4. RESULTS

California clapper rails were present at 42 sites of the 73 sites surveyed by OEI staff in 2008 (Table 1). No clapper rails were detected at the other 31 sites, five of which were evaluated for habitat presence only. Of the sites where clapper rail occurred, Navigable Channel had the highest density of rails (mean = 2.56 birds/acre) while Oro Loma East had the lowest density (mean = 0.02 birds/acre).

Three rounds of call count surveys were conducted at all but five sites (Appendix 5). At these five sites, habitat was determined to be unsuitable for clapper rails during the initial F-survey and call count surveys were deemed unnecessary.

The following pages present our findings for each site, organized by region (Figure 1). Information includes site descriptions, history of treatment, survey methodology and other survey details, and results. Also recorded are other birds detected during surveys: endangered and threatened species are noted in bold type, and all raptors are underlined.
4. Results

4.1 WEST CENTRAL BAY CLAPPER RAIL REGION

The West Central Bay Region stretches from the Golden Gate Bridge to the Richmond-San Rafael Bridge along the bay shore. The region includes all ISP clapper rail sites in Marin County (Table 3, Figure 2). Biologists at OEI conducted surveys at 14 sites within the West Central Bay Region: Blackie’s Pasture (03a & 03b), Corte Madera Ecological Reserve (04a), College of Marin (04b), Larkspur Ferry Landing (04e), Riviera Circle (04f), Creekside Park (04g), Upper Corte Madera Creek (04h), Lower Corte Madera Creek (04i), Corte Madera Creek Mouth (04j), Pickleweed Park (09a), Strawberry Point (23h), and Strawberry Cove (23i).

Table 3. Summary results from clapper rail surveys in the West Central Bay Clapper Rail Region.

<table>
<thead>
<tr>
<th>Site Name and ID</th>
<th>Site Area (Acres)</th>
<th>Survey Area (Acres)</th>
<th>Maximum Number of Rails Detected</th>
<th>Low Density (birds/acre)</th>
<th>High Density (birds/acre)</th>
<th>Population Estimate¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Central Bay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackies Pasture (03a)</td>
<td>2.4</td>
<td>2.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Corte Madera Marsh Reserve (04a)</td>
<td>85.1</td>
<td>42.5</td>
<td>9 - 14</td>
<td>0.212</td>
<td>0.329</td>
<td>18 - 28</td>
</tr>
<tr>
<td>College of Marin (04b)</td>
<td>4.4</td>
<td>4.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Larkspur Ferry Cove (04e)</td>
<td>1.8</td>
<td>1.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Riviera Circle (04f)²</td>
<td>10.6</td>
<td>10.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Creekside Park (04g)</td>
<td>21.6</td>
<td>15.6</td>
<td>7 - 20</td>
<td>0.448</td>
<td>1.280</td>
<td>10 – 28</td>
</tr>
<tr>
<td>Upper Corte Madera Creek (04h)</td>
<td>13.1</td>
<td>13.1</td>
<td>3 - 4</td>
<td>0.229</td>
<td>0.306</td>
<td>3 – 4</td>
</tr>
<tr>
<td>Lower Corte Madera Creek (04i)</td>
<td>23.7</td>
<td>14.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Corte Madera Creek Mouth (04j)</td>
<td>18.3</td>
<td>18.3</td>
<td>1 - 2</td>
<td>0.055</td>
<td>0.109</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Pickleweed Park (09a)</td>
<td>9.6</td>
<td>9.6</td>
<td>8 - 10</td>
<td>0.833</td>
<td>1.042</td>
<td>8 - 10</td>
</tr>
<tr>
<td>Muzzi Marsh (23e)</td>
<td>131.0</td>
<td>55.2</td>
<td>8 - 10</td>
<td>0.145</td>
<td>0.181</td>
<td>19 - 24</td>
</tr>
<tr>
<td>Strawberry Point (23h)</td>
<td>56.1</td>
<td>17.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Strawberry Cove (23i)</td>
<td>10.0</td>
<td>8.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

¹ Where survey areas are less than 85% of the site area, population estimates are extrapolated from the number of clapper rails detected. A detection limitation of 200 meters and a consistent clapper rail density across each entire site are assumed.

² Sites evaluated for clapper rail habitat only (F-survey)
Figure 2. Map of clapper rail survey region and site boundaries in the West Central Bay Clapper Rail Region.
Blackie’s Creek (03a) and Mouth (03b)

Estimated 0 clapper rails

The two sites, Blackie’s Creek and Creek Mouth, have been surveyed every year since 2005 for clapper rails, however none have been detected there to date. Because *Spartina* eradication has been particularly successful at this site, we conducted an F-survey to determine whether any call count surveys were necessary to determine clapper rail absence.

Jude Stalker conducted the habitat assessment survey on February 25, 2008 and recorded more than four habitat characteristics that indicate the possibility of clapper rail presence. The site was subsequently surveyed using Protocol C for a total of three rounds. Surveys were conducted on March 10, March 25, and April 6, 2008 by Jude Stalker. Prerecorded vocalizations were played during all three rounds but no clapper rails were detected. Clapper rails were absent from Blackie’s during the 2008 breeding season.

Other bird species observed at Blackie’s Creek, Strawberry Cove, and Strawberry Point combined included: great blue heron, great egret, snowy egret, Forster’s tern, western grebe, Clark’s grebe, mallard, lesser scaup, marbled godwit, and Canadian goose.
Figure 4. Mouth of Blackie’s Creek
Figure 5: Map of clapper rail survey results at Blackie’s Pasture (03a & b)
Corte Madera Ecological Reserve (04a)

Estimated 18-28 clapper rails (9-14 detected)

Corte Madera Ecological Reserve is an old high elevation tidal marsh to the south of Corte Madera Creek mouth (SFEI EcoAtlas). The site is dominated by native tidal marsh vegetation. *Grindelia stricta* plants border the network of channels and native *Spartina* plants line their banks. PG&E power towers provide perches for raptors along the bay edge of Corte Madera Ecological Reserve. The marsh lies in relatively close proximity to the site of the Cosco Buscan oil spill in November, 2007, possibly posing a threat to the rails that inhabit this site.

Corte Madera Ecological Reserve was surveyed using Protocol A for a total of three rounds. Surveys were conducted on March 6, 2008 by Jeff Lewis; and on March 20, and April 3, 2008 by Jude Stalker. No clapper rails were detected during the first round. J. Stalker and Jen McBroom detected nine to fourteen clapper rails during the second round, the highest count of all surveys. Three to ten clapper rails were detected during the final round. We surveyed 42.5 acres, or 50% of the total site area. Assuming the rail density was similar for the entire 85.1 acres, we estimate the population was 18 to 28 clapper rails at Corte Madera Marsh Reserve during the 2008 breeding season.

Other bird species observed at both Corte Madera Ecological Reserve and Muzzi Marsh combined included: Canada goose, song sparrow, mallard, American crow, *peregrine falcon*, western gull, marsh wren, Common raven, red-winged blackbird, *white-tailed kite*, double-crested cormorant, white-crowned sparrow, and American avocet.
Figure 7. Corte Madera Creek, view from boardwalk
Figure 8. Map of clapper rail survey results at Corte Madera marsh Reserve (04a).
College of Marin (04b)

The small site at the College of Marin (04b) is dominated by riparian habitat at the upper reaches of the Corte Madera Creek complex. The site is nestled in a predominantly residential area and is surrounded by pedestrian paths and roads. College of Marin is hydrologically connected to the creek and receives muted tidal action. Because of the site’s poor configuration and lack of tidal marsh habitat, it is highly unlikely to support breeding clapper rails.

We conducted two rounds of Protocol C survey and one round passive listening (Protocol A). Surveys were conducted on January 28, 2008 by Jude Stalker and on March 6 and April 3, 2008 by Ode Bernstein. Prerecorded vocalizations were played at two of two survey stations during the first and final rounds, however no vocalizations were played during the second round. No rails were detected at the site during the 2008 season, confirming clapper rail absence. Next year, we recommend conducting an F survey to evaluate potential habitat before conducting call count surveys. No other bird species were recorded at the site.
Figure 10. Map of clapper rail survey results at College of Marin.
4. Results

Larkspur Ferry Landing (04e)

The site called Larkspur Ferry Landing is a small strip marsh along the north bank of the ferry inlet. The marsh is less than ten meters at the widest, dominated by two species of non-native *Spartina*: *S. alterniflora x foliosa* hybrids and *S. densiflora*. Sir Francis Drake Blvd. runs parallel to the length of the site and a short breakwater parallels the bayward edge of the marsh. The ferry’s wake causes regular disturbance and erosion. Tall weeds along the upland edge provide habitat for predators such as feral cats, raccoons, and rats.

We surveyed the site for a total of two rounds of active Protocol C surveys. The first round was conducted on January 28, 2008 by Len Liu, who did not detect any rails. L. Liu commented on the poor quality of the habitat at the site and recommended an F-survey in subsequent years. The second and final round was conducted on April 3, 2008 by Jen McBroom. Prerecorded vocalizations were played during both round, but no rails were detected at the site. One male song sparrow was detected singing nearby during both the first and last round.

Figure 11. Larkspur Ferry Landing
Figure 12. Map of clapper rail survey results at Larkspur Ferry Cover (04e).
4. Results

Riviera Circle (04f)

Riviera Circle is a narrow strip of invaded shoreline in Corte Madera Creek. The site is vegetated by sparse *Spartina densiflora* plants and provides very little potential habitat for breeding rails. Surrounded by homes and docks, tidal vegetation grows opportunistically between the landscaped yards. Pets and other predators can easily enter the creek from the upland.

Based upon the initial F-survey conducted by Jude Stalker on February 21, 2008, call count surveys were unnecessary. Breeding clapper rails are highly unlikely to use the habitat at Riviera Circle and are determined to be absent from the site.

Figure 13. Riviera Circle
Creekside Park (04g)

*Estimated 10-28 clapper rails (7-20 detected)*

Creekside Park has a significant infestation of *Spartina densiflora*, as well as smaller infestations of *S. anglica*, *S. alterniflora x foliosa* hybrid, and *S. densiflora x foliosa* hybrid. Native *Sarcocornia pacifica* and *Jaumea carnosa* carpet the understory. The site is surrounded by a paved public trail and across a road from a large hospital. Threats include land-based predators such as dogs, cats, raccoons, and red fox. The site supports a persistent population of clapper rails.

Creekside Park was surveyed using Protocol A for a total of three rounds. To compare survey results between years, we used the same survey stations established by Jules Evans with Avocet Research and Associates in past years. During the first round on January 28, 2008, Jude Stalker detected four to eight clapper rails at Creekside. On March 6, Jude Stalker detected eight to eleven clapper rails and one California black rail at the site. No prerecorded vocalizations were played during the final round, which was conducted on April 3, 2008 by Ode Bernstein. He detected seven to twenty clapper rails and one Virginia rail, the highest count at the site. We surveyed 15.6 acres, or 72% of the site. Assuming the rail density was similar for the entire 21.6 acres, we estimate the population was 10 to 28 clapper rails at Creekside during the 2008 breeding season.

Other bird species observed included American coot, snowy egret, black-crowned night heron, mallard, western grebe, **California black rail**, and Virginia rail.

![Figure 14. Creekside Park](image-url)
Figure 15. Map of clapper rail survey results at Creekside Park (04g).
Upper Corte Madera Creek (04h)

Estimated 3-4 clapper rails

A slender strip marsh no more than 20 meters wide occupies the banks of Upper Corte Madera above Bon Air Road. The surrounding land is occupied by residential developments, roads, schools, and parks. Corte Madera Creek is the main and only channel at the site, functioning more like the bay edge than a channel within the site. The vegetation community is dominated by *Sarcocornia pacifica* and *Spartina densiflora*, which provides some biotic structure for concealment from potential predators. However, pedestrian paths line either side of the creek and allow for easy marsh entry for land-based mammals such as feral cats and off-leash dogs.

Upper Corte Madera Creek was surveyed using Protocol A for a total of three rounds. Surveys were conducted on January 28, 2008 by Allison Nelson; on March 6, 2008 by Ode Bernstein; and on April 3, 2008 by Jeff Lewis. Three to four clapper rails were detected at the site during the first round, but no clapper rails were detected during any subsequent rounds. Our season population estimate, based on our high count during round one, is three to four clapper rails at Upper Corte Madera Creek.

Other bird species observed at the site included: mallard, American coot, great egret, song sparrow, black phoebe, American crow, black-necked stilt, canvasback, California gull, bufflehead, lesser scaup, ring-necked duck, chestnut-backed chickadee, Canada goose, American avocet, greater white-fronted goose, white-tailed kite, greater scaup, western grebe, Common raven, California towhee, golden-crowned sparrow, rock pigeon, willet, double-crested cormorant, barn swallow, and turkey vulture.
Figure 17. Map of clapper rail survey results at Upper Corte Madera Creek (04h).
Lower Corte Madera Creek (04i)

Estimated 0 clapper rails

The marsh fringing the banks of Lower Corte Madera Creek runs from Bon Air Road to the creek mouth. The site is sparsely vegetated with *Spartina densiflora* and *Sarcocornia pacifica* and provides little biotic structure. Roads, pedestrian trails, and residential neighborhoods abut the upland edge of the marsh. Threats include predators - such as cats, raccoons, and dogs, as well as potential impacts from heavy boat traffic.

The site was surveyed using Protocol C for a total of three rounds. Surveys were conducted on January 28, 2008 by Allison Nelson; on March 6, 2008 by Jude Stalker; and on April 3, 2008 by Ode Bernstein. Prerecorded vocalizations were played at all stations during all rounds, yet no rails were detected during any round. Clapper rails were absent from Lower Corte Madera Creek during the 2008 breeding season. No other birds were recorded at this site.
Figure 19. Map of clapper rail survey results at Lower Corte Madera Creek (04i).
Corte Madera Creek Mouth (04j)

Estimated 1-2 clapper rails

Corte Madera Creek Mouth includes the marsh on either side of the creek, from Highway 101 to its outlet to the bay. The marsh on the south side of the creek abuts a large marsh preserve. Raised houses on stilts and a pedestrian boardwalk line the creek edge above the marsh. Native plants - including *Sarcocornia pacifica*, *Distichilis*, *Jaumea*, and *Grindelia* - dominate this portion of the site. Additionally, deep natural branching channels run under houses and into the marsh preserve. The marsh on the north bank of the creek, on the other hand, is heavily invaded by both *Spartina alterniflora* *x* *foliosa* and by *S. densiflora* and has fewer natural channels. It is directly adjacent to the ferry building and parking lot and receives a large amount of wave action from ferry traffic. Land-based predators, including pets, pose a threat to rails on either side of the creek.

The site was surveyed using Protocol A for a total of three rounds. Surveys were conducted on January 28, 2008 by Len Liu; and on March 6, and April 3, 2008 by Jen McBroom. L. Liu detected one to two clapper rails on the northern bank during the first round. No clapper rails were detected at the site during the second round. J. McBroom detected one to two clapper rails during the final round, likely the same pair of rails detected by L. Liu in January. We surveyed the entire site from our survey stations and our final population estimate is one to two clapper rails at Corte Madera Creek Mouth during the 2008 breeding season.

Other species observed at the site included: greater scaup, surf scoter, glaucous-winged gull, *peregrine falcon*, mallard, western grebe, common goldeneye, snowy egret, American coot, white crowned sparrow, bufflehead, western gull, ring-billed gull, house finch, marsh wren, song sparrow, salt marsh common yellowthroat, greater yellowlegs, black-necked stilt, killdeer, least sandpiper, hermit thrush, Canada goose, European starling, common loon, American crow, red-winged blackbird, Anna’s hummingbird, double-crested cormorant, American goldfinch, barn swallow, California towhee, brown-headed cowbird, and marbled godwit.

Figure 20. Corte Madera Creek Mouth
Figure 21. Map of clapper rail survey results at Corte Madera Creek Mouth (04j)
Pickleweed Park (09a)

Estimated 8-10 clapper rails

Pickleweed Park is a small isolated marsh at the mouth of San Rafael Creek, to the north of the Corte Madera Creek Complex. As its name suggests, the site is dominated by tall and bushy pickleweed (*Sarcocornia pacifica*), with some *Grindelia stricta* lining the channels and hybrid *Spartina* lining the bay front. One main channel runs half the length of the marsh with a few small channel offshoots. The site is adjacent to a recreational field in a residential neighborhood. Two large PG&E power towers loom over the north end of the marsh and provide a high perch for avian predators, such as the peregrine falcon observed during the first round of surveys at the site. A recreational trail runs along the interior perimeter of the marsh, providing access for land-based mammalian predators. Despite exposure to these threats, the site supports three species of rail: California clapper rail, California black rail, and Virginia rail.

The site was surveyed using Protocol A for a total of three rounds. During the first round on February 9, 2008, Allison Nelson detected five to eight clapper rails and one California black rail. On February 26, Jen McBroom detected four to six clapper rails, as well as a California black rail and a Virginia rail. No prerecorded vocalizations were played during the final round, which was conducted on April 10, 2008 by Jude Stalker. She detected eight to ten clapper rails and no other rails. This final survey had the highest count and the final population estimate at the site was eight to ten clapper rails.

Other birds observed at the site included: peregrine falcon, mallard, western grebe, greater scaup, glaucous-winged gull, European widgeon, song sparrow, salt marsh common yellowthroat, American avocet, marbled godwit, willet, canvasback, American coot, California black rail, black-necked stilt, snowy egret, and Canada goose.

Figure 22. Pickleweed Park
Figure 23. Map of clapper rail survey results at Pickleweed Park.
Muzzi Marsh (23e)

Estimated 19-24 clapper rails (8-10 detected)

Muzzi Marsh is a high elevation tidal marsh abutting the Corte Madera Marsh Reserve to the south of Corte Madera Creek (SFEI EcoAtlas). The site was restored in 1976 to mitigate for the Larkspur Ferry Terminal to the north (Wetland Tracker). Moderate channelization and complex biotic structure provide quality habitat for clapper rails. However PG&E power towers and upland paths border the western edge of the marsh allow easy predator access to the site.

The site was surveyed using Protocol A for a total of three rounds. Surveys were conducted on March 6, 2008 by Jeff Lewis; and on March 20, and April 3, 2008 by Jude Stalker. One to two clapper rails were detected during the first round. J. Stalker detected eight to ten clapper rails during the second round, the highest count of all surveys. During the final round, Jude detected four to eight clapper rails. We surveyed 55.2 acres, or 42% of the total site area. Assuming the rail density was similar for the entire 131.0 acres, we estimate the population was 19 to 24 clapper rails at Muzzi Marsh during the 2008 breeding season.

Other bird species observed at both Corte Madera Ecological Reserve and Muzzi Marsh combined included: Canada goose, song sparrow, mallard, American crow, peregrine falcon, western gull, marsh wren, common raven, red-winged blackbird, white-tailed kite, double-crested cormorant, white-crowned sparrow, and American avocet.
Figure 25. Map of clapper rail survey results at Muzzi Marsh (23e).
Strawberry Point (23h)

Estimated 0 clapper rails

Strawberry Point is located in a residential area in Tiburon along then north-west portion of Richardson Bay. A public shoreline access trail runs the length of Strawberry Point. The bay here is very shallow, forming extensive mudflats at low tide. The shoreline hosts small stands of *Spartina foliosa* and the marsh along the levee is vegetated with *S. foliosa*, *Sarcocornia pacifica*, *Grindelia stricta* and *Distichlis spicata*. The upper levee is mostly vegetated by non native grasses and shrubs, although the riprap sides of the levee supports little to no vegetation of any kind.

The site also includes a 2 acre tidal marsh island, called Pickleweed Island, that is vegetated predominately by *Sarcocornia pacifica*, but also by *S. foliosa* and *Grindelia* along the lower and upper portions of the channels. This marsh is adjacent to a school and has had some recent channel reconstruction. The main channel winds throughout the marsh area with smaller channels that branch off of the main channel. During the fall of 2006, a member of the Richardson Bay Audubon Center noted a clapper rail on the island, although no other rails have been since detected (Kerry Wilcox, Richardson Bay Audubon Center, pers. comm.).

Jude Stalker conducted the habitat assessment survey on February 25, 2008 and recorded more than 4 habitat characteristics that indicate the possibility of clapper rail presence. The site was subsequently surveyed using Protocol C for a total of three rounds. Surveys were conducted on March 10, March 25, and April 6, 2008 by Jude Stalker. Prerecorded vocalizations were played during all three rounds but no clapper rails were detected. Clapper rails were absent from Strawberry Point during the 2008 breeding season.

Other bird species observed at Blackie’s Creek, Strawberry Cove, and Strawberry Point combined included: great blue heron, great egret, snowy egret, Forster’s tern, western grebe, Clark’s grebe, mallard, lesser scaup, marbled godwit, Canadian goose, western gull, and ring-billed gull.
4. Results

Figure 26. Strawberry Point

Figure 27. Strawberry Point
Figure 28. Strawberry Point
Figure 29. Map of clapper rail survey results at Strawberry Point (23h).
Strawberry Cove (23i)

Estimated 0 clapper rails

Strawberry Cove is adjacent to Highway 101 in Richardson Bay. The relatively small marsh has a complex channel network allowing full tidal exchange through a wide breech in the outboard levee. The site has many ponds, covering about 30% of the site. Strawberry Cove may be too low in tidal elevation to support breeding populations of clapper rails. The short form of native *Spartina foliosa* and *Sarcocornia pacifica* dominate the site and a few small patches of hybrid *Spartina* dot the periphery. Terrestrial predators can readily enter the marsh from the roads and pedestrian paths that encircle the site. Additionally, trees along the upland edge provide perching habitat for predatory birds.

Jude Stalker conducted the habitat assessment survey on February 25, 2008 and recorded more than 4 habitat characteristics that indicate the possibility of clapper rail presence. The site was subsequently surveyed using Protocol C for a total of three rounds. Surveys were conducted on March 10, March 25, and April 6, 2008 by Jude Stalker. Prerecorded vocalizations were played during all three rounds but no clapper rails were detected. Clapper rails were absent from Strawberry Cove during the 2008 breeding season.

Other bird species observed at Blackie’s Creek, Strawberry Cove, and Strawberry Point combined included: great blue heron, great egret, snowy egret, Forster’s tern, western grebe, Clark’s grebe, mallard, lesser scaup, marbled godwit, Canadian goose, western gull, and ring-billed gull.

![Figure 30. Strawberry Cove](image-url)
Figure 31. Map of clapper rail survey results at Strawberry Cove (23i).