Key Baylands Species

The Science Process has called for the project to begin by selecting species or populations of plants and animals that together could represent the overall complexity of the baylands natural community, and that could serve as indicators of local and regional baylands health. The expectation is that successful protection of the baylands ecosystem would depend, or be evidenced by, the successful conservation of these Key Species.

Each Focus Team has been asked to document the criteria it used to select Key Species. The criteria varied among the Teams, although similarities are apparent. For example, it is apparent that every Team focused almost exclusively on native species. The other criteria have been classified into a short series of standard kinds to describe the overall rationale of species selection. Based upon the criteria provided by the Focus Teams, nine standard kinds of criteria have been recognized, as follows.

Table 1: Standard Selection Criteria derived from the various criteria provided by the different Focus Teams (see Table 2 below).

Criterion Code	Narrative
1	Community Indicator: species is indicative of a community, guild, or assemblage of species.
2	Habitat Indicator: species is indicative of a local or regional major habitat type.
3	Sensitive Species: it is especially sensitive to environmental conditions, or has been recommended to be listed for protection.
4	Economic Indicator: it is an important commercial or recreational species.
5	Dominant Species: it strongly influences community structure as a major prey item, keystone species, pollinator, or ecological engineer.
6	Protected Species: it is listed or is a candidate to be listed for protection.
7	Pest Species: is an invasive species or a pest to people.
8	Practical Species: it is a convenient indicator because it is well-studied, or easily studied.
9	Support Species: it is especially important to the survival of a Protected Species.

These standard kinds of criteria represent an integration among the criteria provided by the Focus Teams. The integration was straightforward, given that the Teams tended to use similar criteria. However, the necessary subjectivity involved with interpretation of these criteria, and the fact that they are still being revised, suggests that more than one set of standard criteria could be developed. A complete list of the criteria that the Focus Teams have provided is presented below, based upon the most recent materials provided by each Focus Team.

Table 2: Classification of Selection Criteria. This table contains the selection criteria provided by the Focus Teams, and assigns the criteria to one or more of the 8 Standard Kinds (see Table 1 above).

Focus Team	Selection Criteria Provided by the Focus Teams	Standard Criteria
Terrestrial Invertebrates	Major-dominant prey item for a target taxon (key species) selected by other Focus Teams - usually occurs in large numbers within the project area.	5
	Breeds within the habitat type.	2
	Unique to the project area (could be a listed/protected taxon but does not have to be).	2
	Listed or candidate taxon (FE/SE, FT/ST, PE/PT, Extirpated).	6
	Known major pest taxon (historical and current significance, emphasizing native orientation).	8
Mammals, Amphibians and Reptiles	Threatened/endangered species (includes genetic diversity)	6
	Essential to threatened/endangered species	9
	Keystone for larger community	5
	Control Pest species	7
	Important for productivity, diversity or other ecological standard	5
	Dependent on wetland habitat	2
	Indicators of wetland health	1,2,3,8
Shorebirds and Waterfowl (based upon a subset of selected taxa)	Most abundant shorebird in S.F. Bay; more restricted to marine habitats than associated species.	2,5
	S.F. Bay holds second largest known wintering population in Pacific Flyway; more restricted to estuarine habitats than the other abundant shorebirds in S.F. Bay.	2,5
	S.F. Bay is the only known area with significant (hundreds) numbers in the Pacific Flyway.	2,5
	More than other abundant shorebirds, concentrates in fresh and brackish wetlands.	2
	Abundant species concentrated in salt ponds.	2
	Federally threatened species; one of five shorebird species that nests in S.F. Bay; northern most nesting area in Pacific Flyway.	6
	Most abundant species of a group of uncommon shorebirds in rocky intertidal habitat.	1,2
Other Birds	Large-scale salt marsh needs; an important indicator species.	2
	Utilizes large foraging area; could be fisheries indicator.	1,5
	Utilizes shallow ponded water habitat.	2
	Most clearly tied to salt pond water.	2
	Utilizes higher parts of the marsh and extends into riparian areas; might represent other species.	1,2
	Transition species and indicator of edge; utilizes tidal marsh and upland areas; utilizes seasonal wetlands.	2
	Utilizes salt ponds; sensitive to contaminants and disturbance.	2,3
	Utilizes breakwater areas for roosting sites; restricted to Central Bay; sensitive to contaminants and disturbance.	2,3
	Utilizes freshwater marshes.	2

	Utilizes seasonal wetlands.	2
	Utilizes a variety of areas for nesting and foraging.	2
	Utilizes transitional areas and adjacent uplands.	2
	Utilizes upland areas.	2
	Utilizes remnant prairie areas; utilizes diked marshes; utilizes upland areas; might represent other species.	1,2
	Utilizes riparian corridors.	2
	Deserve attention because of their impact upon other species.	5,9
	An indicator species for waterfowl and shorebird populations.	1
	Occurs throughout the Bay Area and goes inland.	2
	Utilizes seasonal wetlands and transitional areas.	2
Fish	Currently has some protected status due to concern over low population numbers, loss or degradation of habitat, etc. (e.g., Federal or State-listed Threatened or Endangered Species).	6
	Is a principal element (e.g., prey item) in the food web or webs of the estuarine ecosystem.	5,9
	Inhabits ecotones or moves across habitat-type edges in such a way as to establish an ecological link between them.	2
	Possesses recognized commercial or recreational values.	4
	Is considered an "indicator" species for a particular habitat type.	2
	Is a fish or invertebrate species known to be native to the San Francisco Estuary.	7
	Is, or has been, relatively abundant in one or more of the sub-regions of the Estuary and Baylands (e.g., Suisun Bay).	1,2
	There is believed to be sufficient information available about this species or group to aid the Focus Team in establishing regional habitat goals.	8
	Represents or is an "indicator" species for a particular taxon, guild, life history characteristic, or some other feature of the ecosystem deemed to have significant value.	1
Plants	Dominant species of a vegetation community.	2,5
	Sensitive species (including rare, threatened, or endangered species).	3,6

Thus far, the five Focus Teams have selected 206 Key Species, representing the trophic structure within each of the major components of the baylands natural community, and representing the full range of the dominant estuarine gradients of salinity and tidal elevation.

It should be acknowledged that the list of Key Species is subject to change. The Focus Teams continue to exercise the scientific prerogative to add or delete species from the Key Species List. As the Teams advance into the final steps of the Science Process adopted by the RMG, the Key Species List will probably be refined. Some Teams have expressed the expectation that they may shorten their lists of Key Species, or that they will combine some species into functional guilds, or that they will augment their lists with descriptions of interspecific relationships that are indicative of healthy baylands.

As the Focus Teams advance through the Science Process, they will be providing additional materials that will enable the RMG to discuss the extent to which the Key Species are ecologically inter-related, and to what extent other species, including non-native species, might also be addressed by the goals project.

Table 3: Key Species List, with standard kinds of selection criteria for each Key Species

.PLANTS

Dunaliella salina	2
Enteromorpha intestinalis	2
Fucus spp.	2
Crytosiphonia gigartina	2
Pteridium aquilinum	1,2
Scirpus acutus	1,2,5
Scirpus californicus	1,2,5
Scirpus americanus	2
Scirpus maritimus	2
Typha latifolia	1,2,5
Typha angustifolia	1,2
Carex barbarae	2
Juncus xiphioides	2
Juncus patens	2
Juncus balticus	2
Eleocharis parvula	3,6
Eleocharis macrostachya	2
Spartina foliosa	1,2,5
Distichlis spicata	2
Nasella pulchra	1,2
Nassella lepida	1,2
Leymus triticoides	1,2
Danthonia californica	1,2
Calamagrostis nutkaensis	1,2
Deschampsia cespitosa	1,2
Festuca rubra	1,2
Festuca californica	1,2
Streptanthus niger	3,6
Grindelia stricta var. angustifolia	2
Cuscuta salina	2
Salsola soda	2
Atriplex triangularis	1,2
Atriplex semibaccata	1,2
Cotula coronopifolia	2
Sanicula maritima	2
Suaeda californica	1,2
Baccharis pilularis	2
Bassia hyssopifolia	2
Salicornia virginica	1,2
Salicornia subterminalis	3,6
Hemizonia congesta	1,2
Hemizonia parryi ssp. ongdonii	3,6
Heteromeles arbutifolia	2
Artemisia californica	2
Cirsium hydrophylum var. hydrophylum	3,6
Aster lentus	3,6
Potentilla anserina	2
Rubus ursinus	1,2
Rosa californica	2
Hotodiscus discolor	2
Mesembryanthemu nodiflorum	2
Brassica nigra	2
Lepidium latifolium	2,8
Rhaphanus sativus	2
Tetragonia tetragonioides	2
Hibiscus lasiocarpus	3,6
Lathyrus jepsonii	3,6
Lilaeopsis masonii	3,6
Limnosella subulata	3,6
Sagittaria sanfordii	3,6
Cordylanthus maritimus ssp. palustris	3,6
Cordylanthus mollis spp. mollis	3,6
Fritillaria lilacea	3,6
Castilleja affinissp neglecta	3,6
Ceanothus thyrisflorus	1,2
Arctostaphylos hookeri	3,6
Rhamnus californicus	1,2
Toxicodendron diversilobum	1,2
Legenere limosa	1,2,3
Blennosperma bakeri	1,2,3
Limnanthes douglasii	1,2,3
Lasthenia conjugens	1,2,3
Downingia pusilla	1,2,3
Psilocarphus brevissimus	1,2
Psilocarphus brevissimus ssp. multiflorus	1,2,3
Plagiobothrys stipitatus	1,2,3
Erynigium aristulatum	1,2
Eryngium racemosum	1,2,3
Salix lasiolepis	1,2,5
Salix laevigata	1,2,5
Populus fremontii	1,2,5
Quercus agrifolia	1,2,5
Quercus lobata	1,2,5
Umbelluaria californica	1,2,5
Arbutus menziesii	1,2,5
Aesculus californicus	1,2,5

INVERTEBRATES

Artemia salina	2,5
Lepidurus packardi	2,3,6
Neomysis relica	2,5,9
Crangon franciscorum	2,4,5,8
Crangon migrcauda	5,8
Cancer magister	2,4,5,8,9
Cancer productus	2,4,5,8
Cancer antennarius	2,4,5,8
Hemigrapsus oregonensis	1,4,5,8
Amphipoda spp.	1,2,5,8
Mya arenaria	2,5,8
Tapes japonica	2,4,5,8
Arcuatula demissum	2,4,5
Cerithidea californica	2,5,7
Culex tarsalis	2,7,8
Culiseta inornata	2,7,8
Aedes dorsalis	2,7,8
Aedes squamiger	2,7,8
Aedes washinol	2
Ephydra cinerea	2,5
Ephydra millbrae	2,5,9
Ephydra riparia	2
Lipochaeta slossonae	5
Tanypus grodhausi	2
Eristalinus aenus	5
Trichocorixa reticulata	2,5
Cixius praecox	2,5
Prokelisia marginata	2
Brephidium exilis	2
Perizoma custodiata	3
Compsocryptus jamiesoni	2
Erynephala morosa	3
Tanarthrus occidentalis	2
Cicindelia oregonia	2
Cicindelia senilis senilis	2
Octhebius rectus	2
Enochrus diffusus	2,5

FISHES

Leopard Shark	1,4,5,8
Bat Ray	2,5,8
White Sturgeon	1,2,4,5,8
Pacific Herring	2,4,5,8

Northern Anchovy 2,4,5,8
Splittail 2,4,5,6,8
Delta Smelt 2,5,6,8

FISHES (continued)
Longfin Smelt 5,8
Steelhead Trout 2,4,5,8
Chinook salmon 2,4,5,6,8
Plainfin midshipman 2,4,5,8
Rainwater Killifish 2,8
Topsmelt 2,4,5,8
Jacksmelt 4,5,8
Threespine Stickleback 5,8
Brown Rockfish 2,4,5,8
Prickly Sculpin 5,8
Pacific Staghorn Sculpin 4,5,8
Striped Bass 2,4,5,8
White Croaker 2,4,5,8
Shiner Perch 2,4,5,8
Tule Perch 2,5,8
Arrow Goby 1,2,5,8
Longjaw Mudsucker 2,4,5,8
Bay Goby 5,8
Calif. Halibut 2,4,5,8
Starry Flounder 2,4,5,8

AMPHIBIANS
Calif. Tiger Salamander 1,3,6
Calif. Red-legged Frog 1,3,6
California Toad 2
Pacific Treefrog 2

REPTILES
San Francisco Gartcr Snake 3,6
Western Pond Turtle 3,6
California Alligator Lizard 2
Coast Garter Snake 2
Central Coast Garter Snake 2

WATERFOWL
Canvasback 1,2,4?
Mallard 1,2,4?
Northern Pintail 1,2,4?
Ruddy Duck 1,2?
Surf Scoter 1,2?
Tule White-fronted Goose 1,2?
Black Turnstone 1,2
Red Knot 1,2
Wilson's Phalarope 1,2
Long-billed Dowitcher 1,2
Marbled Godwit 2
Snowy Plover 2,3,6
Western Sandpiper 2,5

OTHER BIRDS
Eared Grebe 2
Western/Clark's Grebe 2
American White Pelican 2,3
Brown Pelican 2,3
Double-crested Cormorant 1
Snowy Egret 2
Black-crowned Night Heron 2
Northern Harrier 2
Peregrine Falcon 1,2,3,6
Clapper Rail 2,3,6
Black Rail 2,3,6
Common Moorhen 2
California Gull 5
Western Gull 5
Caspian Tern 1,2
Burrowing Owl 2,3
Belted Kingfisher 2
Horned Lark 2

Yellow Warbler 2
Common Yellowthroat 2
Savannah Sparrow 2
Song Sparrow 2
Red-winged Blackbird 1,2
Western Meadowlark 2
Barn Swallow 2

MAMMALS
SM Harvest Mouse 2,3,5,6
California Vole 5,6
SMWandering Shrew 2,3,5,6
Suisun Shrew 2,3,5,6
Ornate Shrew 5
River Otter 2,3
Sea Otter 3,6
Harbor Seal 2,3
California Sea Lion 2,3

Based upon the assignment of standard criteria (Table 1) to the Key Species (Table 2), the following trends in the use of the standard criteria are apparent (see Table 3 below). Most species were selected because they are either indicators of one or more wetlands habitats (39%), or because they represent other species or dominate a community or assemblage (28% combined). This suggests that the Wetlands Goals Project has an emphasis on habitat, although community conservation is a major objective.

Table 3: Frequency of use of Standard Selection Criteria derived from the various criteria provided by the different Focus Teams.

Criterion Code	Narrative	Frequency of Use (%)
1	Community Indicator: species is indicative of a community, guild, or assemblage of species.	14
2	Habitat Indicator: species is indicative of a local or regional major habitat type.	39
3	Sensitive Species: it is especially sensitive to environmental conditions, or has been recommended to be listed for protection.	10
4	Economic Indicator: it is an important commercial or recreational species.	6
5	Dominant Species: it strongly influences community structure as a major prey item, keystone species, pollinator, or ecological engineer.	14
6	Protected Species: it is listed or is a candidate to be listed for protection.	6
7	Pest Species: is an invasive species or a pest to people.	1
8	Practical Species: it is a convenient indicator because it is well-studied, or easily studied.	9
9	Support Species: it is especially important to the survival of a Protected Species.	1