Functional Assessment Example Using CHAP

Combined Habitat Assessment Protocols (CHAP) produce an ecosystem evaluation using species, habitats, and functions. CHAP is a spatially explicit tool that ranks different management alternatives for a site based on habitat units. It was originally developed for mitigation banking but it is equally well suited for determining baseline conditions, evaluating habitat restoration options, and comparing conservation alternatives to baseline. It is based on the premise that higher functional redundancy is directly related to higher resiliency. CHAP evaluates hundreds of species, habitat components, and ecological functions concurrently to produce functional redundancy values as an indicator of the overall ecological integrity of the site. CHAP provides an explicit and repeatable approach to evaluating functional patterns of species and communities and the potential influences of management activities. Thus, CHAP can deliver an assessment of both impacts and enhancements that can be used in the planning and regulatory process.

CHAP maps an area or site by delineating polygons based on their habitat type and structural condition. State and regional peer-reviewed species maps are used to determine an initial list of vertebrate species. This list is reviewed by local state, federal, tribal, and other interested stakeholders for appropriateness. Species that have the potential to be present are then linked to relevant habitat types associated with the site. This produces a presence/absence species list for the site.

Field inventories are used to confirm the presence of habitat types on the site and determine structural conditions and key environmental correlates, which are fine-scale habitat elements, for each map polygon. Field inventories also include the percent species composition of invasive plants because of invasive species' ability to reduce diversity and exclude native species from an area.

Functional-per-acre value scores are calculated for each polygon based on existing habitat types and elements, called key environmental correlates that support species' ecological functions. Scores for polygons with invasive species are discounted based on the percent composition.

CHAP is designed to work with information that is readily available in western states in particular, although it can be adapted for other regions of the country. It focuses on terrestrial vertebrates for scoring, as range data for terrestrial vertebrate taxa are the most complete of all taxonomic groups. It does not require exhaustive site inventories of species composition or abundance, because restoration and mitigation banking is habitat-based. However, if abundance information is available, particularly for a species of particular management concern such as a listed species, it can be included in the CHAP framework. CHAP is also designed to err on the inclusion of ecological functions for a site that may not be present rather than omitting those that are likely present.

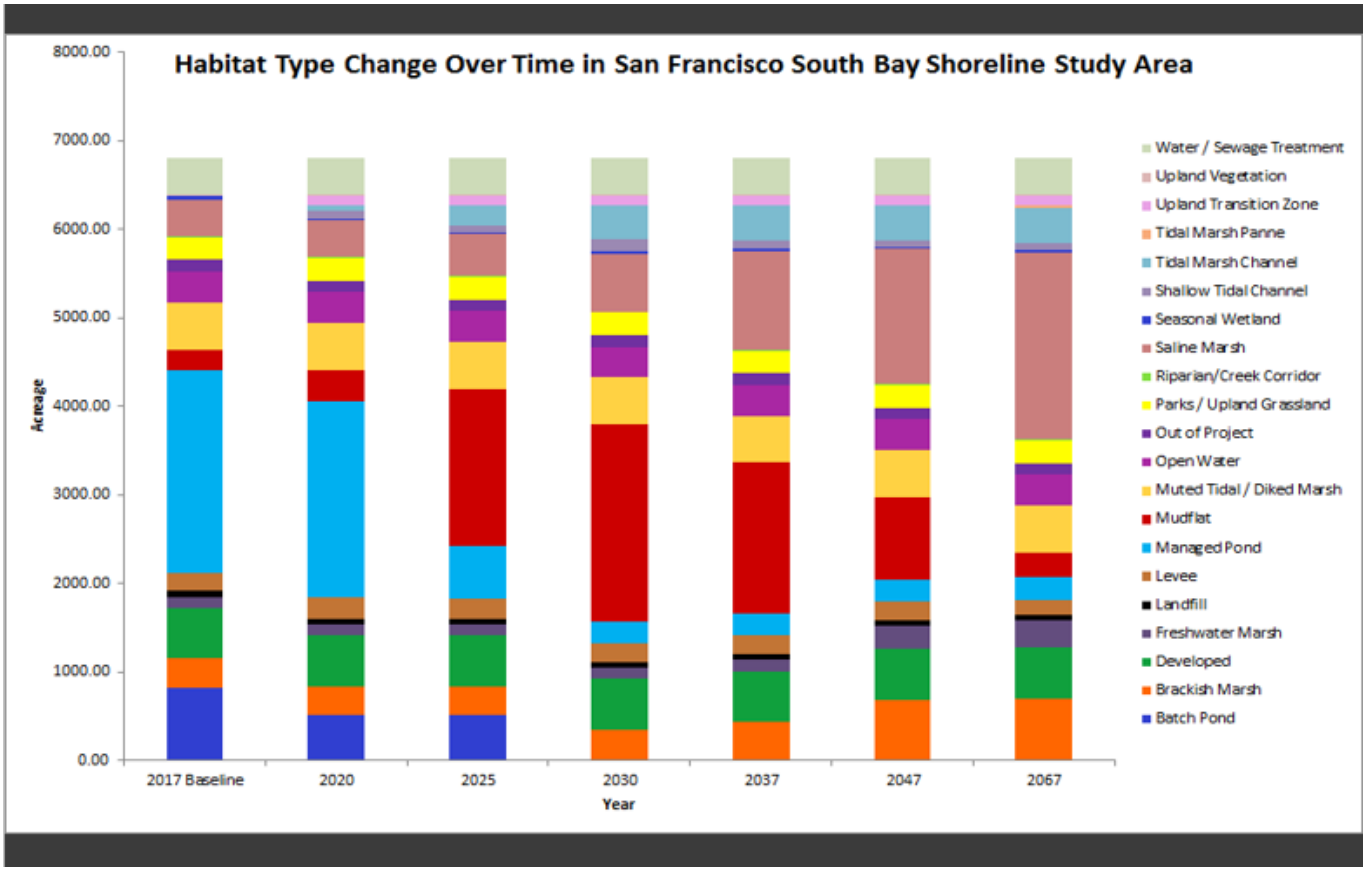
Currently, CHAP does not include nutrient cycling relationships or disease vector ecology relationships. It does not incorporate nonlinear relationships among species. It is not designed or intended to quantify the total frequency, rate or abundance of ecological functional activities such as the total number of seeds dispersed per unit time, or unit area summed overall individual organisms performing this function. In essence, CHAP is only good as our interpretation of the ecological

systems we live and work within. To follow are some functional assessment examples using the Corps of Engineers' South San Francisco Bay Shoreline Project. Additional Information can be found in:

Appendix B2 Environmental Benefits Analysis (CHAP) ~ Summary and Model Outputs

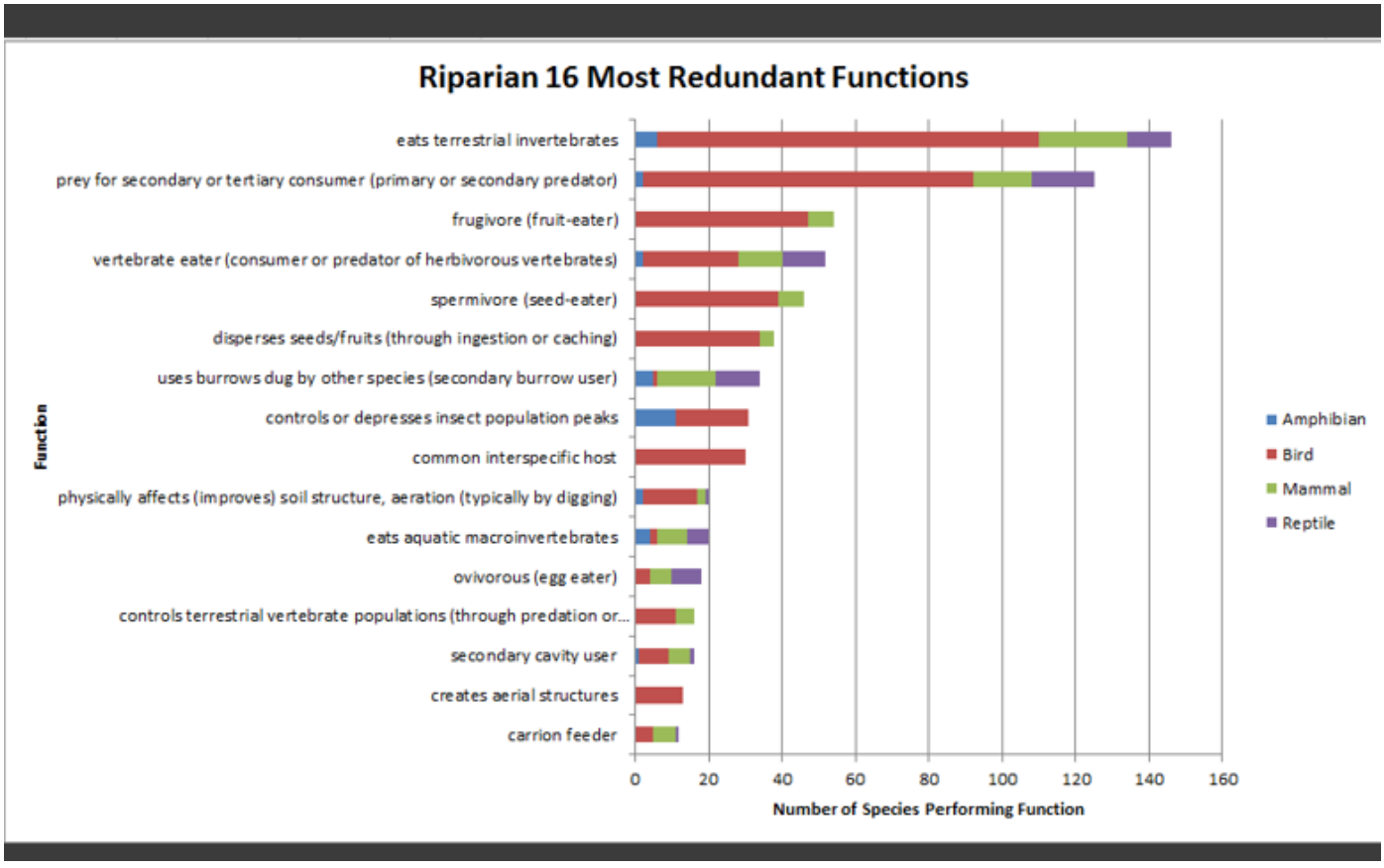
https://www.spn.usace.army.mil/Portals/68/docs/FOIA%20Hot%20Topic%20Docs/SSF%20Bay%20Shoreline%20Study/Appx%20B%20Plan%20Form%20and%20Environ%20Support.pdf

Change in Habitat Type Amounts Over 50 Years.

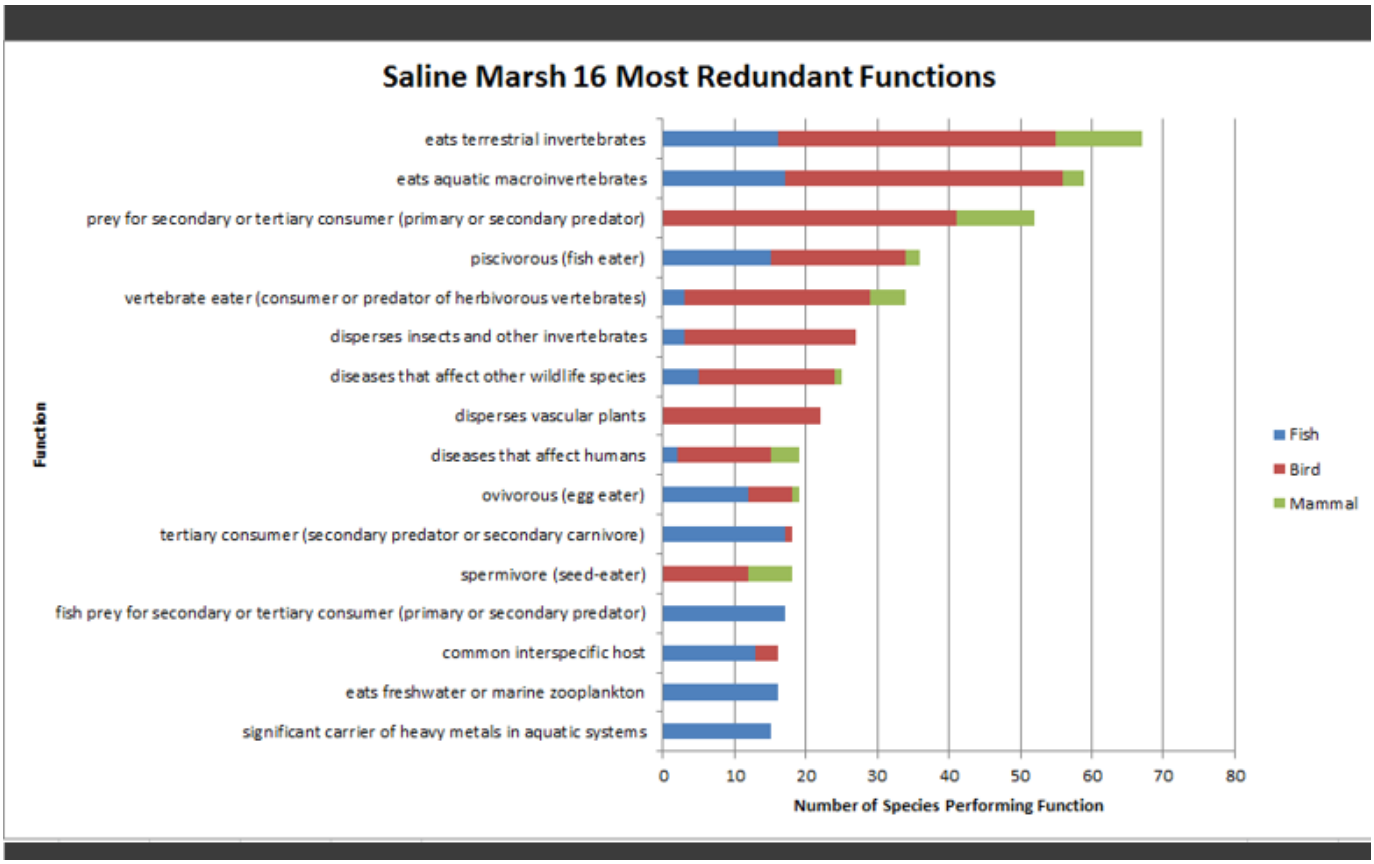


Functional Assessment Example Using CHAP

Most Redundant Functions Performed by Species in Riparian and Saline Marsh Habitats.



Functional Assessment Example Using CHAP



Functional Assessment Example Using CHAP

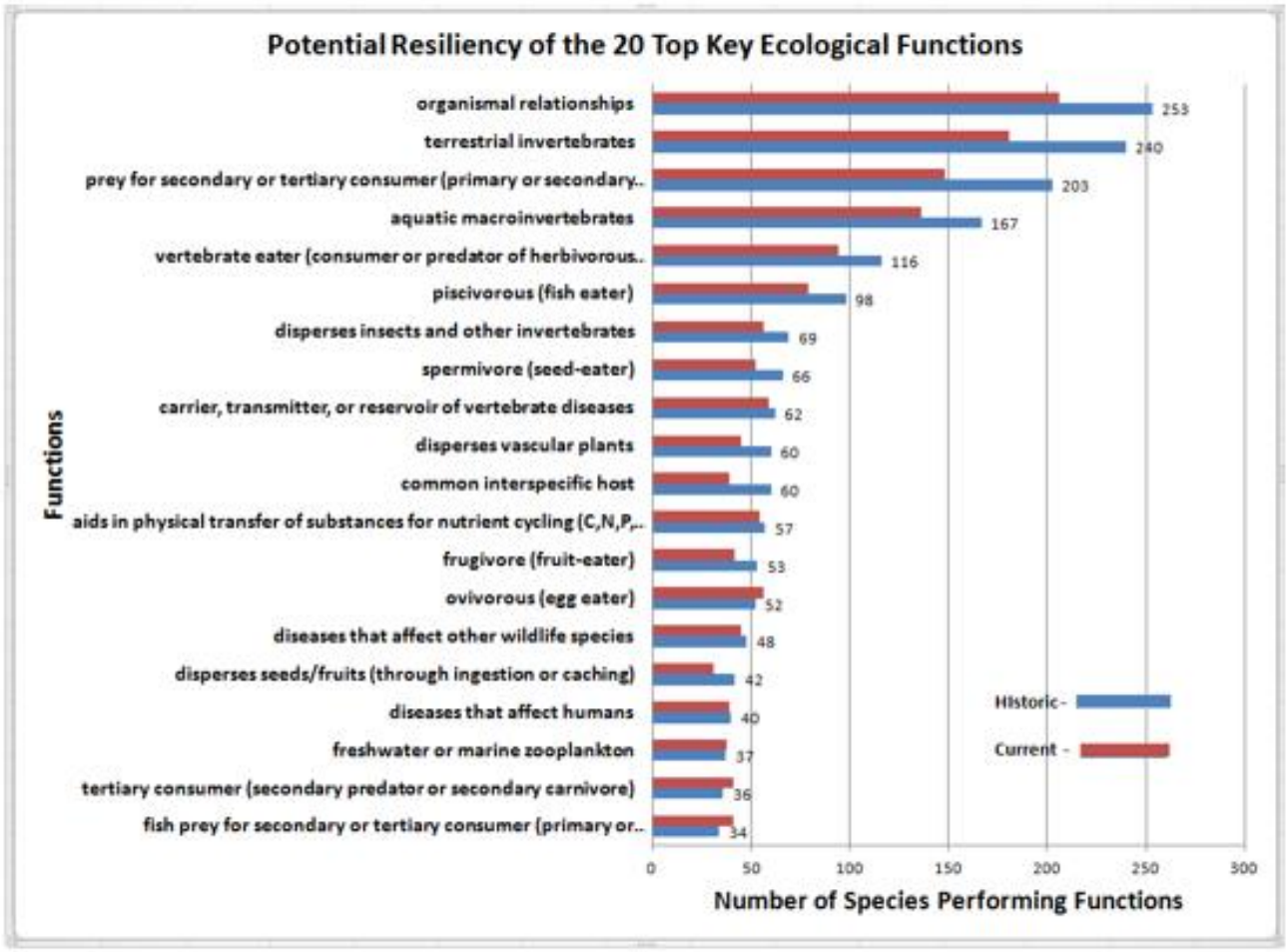
Comparison Between Historic and Current Baseline Conditions for the

Top 20 Key Ecological Functions.

Historic Habitat Value Acreages and Proportions											
Habitats	Deep Bay / Channel	Dune	Lagoon	Salt Pond	Sandy Beach	Shallow Bay / Channel	Tidal Flat	Tidal Marsh	Island	Shellflat	Shell Mmound
Acres	99,527.68	54.75	84.17	1,594.53	199.33	174,440.54	50,054.73	189,985.90	4,823.86	395.34	12.01
Proportions	0.19	0.00	0.00	0.00	0.00	0.33	0.10	0.36	0.01	0.00	0.00
											Total Acres**
											521,172.83

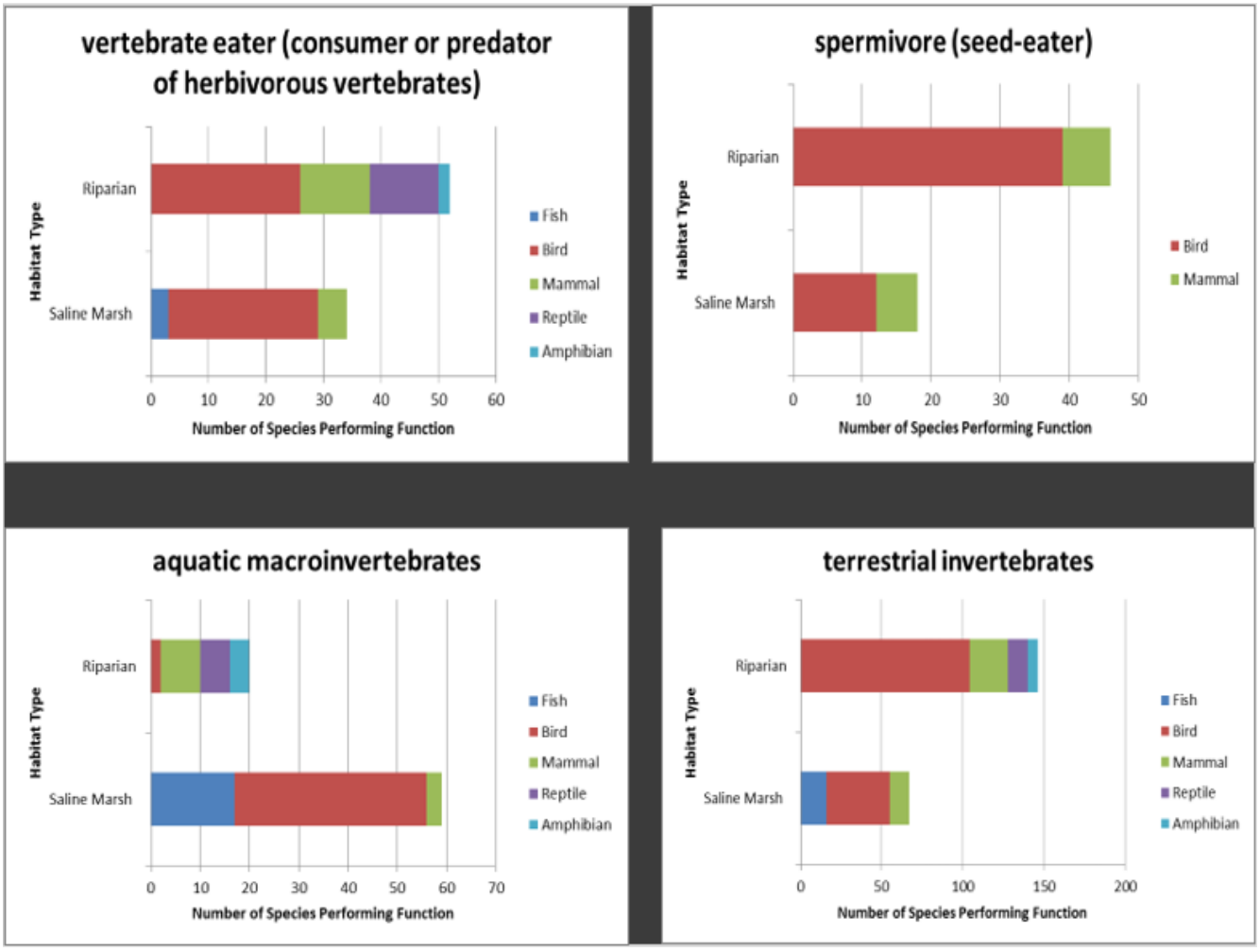
Modern Habiat Value Acreages and Proportions											
Habitats	Deep Bay / Channel	Dune	Lagoon	Salt Pond	Shellflat	Shallow Bay / Channel	Tidal Flat	Tidal Marsh	Developed	Agriculture	No Correlation
Acres	82,530.76	2,254.80	2,325.53	29,738.39	12.41	171,838.91	35,313.67	103,501.19	50,341.78	31,738.89	13,789.87
Proportions	0.16	0.00	0.00	0.06	0.00	0.33	0.07	0.20	0.10	0.06	0.03
											Total Acres
**Note: there is a 2,213 acre discrepancy between Historic to Modern timeframe because of a gap not mapped in the Historic map											523,386.19

Functional Assessment Example Using CHAP



Functional Assessment Example Using CHAP

Species Functional Trade Offs When Comparing Differences Between Riparian and Saline Marsh Habitats.



Functional Assessment Example Using CHAP

Seasonal Habitat Unit Outputs Using CHAP's Mean Functional Values

SITE_ID	Acres	Habitat Units
Spring		
SF_Pond A09	365.92	7,146.4
SF_Pond A10	249.81	4,626.3
SF_Pond A11	261.70	4,937.6
SF_Pond A12	308.20	5,662.5
SF_Pond A13	266.65	4,937.3
SF_Pond A14	336.92	6,563.2
SF_Pond A15	250.89	4,738.6
SF_Pond A16	242.06	4,778.4
SF_Pond A17	130.88	2,583.0
SF_Pond A18	826.87	16,222.3
Total	**3,240**	**62,195.6**

SITE_ID	Acres	Habitat Units
Fall		
SF_Pond A09	365.92	7,678.3
SF_Pond A10	249.81	4,948.0
SF_Pond A11	261.70	4,766.6
SF_Pond A12	308.20	5,757.0
SF_Pond A13	266.65	5,334.2
SF_Pond A14	336.92	6,635.9
SF_Pond A15	250.89	4,963.1
SF_Pond A16	242.06	4,555.4
SF_Pond A17	130.88	2,731.0
SF_Pond A18	826.87	16,002.5
Total	**3,240**	**63,372.0**

SITE_ID	Acres	Habitat Units
Summer		
SF_Pond A09	365.92	6,359.4
SF_Pond A10	249.81	4,196.7
SF_Pond A11	261.70	4,321.4
SF_Pond A12	308.20	5,123.7
SF_Pond A13	266.65	4,219.3
SF_Pond A14	336.92	5,756.5
SF_Pond A15	250.89	4,455.5
SF_Pond A16	242.06	4,587.8
SF_Pond A17	130.88	2,492.3
SF_Pond A18	826.87	14,127.7
Total	**3,240**	**55,640.3**

SITE_ID	Acres	Habitat Units
Winter		
SF_Pond A09	365.92	7,437.2
SF_Pond A10	249.81	4,795.1
SF_Pond A11	261.70	4,799.4
SF_Pond A12	308.20	6,061.6
SF_Pond A13	266.65	5,130.1
SF_Pond A14	336.92	6,769.1
SF_Pond A15	250.89	4,624.6
SF_Pond A16	242.06	4,881.8
SF_Pond A17	130.88	2,538.7
SF_Pond A18	826.87	16,543.9
Total	**3,240**	**63,581.5**

Functional Assessment Example Using CHAP

Baseline Condition Per-acre Values Using Bird Diversity with (weighted) and without (unweighted) Population Abundance

7a. Weighted per-acre values by pond (for abundance)

	Fall	Winter	Spring	Summer
Pond_A09	35.97	33.56	22.67	20.36
Pond_A10	30.66	21.97	21.47	18.50
Pond_A11	25.34	18.31	21.58	17.12
Pond_A12	20.25	20.36	15.77	16.17
Pond_A13	22.88	19.31	19.30	15.10
Pond_A14	24.60	26.92	25.00	19.88
Pond_A15	21.86	14.74	18.81	17.87
Pond_A16	23.41	27.50	22.69	19.69
Pond_A17	31.26	22.08	23.87	21.20

7b. Unweighted per-acre values by pond

	Fall	Winter	Spring	Summer
Pond_A09	12.91	12.06	11.51	9.45
Pond_A10	11.77	10.97	10.76	8.88
Pond_A11	10.29	10.17	10.86	8.59
Pond_A12	9.47	10.17	8.90	7.41
Pond_A13	10.79	9.75	9.54	6.61
Pond_A14	11.77	11.84	11.46	8.85
Pond_A15	10.40	8.74	9.36	8.55
Pond_A16	10.82	11.92	11.72	10.94
Pond_A17	12.80	11.16	11.71	11.03