APPENDIX M: TERRESTRIAL HABITAT AND WILDLIFE REPORT

Mid-Barataria Sediment Diversion Project EIS

Appendix M: Terrestrial Wildlife Resources Habitat Suitability Index Models for Determining Impacts Of The Mid-Barataria Sediment Diversion Project

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GEC

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1.0 INTRODUCTION

Habitat Suitability Indices (HSI) are widely used for evaluating impacts of climate change, water resource projects, and restoration projects on fish and wildlife species habitat suitability (for example, CPRA 2017). The overall HSI for a species can be based on multiple interacting environmental or physical habitat conditions. The suitability score is standardized between 0 and 1 for each habitat or environmental variable and is usually based on species life history information and observed habitat preferences, or else fitted to presence-absence or relative abundance data from field studies. A habitat suitability of 0.0 means the habitat is unsuitable or has no capacity for supporting the species. A habitat suitability score of 1.0 means the habitat is optimal or most suitable for supporting the species.

Four species-specific terrestrial HSI models were selected for use in evaluation of the Mid-Barataria Sediment Diversion (MBSD) Project alternatives, and for communicating potential impacts on habitat suitability over the 50-year analysis period for species that utilize both terrestrial and aquatic habitat (see Table M-1). These four HSIs are versions of the 2017 Louisiana Coastal Master Plan HSIs (CPRA 2017, Appendix C). Select outputs from the Delft3D Basinwide Model production runs were utilized as inputs for these HSI models, as well as inputs for development of the percent likelihood of submerged aquatic vegetation (SAV) presence variable as described in USFWS 2019. The development of the percent likelihood of SAV input utilized Delft3D Basinwide Model outputs for salinity, turbidity, and distance to land as a proxy for exposure to wave energy, wind, and water velocity, to estimate SAV response to the combined impacts of these environmental attributes.

The HSI inputs generated by the Delft3D Basinwide Model and USFWS SAV model were averaged by month (minimum, maximum values also were projected) for the 20 spatial polygons (see Figure M-1). The monthly averaged environmental inputs were provided for years 2020-2029, 2030-2039, 2040-2049, 2050-2059, and 2060-2069.

Table M-1
Four Species HSI Equations, the Environmental Drivers over the Indicated Time Period, and Source for the HSI equation.

Key Species Life Stage	HSI Equation	Environmental Drivers	Source
Gadwall	$HSI = (SI_1 * SI_2 * SI_3)^{0.33}$	SI_1 - Dominant emergent vegetation & associated open water SI_2 – Proportion of open water that is SAV open water SI_3 –Mean water depth during the months of October – April	Leberg 2017a
Green-winged teal	$HSI = (SI_1 * SI_2 * SI_3)^{0.33}$	SI_1 - Dominant emergent vegetation & associated open water SI_2 – Proportion of open water that is open water SI_3 –Mean water depth during the months of September – March	Leberg 2017b
Mottled Duck	$HSI = (SI_1 * SI_2 * SI_3 * SI_4)^{0.25}$	SI_1 - Dominant emergent vegetation & associated open water SI_2 – Proportion of emergent vegetation SI_3 –Mean annual water depth SI_4 – Mean salinity during the months of April – July	Leberg 2017c
Alligator	$HSI = (SI_1 * SI_2 * SI_3 * SI_4 * SI_5)^{0.2}$	SI_1 – Percent open water SI_2 – Water depth relative to marsh surface SI_3 – Dominant emergent vegetation & associated open water SI_4 – Percent edge SI_4 – Mean annual salinity	Waddle 2017
All environmental drivers are mean monthly values unless otherwise noted.			

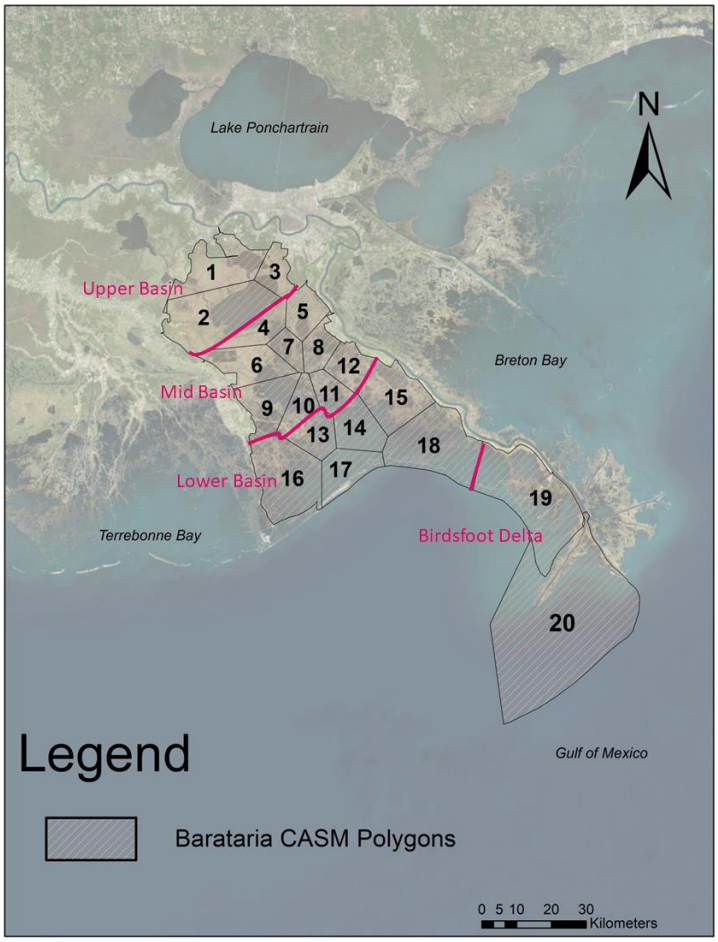

Figure M-1. **Barataria Basin Spatial Polygons Identified by Number and Grouped for the Upper (1-3), Mid (4-12), and Lower Basin (13-18) Regions of the Estuary with the Birdfoot Delta (19, 20).** Figure adapted from Carruthers et al. 2019, and previously developed for the purpose of the Comprehensive Aquatic Systems Model (CASM) modeling for the Mississippi River Delta Management Study. The polygons were aggregated into four geographic regions (that is, Upper Barataria Basin [3 polygons], Mid-Barataria Basin [9 polygons], Lower Barataria Basin [6 polygons], and Birdfoot Delta [2 polygons]) to further facilitate characterization of the HSI results.

The species-specific HSI results are presented in the EIS Chapter 4, Section 4.9 Terrestrial Wildlife and Habitat for the No Action Alternative, the Applicant's Preferred Alternative (75,000 cfs), and Other Alternatives. The difference in HSI values between the alternatives are presented in Table 4.9-2 in EIS Chapter 4, Section 4.9.

To provide readers with a clear demonstration of the modeled HSI results, HSI values by polygon and decadal year are tabularized in this appendix. The Applicant's Preferred Alternative, and the other alternatives, are described as differences in the species HSIs over time and space compared to the No Action Alternative. In this way, the absolute value of the calculated HSIs for the No Action Alternative (see Table M-2 through M-5) can be used with the changes in the HSI values for the operational alternatives to not only determine whether the habitat suitability is better or worse, but if

the increase or decrease in the HSI translates to a relatively impactful change. For example, if a species' HSI increases by 0.3, that could mean the HSI changed from 0.6 to 0.9. In this case, the habitat suitability for that species has increased to be near optimum. However, a 0.3 increase could also mean the HSI changed from 0.1 to 0.4. In this case, although the habitat has become more suitable for a species, it is still far from being considered optimal habitat.

2.0 NO ACTION ALTERNATIVE

The HSI results under the No Action Alternative for the species discussed in EIS Chapter 4, Section 4.9 Terrestrial Wildlife and Habitat are summarized with other relevant information regarding habitat changes impacting these species and the detailed species HSI results are presented in this appendix.

2.1 Gadwall

For gadwall, the modeled HSI scores under the No Action Alternative range from approximately 0.06 to 0.28 (out of a score from 0 to 1) in the first decade of analysis, with highest suitability scores concentrated in the upper and mid-basin polygons of the Barataria Basin and in the birdfoot delta. Over time, minimal increases and decreases in HSI scores are projected, with a maximum decrease of -0.097 and maximum increase of 0.074 (see Table M-2). The largest decrease in HSI score is in the area of the eastern mid-basin that is projected to have the highest loss of wetland acreage, which is likely the primary driver in the HSI reduction. The decreased likelihood of SAV presence in the open water portion of these polygons as sea-level rise contributes to increased salinity and increased exposure also likely contributes to the reduction in HSI scores throughout the basin. The limited increase in HSI score in the northern and western basin could be attributed to increasing water depths. However, the limited increase in some of the projected HSI scores is not substantial enough to appreciably increase the suitability of habitat for gadwall; no HSI scores exceed 0.30 at any point in the 50-year analysis period.

Table M-2
Gadwall HSI Results by Polygon and Decade under the No Action Alternative

	Simulated Decade				
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069
1	0.2511	0.2573	0.2748	0.2917	0.2989
2	0.1974	0.2042	0.2196	0.2396	0.2637
3	0.2396	0.2654	0.2884	0.2958	0.2451
4	0.1967	0.2114	0.2411	0.2689	0.2708
5	0.2665	0.2772	0.2796	0.2660	0.2139
6	0.2211	0.2353	0.2930	0.3029	0.2740
7	0.1841	0.1901	0.2189	0.2152	0.2030
8	0.2681	0.2605	0.2514	0.2371	0.2072
9	0.2211	0.2198	0.2171	0.2113	0.1894
10	0.2213	0.2190	0.2331	0.1899	0.1684
11	0.1980	0.2499	0.1923	0.1686	0.1251
12	0.2767	0.2699	0.2560	0.1787	0.1798
13	0.1533	0.1471	0.1536	0.1574	0.1480
14	0.0861	0.0881	0.0855	0.0747	0.0535
15	0.1975	0.2123	0.2183	0.1995	0.1545
16	0.0953	0.1644	0.0969	0.0899	0.1306
17	0.0784	0.0699	0.0673	0.0616	0.0563
18	0.0884	0.1490	0.1403	0.1233	0.1028
19	0.2049	0.1849	0.2069	0.1945	0.1770
20	0.0555	0.0580	0.0564	0.0530	0.0474

2.2 Mottled Duck

For mottled duck, the modeled HSI scores under the No Action Alternative range from approximately 0.87 to 0.17 (out of a score from 0 to 1) in the first decade of analysis, with the highest suitability scores found in the upper and mid-basin polygons. Over time, substantial decreases in HSI score are projected throughout the basin, with a maximum decrease of -0.57 in the upper basin and similarly large decreases (between -0.30 and -0.52) primarily in the polygons with the highest HSI scores at the beginning of the 50-year analysis period (see Table M-3). The largest decrease in HSI score is projected to occur in the area of the eastern upper and mid-basin that is also projected to have the highest loss of wetland acreage, which is likely the primary driver in the HSI reduction. Reductions throughout the basin can be attributed to not only marsh loss but also increased water depths due to marsh subsidence and sea-level rise, particularly in the last two decades of the analysis period. These substantial reductions in HSI score result in a majority of the basin having low habitat suitability (less than 0.3 HSI) in 2070; the only remaining high-quality habitat in 2070 would be limited to the northernmost basin.

Table M-3
Mottled Duck HSI Results by Polygon and Decade under the No Action Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.8385	0.8524	0.8843	0.9042	0.8807	0.6610
2	0.8007	0.8061	0.8133	0.8269	0.8359	0.7487
3	0.8617	0.8743	0.8730	0.8165	0.5413	0.3389
4	0.8045	0.8129	0.8331	0.8413	0.7073	0.3785
5	0.8705	0.8606	0.8446	0.6890	0.4849	0.2994
6	0.8316	0.8338	0.7598	0.7389	0.5506	0.3685
7	0.6825	0.6613	0.5696	0.5216	0.4546	0.3886
8	0.7164	0.6648	0.6020	0.5235	0.4266	0.3701
9	0.5912	0.5542	0.5074	0.4398	0.3383	0.2335
10	0.6436	0.6131	0.5802	0.4789	0.3353	0.2023
11	0.6038	0.5707	0.4521	0.3165	0.1999	0.0953
12	0.6966	0.6107	0.4996	0.3449	0.2353	0.1281
13	0.4821	0.4548	0.4289	0.3845	0.2848	0.1793
14	0.2222	0.2110	0.1877	0.1586	0.1051	0.0259
15	0.6734	0.6637	0.5756	0.4246	0.2755	0.1714
16	0.3778	0.4670	0.3255	0.2702	0.2305	0.1416
17	0.2650	0.2697	0.2332	0.2245	0.2026	0.1791
18	0.3328	0.3743	0.3235	0.2687	0.2133	0.1809
19	0.4866	0.5150	0.4178	0.3628	0.3117	0.2882
20	0.1656	0.1654	0.1269	0.1237	0.1139	0.0956

2.3 Green-winged Teal

For green-winged teal, the modeled HSI scores under the No Action Alternative range from approximately 0.83 to 0.15 (out of a score from 0 to 1) in the first decade of analysis, with the highest suitability scores concentrated in the upper and mid-basin polygons. Over time, substantial decreases in HSI score are projected throughout the basin, with a maximum decrease of -0.60 in the upper basin and similarly large decreases (between -0.32 and -0.59) primarily in the polygons with the highest HSI scores at the beginning of the 50-year analysis period (see Table M-4). Similar to the mottled duck, the largest decrease in HSI score is projected to occur in the area of the eastern mid-basin that is projected to have the highest loss of wetland acreage, which is likely the primary driver in the HSI reduction. Reductions throughout the basin can be attributed to not only marsh loss but also increased water depths due to marsh subsidence and sea-level rise, particularly in the last two decades of the analysis period. These substantial reductions in HSI score result in a majority of the basin having low habitat suitability (less than 0.3 HSI) by 2070; the only remaining high-quality habitat in 2070 would be limited to the northernmost basin.

Table M-4
Green-winged Teal HSI Results by Polygon and Decade under the No Action Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.7401	0.7499	0.7699	0.8021	0.7207	0.4626
2	0.7697	0.7702	0.7663	0.7570	0.7180	0.5875
3	0.8252	0.8229	0.7791	0.6800	0.3369	0.2326
4	0.7755	0.7778	0.7751	0.7424	0.5512	0.1983
5	0.8021	0.7673	0.6941	0.5376	0.3368	0.1937
6	0.7871	0.7778	0.6332	0.5744	0.3739	0.2330
7	0.6377	0.6235	0.4724	0.4137	0.3444	0.2691
8	0.5884	0.5605	0.4902	0.3989	0.3163	0.2729
9	0.5081	0.4623	0.3891	0.3099	0.2054	0.1596
10	0.5559	0.5369	0.4814	0.4280	0.2329	0.1232
11	0.6286	0.4635	0.3825	0.2170	0.1299	0.1066
12	0.5794	0.5062	0.3570	0.2609	0.1301	0.1149
13	0.4877	0.4557	0.3981	0.3247	0.1831	0.1040
14	0.1626	0.1422	0.1137	0.0826	0.0562	0.0477
15	0.7044	0.6779	0.5505	0.3386	0.1886	0.1356
16	0.4001	0.4663	0.2884	0.1923	0.1388	0.1026
17	0.2376	0.2258	0.2009	0.1740	0.1487	0.1179
18	0.2962	0.3301	0.2479	0.1902	0.1414	0.1225
19	0.3809	0.4061	0.2695	0.2281	0.1919	0.1688
20	0.1490	0.1246	0.1018	0.0912	0.0704	0.0529

2.4 Alligator

For alligator, the modeled HSI scores under the No Action Alternative range from 0.83 to 0.00 (out of a score from 0 to 1) in the first decade of analysis, with the highest suitability scores found in polygons with lower salinities, more marsh, and shallow water. With the exception of a portion of the birdfoot delta, the southernmost polygons in the Project area lack suitable habitat for the alligator, due to higher salinity and a lack of marsh and shallow water. Over time, substantial decreases in HSI score are projected throughout the basin, with a maximum decrease of -0.69 in the mid-basin and similarly large decreases (between -0.26 and -0.65) throughout the majority of the polygons (see Table M-5). Reductions throughout the basin can be attributed to not only marsh loss but also increased water depths and increased salinity, particularly in the last two decades of the analysis period. These substantial reductions in HSI score result in a majority of the basin having low habitat suitability (defined for this analysis as less than 0.3 HSI), and reduce the HSI score of several polygons to 0.0 by 2070; the only remaining habitat with an HSI score above 0.3 in 2070 would be limited to the upper basin.

Table M-5
Alligator HSI Results by Polygon and Decade under the No Action Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.7670	0.7395	0.7001	0.6502	0.5161	0.3722
2	0.6521	0.6542	0.6404	0.6184	0.5603	0.4475
3	0.7308	0.6917	0.6265	0.4798	0.3644	0.2912
4	0.7527	0.7231	0.6764	0.5918	0.4280	0.2445
5	0.7736	0.7075	0.5922	0.4772	0.3476	0.2729
6	0.7671	0.7341	0.7257	0.6146	0.4542	0.3335
7	0.6259	0.6075	0.5891	0.5142	0.4348	0.3418
8	0.8300	0.7688	0.6844	0.5788	0.4691	0.3941
9	0.5900	0.5567	0.4947	0.4071	0.3059	0.1921
10	0.6452	0.6020	0.5320	0.3440	0.2017	0.0000
11	0.4761	0.4883	0.3083	0.1698	0.0000	0.0000
12	0.6940	0.6099	0.4545	0.2397	0.1532	0.0000
13	0.4049	0.3815	0.3240	0.2427	0.1475	0.0000
14	0.1718	0.1647	0.1215	0.0699	0.0000	0.0000
15	0.5615	0.5474	0.4355	0.2795	0.1790	0.1187
16	0.0000	0.2890	0.0000	0.0000	0.1148	0.0707
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.2938	0.2496	0.1664	0.1270	0.1199
19	0.5397	0.4715	0.4208	0.3715	0.3184	0.2780
20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

3.0 APPLICANT'S PREFERRED ALTERNATIVE

Habitat suitability for four terrestrial species was assessed to determine if the Applicant's Preferred Alternative (75,000 cfs) would result in significant changes over space and time as compared to the No Action Alternative.

3.1 Gadwall

For gadwall, the modeled HSI under the Applicant's Preferred Alternative follows a similar pattern of increase and decrease throughout the basin over time as the No Action Alternative, with the exception of polygons located in the immediate outfall area of the Project. Polygons 8 and 12, which are projected to have some of the larger decreases in HSI score under the No Action Alternative, are projected to have small increases in HSI score under the Applicant's Preferred Alternative. This reversal of the HSI score trend as compared to the No Action Alternative is largely driven by the marsh maintenance and creation in these polygons under the Applicant's Preferred Alternative. However, in the polygons further from the immediate outfall area, the trend of slightly increasing and decreasing HSI scores seen under the No Action Alternative is also seen under the Applicant's Preferred Alternative. The range of HSI increase and decrease over the 50-year analysis period is also similar to the No Action Alternative in these

other polygons, with a maximum decrease of -0.057 and maximum increase of 0.069 (see Table M-6) by 2070. As with the No Action Alternative, the limited increase in Project HSI is not substantial enough to appreciably increase the suitability of habitat for gadwall; no HSI scores exceed 0.30 at any point in the 50-year analysis period.

Table M-6
Gadwall HSI Results by Polygon and Decade under the Applicant's Preferred Alternative

	Simulated Decades				
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069
1	0.2488	0.2639	0.2810	0.2963	0.2972
2	0.1965	0.2100	0.2275	0.2455	0.2659
3	0.2473	0.2765	0.2979	0.2906	0.2325
4	0.1992	0.2243	0.2569	0.2741	0.2663
5	0.2725	0.2803	0.2629	0.2572	0.2154
6	0.2242	0.2443	0.2644	0.2670	0.2345
7	0.1874	0.1936	0.1928	0.1897	0.1818
8	0.2329	0.2458	0.2545	0.2640	0.2660
9	0.2213	0.1955	0.1909	0.1855	0.1676
10	0.2190	0.1989	0.2106	0.2442	0.2171
11	0.2205	0.2290	0.2198	0.2344	0.1834
12	0.2407	0.2466	0.2486	0.2571	0.2511
13	0.1919	0.1878	0.1966	0.2014	0.1860
14	0.0873	0.1140	0.1097	0.0752	0.0541
15	0.2528	0.2722	0.2739	0.2519	0.1937
16	0.1677	0.1659	0.1719	0.1606	0.1319
17	0.0778	0.0691	0.0663	0.0608	0.0581
18	0.1558	0.1492	0.1380	0.1230	0.1013
19	0.2044	0.1847	0.2062	0.1936	0.1761
20	0.0553	0.0580	0.0554	0.0527	0.0471

3.2 Mottled Duck

For mottled duck, the modeled HSI under the Applicant's Preferred Alternative follows a similar pattern of decrease throughout the basin over time as the No Action Alternative, with the exception of polygons within the immediate outfall area of the Project. The HSI score in polygon 8 is projected to slightly increase over time (with an increase of approximately 0.05 over 50 years), and the HSI score in polygon 12 is projected have a much smaller reduction in HSI score as compared to the No Action Alternative (with a decrease of -0.19 over 50 years, compared to a decrease of -0.57 under the No Action Alternative). This maintenance of higher quality habitat in the Project outfall area is largely driven by the marsh maintenance and creation in these polygons under the Applicant's Preferred Alternative. Elsewhere in the basin, the scale of HSI score reduction is similar to or only slightly less than reductions projected under the No Action Alternative, with the largest HSI score reductions occurring primarily in

the polygons with the highest HSI scores at the beginning of the 50-year analysis period (see Table M-7). These reductions in HSI score result in high-quality habitat remaining only in the northernmost basin and in the Project outfall area in 2070.

Table M-7
Mottled Duck HSI Results by Polygon and Decade under the Applicant's Preferred Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.8441	0.8600	0.8928	0.9064	0.8738	0.6551
2	0.8025	0.8104	0.8180	0.8317	0.8338	0.7460
3	0.8688	0.8763	0.8710	0.8027	0.5244	0.3285
4	0.8080	0.8222	0.8396	0.8405	0.6975	0.4098
5	0.8710	0.8527	0.8222	0.6897	0.4935	0.3450
6	0.8334	0.8399	0.8406	0.8127	0.5972	0.4033
7	0.6821	0.6650	0.6301	0.5759	0.5063	0.4332
8	0.7749	0.8029	0.8233	0.8514	0.8407	0.8226
9	0.5911	0.6103	0.5589	0.4889	0.3804	0.2551
10	0.6439	0.6776	0.6455	0.5061	0.3591	0.2266
11	0.6984	0.6434	0.5488	0.3779	0.2580	0.1705
12	0.7444	0.7394	0.7353	0.7249	0.6653	0.5580
13	0.5043	0.4776	0.4519	0.4064	0.2982	0.1817
14	0.2207	0.2226	0.1971	0.1586	0.1075	0.0459
15	0.7069	0.6985	0.6055	0.4521	0.2984	0.1981
16	0.5026	0.4660	0.4253	0.3443	0.2367	0.1491
17	0.2890	0.2707	0.2461	0.2233	0.2007	0.1736
18	0.4124	0.3733	0.3212	0.2666	0.2106	0.1794
19	0.4869	0.5135	0.4145	0.3617	0.3067	0.2671
20	0.1637	0.1630	0.1296	0.1246	0.1138	0.0813

3.3 Green-winged Teal

For green-winged teal, the modeled HSI under the Applicant's Preferred Alternative follows a similar pattern of decrease throughout the basin over time as the No Action Alternative, with the exception of polygons within the immediate outfall area of the Project. The HSI score in polygon 8 is projected to slightly increase over time (with an increase of approximately 0.06 over 50 years), and the HSI score in polygon 12 is projected have a much smaller reduction in HSI score as compared to the No Action Alternative (with a decrease of -0.22 over 50 years, compared to a decrease of -0.46 under the No Action Alternative). This maintenance of higher quality habitat in the Project outfall area is largely driven by the marsh maintenance and creation in these polygons under the Applicant's Preferred Alternative. Elsewhere in the basin, the scale of HSI score reduction is similar to or only slightly less than reductions projected under the No Action Alternative, with the largest HSI score reductions occurring primarily in the polygons with the highest HSI scores at the beginning of the 50-year analysis period

(see Table M-8). These reductions in HSI score result in high-quality habitat remaining only in the northernmost basin and in the Project outfall area in 2070.

Table M-8
Green-winged Teal HSI Results by Polygon and Decade under the Applicant's Preferred Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.7480	0.7577	0.7825	0.8009	0.7131	0.4633
2	0.7699	0.7693	0.7654	0.7559	0.7116	0.5868
3	0.8264	0.8181	0.7464	0.6477	0.3249	0.2325
4	0.7758	0.7763	0.7669	0.7253	0.5234	0.2319
5	0.7943	0.7335	0.6271	0.5343	0.3511	0.2373
6	0.7868	0.7735	0.7307	0.6594	0.4289	0.2749
7	0.6344	0.6150	0.5480	0.4851	0.4001	0.3214
8	0.6748	0.6942	0.7145	0.7691	0.7512	0.7324
9	0.5064	0.5402	0.4495	0.3645	0.2497	0.1430
10	0.5523	0.6307	0.5570	0.3641	0.2023	0.1110
11	0.6346	0.5452	0.3895	0.2141	0.1370	0.1203
12	0.6520	0.6376	0.6225	0.6352	0.5567	0.4286
13	0.4211	0.3899	0.3396	0.2804	0.1552	0.1051
14	0.1626	0.1221	0.0930	0.0816	0.0562	0.0486
15	0.6058	0.5782	0.4620	0.2963	0.1711	0.1299
16	0.5048	0.4641	0.3662	0.2523	0.1423	0.1043
17	0.2359	0.2241	0.1953	0.1709	0.1443	0.1135
18	0.3742	0.3282	0.2447	0.1895	0.1389	0.1237
19	0.3809	0.4042	0.2653	0.2264	0.1865	0.1868
20	0.1493	0.1231	0.0993	0.0905	0.0699	0.0537

3.4 Alligator

For alligator, the modeled HSI under the Applicant's Preferred Alternative follows a similar pattern of decrease throughout the basin over time as the No Action Alternative, with the exception of polygons within the immediate outfall area of the Project. The HSI score in polygon 8 is projected to increase by approximately 0.09 in the first three decades, but then decrease by approximately the same amount by 2070. The HSI score in polygon 12 is projected have a much smaller reduction in HSI score as compared to the No Action Alternative (with a decrease of -0.16 over 50 years, compared to a decrease of -0.69 under the No Action Alternative). This maintenance of higher quality habitat in the Project outfall area is largely driven by the marsh maintenance and creation and reduced salinity in these polygons under the Applicant's Preferred Alternative. Elsewhere in the basin, the scale of HSI score reduction is similar to reductions projected under the No Action Alternative (see Table M-9) over the 50-year analysis period.

Table M-9
Alligator HSI Results by Polygon and Decade under the Applicant's Preferred Alternative

	Simulated Decades					
Polygons	2020-2029	2030-2039	2040-2049	2050-2059	2060-2069	2070
1	0.7631	0.7312	0.6931	0.6370	0.5011	0.3581
2	0.6595	0.6431	0.6276	0.6029	0.5420	0.4331
3	0.7212	0.6692	0.5926	0.4644	0.3610	0.2980
4	0.7504	0.7089	0.6573	0.5728	0.4118	0.2291
5	0.7641	0.6741	0.5530	0.4732	0.3505	0.2579
6	0.7748	0.7326	0.6567	0.5614	0.4255	0.3224
7	0.6447	0.6082	0.5463	0.4838	0.4039	0.3278
8	0.7583	0.7684	0.8124	0.8493	0.8295	0.7587
9	0.6117	0.5382	0.4788	0.4061	0.3098	0.2557
10	0.6736	0.5848	0.5243	0.4399	0.2669	0.0000
11	0.5639	0.4805	0.3741	0.2582	0.1435	0.1061
12	0.6444	0.6289	0.6164	0.5800	0.5001	0.4890
13	0.5381	0.5056	0.4456	0.3566	0.2124	0.0000
14	0.2143	0.2291	0.1796	0.1007	0.0000	0.0000
15	0.7567	0.7041	0.5707	0.3848	0.2425	0.1847
16	0.3972	0.3919	0.3244	0.2375	0.1541	0.0984
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.2983	0.3254	0.2830	0.2008	0.1314	0.1229
19	0.5390	0.4694	0.4209	0.3714	0.3135	0.2213
20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.0 OTHER ALTERNATIVES

Table 4.9-2 in EIS Chapter 4, Section 4.9 (Terrestrial Wildlife and Habitat) shows HSI scores for the four modeled species for six polygons by decadal year under the No Action Alternative, and the changes (+/-) in HSI scores for the 50,000 cfs Alternative, the Applicant's Preferred Alternative (75,000 cfs), and the 150,000 cfs Alternative. Polygons 5, 7, 8, 11, 12, and 15 were used to illustrate the changes in HSI scores from the No Action Alternative relative to the other operational alternatives. For gadwall, the HSI scores for the 50,000 cfs and 150,000 cfs alternatives showed similar trends in slight increases and decreases as the Applicant's Preferred Alternative. For mottled duck, green-winged teal, and alligator, the 50,000 cfs Alternative HSI scores were similar to the Applicant's Preferred Alternative, and the 150,000 cfs Alternative showed slightly greater increases in HSI score than the Applicant's Preferred Alternative.

5.0 REFERENCES

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