

Measures of Change Report Outline
Ballona Wetland Restoration Feasibility
December 6, 2007

1 Introduction

This document is an outline of the Measures of Change report for the Ballona Wetlands Restoration Plan. The report will characterize the differences between the five alternatives developed by the Project Management Team (PMT). The aim is to provide a consistent set of information for each alternative using measures of changes developed from the project's Goals and Objectives. The PMT will use this information to screen out infeasible or undesirable alternatives from advancing to the EIS/EIR process. While the report is structured around five alternatives, they will be discussed at the area level when appropriate, allowing the preferred alternative(s) to be developed from a combination of alternatives from different areas.

The structure of the Measures of Change report is given in the table below:

Chapter	
1	Process to develop alternatives
2	Description of five alternatives
3	Process to develop measures of change
4	Measures of change
4.1	Alternative 1
4.2	Alternative 2
4.3	Alternative 3
4.4	Alternative 4
4.5	Alternative 5
5	Next steps
Appendix	
1	Ballona Wetlands Restoration Plan Goals and Objectives
2	Habitat Descriptions for Restoration Alternatives
3	Hydrodynamic Modeling

The present document outlines Chapter 4 of the report, the core chapter describing the measures of change. Chapter 4 is divided into five sections, sections 4.1 to 4.5; one for each alternative. The information used will be derived from existing sources, in particular the Existing Conditions Report, and from hydrodynamic modeling being undertaken as part of the present study. Quantifiable measures will be used where possible (e.g. acreages of habitat); measures that cannot be quantified will require a more subjective assessment. Similarly, the degree of certainty will vary between different measures; the level of uncertainty will be indicated for each measure in the report.

Matrices will be used to supplement the text, allowing the reader to compare the measures of change between the alternatives. However, the PMT does not anticipate a scoring system and no value judgments will be made in the report.

For some alternatives, it may take several years for the final habitat to be established and a timeline of interim habitat will be indicated. In evaluating the different alternatives, it will be assumed that the site will be managed to achieve the best quality habitat that is possible at any given time. There will also be discussion of phasing of each of the alternatives and the dependency of each phase on the successful implementation of prior phases.

2 Measures of Change

The following is an outline of an example Measures of Change sections in Chapter 4. The structure of the section is based on the Goals and Objectives of the project previously identified by the PMT. Each alternative will be assessed in the same way using the same structure.

2.1 Goal 1: Ecosystem Restoration

Restore, enhance, and create estuarine habitat and processes in the Ballona Ecosystem to support a natural range of habitat and functions, especially as related to estuarine dependent plants and animals.

2.1.1 Sub-goal 1: Habitat

Preserve, restore, enhance, and create a variety of functional wetland, estuarine and other habitats representative of the Ballona Ecosystem.

Objectives:

- a. Support existing and future habitat based on identified regional needs*
- b. Create spatial connectivity within the site*
- c. Create appropriate edge habitat and connectivity to adjacent areas of the Ballona Ecosystem*
- d. Provide landscape-level function at a regional scale addressing habitat/landscape patches, corridors, connectivity and mosaics landscapes. Provide habitat for migratory birds, fish nurseries, etc.*

Measures of Change:

1. New habitats and acreages (by sub-area) – using Habitat Descriptions for Restoration Alternatives (Appendix 3 of the report) – *quantitative*
2. Acres of tidal habitat and degree of inundation – *quantitative*

3. Quality of proposed habitats – a qualitative discussion, focusing on its functionality – comparing proposed with existing and with ‘high quality’ habitat. In particular:
 - a. Regional “rarity” of existing habitats – *qualitative, regional data from SAC*
 - b. Number of patches of each existing habitat - *quantitative*
 - c. Range of habitat patch areas - *quantitative*
 - d. Connectivity between habitat patches (connected by channels, transition areas, dissection by roads, channels, levees etc) – *qualitative*
 - e. Adjacency of complementary habitats - *qualitative*
 - f. Relationship to adjacent developed areas - *qualitative*
 - g. Transition to upland – *qualitative*

4. Local connectivity with larger Ballona ecosystem (such as Del Rey Lagoon, Grand Canal, El Segundo Dunes, Baldwin Hills etc for fish, birds, butterflies etc)
 - a. Connectivity to greater Ballona ecosystem (connected by channels, flyways, dissection by roads, channels, levees etc) - *qualitative*
 - b. Complementary habitats of the greater system - *qualitative*

5. Regional Connectivity to Southern Californian wetlands– how does it fit into the regional picture? – how much is the alternative a benefit and a complement to the region?
 - a. Complements existing regional habitats (e.g. Mugu, Newport) - *qualitative*
 - b. Supports migratory species- *qualitative*

6. Impacts on existing habitat
 - a. Type, acres, rareness of habitats lost - *quantitative*
 - b. Improvements to existing habitat – *qualitative*
 - i. Upland habitats
 - ii. Wetland habitats
 - c. Ease of replacing lost habitat? - *qualitative*
 - d. Opportunities to replace locally? - *qualitative*

2.1.2 Sub-goal 2. Biodiversity:

Preserve and increase the native biodiversity of the Ballona Ecosystem. Identify and protect multiple levels of diversity (e.g. species, habitats, biogeographic provinces and trophic structure).

Objectives:

- a) *Increase diversity and populations of rare and endangered plant and animal species.*
- b) *Establish and maintain diverse native plant communities, including vascular plants, algae, and diatoms.*

- c) *Support a diverse complement of species including: birds, fish, amphibians, reptiles, native aquatic and terrestrial invertebrates.*

Measures of Change:

Short qualitative description of what the habitat changes mean for each group – e.g more foraging area, less roosting area etc. foraging, nesting, breeding, migration, residence, pollinators etc. Plus matrix showing +ve and –ve impacts on biodiversity, capacity and potential to support. All +ve and –ve relative to existing conditions.

1. Biodiversity – functional groups - *qualitative*
 - a. Plants
 - i. nonvascular plants (plankton, algae, fungi)
 - ii. vascular plants (annuals, perennials)
 - b. Animals
 - i. terrestrial invertebrates (insect pollinators)
 - ii. terrestrial vertebrates (birds, herpetofauna, mammals)
 - iii. aquatic invertebrates (infauna, epifauna)
 - iv. aquatic vertebrates (fish)

2. Capacity to support sustainable populations(s) – based on habitat features (patch size, connectivity, associated habitats (roosting, foraging, etc) - *qualitative*
 - a. Plants
 - i. nonvascular plants
 - ii. vascular plants
 - b. Animals
 - i. terrestrial invertebrates
 - ii. terrestrial vertebrates
 - iii. aquatic invertebrates
 - iv. aquatic vertebrates

2.1.3 Sub-goal 3. Physical/Chemical Processes:

Maintain and establish physical and chemical processes consistent with the restoration goals.

Objectives:

- a) *Improve tidal circulation and enlarge the amount of area that is tidally inundated.*
- b) *Manage surface and subsurface freshwater inflows to support desired on-site habitats.*
- c) *Establish and maintain a sediment transport regime that supports the desired wetland functions.*
- d) *Re-establish a dynamic range of hydrologic conditions (intensity and duration) to support natural ecosystem processes.*

- e) *Establish and maintain biogeochemical processes representative of natural wetland ecosystems.*

Measures of Change:

1. Tidal circulation
 - a. Tidal regime to support desired ecological processes (muted, fully tidal) - quantitative
 - b. Volume of tidal prism – quantitative
 - c. Connection to tidal sources - breaches or culverts/gates or levee removal - quantitative
 - d. Channel network properties – length, width, depth, sinuosity, etc – compared with natural system - quantitative
 - e. Flow rates, residence time, excursion length within Project area - quantitative

2. Properties of tidal source water (MDR, Ballona Creek)
 - a. Volume of water available within the wetland – some alternatives may be restricted by connection - *quantitative*
 - b. Salinity of source water - *quantitative*
 - c. Pollutant load of source water - *quantitative*
 - d. Flow rates, residence time, excursion length of source area outside of Project area (e.g. Basin H) - *quantitative*

3. Stormwater and freshwater inputs
 - a. Volume, timing, duration of stormwater (Wet/Dry years) - *quantitative*
 - b. Volume, timing, duration annual freshwater inflows (Wet/Dry years) - *quantitative*
 - c. Water quality of freshwater and stormwater - *quantitative*
 - d. Potential for treatment of stormwater by treatment wetlands - *qualitative*
 - e. Potential for treatment by creek flow by wetlands (e.g. reduction of bacteria) - *qualitative*

4. Biogeochemical cycling - *qualitative*

5. Potential new bacteria sources – depends on likely bird use, residence time, depth etc – focusing on natural sources exempt from TMDL – *qualitative*

6. Sediment quality
 - a. Location of contaminated soils in relation to grading - - *qualitative*
 - b. Mobilization of contaminants by hydraulic action - *quantitative*
 - c. Volume and quality of sediment to be graded during construction- *quantitative*
 - d. Volume and quality of sediment to be eroded by scour processes following construction - *quantitative*

7. Sediment supply

- a. Demand for sediment from wetlands as they reach equilibrium elevations - *quantitative*
 - b. Impact of type of connection on supply – ability of sediment to pass through breaches versus culverts/gates versus levee removal - *quantitative*
 - c. Location of connections in relation to grading (MDR vs Ballona Creek) - *qualitative*
 - d. Sediment quality (pollutants, grain size etc) - *quantitative*
8. Flood Management
- a. Ability to maintain existing flood protection - *quantitative*
 - b. Additional flood protection provided by increased flood storage, damping of elevations by wetlands - *quantitative*
 - c. Additional flood protection required along perimeter and adjacent to roads - *quantitative*

2.1.4 Sub-goal 4. Sustainability:

Facilitate the conservation and restoration of natural resources in a manner that maintains and improves the ecological integrity, function, diversity and productivity for future generations.

Objectives:

- a) *Accommodate potential sea level rise for transitional habitat provide appropriate elevations to accommodate habitat shifts*
- b) *Use self-sustaining, low maintenance systems where possible*
- c) *Minimize future adverse effects of nuisance species, including non-native, invasive species, feral predators and disease vectors.*
- d) *Protect the wetlands from adverse impacts caused by contaminants in influent water or sediment.*
- e) *Plan for the longterm management of the site*

Measures of Change

- 1. Sensitivity to climate change –uncertainty due to large range in climate change scenarios - *qualitative*
 - a. Ability to accommodate changing climate
 - i. less freshwater input (amount and timing) - *qualitative*
 - b. Long term demand for sediment with rising sea level - *quantitative*
 - c. Room to allow transgression of habitats with rising sea level - *quantitative*
 - d. Future erosion/accretion of channels with rising sea levels - *quantitative*
 - e. Sensitivity of flood protection to rising sea levels - *quantitative*
- 2. Resilience to events – uncertainty in timing of these events - *qualitative*
 - a. Resilience to extreme events such as flood, drought, el Nino - *qualitative*

- b. Ability to respond to contaminant inflows – use of tide gates etc - *qualitative*
 - c. Ability to respond to vectors – ability to drain wetlands, movement of water - *qualitative*
3. Invasive species and predators
 - a. Invasive species impact on biodiversity - *qualitative*
 - b. Predator impacts – access for predators - *qualitative*
 4. Degree self sustaining/low maintenance
 - a. List major management needs (routine maintenance and maintenance after events)

2.2 Goal 2: Social and Socioeconomic Values:

Create opportunities for aesthetic, cultural, recreation, research and educational use of the Ballona Ecosystem that are compatible with the environmentally sensitive resources of the area.

2.2.1 Sub-goal 1. Public Access:

Design enhanced access to and within the Ballona Ecosystem consistent with ecosystem preservation and restoration values in a safe, consistent, coherent and functional manner.

Objectives:

- a. *Develop gateway entrances that attract, welcome and inform ecosystem visitors.*
- b. *Phase-out inappropriate or uncontrolled access points.*
- c. *Create public outreach, education and interpretive opportunities for visitors, organizations and institutions.*
- d. *Develop appropriate signage that enhances visitor understanding of wetland restoration efforts; increase public awareness of local biological and physical resources present within Ballona Wetlands.*
- e. *Develop overlooks and connections accessible to pedestrian, bike and bus users and provide the appropriate signage to facilitate such access.*
- f. *Provide potential opportunities for the public to participate in restoration and monitoring efforts.*

Measures of Change:

1. Opportunities to increase public access
 - a. Number and feasibility of access points - *quantitative*
 - b. Length trails - *quantitative*
 - c. Location of trails (peripheral/crossing) - *quantitative*
 - d. Connectivity of trail network within the site - *quantitative*

- e. Overlooks, visitor center - *quantitative*
- f. Education opportunities - *qualitative*
- g. Parking - *quantitative*
- h. Barriers to access (fencing, channels) - *quantitative*

- 2. Opportunities to increase regional connectivity - *qualitative*

2.2.2 Sub-goal 2. Cultural Access and Preservation:

Initiate formal and informal consultation with representatives of the Gabrielino/Tongva Tribal Council to develop guidelines that contribute to the preservation of sacred and cultural sites.

- 1. Impact on cultural resources - *qualitative*
- 2. Opportunities to enhance cultural awareness/education - *qualitative*

2.2.3 Sub-goal 3 Recreational Use:

Design site to accommodate an appropriate level of fishing, boating, walking, and other activities consistent with the Ecological Reserve Designation and ecosystem restoration values.

Objectives:

- a. *Provide public trails and viewing areas around the perimeter of the wetlands with interpretive displays at selected locations.*
- b. *Concentrate potentially incompatible human activities in non-sensitive areas*

Measures of Change

- 1. Opportunities to provide for recreation
 - a. Fishing - *qualitative*
 - b. Boating - *qualitative*
 - c. Walking - *qualitative*
 - d. Biking - *qualitative*
 - e. Other - *qualitative*

2.2.4 Sub-goal 4. Public Safety and Security:

Design public access so that the wetlands are a safe place to visit.

Objectives:

- a. *Design access to minimize maintenance costs*
- b. *Provide access points at locations responsive to the needs of law enforcement.*
- c. *Create and maintain access points in a manner that minimizes safety concerns and hazards.*

Measures of Change:

1. Sufficient access for law enforcement, vector control, emergency services - *qualitative*
2. Separation of incompatible uses - e.g. bikes and walkers, bikes and cars etc - *qualitative*
3. Personal safety - lit pathways, vegetated areas - *qualitative*
4. Attractions for incompatible uses - e.g. vegetated areas for homeless use - *qualitative*
5. Safe traffic access to site - not roadside pullouts - *qualitative*
6. Proximity to hazards - deep water, steep slopes - *qualitative*
7. Barriers to access - fencing, channels - *qualitative*

2.2.5 Traffic

1. Impacts on traffic circulation - Lincoln widening, Culver-Jefferson intersection, Lincoln-Culver intersection - *qualitative*
2. Impacts on wildlife - shadows, noise, light, passage - *qualitative*
3. Impacts on tidal circulation - raising roads, modifying bridges - *qualitative*
4. Alternative modes of transport - bikeways - *qualitative*

2.3 Cost

1. Relative operation and maintenance cost – *quantitative – relative costs*
2. Cost of avoiding areas - contaminated areas, cultural resources, easements etc - *quantitative – relative costs*
3. Cost of relocating infrastructure - *quantitative – relative costs*
4. Relative construction cost - *quantitative – relative costs*
5. Cost to dispose of, or import, soils - *quantitative – relative costs*

2.4 Phasing

1. Ability to support phased implementation - *qualitative*
2. Cost of phasing compared with “doing all at once” - *qualitative*
3. Benefits/disbenefits of phasing - *qualitative*