ITEM 18

Agenda of January 21, 2010

TO: **Sacramento Area Flood Control Agency**
Board of Directors

FROM: **Peter E. F. Buck, Natural Resources Supervisor**
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SUBJECT: **INFORMATION – NATOMAS LEVEE IMPROVEMENT PROGRAM - WOODLAND HABITAT CONSERVATION AND MITIGATION STRATEGY**

Summary

The Natomas Levee Improvement Program (NLIP) will cause a significant and unavoidable temporal loss of woodlands in the Natomas Basin, particularly along the footprint of the Sacramento River east levee which is being significantly expanded to the landside. This report documents the extent of this loss and describes the woodland conservation and mitigation strategy being implemented by the Sacramento Area Flood Control Agency (SAFCA). Toward this end, the report presents the following information:

- Woodland impacts and compensation;
- Impact avoidance and minimization;
- Compensation methodology;
- Ecological considerations;
- Integration of science and best management practices;
- Stakeholder coordination and compliance with environmental laws and regulation; and
- Status and anticipated success of compensation measures.

Woodlands Impacts and Compensation

Table 1 identifies the impacts to woodlands that are expected in Phases 1 through 4A of the NLIP and the compensation that will be provided to offset these impacts. The table indicates that approximately 53 acres of woodlands will be removed during these phases. These impacts will be offset by preserving approximately 21 acres and planting approximately 145 acres of woodlands.

Table 1 - Woodland Impacts and Compensation (Acres)

NLIP Phase	Woodland Impacts[1]	Woodland Creation/Preservation
Phase 1	00.06	00.00
Phase 2	12.06	61.07
Phase 3	15.73	26.80
Phase 4a	25.20	77.82
Total	**53.05**	**165.69**

Appendix A to this report, which is posted at *www.safca.org/Programs_Natomas.html*, presents a more detailed accounting of these woodland impacts, identifying each of the parcels in the NLIP footprint that has been affected by tree removals and each parcel where compensation has occurred and is proposed to occur.

Impact Avoidance and Minimization

In 2007 the U. S. Army Corps of Engineers (Corps) announced a new nationwide policy requiring extensive removal of trees and prohibiting future establishment of woody vegetation on or near levees. The policy is based on the premise that all woody vegetation poses a potential risk to levee reliability, maintenance, and flood fighting. Failure to comply with this tree removal policy could result in decertification of levees and termination of eligibility for Federal rehabilitation assistance under Public Law 84-99 in the event of flood damage.

In light of this policy, SAFCA concluded that identified height and seepage deficiencies along the Sacramento River east levee in Natomas could not be addressed by traditional 'fix in place' methods without removing a very substantial number of waterside trees and shrubs which provide critical habitat for a range of threatened and endangered species. Because of the sandy composition of the levee, these removals would involve significant excavation and reconstruction of the levee structure. This would likely take many years and would trigger substantial and costly mitigation requirements that would be difficult, if not impossible, to complete.

For these reasons, SAFCA opted to widen the existing levee structure to the landside, thereby creating a new levee prism adjacent to the existing levee that could meet the performance objectives of the Corps policy without requiring waterside vegetation removal. The trade-off for this 'adjacent levee' design is an increase in landside tree removals by comparison to the 'fix in place' option. However, the total number of trees removed under the adjacent levee design is significantly lower than the 'fix in place' option and, as explained below, the opportunities for compensation are much more favorable.

[1] Data source: NLIP Phase 4A biological assessment (Dec. 22/09). Acreage reflects current engineering footprint and differs from previous estimates provided in various CEQA & NEPA planning documents. Estimates contained in those documents represent a 'worst case scenario' loss of woodlands.

Compensation Methodology

Reflecting the scope of the NLIP, SAFCA has devised a woodland compensation strategy at a landscape and ecosystem level. The aim of this strategy is to preserve existing woodlands and establish new woodlands in locations and patterns that will complement the habitat preserves being created and managed by The Natomas Basin Conservancy (TNBC) along the Sacramento River in Sutter County and in Sacramento County around Fisherman's Lake. This approach has been welcomed by the U. S. Fish and Wildlife Service and California Department of Fish and Game (Resource Agencies) who are responsible for protecting the wildlife species in the Natomas Basin.

Consistent with the landscape scale of SAFCA's compensation strategy and the methods employed by the Resource Agencies to estimate impacts to protected species, the woodland impacts of the project have been measured by 'canopy acreage'. This method relies on ARC Map software and high resolution color aerial photography to develop 'line-work' data depicting the project footprint superimposed over existing woodlands as shown in Figure 1. Based on this line-work, canopy acreages have been estimated by experienced AECOM biological staff and field checked prior to finalizing acreage estimates.

Figure1 - Example of Line Work Used to Calculate Woodland Impacts

In order to support the adequacy of the 'canopy acreage' method, SAFCA has compared this method to a method based on 'loss of inches of tree diameter' (calculated at breast height). This diameter method has typically been used in subdivision development projects and is based on

replacing one new seedling for every inch of tree diameter lost. As indicated in Table 2, for NLIP Phases 1 through 4A, SAFCA estimates that 4,055 trees totaling 54,656 inches in diameter will be removed of which 846 trees totaling 5,368 inches in diameter will be relocated. Thus the net loss will be 49,288 inches in diameter.

Table 2 - Woodland Impacts Using the Tree Diameter Method

	Trees Impacted	**Average Diameter (inches)**	**Trees Relocated**	**Average Diameter (inches)**	**Net Impact (inches)**
Phase 1	10	12	0		120
Phase 2	897	12	277	5	9379
Phase 3	1541	14	308	7	19418
Phase 4A	1307	14	261	7	16471
Trees not measured due to access restrictions	300	13			3900
Total	**4055**		**846**		**49288**

Table 3 converts SAFCA's compensation for woodland impacts in Phases 1 through 4A from canopy acreage to the diameter method. The table assumes that each of the 145 acres of planted woodlands included in the compensation program will contain 272 seedlings (1 tree per 160 square feet). Each seedling will be 1 inch in diameter. This equates to a total of 39,440 inches in diameter. In addition, SAFCA will preserve 21 acres of existing woodlands containing approximately 1,580 trees totaling approximately 18,960 inches in diameter. Altogether the trees planted and preserved will total approximately 58,400 inches in diameter.

Table 3 – Woodland Compensation Using the Tree Diameter Method

Phases 1-4A	**Acres**	**Number of Trees**	**Average Diameter (inches)**	**Total Compensation (inches)**
Trees Planted	145	39440	1	39440
Trees Preserved	21	1580	12	18960
Total	**166**	**41020**		**58400**

Ecological Considerations

SAFCA's compensation strategy is ecologically based. It focuses on developing landside woodland corridors that will substantially increase the acreage and spatial distribution of landside woodlands adjacent to surrounding protected and managed native perennial grasslands, cropland, and wetlands. This will diversify the complexity of the landscape, compensate for gaps in the riverside forest community, increase beneficial habitat edge effects, and provide migratory corridors between habitat

nodes such as the Cummings North and Lausevic properties north of Riego Road, and in future corridors identified south of the Teal Bend Golf Course and the Fisherman's Lake complex.

The landside woodland corridors will also compensate for losses and view-shed impacts associated with woodlands slated for removal. Planted areas will be wider than most of the existing tree rows, and more contiguous than other landside woodlands that are scattered throughout the Basin in small groves or narrow tree rows along the edges of fields, canals, and roads. In addition, new woodland corridors will be planted adjacent to foraging habitat for Swainson's Hawk and other bird species to maximize habitat-edge transitions between nesting and foraging habitat, and to minimize distances between nesting and foraging areas.

Much of the land SAFCA has acquired for the woodland corridors had previously been left fallow with an undesirable cover of invasive weeds and extensive residual weed seed bank. To combat this problem and to merge important herbaceous cover into planned woody riparian communities, SAFCA has initiated large scale removal and conversion of noxious weed communities to native perennial grassland. This future herbaceous cover will be available to small mammals year-round. The planted areas will be more biologically diverse and stable, and more aesthetically pleasing than the pre-project condition. The botanical species composition of each planted area will mimic reference site vegetation types including: Valley Oak woodland; mixed riparian forest, Cottonwood-Dominant; Willow Scrub; Sycamore and Oak Savanna; native perennial grassland; and Elderberry Shrub/scrub. The development of these sites will be accelerated through selective relocation of several hundred trees removed from the project footprint.

Integration of Science and Best Management Practices

SAFCA's approach to woodland compensation will benefit from the field science and habitat management research that the Agency has been a part of for more than a decade. This science and research experience includes:

Valley Elderberry Longhorn Beetle (VELB) Research Collaborative

SAFCA has used results from the VELB research collaborative and UC Davis researchers to support actions regarding the spatial placement and patch arrangement of Elderberry shrubs to optimize habitat conditions for the endangered Valley Elderberry Longhorn Beetle. This effort will be continued during further phases of the project.

Pollination Research and Flowering Plants

In 2009 SAFCA convened a team of conservation biologists and pollination research scientists from UC Berkeley College of Natural Resources, UC Davis Department of Entomology, and the Xerces Society to seek their expertise on how to optimize conditions supporting populations of beneficial pollinating insects. Recommendations of flowering plant species selection and spatial arrangement have been incorporated into woodland mitigation planting designs to promote these specialized insects.

SWHA Habitat Considerations

SAFCA has endeavored to create optimal future nesting and foraging habitat conditions for the endangered Swainson's Hawk through plant species selection and the spatial arrangement of woodland corridors adjacent to fields of high quality foraging habitat such as alfalfa, other row crops, and created native perennial grasslands. Tall, fast-growing tree species such as cottonwood, the hawk's preferential nest tree, have been integrated in our planting designs to promote occupation and future nest site development. Larger trees have and will be relocated into woodland corridors to provide perching and foraging opportunities for the hawk and many other valued species as new planted woodlands develop and increase in size and maturity over time.

Coordination with Stakeholders and Compliance with Laws and Regulations

SAFCA has fully disclosed and provided opportunities for comment on all elements of its woodland compensation program to the Resource Agencies and Corps regulatory staff. Resource Agency personnel have been included in many hours of consultations, meetings and field trips which have led to refinements and improvements to the overall NLIP habitat conservation and mitigation program.

In addition, SAFCA has frequently sought the support and recommendations of TNBC staff and other biological resource experts. TNBC has agreed to accept responsibility for long-term management for most of the NLIP associated habitat features. SAFCA staff and consultants have also extensively collaborated with representatives of the Sacramento County Airport System to replace woodlands in areas away from the critical flight path and runways of the airport.

Status and Anticipated Success of Compensation Measures

Tree Relocation

As discussed above, relocation of trees will accelerate the establishment of planted areas. This is a key element of SAFCA's woodland compensation strategy. To date, two separate tree moving contractors have been retained to transplant trees in three diameter classes ranging up to 22 inches in diameter. In addition, a third tree moving contractor will relocate all Elderberry shrubs identified in the project footprint. Thus far SAFCA has transplanted 277 native trees, with survival exceeding 90% (approximately 30% of the 900 trees identified in the Phase 2 footprint), and anticipates an additional 570 native trees and Elderberry shrubs can be moved where site conditions allow. Transplanting trees is governed by a number of site specific conditions and constraints such as: proximity to utilities (overhead and underground); existing facilities (canal embankments, roadways etc); cultural resources; proximity/separation of surrounding trees; and weather and soil conditions (extended rain or high river elevation). Trees will be relocated to a number of receiving sites already acquired by SAFCA for woodland corridors.

Performance of Planted Woodlands

The North Cummings and Lausevic properties acquired by SAFCA for woodland mitigation and preservation were planted with approximately 5000 trees and shrubs on 21.3 acres and an additional 2.3 acres for transplants in June and July 2009. The newly planted vegetation is currently thriving with vigorous height and diameter growth by some species exceeding 10 feet in less than 6 months. A contractor will actively maintain these sites for the next five years, with oversight and management provided by SAFCA consultants and staff.

Anticipated Growth and Yield of New Woodlands

Tree ring analysis of selected species in the Natomas Basin has confirmed the rich, fertile alluvial soils along Sacramento River and the resultant potential for vigorous forest development. Historic maps and published soil surveys indicate extensive historic woodlands on these alluvial soils where the NLIP mitigation woodland corridor is planned. Based on a preliminary evaluation and proposed spacing of new trees planted (16 ft x 10 ft) the tree crowns in planted woodlands are anticipated to develop a woodland canopy within approximately 15 years of planting or earlier. This evaluation is based on field measurements of existing tree crown dimensions, stem diameters, proposed NLIP planting densities, tree age-diameter relationships, and tree ages derived from a recent Natomas tree ring analysis. This conclusion was based on verification and comparison with crown diameter-stem diameter relationships of other oak species (Paine and Hann 1982).

Carbon Sequestration

Valley Oak woodlands have the potential to sequester carbon over many decades, primarily in the branches and trunks of growing trees. A preliminary analysis of tree rings of selected trees in the Natomas Basin and a review of modeled carbon storage in valley oak woodlands (COLE Development Group 2010) indicates that removal of trees as part of the NLIP will reduce carbon sequestration by comparison to the pre-project condition during the 30- to 50-year period following project construction. Within 10 to 15 years, trees planted in woodland corridors on approximately three times the acreage of woodlands removed by NLIP will be sequestering carbon at a rate comparable to the pre-project condition. Thereafter, the new woodlands will sequester carbon at a steadily higher rate and over the following 20 to 30 years, this overall increase in the rate of sequestration will offset the sequestration deficit created by the tree removals at the outset of the project. Over time the NLIP Woodland mitigation effort will result in a net positive carbon sequestration balance as compared to the baseline condition.

References

Paine, D. P. and D. W. Hann. 1982. Maximum Crown-Width Equations for Southwestern Oregon Tree Species. Research Paper 46. Forest Research Lab, School of Forestry, Oregon State University, Corvallis, OR.

COLE Development Group. 2010. COLE 1605(b) Report for California Filtered for Forest Type Group: Western Oak Group; Forest Type: California White Oak (Valley Oak). Carbon On Line Estimator Version 2. Available at: http://ncasi.uml.edu/COLE/. Last accessed on January 10, 2010.

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Attachment(s)