when acoustical conditions are far better. Thus, this is the reason for the increase in overall detections at the Memorial survey station. There is no logical reason for the decrease in detections at the Sequoia station. One possible explanation is the preponderance of Stellar’s Jays at the station. It is safe to assume that this could have caused several “misses” on possible acoustical murrelet detections, as sometimes up to 7 or 8 Jays were squawking at once. This obviously decreases longer distance acoustics, thus decreasing possible “keers” from being heard.

Numbers through the eight-year 2003-2010 period show that at Sequoia, there was a decent 12/morning detection rate level from 2003-2007, with a fairly substantial drop off in detections from 2008-2010 (4 detects/morning). Again this could be due to murrelets choosing against this site for landing, nesting or any other I life-history behavior as a result of the unruly corvid presence here. Numbers at Memorial station increased significantly from the average 2003-2009 years (1.5 detects/morning) to 11 detects/morning. This is in direct

relation to placing the survey station just beyond earshot of the creek and associated falls station location. Future surveys should further play out this trend of increased detections, especially acoustical.

See Table 4, Figures 5, 16-17 for representations of data for San Mateo County Memorial Redwoods Park.

CORVIDS

A simultaneous corvid survey was conducted for Stellar's Jays and Common Raven during the two-hour murrelet survey. No specific methodology was used here, besides the simple ability to recognize the sounds and visual appearance of each species. Thus, survey for these two species proved very easy, even while studying the morning sky and forest for murrelets.

Please note that surveyors used their best judgment in not "double-counting" especially the jays, as they are significantly more prevalent and somewhat more mobile. Thus, jays are a bit more difficult not to double count than ravens. Thus, total morning numbers of all counted corvids took this into consideration.

Overall, corvids were found in highest abundance at the Memorial campground and least abundance at Portola campground.

Big Basin Redwoods State Park

Both ravens and jays were found at each of the five murrelet stations within Big Basin State Park. As was the case in most of the 2003-2009 years, numbers were greatest at the Blooms and Huckleberry campgrounds, with average numbers during murrelet surveys averaging 7 to 8 jays and several ravens during the morning survey. The further studies that were completed here also showed abundant numbers of corvids at the campgrounds versus at the off-campground Sempevions, 100-acre woods, and Redwood Meadows locations, where corvid numbers were significantly lower. For instance, the most jays at any of the non-campground survey locations was 4 one morning at sempevions, but averaged around 2 total jays for all three of these off-campground locations on any given morning. Further, numbers of ravens were even fewer, with an average of around 1 raven found at the non-campground survey locations.

Stellar's Jay

Overall numbers of STJA decreased somewhat from previous years, with an average of 3.4 jays per morning, where the average of the previous years (2003-2009) was near 9 jays/station.

Common Raven

Overall numbers of CORA decreased negligibly from previous years, with an average of 1.3 ravens per morning, where the average of the previous years (2003-2009) was around 2.3 jays/station.

Portola Redwoods State Park

Both ravens and jays were found at Portola State Park, with numbers at the campground-adjacent Peters Creek survey station significantly higher than the Iverson Creek survey station. The numbers reflect this, with numbers ranging from 1 to 9 jays (average of 5+) at Peters Creek and less than three per morning at Iverson Creek. The 3 number at Iverson Creek would be considered “normal” and “typical” for jays found in a forest setting. But the 5, 6, and 9 totals on separate mornings found at Peters Creek are definitely indicative of the campground and human use setting. The numbers of ravens found at each station are fairly similar to each other, with less than significant differences between the two. However, jays are typically more abundant overall no matter the setting, so using jays is typically a more realistic and reliable method of showing this scavenger’s use (overuse and pest like behavior) than that of ravens, who typically have fewer numbers, even near campgrounds overall than jays.

Stellars Jay

Overall numbers of STJA decreased from previous years totals, with an average of 1.2 jays per morning, where the average of the previous years (2003-2009) was near 5 jays per station.

Common Raven

Overall numbers of CORA remained the same from in previous years, with an average of 1.3 ravens per morning, where the average of the previous years (2003-2009) was around 1.5 jays per station.

Butano Redwoods State Park

Both jays and ravens were found within the park, with the Ben Reis survey station near the campground showing far more of both species than the more natural setting of the Little Butano survey station. This is reflected in the numbers, with Little Butano averaging three jays per morning, and Ben Reis averaging 6 to 7 jays per morning, with a top out total of near 15 jays. Raven numbers were significantly higher at Ben Reis also, with three per morning being the average, while 1 raven per morning was found at Little Butano.

Again, three jays and one raven per morning are typical for a natural coniferous forest setting anywhere in California within the mixed conifer zone and below (and sometimes higher in central and southern CA mountains). Thus, the 6 to 7 jays and at least 3 ravens found typically at the Ben Reis near-campground station is definitely related to the human use found at the campground, where corvids “hang-out” waiting and searching for easy food scraps.

Stellars Jay

Overall numbers of STJA decreased somewhat from previous years, with an average of 4.7 jays per morning, where the average of the previous years (2003-2009) was near 6.5 jays per station.

Common Raven

Overall numbers of CORA remained the same from in previous years, with an average of 2.3 ravens per morning, where the average of the previous years (2003-2009) was 2.1 jays per station.

Memorial Redwoods County Park

Corvids seem to be more of a problem in Memorial Park campgrounds than in the other three state park campgrounds. This is evidenced by the large numbers of jays especially found at the Sequoia survey station, which is directly within the Sequoia Campground section of the park. Numbers show an average of 12 (range of 10-16 per morning) jays found during the survey at this station. Only 2 to 3 ravens were found per morning though. At the non-campground (although not that far from a campground) Memorial survey station totals show an average of 4 jays and 4 ravens observed per morning. This number is still above what would be considered within a “normal” forest setting away from humans. This is due to the fairly close proximity (compared to say the *Sempevirons* site in Big Basin SP) of this station to a campground (only a few hundred meters away). So, this number would be expected here. However, the high number at Sequoia shows a large scavenging population of jays found here nearly certainly due to the high usage by humans of this campground.

Stellars Jay

Overall numbers of STJA decreased significantly from previous years, with an average of 5.8 jays per morning, where the average of the previous years (2003-2009) was near 15 jays per station.

Common Raven

Overall numbers of CORA decreased somewhat from in previous years, with an average of 2.2 ravens per morning, where the average of the previous years (2003-2009) was 5.5 jays per station.

See Tables 5 & 6 for corvid data by State/County Park.

AVIAN SURVEYS

An incidental avian study was completed during each two-hour murrelet survey. All avian species identified by sight and/or sound were recorded during the murrelet survey. During murrelet detection voice recording, it is possible that a few of the individual avian species calls could have been missed. The crux of this overall study was to study marbled murrelets. Thus if a complex murrelet detection was being voice recorded into the surveyors handheld device, the importance of that detection exceeded the possible avian calls that could have been heard during the murrelet detection. However, a respectable level of birds were represented as a result of these morning avian surveys.

Songbirds in the parks showed a typical representation of individuals within a redwood forest avian population, with some not quite as typical edge type birds found in a southern coastal redwood (*sempevirons spp*) forest. Notable species that were found that are not quite as typical in these forests, or are notable as large, more important birds at the top of the food chain found within the parks include: pileated woodpecker, red-tailed hawk, northern flicker, acorn woodpecker, hairy woodpecker and downy woodpecker.

There were an abundance of smaller passerine type birds also, with some notable numerously occurring species such as hermit thrush, dark-eyed junco, chestnut-backed chickadee, and pacific-sloped flycatcher. One notable flock of nine California quail was seen during one morning survey at Big Basin SP.

A simple list of individual birds found within each park is represented by **Table 7**.

RAPTORS

One Red-tailed Hawk was detected during one of the murrelet surveys. There were also Great Horned Owls heard at night on several of the nights while camping at the Gazos Creek Group Campground. This is the extent of the raptor activity detected during the 2010 murrelet, avian and corvid surveys.

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Appendix 1: Tables and Graphs

Table 1. Summary of protocol murrelet surveys conducted at the Big Basin Redwoods State Park in 2010.

Station	Date	Observer	Cloud Cover	Total Detects	Occupied Detects
Redwood Meadow	6/22/10	MLF	0	7	1
Redwood Meadow	7/21/10	BKS	50	37	7
Redwood Meadow	8/4/10	MLF	0	2	1
100 Acre Woods	6/23/10	SS	0	1	0
100 Acre Woods	7/22/10	MLF	25	5	0
100 Acre Woods	8/4/10	SS	0	0	0
Blooms Creek	6/23/10	MLF	0	0	0
Blooms Creek	7/21/10	MLF	50	8	2
Blooms Creek	8/3/10	MLF	0	0	0
Huckleberry #17	6/22/10	SS	0	0	0
Huckleberry #17	7/21/10	SS	50	1	0
Huckleberry #17	8/3/10	SS	0	0	0
Sempevirons	6/22/10	BKS	0	0	0
Sempevirons	7/22/10	SS	50	2	0
Sempevirons	8/3/10	BKS	0	0	0

Table 2. Summary of protocol marbled murrelet surveys conducted at the Portola Redwoods State Park in 2010.

Station	Date	Observer	Cloud Cover	Total Detects	Occupied Detects
Iverson	6/25/10	SS	100	31	3
Iverson	7/8/10	BKS	0	23	5
Iverson	7/23/10	BKS	0	33	10
Iverson	7/25/10	SS	100	82	13
Iverson	8/2/10	SS	0	32	2
Peters Creek Bridge	6/25/10	MLF	100	18	1
Peters Creek Bridge	7/7/10	BKS	0	16	5
Peters Creek Bridge	7/22/10	BKS	25	41	9
Peters Creek Bridge	7/25/10	MLF	100	72	7
Peters Creek Bridge	8/2/10	MLF	100	18	7

--5 Surveys were conducted at both Iverson and at Peters Creek Bridge.

Table 3. Summary of protocol marbled murrelet surveys conducted at the Butano State Park in 2010.

Station	Date	Observer	Cloud Cover	Total Detects	Occupied Detects
Little Butano Creek	6/24/10	MLF	0	15	3
Little Butano Creek	7/24/10	MLF	100	52	1
Little Butano Creek	8/5/10	MLF	25	12	0
Ben Reis	6/23/10	BKS	25	42	22
Ben Reis	7/20/10	MLF	100	122	37
Ben Reis	7/26/10	MLF	0	22	0

Table 4. Summary of protocol marbled murrelet surveys conducted at the San Mateo County Memorial Park in 2010.

Station	Date	Observer	Cloud Cover	Total Detects	Occupied Detects
Memorial	6/24/10	BKS	0	19	2
Memorial	7/23/10	MLF	0	10	0
Memorial	8/2/10	BKS	25	4	1
Sequoia	6/24/10	SS	0	1	0
Sequoia	7/23/10	SS	0	8	1
Sequoia	8/4/10	BKS	100	3	0

Table 5. Comparison of murrelet activity levels between years at each park from 1995-2009.¹

Station	Year	N	<u>All Detections</u> Avg Detects	<u>Occupied Site Detections</u> Average Detects
<i>BIG BASIN</i>				
Redwood Meadow	1995	4	177.0	64.0
	1996	4	97.0	27.5
	1998	4	92.3	33.5
	2001	3	86.3	8.0
	2002	3	18.7	1.3
	2003	3	16.3	1.3
	2004	3	17.0	2.3
	2005	3	14.0	1.3
	2006	3	18.3	9.0
	2007	3	16.3	2.7
	2008	3	12.0	0.0
100 Acre Woods	2009	3	1.7	0.0
	2010	3	15.3	3.0
	1995	4	25.3	9.0
	1996	4	9.5	2.0
	1998	4	5.0	3.7
	2001	3	3.7	0.3
	2002	3	2.7	0.0
	2003	3	7.0	2.3
	2004	3	7.0	0.0
	2005	3	1.0	0.0
	2006	3	8.0	3.0
2007	3	3.0	0.0	
2008	3	6.7	2.3	
2009	3	0.0	0.0	
2010	3	2.0	0.0	
Blooms Creek	1995	4	44.8	1.5
	1996	4	44.8	1.8
	1998	4	15.0	1.0
	2001	3	23.0	3.0
	2002	3	0.7	0.0
	2003	3	2.7	0.0
	2004	3	1.3	0.0
	2005	3	4.0	0.0
	2006	3	3.0	0.0
	2007	3	2.3	0.0
	2008	3	1.3	0.0
2009	3	1.3	0.0	
2010	3	2.7	0.7	

Table 5, continued.

Station	Year	N	<u>All Detections</u> Average Detects	<u>Occupied Site Detections</u> Average Detects
<i>BIG BASIN</i>				
Huckleberry	1995	4	24.3	7.5
	1996	4	23.3	5.5
	1998	4	14.0	1.0
	2001	3	4.3	0.0
	2002	3	0.0	0.0
	2003	3	3.0	0.7
	2004	3	0.3	0.0
	2005	3	1.0	0.0
	2006	3	6.0	0.3
	2007	3	2.0	0.7
	2008	3	0.0	0.0
	2009	3	0.0	0.0
	2010	3	0.3	0.0
Sempervirens	1995	4	1.3	0.3
	1996	4	4.8	0.0
	1998	4	5.3	0.3
	2001	3	1.0	0.0
	2002	3	0.0	0.0
	2003	3	0.0	0.0
	2004	3	0.0	0.0
	2005	3	0.0	0.0
	2006	3	0.0	0.0
	2007	3	0.0	0.0
	2008	3	0.0	0.0
	2009	3	0.0	0.0
	2010	3	0.7	0.0
<i>All Big Basin Stations Combined</i>	1995	20	54.5	16.5
	1996	20	35.9	7.4
	1998	20	27.4	8.1
	2001	15	23.7	2.3
	2002	15	4.4	0.3
	2003	15	5.8	0.9
	2004	15	5.1	0.5
	2005	15	4.0	0.3
	2006	15	7.1	2.5
	2007	15	4.7	1.9
	2008	15	4.0	0.5
2009	15	0.6	0.0	
2010	15	4.2	0.7	

Table 5, continued.

Station	Year	N	<u>All Detections</u> Average Detects	<u>Occupied Site Detections</u> Average Detects	
<u>Portola</u>					
Peters Creek Bridge	2003	5	33.2	6.0	
	2004	5	35.6	4.4	
	2005	5	18.0	0.2	
	2006	5	18.6	2.4	
	2007	5	30.6	0.8	
	2008	5	19.0	0.6	
	2009	5	5.4	0.0	
	2010	5	33.0	5.8	
	Iverson	2003	3	59.3	28.3
		2004	3	39.3	9.0
2005		3	3.7	0.0	
2006		3	11.7	1.7	
2007		3	8.7	0.7	
2008		3	12.7	2.7	
2009		3	9.7	0.3	
2010		5	40.2	6.6	
<i>All Portola Stations Combined</i>		2003	8	43.0	14.4
		2004	8	37.0	6.1
	2005	8	12.6	0.1	
	2006	8	16.0	2.1	
	2007	8	22.4	0.8	
	2008	8	16.6	1.4	
	2009	8	7.0	0.1	
	2010	10	36.6	5.2	
	<u>Butano</u>				
	Ben Ries	2003	3	23.3	1.3
2004		3	48.0	5.7	
2005		3	13.7	0.0	
2006		3	11.7	0.7	
2007		3	12.7	0.3	
2008		3	10.0	0.0	
2009		3	5.3	0.0	
2010		3	26.3	1.3	
Little Butano Creek		2003	3	34.0	6.0
		2004	3	68.3	22.0
	2005	3	26.7	4.0	
	2006	3	48.0	4.3	
	2007	3	46.3	5.7	
	2008	3	20.7	3.0	
	2009	3	17.7	2.0	
	2010	3	62.0	19.7	

Table 5, continued.

Station	Year	N	<u>All Detections</u> Average Detects	<u>Occupied Site Detections</u> Average Detects	
<i>All Butano Stations Combined</i>	2003	6	28.7	3.7	
	2004	6	58.2	13.8	
	2005	6	20.2	2.0	
	2006	6	29.8	2.5	
	2007	6	29.5	3.0	
	2008	6	15.3	1.5	
	2009	6	11.5	1.0	
	2010	6	44.2	12.5	
	<u>Memorial</u>				
	Memorial	2003	3	4.3	0.0
2004		3	1.0	0.0	
2005		3	1.3	0.0	
2006		3	4.7	0.3	
2007		3	0.7	0.0	
2008		3	0.7	0.0	
2009		3	0.7	0.0	
2010		3	11.0	1.0	
Sequoia		2003	3	9.7	0.7
		2004	3	12.3	1.0
	2005	3	15.3	0.0	
	2006	3	13.7	0.0	
	2007	3	8.7	0.3	
	2008	3	7.0	0.3	
	2009	3	2.0	0.0	
	2010	3	4.0	0.3	
	<i>All Memorial Stations Combined</i>	2003	6	7.0	0.3
		2004	6	6.7	0.5
2005		6	15.3	0.0	
2006		6	9.2	0.2	
2007		6	4.7	0.2	
2008		6	3.8	0.2	
2009		6	1.3	0.0	
2010		6	7.5	0.2	

1. This table only presents data from CDFG or COSTC sponsored surveys. Results from additional non-CDFG or COSTC sponsored surveys are not shown.

Table 6: High counts for Steller’s Jay and Common Raven from 10-minute point counts and 2-hour dawn surveys at each park in 2010.

Station	<u>Stellars</u>	<u>Jay</u>	<u>Common</u>	<u>Raven</u>
	Point Count	2-Hour Survey	Point Count	2-Hour Survey
Big Basin				
Redwood Meadow	2	4	10	13
100 Acre Woods	2	4	1	1
Blooms Creek	6	8	3	4
Huckleberry #17	5	8	2	2
Sempevirons	2	4	1	2
Portola				
Peters Creek	6	12	3	3
Iverson	3	7	1	1
Butano				
Ben Reis	6	10	6	6
Little Butano Ck.	3	6	1	1
Memorial				
Memorial	3	5	4	6
Sequoia	11	16	2	2

Table 7: Average numbers for Steller’s Jay and Common Raven from 2-hour dawn surveys at each park in 2010.

Station	<u>Stellars</u> 2-Hour Survey	<u>Jay</u>	<u>Common</u> 2-Hour Survey	<u>Raven</u>
Big Basin				
Redwood Meadow	2		2.5	
100 Acre Woods	3		1	
Blooms Creek	8		2	
Huckleberry #17	6		3	
Sempevirons	3		1	
Portola				
Peters Creek	3.8		1	
Iverson	5		1	
Butano				
Ben Reis	6		3	
Little Butano Ck.	3		1	
Memorial				
Memorial	4		4	
Sequoia	12		1.5	

Table 8: 2010 Avian species list by park – 2 Hour morning murrelet survey avian count.

Big Basin	Portola	Butano	Memorial
Stellars Jay	Stellars Jay	Stellars Jay	Stellars Jay
Common Raven	Common Raven	Common Raven	Common Raven
Dark-Eyed Junco	Dark-Eyed Junco	Dark-Eyed Junco	Dark-Eyed Junco
Hermit Thrush	Hermit Thrush	Hermit Thrush	Hermit Thrush
Pac-Slope Flycatcher	Pac-Slope Flycatcher	Pac-Slope Flycatcher	Pac-Slope Flycatcher
Northern Flicker	Northern Flicker	Northern Flicker	Northern Flicker
Acorn Woodpecker	Acorn Woodpecker	Acorn Woodpecker	Acorn Woodpecker
Pileated Woodpecker	Pileated Woodpecker	Pileated Woodpecker	Pileated Woodpecker
Downy Woodpecker	Downy Woodpecker		Downy Woodpecker
Morning Dove	Morning Dove	Morning Dove	Morning Dove
American Robin	American Robin		American Robin
	Wilson's Warbler	Wilson's Warbler	Wilson's Warbler
Chestnut Backed Chickadee	Chestnut Backed Chickadee	Chestnut Backed Chickadee	
California Quail		California Quail	
	Vaux's Swift		Anna's Hummingbird Vaux's Swift
Hairy Woodpecker			
	Warbling Vireo	Warbling Vireo	
Brown Creeper			
Red-Tailed Hawk			
	Mallard		

Figure 1: California State/County Parks Overview Map: Murrelet Surveys 2003-2010 and Previous Years

Figure 2: Big Basin Murrelet Survey Station Locations

Figure 3: Portola Murrelet Survey Station Locations

Figure 4: Butano State Park Murrelet Survey Station Locations

Figure 5: San Mateo County Park Murrelet Survey Station Locations

Figure 6: Murrelet Average Detections and Occupied Behavior Averages Per Area – 2010
Three Redwoods State Parks and San Mateo Memorial Park

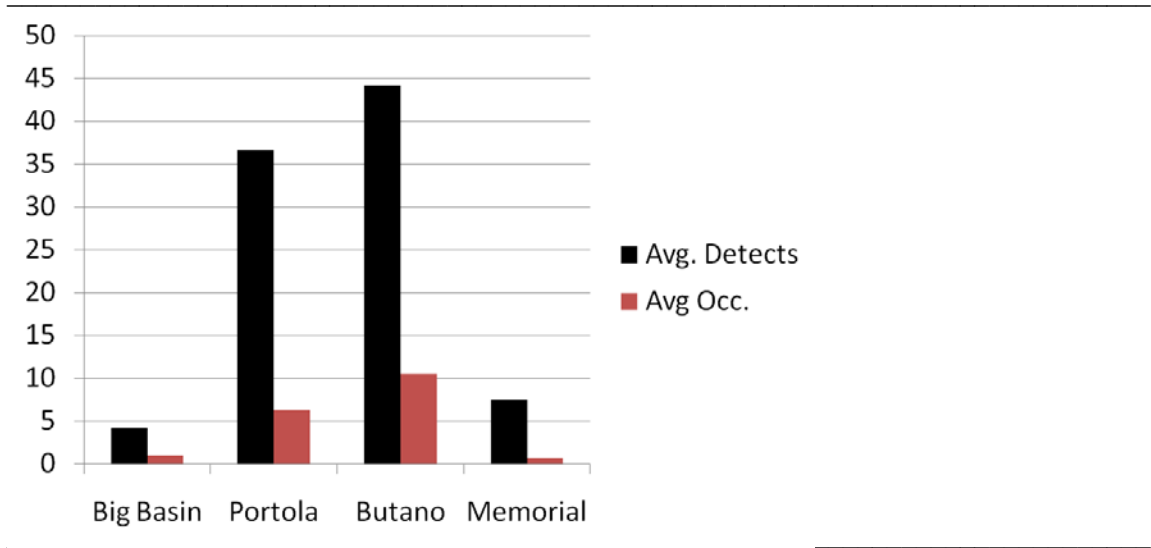


Figure 7: Big Basin State Park - Redwood Meadow Average Number of Total Detections 1993-2003, 2010

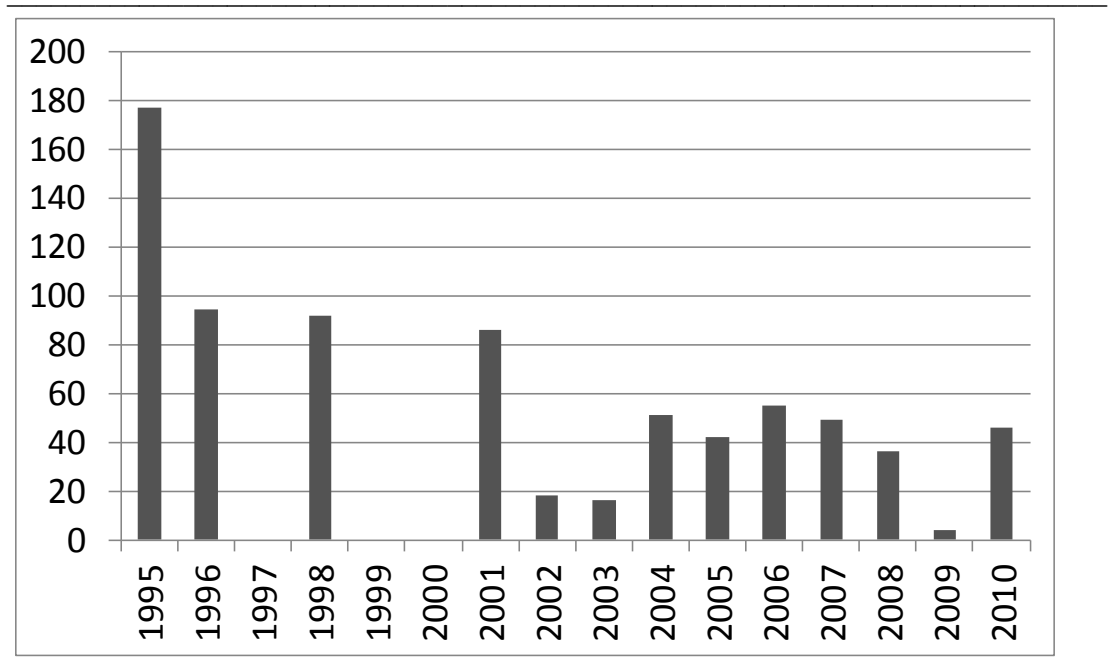


Figure 8: Big Basin State Park – **100 Acre Woods** Survey Station Average Number of Murrelet Detections 1995-2010

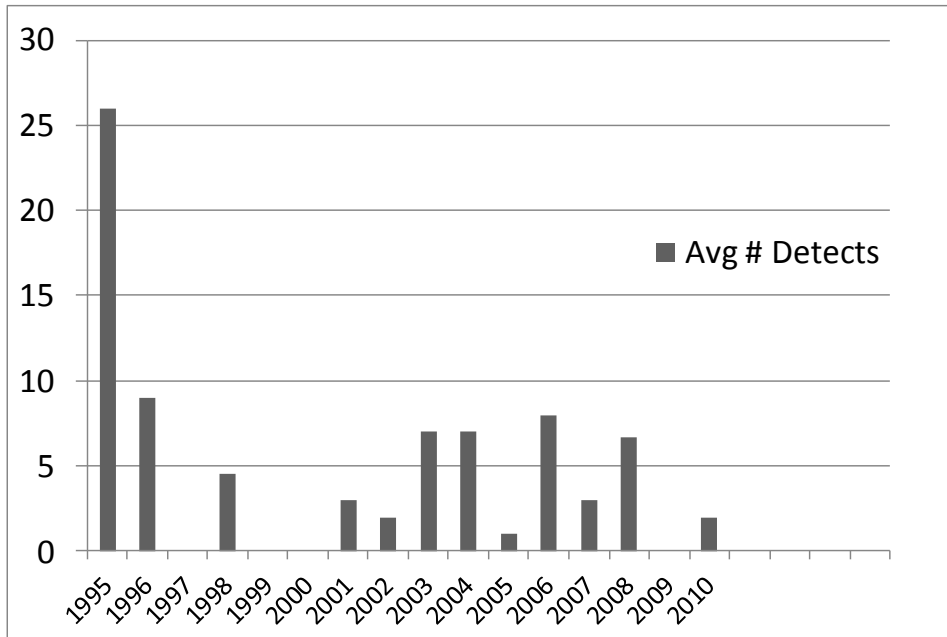


Figure 9: Big Basin State Park – **Blooms** Survey Station Average Number of Murrelet Detections 1995-2010

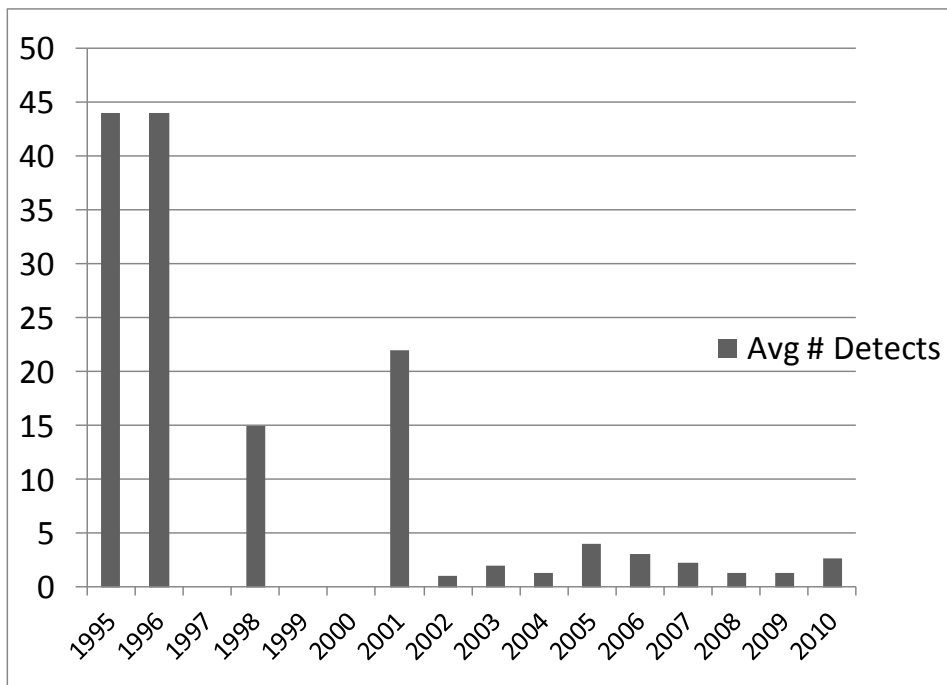


Figure 10: Big Basin State Park –**Huckleberry 17** Survey Station Average Number of Murrelet Detections 1995-2010

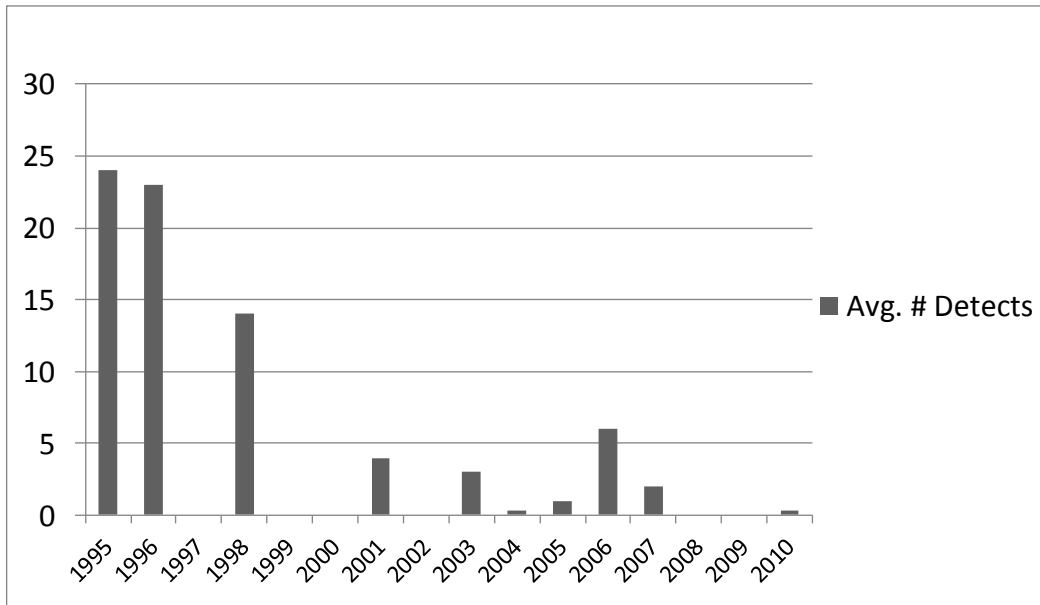


Figure 11: Big Basin State Park –**Sempevirons** Survey Station Average Number of Murrelet Detections 1995-2010

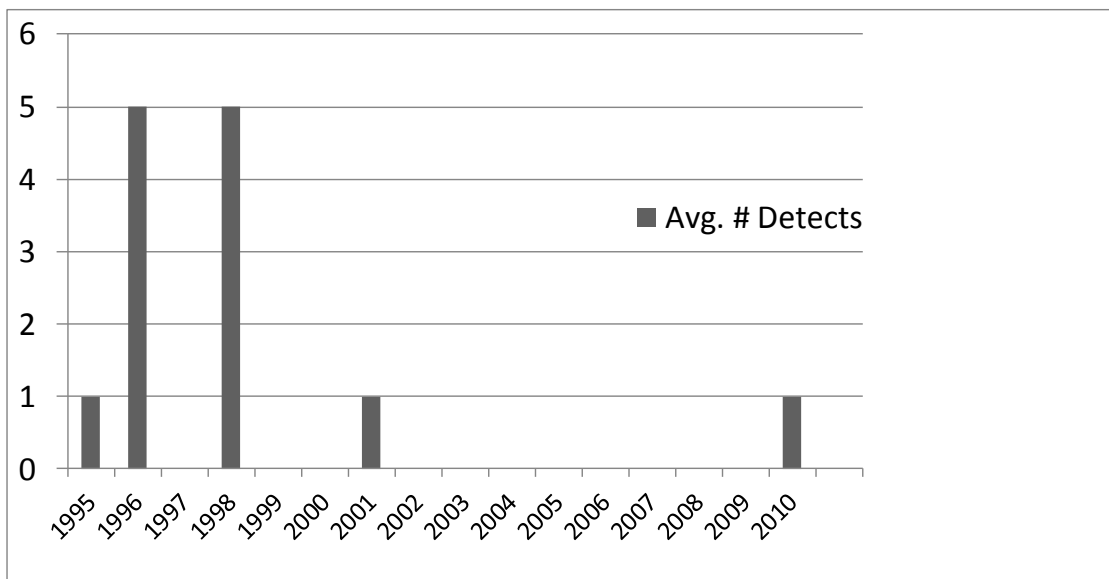


Figure 12: Portola State Park– **Peters Creek** Survey Station Average Number of Total and Occupied Detects Murrelet Detections 1992-2010

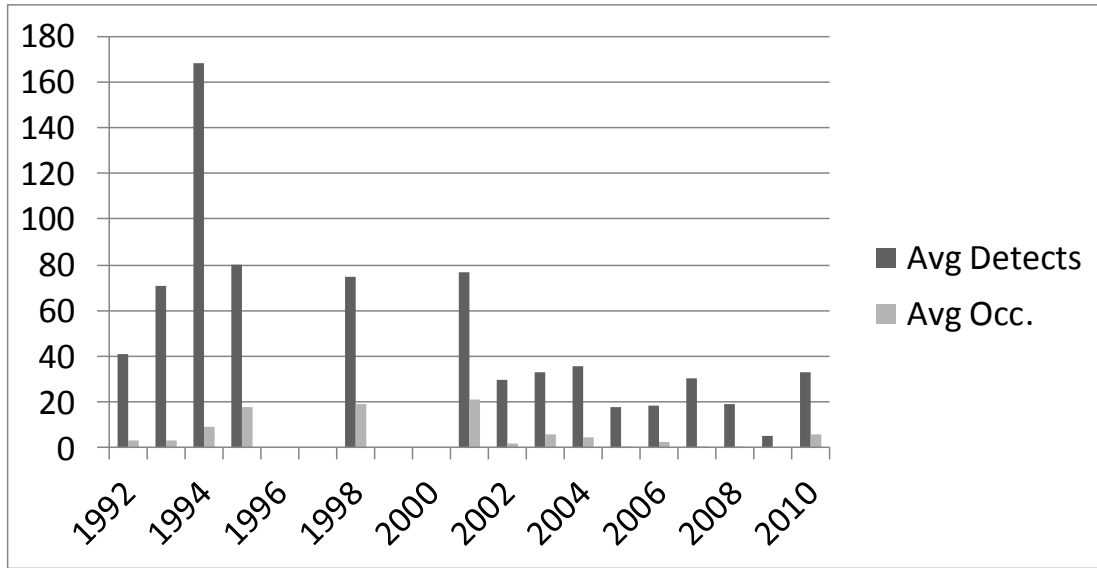


Figure 13: Portola Redwoods State Park **Iverson** Survey Station Average Number Murrelet Detections and Occupied Behaviors 2003-2010

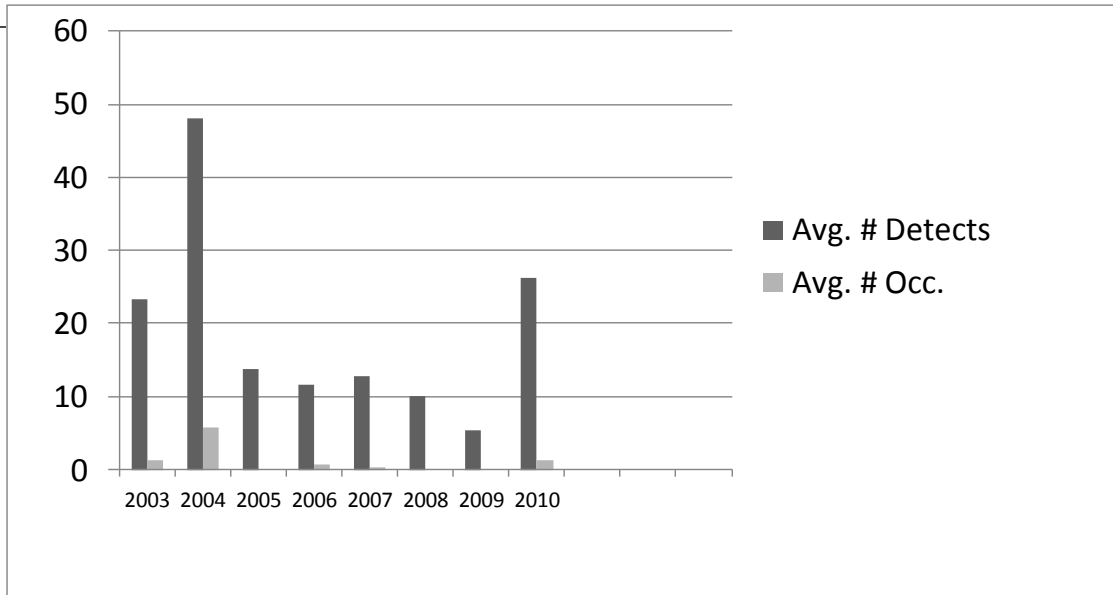


Figure 14: Butano State Park **Ben Reis** Survey Station Average Number Murrelet Detections and Occupied Behaviors 2003-2010

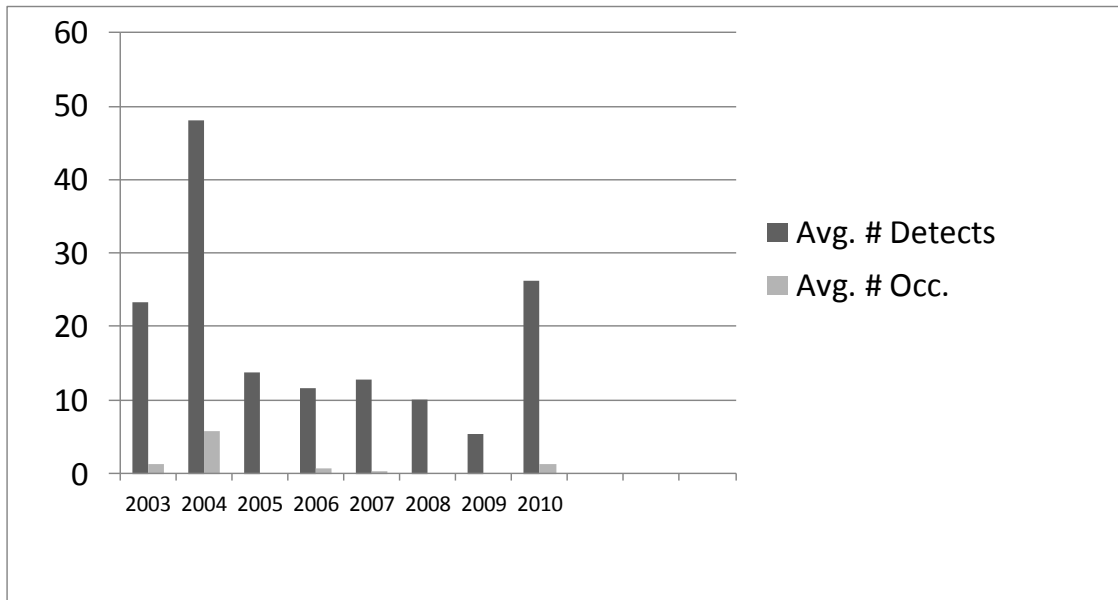


Figure 15: Butano State Park **Little Butano Creek** Survey Station Average Number Murrelet Detections and Occupied Behaviors 2003-2010

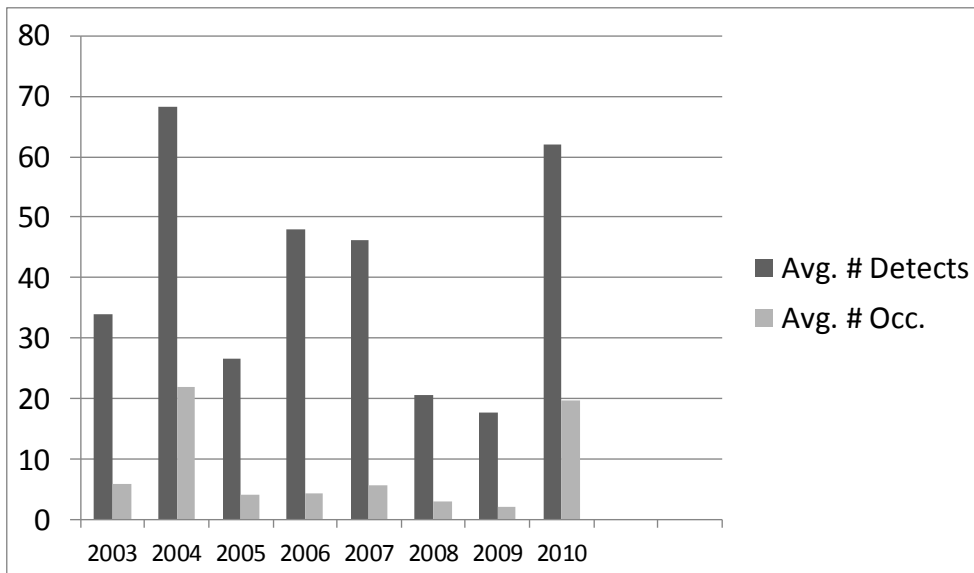


Figure 16: Memorial County Park **Memorial** Survey Station Average Number Murrelet Detections and Occupied Behaviors 2003-2010

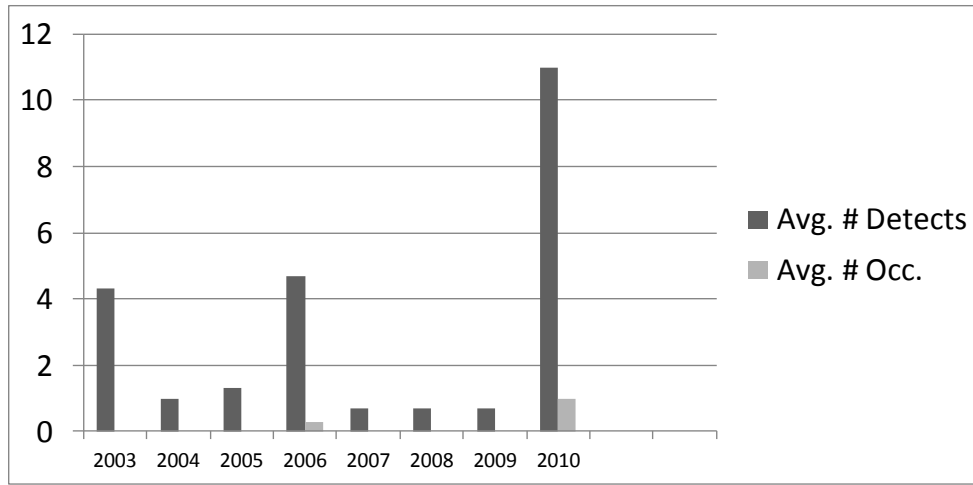


Figure 17: Memorial County Park **Sequoia** Survey Station Average Number Murrelet Detections and Occupied Behaviors 2003-2010

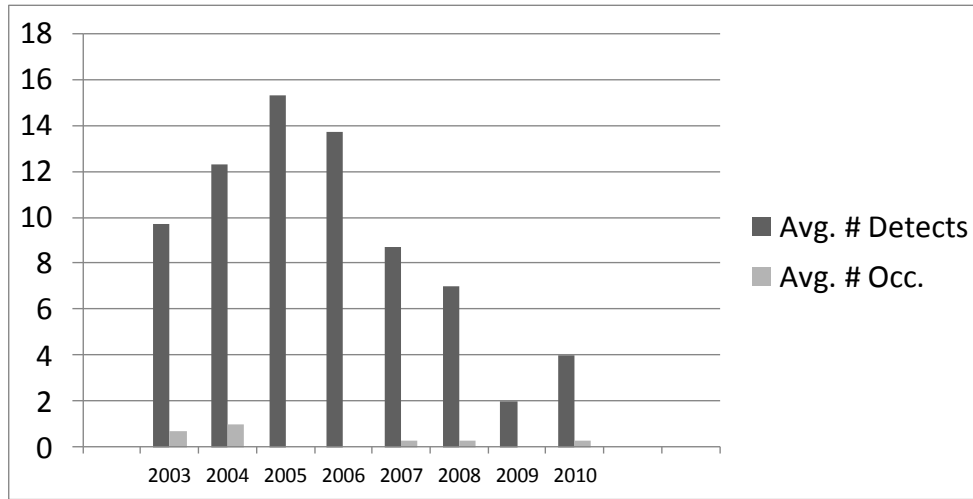


Figure 18: Average Number of STJA per station at each park 2001-2009 (Big Basin) or 2003-2009 (all other parks)

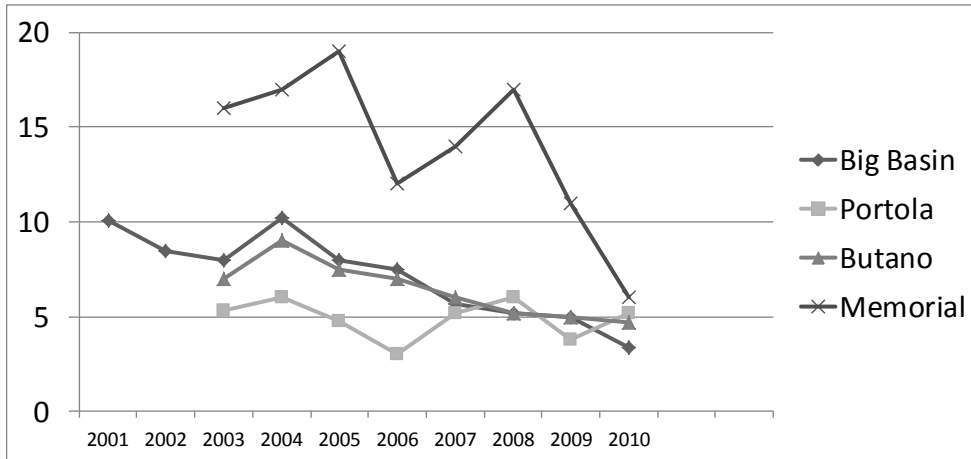


Figure 19: Average Number of CORA per station at each park 2001-2009 (Big Basin) or 2003-2009 (all other parks)

