Climate Smart Actions for Natural Resource Managers Workshop
Case Study: Sears Point Restoration Project

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Lead Agency/Organization and Partners: Sonoma Land Trust (SLT) is leading the Sears Point Restoration Project. Since its establishment in 1976, SLT has invested in acquisition and restoration of the Sonoma Baylands, protecting nearly 5,000 acres there. Ducks Unlimited (DU) is SLT's primary partner on the project providing design, permitting, and construction management services as well as assistance with fundraising. US Fish and Wildlife Service San Pablo Bay National Wildlife Refuge and California Department of Fish and Game serve as lead agencies.

Project Description: Since the late 1800s the San Francisco Bay Estuary has lost an estimated 80% of its tidal marshes and nearly that amount of the seasonal freshwater wetlands that surround its margins.

In 2005 SLT acquired the 2,327-acre Sears Point property, a vital link along the northern San Pablo Bay shoreline connecting nearly five miles of protected and restored tidal marsh habitat from the Petaluma River to Tolay Creek. Unique among nearly all shoreline conservation properties, Sears Point extends deep into the adjacent uplands reaching elevations of nearly 400 feet. Some nine miles of riparian corridors traverse its grasslands, willow groves, and broad plains of seasonal wetlands to connect upland to Bay. Slated for casino development prior to SLT's acquisition, Sears Point is protected in perpetuity offering an unparalleled opportunity for landscape-scale restoration of multiple habitats in the North Bay.

Climate change was just one of the factors to be considered during restoration planning. Endangered species recovery and water quality were also considered, but today it is clear that all these drivers fit under the umbrella of climate change because each will be affected by projected changes.

Over the next several years SLT, will restore/enhance 960 acres of tidal marsh and nearly 1,350 acres of associated ecotonal seasonal wetlands, riparian corridors, and upland grasslands at Sears Point. As part of the project, SLT will construct 2.5 miles of the Bay Trail for public use. However, this case study focuses primarily on the tidal marsh restoration element.

The total cost of the restoration is expected to be $18 million with roughly 90% of the project cost related to the tidal marsh project elements.

Approach to Vulnerability Assessment: While no formal vulnerability assessment was done per se, the planning process included an extensive inventory of biological and physical (*e.g.*, elevation) attributes of the property. Its juxtaposition to other conservation properties and

infrastructure were evaluated. The likelihood of success was evaluated on these factors as well as the local and regional supply of suspended sediment, which would be needed to build the marsh. Several restoration scenarios were developed. All of the diked agricultural baylands along the San Pablo Bay shoreline are subsided and vulnerable to catastrophic flooding with or without sea level rise. Sears Point is separated from the Bay by a 5-mile long, 120-year old levee that has been capped, patched, and raised on numerous occasions over the past century.

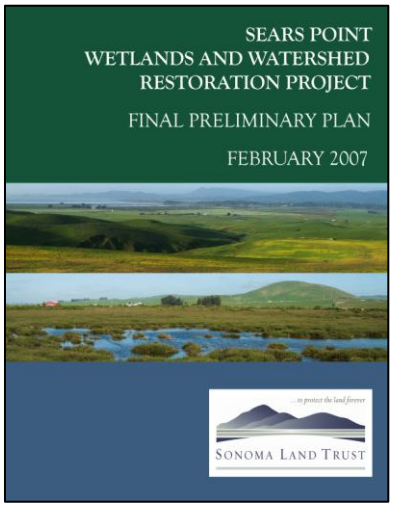
The planning process spanned two years and was conducted by SLT and a team of contracted hydrologists, ecologists, and engineers working with a technical review committee.

Adaptation Actions: Successful tidal marsh restoration depends in large part on three factors: suspended sediment supply, site elevation, and rate of sea level rise. While only the site elevation can be known for certain, we used knowledge of a relatively rich sediment supply from the Petaluma River watershed and other local sources to determine that Sears Point tidal marsh development has a strong chance of keeping pace with sea level rise, particularly if implemented in the near term.

Specific design elements included to hasten marsh development and provide resilience against sea level rise (see map on following page) include:

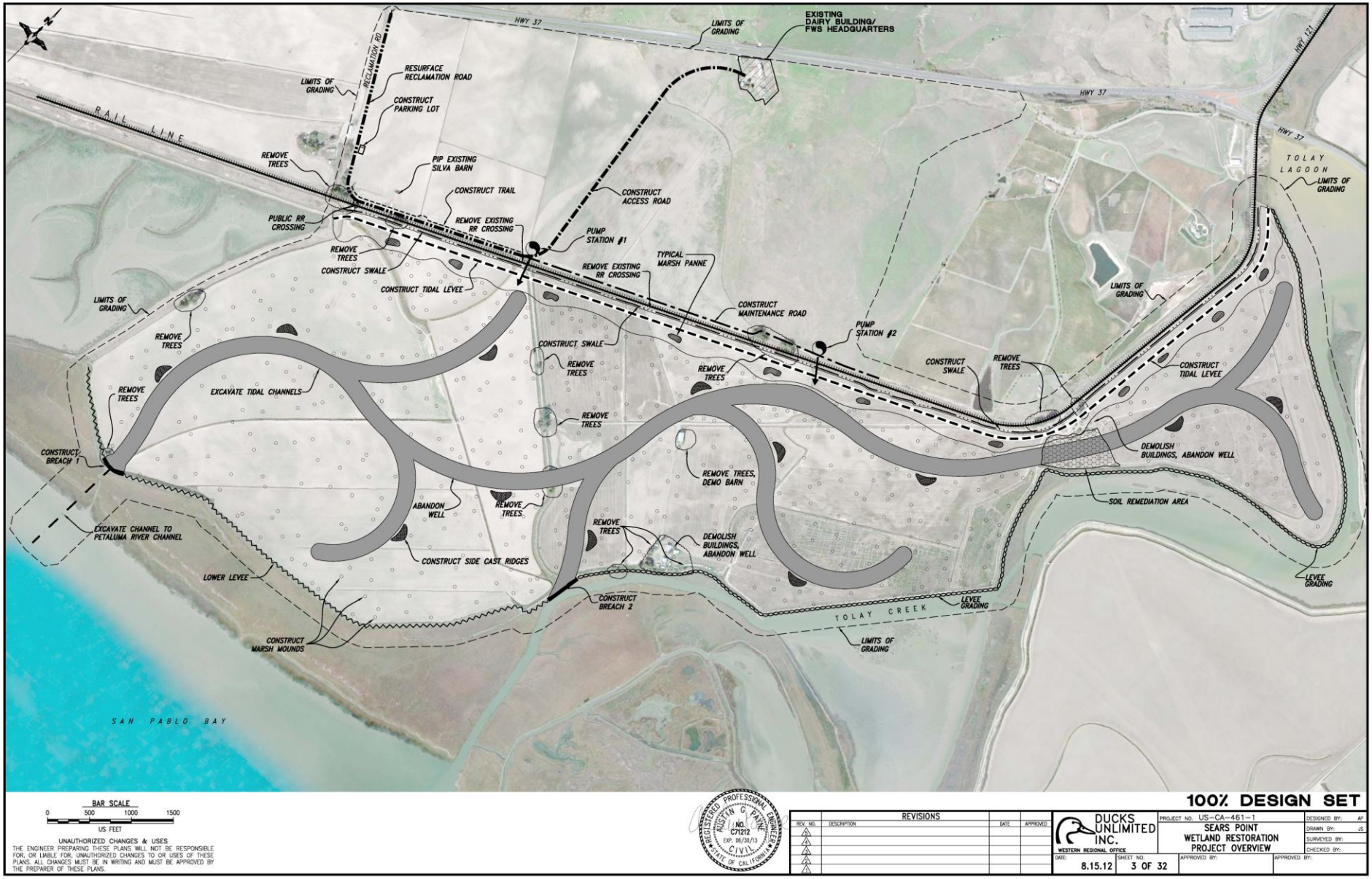
- Construct topographic features (*e.g.*, marsh mounds) in the tidal basin to reduce wind fetch and associated wave energy to maximize sediment deposition.
- Construct a gradually sloping levee (10:1 to 20:1) to enable elevation zones of tidal marsh to shift upslope as sea level rises. This also provides high tide refuge for marsh wildlife during extreme tides and storm surge.
- Stockpile material to enable raising the levee up to 7 feet to accommodate higher levels of sea level rise.

Implementation: A detailed conceptual restoration plan was completed in 2007. This was followed by a more detailed engineering design plan that underwent review at the 30%, 60% and 90% completion levels. Implementation will begin in summer 2013.



Monitoring and Management: Typical post-project monitoring includes tracking of various water quality parameters, rate of sedimentation, vegetative cover, and wildlife use. If monitoring reveals that the project is not meeting objectives, several potential adaptive management measures are built in. For example, if the two levee breaches are not providing sufficient tidal exchange and therefore import of sediment, one or two additional breaches could be excavated. If sea level is rising more quickly than expected and threatening to overtop the new levee, it can be raised up to seven feet.

Funding permitting, monitoring will continue for 10-15 years.


HWY 37
LIMITS OF GRADING
EXISTING DAIRY BUILDING/ FWS HEADQUARTERS
HWY 121
RECLAMATION RD
RESURFACE RECLAMATION ROAD
CONSTRUCT PARKING LOT
RAIL LINE
REMOVE TREES
PIP EXISTING SILVA BARN
CONSTRUCT TRAIL
CONSTRUCT ACCESS ROAD
PUBLIC RR CROSSING
REMOVE EXISTING RR CROSSING
PUMP STATION #1
TYPICAL MARSH PANNE
CONSTRUCT SWALE
CONSTRUCT TIDAL LEVEE
CONSTRUCT MAINTENANCE ROAD
PUMP STATION #2
EXCAVATE TIDAL CHANNELS
CONSTRUCT BREACH 1
ABANDON WELL
REMOVE TREES, DEMO BARN
DEMOLISH BUILDINGS, ABANDON WELL
SOIL REMEDIATION AREA
EXCAVATE CHANNEL TO PETALUMA RIVER CHANNEL
CONSTRUCT SIDE CAST RIDGES
LOWER LEVEE
CONSTRUCT BREACH 2
LEVEE GRADING
TOLAY CREEK
CONSTRUCT MARSH MOUNDS
TOLAY LAGOON
SAN PABLO BAY
BAR SCALE
0 500 1000 1500
US FEET
UNAUTHORIZED CHANGES & USES
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AUSTIN G. PAYNE
NO. C71212
EXP. 06/30/13
CIVIL
STATE OF CALIFORNIA
100% DESIGN SET
REVISIONS
REV. NO. DESCRIPTION DATE APPROVED
DUCKS UNLIMITED INC.
WESTERN REGIONAL OFFICE
PROJECT NO. US-CA-461-1
SEARS POINT WETLAND RESTORATION PROJECT OVERVIEW
DESIGNED BY: AP
DRAWN BY: JS
SURVEYED BY:
CHECKED BY:
DATE: 8.15.12
SHEET NO. 3 OF 32
APPROVED BY:
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Lessons Learned: Anticipating sea level rise is challenging. As new information emerges, projections change and previous planning, adaptation measures, and resilience tools can quickly become dated. This is vexing for large projects like Sears Point.

Uncertainty of the projections is also challenging: should we build out for the worst case scenario? What is the planning horizon that makes sense? There is the danger of doing nothing while waiting for all the answers.

An important lesson we have taken is to look not only at our own project's resilience but also at the matrix of lands and infrastructure in which it sits. Building a towering levee that could resist the worst-case scenarios makes little sense if the adjoining levees won't weather even a moderate rise. Cost is a major factor as extraordinary measures - such as planning for a worst case future may doom a project simply by being too expensive. Final project design is inevitably a compromise between the most "climate smart" design and the available funds.

Consideration of future actions by others must also be factored into the restoration design. The Sears Point levee will protect State Highway 37 and the SMART railroad for up to 50 years, even if the levee has to be raised. But in 50 years both Caltrans and the railroad will have been forced to address their own vulnerabilities. Perhaps the Sears Point levee will no longer be needed. Economic feasibility and a common sense look to the future are required as we are faced with vulnerability decisions.

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