

APPENDIX A

**FUNCTIONS OF THE NATOMAS BASIN CONSERVANCY
AND REGIONAL MITIGATION PROGRAM
UNDER THE 1997 NATOMAS BASIN HABITAT CONSERVATION PLAN**

The NBC will perform an important function for the MAP HCP by establishing and overseeing a concerted Basin-wide program for acquiring and managing mitigation lands on behalf of Regional Plan (Natomas Basin HCP) permittees. Specifically, the NBC will be responsible for collecting and managing mitigation fees required by the City and Counties and the Metro Air Park Association, for using the fees to establish mitigation lands, and for managing the mitigation lands for the benefit of the covered species. Mitigation lands will be established through fee simple or easement acquisition. The NBC may legally buy and sell land, lease land for revenue, hold title to conservation easements, etc. As a non-governmental entity, the NBC has no powers of condemnation and can only purchase lands from willing sellers. The NBC will also have full power to establish and sign contracts with appropriate individuals or organizations for the purpose of carrying out specific activities under the regional mitigation program, including, but not limited to, managed marsh construction, habitat restoration, and monitoring.

All proceedings of the NBC will comply with the Ralph M. Brown Act (California Government Code, Section 54950 et seq.) regarding open and public meetings, and with the California Public Records Act (California Government Code, Section 6250 et. seq.) regarding maintenance of public records. The NBC may, in time, be succeeded by another suitable non-profit entity or by CDFG (see Section 3.4.9 of the MAP Implementation Agreement).

Activities of the NBC will be overseen by a Technical Advisory Committee (refer to Chapter IV.4.b. in the NBHCP for more information on the TAC). The NBHCP text is in italics while update notes are shown in plain text.

The NBC was formed in 1994 but was not in full operation, with staff and a Board of Directors until early 1999. At present, the NBC carries out mitigation activities to implement the regional plan for the City of Sacramento as required by the City's Natomas Basin Habitat Conservation Plan (NB HCP) and Implementation Agreement.

The City of Sacramento collects mitigation fees for all urban development within its boundaries within the Natomas Basin. As of the end of 1999, the City had collected almost \$8,000,000.00 of mitigation fees from approximately 3,000 acres of urban development. The mitigation fees were forwarded to the NBC.

The NBC's current mitigation objective for the Regional Program is to maintain 25% of reserve land as managed marsh, 25% of reserve land as upland habitat for use by Swainson's hawk, and 50% in rice production that is grown using best management practices for giant garter snake and other wetland species.

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The following is a summary of some of the NBC's accomplishments as described in its 1999 Annual Report:

- The NBC acquired seven farms totaling approximately 1,300 acres of habitat mitigation land.
- The 1999 mitigation acreage totaled more than the required 1999 mitigation needs of 800 acres.
- Mitigation land acquisition met the requirement of a minimum of one contiguous 400-acre parcel.
- Steps were taken to remove barriers to giant garter snake migration onto NBC lands.
- The NBC worked to protect areas on its mitigation lands where NB HCP species are known to exist.
- Fields were managed in such a way as to encourage Swainson's hawk foraging activity.
- Swainson's hawk and giant garter snake surveys were conducted in the Natomas Basin.

In addition, the NBC completed preparation of a Site-Specific Management Plan (dated July 14, 2000) for their approximately 1,300 acres of mitigation lands acquired for the City of Sacramento as of the end of 1999. According to the Plan "to meet wetland conservation objectives, a minimum of 324 (25% of total) will be developed as managed marsh on the various sites; approximately 648 acres (50% of the total) will be maintained in rice production. To meet upland conservation objectives, a minimum of 324 acres will be developed or maintained as uplands that provide foraging, nesting, or future nesting sites for Swainson's hawk."

1. Conservation Strategies -- Establishment of Habitat Reserves/Mitigation Ratio

The following discussion of conservation strategies is taken straight from the NBHCP as it describes the regional mitigation program in which MAP POA will participate.

The primary type of mitigation for the impacts of urban development on covered species and habitat values in the Natomas Basin will be the collection and use of mitigation fees to set aside 0.5 acres of habitat land for each 1.0 acres of gross development that occurs in the Basin. This 0.5-to-1 ratio will specifically mitigate for the loss of wetland habitat values necessary for the giant garter snake and other wetland associated species (see below, Section C. 1), and for the loss of upland habitat values necessary for the Swainson's hawk and other upland species (see below, Section C .2). For purposes of the NBHCP, urban development of all currently undeveloped land on a gross-acre basis converted for other uses will be subject to the mitigation fee, including urban uses (commercial, industrial), roads and utilities (public or private), schools and other public facilities, golf courses, and other developed parks, except as otherwise specified.

Based on existing general plans, reasonably foreseeable development will result in approximately 17,500 acres in the Natomas Basin being converted to urban and associated uses. Thus, under the 0.5-to-1 mitigation ratio, approximately 8,750 acres of land will be acquired by the NBC and set aside as habitat reserves (however, note that the effective ratio is actually

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higher than 0.5-to, because all undeveloped lands in the plan area are subject to the mitigation ratio regardless of their value as habitat for the covered species). Habitat reserves will be managed by the NBC and will consist of managed marsh habitats, upland habitats, rice fields (which will typically be leased for use to rice farmers), and associated buffers and infrastructure. The NBHCP does not specify any particular land area for acquisition for habitat reserves, since many factors will affect the land areas ultimately purchased.

Note: Metro Air Park's portion of the foreseeable development is as much as 1,892 acres, roughly 10 percent of the total. Under the 0.5:1 mitigation ratio, the MAP will generate 940 acres of mitigation land, roughly 10 percent of the total.

2. Conservation Strategy for Wetland Habitat Values

Conservation objectives for the giant garter snake under the NBHCP are:

(1) *Maintenance of the long-term integrity of the Natomas Basin giant garter snake population.*

(2) *Mitigation to fully offset impacts of urbanization on the giant garter snake and other covered species through development of a biologically sound network of habitat reserves that contribute to the recovery of these species.*

(3) *Reserves described in (2) above will consist of habitat blocks a minimum of 400 acres in size, consisting of both wetland and upland habitat, with an interlinking network of water supply channels or canals. The reserve system will also include at least one parcel a minimum of 2,500 acres in size.*

(4) *Of that portion of the reserve system that is committed to wetlands, 75 % of its total area will be maintained as rice lands and 25 % will be maintained as managed marsh. This 25 % managed marsh requirement shall be satisfied by the end of the fifth year after issuance of the state and federal permits (see Sections 5.5 and 5.7 of the MAP Implementation Agreement). However, this rice-to-marsh proportion may be revised if the Giant Garter Snake Recovery Plan, when such a plan is approved by the USFWS, makes any recommendations with respect to the relative importance of these habitats to giant garter snakes (see Section H below). However, under any future giant garter snake Recovery Plan recommendations, the maximum that may be committed to managed marsh under the NBHCP is 75 % of the wetland reserve system's land area.*

(5) *Improvement of giant garter snake habitat values in reserve areas in the Basin through habitat creation, protection and enhancement; reduction in mortality sources; and appropriate water distribution systems management (through inclusion of RD 1000 and NCMWC as permittees).*

b. Establishment and Management of Wetland Reserves

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A primary goal of the NBHCP is to create a system of wetland reserves, with associated uplands, that would support populations of the giant garter snake and other covered species which co-exist with the garter snake in the same habitat. The final reserve system will consist of at least one 2,500-acre or larger contiguous block of reserve land. At completion, the remainder of the reserve system will consist of 400-acre or larger blocks of habitat.

Wetland Reserve Acquisition Criteria/Methodology

Habitat reserves will be established by the NBC in consultation with its Technical Advisory Committee. Prior to purchase, all lands being considered for acquisition will be submitted to USFWS and CDFG for review and concurrence; such concurrence will be required before any land acquisitions are completed. However, formal USFWS and CDFG concurrence may be waived, provided that the NBC's Technical Advisory Committee, including its USFWS and CDFG representatives, unanimously concurs in the proposed acquisition and that documentation of such concurrence is placed into the NBC's administrative record. In addition, the NBC will formulate an annual work plan within its annual report which identifies lands identified for acquisition in fee or by easement during the following year.

The following guidelines will be used to identify lands for wetland reserve area acquisition:

- (1) Land has existing or potential wetland habitat values that currently support or can support, with necessary enhancement and restoration, giant garter snakes and other wetland associated covered species.*
- (2) Land contains soils that can support rice farming or the type of managed marsh wetlands proposed in the Plan (see Managed Marsh Design/Management section below).*
- (3) Land meets the minimum parcel size criteria according to existing general plan designations within the jurisdiction where the land is acquired (usually 20 acres or greater in agricultural zoning).*
- (4) Land has adequate buffers from public roads and other adjoining land uses, as necessary (see Buffers section below).*
- (5) Land is adequately removed from incompatible urban development or uses (see Setbacks section below).*
- (6) Land must be hydrologically connected to the RD 1000 or NCMWC canal systems or to another suitable water supply source or system. Blocks of reserve lands must also be hydrologically connected to other blocks through irrigation and drainage systems or other systems to ensure connectivity and opportunity for travel by garter snakes between sections of the reserve system. To the extent practicable, reserve lands should also be near or adjacent to other protected lands; this would increase the overall effectiveness and size of protected lands in the Basin for covered species.*
- (7) Land has an adequate water supply and adequate water rights.*

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Buffers

Reserve lands shall, to the extent necessary and practicable, include adequate buffers to minimize the effects of incompatible adjoining land uses, including roads, on the reserves. In addition, the buffers will help ensure that the management of reserve lands does not impose an unnecessary burden on adjoining landowners. Buffers shall be established so that they are inside the reserve system (i.e., the buffers shall be part of, not outside of, reserve lands).

Buffers between giant garter snake reserve lands and surrounding land uses (e.g., urban or residential areas) will extend from the outside edge of the habitat (i.e., levee toe or maintenance road) to the boundary fence or edge of the designated reserve area. This "perimeter" buffer will consist of at least 75 feet of native or ruderal vegetation. Giant garter snake habitat will be separated from public roads by a minimum 30-foot buffer between the habitat and the outside edge of the road right-of-way.

However, buffers may not always be necessary or in certain cases may not represent the best use of reserve lands. Therefore, buffer widths may be reduced or buffers may be eliminated on a case-by-case basis, if: (1) the NBC's Technical Advisory Committee, including its USFWS and CDFG representatives, concur unanimously in a decision to reduce or eliminate buffers on a case-by-case basis; or (2) if not unanimous, the USFWS and CDFG concur in writing that a buffer may be reduced or eliminated. Decisions about the need for buffers and buffer widths shall be included in the management plan(s) for any given parcel or block of reserve land (see below, Section D).

Thus, the presence, width, or extent of buffers may vary with the situation, as long as they adequately reduce population mortality effects. For example, if the reserve lands are adjacent to other protected natural habitat or open space, then buffer widths could be reduced or eliminated. Narrower buffers would also be acceptable between garter snake habitat and agriculture, with the buffer width depending upon the particular crop and farming practices.

Buffer areas as described above may serve as upland habitat adjoining wetlands and may be counted toward the upland portion of the wetland reserve system, so long as the total area of buffer claimed as upland habitat does not exceed ten percent (10%) of the total wetland mitigation requirement.

Setbacks

All mitigation lands acquired by the NBC or for which conservation easements are obtained shall, at the time of acquisition and with the exceptions described below, be situated a minimum of 800 feet from existing urban lands or lands that are designated for urban uses in an adopted general plan. However, mitigation lands or easements closer than this setback distance may be acquired on a case-by-case basis, if: (1) the NBC's Technical Advisory Committee, including its USFWS and CDFG representatives, concur unanimously in a decision to reduce the setback distance; or (2) if not unanimous, the USFWS and CDFG concur in writing that a reduction in the setback distance is necessary or appropriate. For purposes of this provision, "existing urban lands" means lands that are intensively or completely developed for urban,

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commercial, or residential uses or are adjacent to or within the immediate vicinity of intensively developed areas, such that the direct and indirect effects of such development are significantly incompatible with the objectives and purposes of the reserve system and would be likely to have significant adverse effects on reserve viability or on covered species inhabiting the reserve lands. "Lands that are designated for urban uses in an adopted general plan" has the same meaning as "existing urban lands," except that such development and its associated effects on reserve lands, if reserves were acquired in the vicinity, would be presumed to be present in the foreseeable future consistent with the general plan. The rationale for decisions about setback distances, where the setback differs from the 800-foot requirement described above, shall be included in the management plan(s) for any given parcel or block of reserve land (see below, Section D).

Lands in the intervening 800 feet between urban development and reserve areas should be in agriculture or another open-space or non-urban use. However, such lands will not necessarily be under the control of the NBC and will not typically count as mitigation land. The purpose of this provision is, to the maximum extent practicable, to ensure that reserve lands are not established near or adjacent to significantly incompatible urban land uses, not to impose an obligation on either the NBC or the owners of the setback lands to manage the lands in any particular fashion. Thus, it is the responsibility of the NBC to locate reserve lands sufficiently far from urban areas or from lands designated for urban uses to fulfill this requirement; however, the setback requirement applies only to land acquisition by the NBC and is not to be construed as a land use restriction on privately owned land within 800 feet of any land with the NBHCP reserve system.

If the NBC proposes to establish all or part of the 800-foot setback on NBC mitigation land (that is, the setback would be part of the reserve system), the USFWS and CDFG must review the status and adequacy of the area as mitigation land on a case-by-case basis and approve any such decision or purchase in writing. However, if the setback land within the reserve is considered mitigation land and then loses that status due to encroaching development, the NBC must acquire an additional area of land equal in acreage to the lost portion of the setback.

The status and adequacy of setbacks will be reviewed and, where necessary and appropriate, corrected during the NBHCP 9,000-acre program review described in Section I below.

Protection from Flooding

Flood waters can destroy giant garter snake underground retreats by (1) liquefying the fine clay-silt substrate, allowing tunnels to collapse; (2) saturating the substrate with water, allowing the soil to swell and thus eliminate deep cracks that had been created by shrinking during a previous drying of the soil; (3) exposing slopes lying below the high water mark to the erosive force of wave action; and (4) depositing silt that blankets substrate surfaces and covers any underground retreats that survive (1), (2), and (3). While giant garter snakes can survive being flooded from underground retreats (Glenn Wylie, BRD, pers. comm.), such disruptive events are not advantageous either to garter snakes or to management of wetland reserves under the NBHCP.

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Consequently, lands selected for the NBHCP wetland reserve system shall be situated outside areas known to regularly receive flood waters (e.g., the Yolo and Sutter Bypasses). They shall also be situated so that they do not directly receive Flood waters from urban areas or direct runoff from paved surfaces or inflow from urban storm water drainage systems. Also, the drainage regime for managed wetlands or rice fields inside the reserve system shall be designed to ensure that giant garter snake retreats are not inundated when water is drained from ditches, fields or wetland areas. It is also desirable to locate upland habitats inside the wetland reserve system to avoid flooding of winter retreats.

Managed Marsh Design/Management

The NBHCP recognizes the wildlife values for many covered species associated with natural marsh and managed marsh areas as well as rice fields and seeks to protect, restore, or create such areas through the NBHCP's conservation program. Management of rice fields is discussed in the next section.

Section C.1.a of the NBHCP requires that at least 25 % (and possibly up to 75 %) of the land acquired for the NBHCP reserve system be converted into managed marsh wetlands to enhance habitat values for the giant garter snake and other covered species. These managed marsh wetlands, together with associated uplands, rice fields, and water conveyance ditches and canals, are expected to form a mosaic of diverse wetland habitats in the wetland portion of the reserve system that will support giant garter snakes and other wetland associated species. Although it is unproven, there is good reason to believe that such managed marshes and their supporting delivery canal and ditch/drain infrastructure can support large populations of giant garter snakes, so long as their construction and management are guided by what is known (and what will be known in the future) about giant garter snake biology and the habitat features that are important to giant garter snake survival. Embedded within an agricultural landscape dominated by rice farming, managed marsh wetlands based on such biological principles should support giant garter snakes as well as many other covered species (e.g., white-faced ibis, tricolored blackbird, and northwestern pond turtle).

The specific locations where the NBC will develop managed marsh habitat are not identified in the NBHCP. Such lands will be identified as the NBHCP is implemented, and site-specific management and monitoring plans for each managed marsh area will be developed when the site is acquired. When the NBC proposes to acquire a particular land parcel as mitigation, it will submit the proposal to the USFWS and CDFG for review and approval as described in the Reserve Acquisition Methodology section above. Development of specific management and monitoring plans for managed marshes and other mitigation lands are discussed in Sections D and F, respectively of the NBHCP.

Similarly, the NBHCP does not provide site-specific prescriptions for marsh design and management, but outlines the basic habitat elements needed for managed marsh within the reserve system to support giant garter snakes and other covered species. It is important that these marsh elements, including the water regime and physical structure, are consistent with giant garter snake biology and that, to the extent known, they mimic relevant features of the

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original marsh complexes of the Central Valley where the giant garter snake evolved, or the rice culture ecosystem that currently supports the snake. These features include, but are not limited to: (1) summer dry-down of seasonal marsh; (2) availability of summer water either as pockets of deeper water that persist in the seasonal marsh or as permanent marsh, located near or adjacent to vegetated banks or suitable upland habitat; (3) availability of steep-sided, vegetated ditches or canals; (4) availability of abundant emergent vegetation and near shore habitat; (5) a good food supply; and (6) availability of diverse habitat elements.

The following describes these managed marsh components and other factors in more detail. Note, however, that the following descriptions for managed marsh design under the NBHCP (including water management and marsh configuration) may be modified throughout the life of the Plan according to its Adaptive Management provisions (see below). Marsh management plans will be developed in accordance with Section D below.

Water Regime: The NBHCP wetland reserves may consist of two types of managed marsh wetlands--seasonal wetlands or permanent wetlands. As its name implies, the first type is flooded seasonally to accomplish a variety of purposes, including benefits to wildlife and vegetation management. The season when such wetlands are flooded depends on the wildlife species being targeted (e.g., spring and summer for giant garter snakes; winter for waterfowl). Though seasonal marsh may have pockets of permanent water as described below, these are the result of deep water areas that are nevertheless within the seasonal wetland, and are therefore considered separately from permanent marsh. Permanent marsh retains its water year round, or at least is not subjected to seasonal manipulation on an annual basis, as is seasonal marsh.

Seasonal managed marshes will be flooded by about mid-March (if not flooded during the winter) so that water and prey are available when giant garter snakes emerge from winter retreats. Water will be drained off the marshes more or less coincident with the dry-down of the rice fields (approximately mid-August). The purpose of the dry-down is to: (1) mimic rice culture patterns known to support giant garter snakes, and the wetland patterns of historical garter snake habitats; (2) promote growth of certain wetland vegetation types (e.g., cattails); (3) reduce numbers of or eliminate large fish that are predators of giant garter snakes; (4) help concentrate giant garter snake prey species; and (5) create feeding and resting areas for other covered species as well as waterfowl (so long as waterfowl management is consistent with the purposes of the NBHCP). If marshes are designed correctly, dry-down will also result in pockets of permanent water that help support giant garter snakes and their prey through the summer months. Such pockets of permanent water will be an integral part of marsh designs developed for the reserves. However, where permanent pockets of water are included, they must be sufficiently close to vegetated canals, ditches, or suitable upland habitat to allow snakes to readily escape predators. Marsh designs that result in permanent water surrounded by bare mudflats must be avoided, since snakes in such waters would be highly vulnerable to predation.

Giant garter snakes are also known to use areas of permanent marsh. In initial studies by the BRD radio-telemetered giant garter snakes utilized permanent marshes extensively, although a low sample size and other variables prevent drawing final conclusions from this data as yet (Glenn Wylie, BRD, pers. comm.). Nevertheless, based on this data it is considered advantageous to include within the NBHCP wetland reserve system some areas of permanent

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marshes and sloughs interspersed with the seasonal marshes, rice fields, and uplands. This will increase the overall habitat diversity of the reserves for the giant garter snake as well as other covered species. Permanent marshes utilized by BRD-telemetered snakes are fairly small (e.g., borrow areas), have extensive emergent vegetation, and are fairly shallow (2-3 feet deep) (Wylie, BRD, pers. comm).

Uplands: While a portion of the terrestrial component of the managed marsh system will be designed to meet the buffer requirements of the NBHCP, the rest will be designed and managed to meet the needs of giant garter snakes and other covered species.

The NBHCP does not describe specific wetland habitat/upland habitat proportions for the wetland portion of the reserve system, but leaves such decisions to the NBC's Technical Advisory Committee under the provisions described in Sections D and E below. However, a typical proportion for upland habitats within the wetland reserves would be approximately 20 to 30 percent. Upland areas have several purposes: (1) providing basking and resting sites, escape cover and winter retreats for giant garter snakes; and (2) providing foraging and nesting areas for other covered species (e.g., loggerhead shrike, tricolored blackbird, burrowing owl, and Swainson's hawk). Upland areas under the NBHCP may consist of agricultural fields (especially with crops known to support Swainson's hawks--e.g., alfalfa), dryland pasture, grasslands, fallow fields, levees, and any other land use approved by the NBC's Technical Advisory Committee.

Giant garter snakes that have been flooded in their winter retreats are subject to many forms of mortality, or may be killed directly by drowning. Therefore, it is important that uplands in and around the reserve's managed marshes are designed so that a significant portion is above expected winter flood levels. They should also provide escape cover where the permanent pools of water described above may attract garter snakes as well as snake predators.

Water Conveyance Structures/Edge: Wherever possible, marsh management plans and design will maximize the area of interface between the terrestrial and aquatic components of the reserve system's managed marsh wetlands. This can be accomplished in several ways. A good model is the ditch/drain conveyance systems already extant in the rice-growing regions of the Basin. For example, edge area could be increased in the interior of the marsh by the construction of deep, steep-sided ditches separated by berms higher than the highest water level of the marsh. Because giant garter snakes are known to utilize the ditch/drain system in the Basin extensively, reserve management should also maximize the habitat value of these features to giant garter snakes within the reserve system, and, where applicable, on private lands (see Section 5.7.4 of the City of Sacramento's Implementation Agreement). Also, the construction of channels or ditches that are actually used as water conveyance structures or that mimic these structures should be encouraged. Edge effects can also be created through the design of the reserve's permanent water pools and uplands--i.e., by varying the shapes of pools, associated islands, ditches and drains, and uplands where these features interface.

*Vegetation/Cover: Vegetation in a managed marsh should support a diversity of wildlife. Plant species that currently occur in the emergent marsh habitat found in the Natomas Basin will be included in the NBHCP's managed marsh wetlands. These include cattails (*Typha latifolia*),*

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tules (*Scirpus acutus*), rushes (*Juncus sp.*), river bulrush (*S. fluvialtilis*), sedges (*Carex sp.*, *Cyperus sp.*), and vervain (*Verbena hastata*). Marsh edges and "islands" should be well-vegetated with plants that discourage the movement of garter snake predators, such as herons, egrets, rats, and domestic animals. Plant species such as blackberry and thimbleberry are relatively impenetrable to many predator species but not to giant garter snakes and serve as basking sites for the snakes.

Exotic pest plants, such as giant reed grass and Johnson grass, can choke out native vegetation and have low habitat value. Such exotics will be periodically removed from the reserve system's managed marshes where feasible and necessary. Specific decisions about the need for exotic plant control shall be included in the management plan(s) for any given parcel or block of reserve land (see below, Section D).

Garter snakes utilize a variety of sites for escape cover and winter retreats, including small mammal burrows, thick vegetation such as blackberry and thimbleberry, and areas of jumbled rock such as rip rap, chunks of rock, or broken concrete. Management of wetland reserves under the NBHCP shall thus include protection and or construction of such types of giant garter snake cover and retreats as deemed appropriate by the NBC Technical Advisory Committee.

Access: Road kills are believed to be a significant giant garter snake mortality factor, especially for males (see Chapter II of NBHCP). Consequently, new roads within acquired reserve lands will be constructed to the minimum extent necessary to provide for the adequate maintenance of the marshes and other reserve lands. If roads already exist in an area acquired as a reserve, access to these roads will be restricted as necessary to protect the reserves from unnecessary disturbance and as described in the reserve management plans.

Other Factors: Soils are an important factor in designing and constructing managed marshes because they dictate whether water will be retained or lost through percolation. Generally, only those lands within the Natomas Basin that are underlain by clay soils will be conducive to the development of levee constructed managed marshes. Managed marshes must also be kept clear of winter storm runoff coming directly from urban areas. Pollutants such as petroleum compounds (e.g. motor oil) in urban runoff have been observed to cause respiratory and skin problems for the giant garter snake and may also reduce its food supply (George Hansen, pers. comm.). Water quality must also be maintained in order to maintain wildlife productivity and preclude the outbreak of wildlife diseases.

Water Control Structures: Managed marsh requires a controlled source of good quality water at suitable depths, usually less than three feet (water depth is important to the establishment of appropriate vegetation). Management and enhancement of managed marsh can be maximized through water control. A variety of water manipulation approaches can be utilized, including levees, stoplog and screwgate water control structures to regulate water flows and depths, and dewatering systems. In fact, a dewatering system is as important to successful wetland management as a flooding system. Water manipulation can also contribute to control of exotic plants and other undesirable vegetation.

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Levees constructed on natural contours have been found to be more effective for marsh management than levees constructed across contours. Generally, levees should be constructed to maximize the amount of flooded habitat.

Permanent or semipermanent impoundment levees will be used to create marsh which sets above the natural elevation of the land, much in the same way a bathtub holds water. Header-ditch levees are used along the upper elevation of a field or marsh to create the ditch or canal which brings water to the wetland. Water drops through control structures are then made through the header-ditch levee to the marsh or field. Rice-dike levees are used along natural contours in a rice field to back up water to flood the land. Depending upon the topography and the water conveyance and flooding regimes, the NBC will use a combination of these levee types to develop its marsh and rice wetlands.

Mosquito Control: Mosquito control programs operate throughout Natomas Basin. Generally, conventional mosquito control methods are not incompatible with garter snake habitat. Use of mosquito fish and low intensity pesticide applications would not directly threaten garter snakes or their habitat, and mosquito fish may actually serve as garter snake prey. However, mosquito control programs are more focused near urban areas, and the more intensive control methods there could harm giant garter snakes. If necessary the NBC should work directly with Mosquito Abatement Districts to determine suitable methods to resolve mosquito problems near urban areas in a manner consistent with the management of giant garter snake wetland habitats established under the NBHCP.

Summary: In summary, a good concept for a managed marsh wetland for giant garter snakes would be a mosaic of habitat types with variations in topography and an abundance of edges within and between habitat types. It would include seasonal marsh with shallow and deep water configurations; some permanent marsh; and upland habitats in the form of buffers, higher ground resembling the ditch banks and levees of the Basin's water conveyance system, and "islands" scattered throughout the marshes wetland component. Permanent water features would be constructed so that they ensure adequate nearby escape cover. A significant portion of the upland component would be above winter flood levels to protect giant garter snakes in their winter retreats. Vegetation would be natural marsh vegetation such as cattails, spike rush, tule clumps, and thimbleberry placed to maximize protected resting and basking sites and escape cover for the snakes.

In some cases, NBC may be able to acquire an historical marsh area that has been degraded but is undeveloped. In such cases, the best approach is likely to be restoration of the marsh rather than construction of new marsh. Nevertheless, to the extent applicable, the same principles and factors of marsh design and management as described above will guide marsh restoration activities where such restoration opportunities can be found, either in the Natomas Basin or in the out-of-Basin Area "B" as described above.

2,500-Acre/400-Acre Minimum Habitat Block Size Requirements

Conservation objectives described above for the giant garter snake require that one habitat block for the wetland reserve system be a minimum of 2,500 acres in size and the balance

of wetland reserve lands be in habitat blocks a minimum of 400 acres in size. However, the NBHCP recognizes that specific land use patterns and the potential problem of finding willing sellers in conformity with these requirements may create difficulty in fully satisfying this conservation objective. Consequently, if, after diligent efforts, the NBC is unable to acquire suitable habitat lands in the proper configuration or size to meet the objective, or if it appears that meeting the objective will be unlikely, the NBC shall undertake one or more of the following options, as appropriate: (1) consult with or request assistance from the local agency permittees to determine if there is any means to resolve the problem consistent with the terms of the NBHCP; (2) request review by the NBC Technical Advisory Committee to determine whether any new information on giant garter snake biology is available that is pertinent to the problem and that might suggest alternate habitat strategies; or (3) based on TAC recommendations resulting from number (2) above, or from other sources, request review of the requirements of this objective by the USFWS and CDFG to determine whether the requirements could be modified in any fashion consistent with land acquisition limitations that may be present in the Natomas Basin. Any revision of NBHCP requirements resulting from number (3) above would be adopted through the Plan's Adaptive Management provisions (Section E) or its 9,000-acre review process (Section I).

c. Management of Rice Lands for the Giant Garter Snake

As explained in Chapter II of the NBHCP, the rice growing areas of the Natomas Basin are known to support the giant garter snake (George Hansen, pers. comm.; Glenn Wylie, BRD, pers. comm.). For example, in its ongoing radio-telemetry studies, BRD has found that half of all garter snakes telemetered utilize rice fields at one time or another (Wylie, pers. comm.). The features of these rice lands that support garter snakes appear to include the rice fields themselves, the water conveyance system that supports the fields (including delivery canals, ditches, drains, and their associated levees) and other associated features such as tailwater marshes. The reasons giant garter snakes persist in this man-made rice culture ecosystem, and why some fields support snakes while others do not, are not fully understood (G. Hansen, pers. comm.). However, it may be because the rice fields, together with their supporting infrastructure, mimic to some extent the area's original marsh and upland habitats. It may also be because the water regime in the rice fields (spring and summer flooding and fall dry-down) coincides fairly closely with the biological needs of the species. The rice growing ecosystem also appears to provide many of the garter snake's basic habitat needs--e.g., warm, shallow water in the rice fields with sheltering emergent vegetation (i.e., rice plants); ditches and drains, some of which retain water year round and in which giant garter snake prey species (e.g., mosquito fish) can overwinter; and associated upland areas (e. g., levees) with suitable winter retreats.

In any case, the fact that giant garter snakes persist in the Natomas Basin's rice growing areas is well documented. The rice fields themselves support giant garter snakes through the active summer season, and the water conveyance systems that serve the rice fields support snakes throughout the year. The water conveyance systems in many parts of the Basin contain pockets of permanent water where prey such as bullfrog larvae and mosquitofish overwinter, resulting in high prey availability in the spring when snakes emerge from winter retreats and begin to use the aquatic components of the rice ecosystem. The late summer/early fall drydown of the rice fields may be important by removing predatory fish large enough to prey on giant

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garter snakes, and because giant garter snake prey, which have been proliferating in the ditches, drains, and rice fields, may be concentrated in the remaining pockets of standing water where snakes can gorge prior to the period of winter inactivity.

What is known about the relationship between rice farming and giant garter snakes is summarized above and in Chapter II. Additional studies are needed to better understand giant garter snake habitat needs, why and under what conditions giant garter snake populations persist where rice is farmed, and what types of reserve management would best benefit this species. Where appropriate, the results of such studies will be incorporated into the NBHCP through the Plan's Adaptive Management provisions (see below, Section E). Nevertheless, the NBHCP recognizes that: (1) continued rice farming in the Natomas Basin is beneficial to the giant garter snake; and (2) that maintaining rice farming on a significant portion of acquired NBC reserve lands is--unless otherwise indicated by the Giant Garter Snake Recovery Plan (see below, Section H), the Plan's monitoring and Adaptive Management programs (Sections F and E), or the 9,000-acre program review (Section I)--an integral component of the overall conservation strategy.

With respect to the selection of rice fields for inclusion in the NBHCP reserve system, and subsequent management, the following criteria shall be considered.

(1) Rice fields should be selected in areas that are within, or that have connectivity to, known giant garter snake populations or known occupied garter snake habitat.

(2) Rice fields located in areas that receive winter flooding should be avoided (e.g., the Yoio and Sutter Bypasses).

(3) Rice fields in the NBHCP reserve system should be managed to maximize giant garter snake compatibility. This includes maintenance of rice checks, berms, and other water control structures in as natural a state as practicable by limiting mowing or herbicide treatment, maintenance of garter snake prey species (e.g., mosquito fish) in or near the rice fields through appropriate management, and other measures as appropriate. However, any such management must also be compatible with economical rice production.

Specific measures for managing rice fields in the NBHCP wetland reserve system will be as determined by the NBC's Technical Advisory Committee and as described in reserve management plans (see below, Section D).

d. Out-of-Basin Reserves for Giant Garter Snakes

Most mitigation lands under the NBHCP will be situated inside the Plan area (80 %, currently). However, the Plan recognizes two potential out-of-Basin mitigation areas, shown in Figure 21 (in NBHCP), Potential Out-of-Basin Mitigation Area. Area "B" is a 60,000-acre area of agricultural land, north of the Basin, that is not currently known to support large populations of giant garter snakes, and its value for other species covered by the Plan has not been well documented. Areas "B" is not within the Natomas Basin; thus, take during development and rice farming activities in this area would not be covered by the NBHCP associated permits. However,

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any take associated with management and habitat enhancement in reserve areas within Areas "B" would be covered by the permits (see Chapter V, Section E. 1).

Under the NBHCP, an initial 800 acres of reserve lands must be established within the Natomas Basin. After that goal is achieved, the both Plans allow for up to 20 percent of the remaining reserve lands to be established in Area "B," if it can be demonstrated that a reserve of adequate size, viability, and habitat value can be established in this area and can support a population of giant garter snakes. Acquisition of reserve lands in Area "B" may occur if: (1) the NBC's Technical Advisory Committee, including its USFWS and CDFG representatives, concur unanimously in a decision to acquire reserve lands in Area "B" and the reasons for such decision are clearly documented in the NBC's administrative record; or (2) if not unanimous, the NBC submits a proposal for such an acquisition in writing to the USFWS and CDFG, together with an explanation of how and why the acquisition would benefit the reserve system or be consistent with reserve system objectives, and the USFWS and CDFG concur with the acquisition in writing.

If out-of-Basin reserve lands are acquired in Area "B" as described above, the NBC shall be responsible for managing such lands in accordance with Section D below, unless: (1) another reliable, willing reserve manager for such lands is located; (2) management of such lands by another land manager is consistent with all applicable conditions of the NBHCP; and (3) delegation of management authority to such a reserve manager is authorized by the USFWS and CDFG in writing.

The purpose of allowing out-of-Basin reserves is to potentially reduce the cost of establishing reserve areas by allowing acquisition of potentially lower-cost land, and to reduce the impact of NBC acquisitions on continuing farming in the Basin. However, at a minimum, such acquisitions must be consistent with the NBHCP's conservation objectives for the giant garter snake (see above, Section C. 1 .a) and wetland reserve acquisition criteria (see Section C. 1 .b). Out-Of-Basin acquisitions could actually benefit the giant garter snake overall through the creation of reserve lands for out-of-Basin giant garter snake populations, especially if key habitat areas for these populations could be protected via NBHCP funds.

In summary, it is currently expected that at least 80 percent of the NBHCP reserve lands will be established within the Natomas Basin. After an initial 800 acres of reserve land have been acquired in-Basin, up to 20 percent of the total mitigation lands required by the Plans may be acquired out-of-Basin.

3. Conservation Strategy for Upland Habitat Values

a. Conservation Objectives for the Swainson's Hawk

Swainson's hawk populations in the Central Valley are believed to have been reduced by approximately 90 % compared to historical levels. Approximately 24 pairs of Swainson's hawks nest annually within or immediately adjacent to the Natomas Basin along the Sacramento River. The Basin thus represents an important part of the remaining Swainson's hawk population in California, and protection of these hawks under the NBHCP is considered critical to

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maintenance of the Central Valley population of this species. Consequently, conservation objectives for the Swainson's hawk under the NBHCP are:

(1) Retention and creation of sufficient quality nesting and foraging habitat to maintain existing Swainson's hawk population levels in the plan area, and allow for population increases to meet any future recovery goals (as defined by the forthcoming CDFG's Swainson's Hawk Recovery Plan).

(2) No net loss of nesting habitat within the Swainson's hawk zone. This zone is defined as a corridor beginning at the Sacramento River levee, extending eastward for one mile, and running from the intersection of the Sacramento River and Natomas Cross Canal in the north of the plan area to the intersection of the Sacramento River and the American River in the south (see Figure 11, Swainson's Hawk Records). For purposes of this objective, the Swainson's hawk zone shall be considered to include those Swainson's hawk nest trees that are outside of but immediately adjacent to the NBHCP plan area along the Sacramento River.

(3) Tracking of urban development proposals in the Swainson's hawk zone in order to minimize loss of foraging habitat within that zone.

(4) Acquisition or protection of sufficient foraging habitat to support breeding and successful fledging of young by hawks nesting within the Swainson's hawk zone (such protection could occur inside or outside the zone to achieve this purpose).

(5) Prevention of disturbance to and loss of Swainson's hawk nest trees throughout the plan area.

(6) Acquisition of habitat lands for Swainson's hawks within the Natomas Basin only (i.e., no out-of-Basin acquisitions for the Swainson's hawk is permitted under the Plan).

(7) Establishment of a tree planting program to provide for future Swainson's hawk nest trees. This can be done on NBC reserve lands and in coordination with Sacramento Area Flood Control Agency, RD 1000, and other agencies to establish new nest sites in the eastern portions of Natomas Basin (including, but not limited to, areas along the levees and Natomas East Main Drain). However, no trees will be planted within water conveyance or flood control ditches or canals where such plantings would interfere with the function of these facilities.

b. Establishment and Management of Upland Reserves

Upland reserves are intended to provide for the long-term protection of existing and potential upland habitat in the Basin that currently supports or could support the Swainson's hawk and other upland species listed in Table I-1. In most cases, upland reserves established for the Swainson's hawk will also benefit other upland-associated covered species (e.g., the loggerhead shrike and burrowing owl). Consequently, selection of upland reserve sites will usually focus on the needs of the Swainson's hawk, except in cases where, in the judgement of the

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NBC and its Technical Advisory Committee, specific or important needs of other upland-associated species can be met at sites not selected primarily for Swainson's hawks.

Upland Reserve Acquisition Criteria/Methodology

The primary mitigation strategy for the Swainson's hawk under the NBHCP is the acquisition of upland reserves inside the Swainson's hawk zone. This will provide optimum nesting and foraging habitat for the hawk in the area where most nesting occurs within the plan area--along the Sacramento River. Minimum foraging habitat needed for Swainson's hawk nesting sites can vary depending on prey availability and density, which is in part a function of vegetation cover type within the foraging habitat and the activities (management practices, agricultural activities, etc.) associated with that habitat. The goal of this strategy is to maintain optimum nesting and foraging habitat for the hawks nesting in this zone. However, the Plan also calls for maintenance of nesting and foraging habitat for hawks nesting elsewhere in the Basin, as well as acquisition of reserve lands that benefit the other upland-associated species. In light of these considerations, upland reserve acquisition sites will be evaluated based upon the following criteria:

- (1) The land contains known or potential Swainson's hawk nest trees, or includes or is adjacent to suitable foraging habitat (e.g., agricultural croplands and grasslands).*
- (2) Agricultural croplands and grasslands that, based on crop type or surveys, are expected to have a suitable Swainson's hawk prey base and, preferably, have historically been used by Swainson's hawks (as determined by NDDDB or CDFG data and reports).*
- (3) The land is or can be used to grow crops conducive to Swainson's hawk foraging, including alfalfa and other hay crops, lightly grazed pasture, fallow fields, summer harvested row crops, but not cotton and other late harvest crops (see Chapter II, Section C.3.c).*
- (4) If possible, the land contains appropriate areas for the establishment of riparian woodland habitat, or isolated groves in agricultural fields, for future use by Swainson's hawks. Trees which may be planted include valley oaks, cottonwoods, willows, sycamores, and California walnut.*
- (5) Contiguity of upland reserve sites will be maximized. The Swainson's hawk conservation objectives above direct the NBC to focus acquisition of upland reserves in the Swainson's hawk zone. That objective, together with this provision, is intended to ensure that Swainson's hawk habitat protected in reserves will not be excessively fragmented, either inside the Swainson's hawk zone or outside the zone, and that habitat contiguity will be a primary criteria under which upland reserve sites will be selected.*
- (7) The land supports or has the potential to support other covered species which utilize upland habitat (see Tables I-1 and II-4).*

Generally, priority for acquiring upland reserve sites is as follows (in descending priority order): (1) sites located within the Swainson's hawk zone; (2) sites that, in the judgement of the

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NBC and its Technical Advisory Committee, would provide specific, important benefits to other upland-associated covered species (e.g., tricolored blackbird nesting colonies); (3) sites supporting Swainson's hawk nests or foraging habitat outside the Swainson's hawk zone; and (4) any other site that would result in a benefit to any upland covered species.

The NBC will monitor proposed development in the Swainson's hawk zone, where the majority of known Swainson's hawk nest sites are located and, hence, much of the Swainson's hawk nesting and foraging in the Basin occurs. Based on existing general plans, development in this zone is expected to be limited over the life of the Plan. However, if such development does occur, reserve lands established in mitigation for that development shall, likewise, be located within the Swainson's hawk zone. In addition, the NBC shall set as a top priority the acquisition of upland reserve sites in the Swainson's hawk zone (via easement or land purchase), irrespective of any specific development proposals in this area. Further, any reserve lands established in the Swainson's hawk zone shall, to the maximum extent possible, be managed to benefit all upland-associated covered species, though any management in this zone must be fully consistent with Swainson's hawk biology and needs.

In addition, wetland mitigation lands developed primarily for the giant garter snake and the wetland species will also contribute to Swainson's hawk needs. Recent observations by CDFG indicate that rice farming lands are also used by Swainson's hawks for foraging, particularly where there is vegetation at the perimeter of the fields (Dave Zezulak, pers. comm.). Also, all wetland reserves will have an upland component (see Section C. 1 .b above). Thus, wetland reserves, along with the upland reserves described above, will help offset habitat losses affecting the Swainson's hawk within the NBHCP plan area. Also, the upland component of wetland reserves will benefit some of the upland covered species, especially those that also have wetland habitat needs (e.g., the tricolored blackbird).

Specific plans for acquisition of upland habitat reserve lands will be determined by the NBC in consultation with its Technical Advisory Committee, by applying the objectives and criteria described above, and consistent with the requirements described in Section G.2 below (Phasing of Mitigation). Specific plans for management of these lands will be developed as described in Section D below (Management of Reserves).

Upland reserves will initially be designed to maintain existing Swainson's hawk populations and, where possible, to increase such populations through the tree planting program. However, such reserves will be re-designed, as necessary, to meet Swainson's Hawk recovery plan goals, once a Swainson's Hawk Recovery Plan is prepared and approved by CDFG. Specific measures for incorporating any future Swainson's Hawk Recovery Plan are described in Section E (Adaptive Management) and Section H (Program Adaptation for Recovery Plans) of the NBHCP.

Survey Activities

Some survey activities will be needed to guide upland reserve design and take avoidance efforts within the NBHCP plan area (see section C.2.c of the NBHCP). Information likely to be needed includes: (1) assessment of the numbers of Swainson's hawk breeding pairs in the

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NBHCP plan area, including nest sites along the Sacramento River as described under conservation objective (2) above; (2) assessment of annual nesting success; (3) identification of the locations of nest trees, both active and inactive, and the locations of potential nest trees (i.e. trees not known to be used that may be suitable for nesting if adjacent foraging habitat exists or was enhanced); (4) monitoring the status of any trees planted under the tree planting program; (5) estimates of prey densities found in various cover types in the Basin, especially within foraging distance of nesting areas along the Sacramento River; and (6) identification of agricultural fields that do or may provide suitable foraging habitat. Specific survey activities under this section will be determined by the NBC in consultation with its Technical Advisory Committee. These survey activities shall be in addition to those described in Section C.4 of the NBHCP and shall be coordinated with the survey requirements described in Section C.2.c of the NBHCP.

Please refer to the City of Sacramento version of the Natomas Basin Habitat Conservation Plan Chapters IV. D. Reserve Management/Management Plans, IV. E. Adaptive Management, IV. F. Biological Monitoring, IV. H. Program Adaption for Recovery Plans, and IV. I. NBHCP Program Review at 9,000 Acres of Development for additional information on how the NBC will implement the regional mitigation program under the NBHCP.

APPENDIX B

GIANT GARTER SNAKE STANDARD AVOIDANCE AND MINIMIZATION MEASURES TO BE CARRIED OUT DURING CONSTRUCTION ACTIVITIES IN THE METRO AIR PARK PROJECT AREA (March 1999)

Presence of giant garter snake (GGS) should be assumed. Surveys are required to determine where avoidance and minimization measures are appropriate. The following take avoidance and minimization measures for the giant garter snake are required by the USFWS to be carried out by permittees during construction activities in any areas that contain GGS habitat. These measures are subject to occasional revision, so check with the USFWS and/or the NBC Staff Biologist for current measures before proceeding with construction activities.

MEASURE: Within the Natomas Basin, all construction activity within GGS habitat is restricted to the period between May 1 and October 1. This is the active period for giant garter snakes and direct mortality is reduced because snakes are expected to actively move away from danger. This window is timed to avoid spring GGS breeding and dispersal periods, and essential fall foraging and over-wintering periods, which is when the GGS is most vulnerable to take.

If construction cannot be scheduled between May 1 and October 1, contact the Sacramento Office of the USFWS and/or the NBC Staff Biologist to determine if additional measures are necessary to avoid and/or minimize take of GGS.

MEASURE: Pre-construction surveys for GGS must be carried out on all development projects. If any GGS habitat is found within a specific site, the following additional measures will be followed to minimize disturbance of habitat and harassment of GGS, unless they are specifically exempted by the USFWS.

MEASURE: Between April 15 and September 30th, all irrigation ditches, canals, or other aquatic habitat should be completely dewatered, with no puddled water remaining, for at least 15 consecutive days prior to the excavation or filling in of the dewatered habitat. Make sure dewatered habitat does not continue to support GGS prey, which could detain or attract snakes into the area. If a site cannot be completely dewatered, netting and salvage of prey items may be necessary. Further consultation with USFWS is required if waterways cannot be completely dewatered. This measure removes aquatic habitat component and allows GGS to leave on their own.

MEASURE: For sites that contain GGS habitat, no more than 24-hours prior to the start of construction activities, have a qualified biologist survey the project area for the presence of GGS. If construction activities stop on the project site for a period of two weeks or more, a new GGS survey should be completed no more than 24-hours prior to the re-start of construction activities.

MEASURE: Most GGS are found close to water (usually within 200 feet). In any areas where canals or ditches are to be preserved, avoid construction activities within 200 feet from the banks

APPENDIX B — GIANT GARTER SNAKE STANDARD AVOIDANCE AND MINIMIZATION MEASURES TO BE CARRIED OUT DURING CONSTRUCTION ACTIVITIES IN THE METRO AIR PARK PROJECT AREA (March 1999)

of this giant garter snake aquatic habitat. To minimize habitat disturbance, flag the corridor area and confine movement of heavy equipment to existing disturbed areas and roadways.

MEASURE: Confine clearing to the minimal area necessary to facilitate construction activities. Habitat that can be avoided should be cordoned off, clearly flagged, and designated as an "Environmentally Sensitive Area".

MEASURE: All construction personnel shall receive USFWS approved worker environmental awareness training. This training instructs workers on how to identify the GGS and its habitat, and what to do if a GGS is encountered during construction activities. During this training an on-site biological monitor shall be designated.

MEASURE: If a live GGS is found during construction activities, immediately notify the USFWS and the project's biological monitor. The biological monitor, or his assignee, should do the following:

1. Stop construction in the vicinity of the snake. Monitor the snake and give it a chance to leave on its own. If the snake does not show signs of leaving, then slowly move toward the snake to flush it toward adjacent habitat away from construction area. The monitor should remain in the area for the remainder of the work day to make sure the snake does not return. Escape routes for GGS should be determined in advance of construction and GGS should always be allowed to leave on their own. If a GGS does not leave on its own within 1 working day, further consultation with the USFWS is required.
2. Upon locating dead, injured or sick endangered or threatened wildlife species, the permittees or their designated agents must notify within 1 working day the Service's Division of Law Enforcement (2800 Cottage Way, Sacramento, California, 95825) or the Sacramento Fish and Wildlife Office (2800 Cottage Way, Room W-2650, Sacramento, California 95825, telephone 916-414-6600). Written notification to both offices must be made within 3 calendar days and must include the date, time, and location of the finding of a specimen and any other pertinent information.

MEASURE: Fill or construction debris may be used by GGS as an over-wintering site. Therefore, upon completion of construction activities remove any temporary fill and/or construction debris from the site. If this material is situated near undisturbed GGS habitat and it is to be removed between October 1 and May 1, it should be inspected by a qualified biologist to assure that GGS are not using it as hibernaculae.

APPENDIX C

BEST MANAGEMENT PRACTICES FOR RICE FARMING

Ricelands are composed of diverse habitat elements; the rice fields, tail water marshes, the ditch and drain components of the water conveyance system, delivery canals, and associated levees; all of which contribute structure and complexity to this man-made ecosystem. Irrigated rice and the vast network of irrigation ditches and canals in the Sacramento Valley provide some of the last remaining habitat for the giant garter snake (GGS). The GGS can survive in this artificial ecosystem because the spring and summer flooding and fall dry-down of rice culture coincides fairly closely with the biological needs of the species. The combined effects of having rice fields as part of the agricultural landscape, of keeping water in ditches, canals, and sloughs, is important in providing habitat for GGS. A combination of permanent marshes and appropriately managed rice fields would be a practical approach to maintaining GGS numbers.

Rice fields contain warm shallow water with sheltering emergent vegetation (i.e. rice plants) which is present within the fields during the spring-summer-early fall active season of the giant garter snake. This habitat, if managed properly, provides the GGS ease of movement, protection from detection by predators, warmth to aid metabolism, gestation, and digestion. The rice fields also function to produce populations of food organisms to sustain snake populations and may be important as nursery areas for young snakes. Emergent rice fields serve as refuges for snakes when adjacent ditches are drained or are denuded by weed control.

A study by Brode and Hansen in 1993 at Gilsizer slough, where rice was available next to a slough, the GGS were located in rice fields 19 to 20 percent of the time, in marsh habitat 20 to 23 percent, and in canal and agricultural waterway habitats 50 to 56 percent of the time. The Dixon Field Station of the U.S. Geological Survey, Biological Resources Division, studied the GGS in the Natomas Basin area of northern Sacramento County during 1998 and 1999. The study included habitats categorized as rice, ditch, slough/riparian, fallow field, and other. Where marsh-like habitat existed, but there was very little rice available, the snakes extensively used the slough habitat and seldom ventured into surrounded rice fields. At the site where rice fields were more prevalent (Elverta site) the snakes used rice fields when they became emergent habitat. Associated ditches and canals were important habitat even when rice fields were available and they proved the only habitat at other times. At the Elverta site 80-90% percent of the observations of the radio-marked snakes were in ditches with the remainder in rice fields. Snakes began to use rice fields shortly after vegetation emerged in late spring. In the summer, when rice fields were established as emergent habitat, snakes used them in approximately half of the observations; and they used ditches in the other half of the observations. Rice fields were used until early October when they were completely dewatered. GGS then used ditches which retained water the longest after rice harvest and overwintered in burrows high in the ditch banks. Giant garter snakes primarily used the edges of rice fields and checks, but the importance of the rice fields to GGS in the Natomas Basin should not be underestimated (Wylie 2000).

APPENDIX C – RICE FARMING

In the 1980's and early 1990's vegetative cover used to be markedly more abundant along ditch banks according to the long-term observations of George Hanson (Wylie 2000). Management for GGS can be improved by using a strategy of benign neglect; that is, to allow vegetative cover to grow along ditches, canals, and sloughs. Also, more habitat could be provided by maintaining water in drainage ditches for longer periods. Maintenance of water in ditches would be most important in the spring, after the snakes become active and before rice is planted, and in the fall, after the rice fields are drained and before the snakes enter dormancy. There is a great potential to enhance populations of GGS in the Natomas by appropriate habitat management and habitat creation. Existing rice agriculture could become better habitat for GGS if flood control and water conveyance agencies, and rice growers were to follow recommended low cost management guidelines. Therefore, flood control and water conveyance agencies, and rice growers have the opportunity to reduce take of GGS and maximize habitat values. These guidelines and methods are considered best management practices (BMPs).

The goals of following best management practices are to: 1) reduce mortality of GGS associated with management of ricelands; 2) maintain and enhance the value of existing habitat provided by rice lands; and 3) allow habitat elements to become established or reestablished to provide additional habitat that could support GGS. The USFWS realizes that some of the BMPs below may not be appropriate to implement in certain situations. The measures below provide several management options to meet the goals of the BMPs, but do not preclude use of other methods that may contribute to these goals. If the BMP's below cannot be implemented or if other methods are proposed, the USFWS recommends that the flood control and water conveyance agencies, and rice growers work with the USFWS to determine what site specific measures may be more appropriate.

BMPs may be subject to modification in the future. The flood control and water conveyance agencies, and rice growers should contact USFWS staff to obtain information on the most current BMPs.

Following is a list of BMPs that if employed would act to maximize GGS compatibility with rice farming and minimize GGS mortality:

1) Vegetation Management

Vegetation growing along ditch and canal banks is important shelter for the GGS. Vegetation should be allowed to grow on the rice check berms and perimeter levees and there should be a minimum of disturbance to ditch banks. Annual maintenance activities along ditches and canals, should maintain buffer strips of standing vegetation along the ditch and canal. The use of native grasses on canals and ditches is encouraged because the deep-rooted native grasses control erosion, require less weed maintenance, and excludes annual weedy species. Avoid vegetation management along canals and ditches whenever possible. If vegetation control is necessary for the movement of irrigation water then the following is a list of several different methods for that purpose: If vegetation control is used then it should be used only on one side of the ditch in any given year.

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- a. Mowing or Hand Removal. These are the preferred methods used to control terrestrial vegetation cover. Mowing vegetation growing along ditch banks from the top of the bank down to the water line should be avoided to the greatest extent practicable. If mowing is used to control terrestrial vegetation, the height of the vegetation after mowing should be at least 6-12 inches in height on top of and inside canal and ditch banks to the water line. Mowing to this height will minimize the risk that GGS will be killed or injured by mowing equipment and will leave some protective vegetative cover.
- b. Burning. Burning is a less preferable method of vegetation control than mowing. If burning is necessary then the most preferable time to burn is in late fall (after November 1). If burning is done in the spring, it should be done early enough so that the vegetation can recover by the time the snakes are active. This BMP does not exempt the operator from following any other state or county laws, regulations or ordinances regarding burning activities.
- c. Discing. Discing is also a less preferable method for vegetation control because of greater risk of injury to GGS and because underground retreats such as burrows and soil crevices may be destroyed. Discing should only be used during the active season of the snake, so the snakes can attempt to escape injury.
- d. Herbicides. Use of herbicides to control terrestrial and aquatic vegetation should be minimized to the greatest extent practicable, and use shall be consistent with manufacturer's recommendations and all other applicable laws and regulations. The use of Magnacide H (Acrolene) shall be limited to canals or ditches where such use has been approved by the California Department of Fish and Game. Spot treatment with herbicide is preferable over broad herbicide application.

2) Canal and Ditch Maintenance

- a. In those areas where GGS habitat occurs conduct ditch and canal maintenance between May 1 and October 1, where possible.
- b. Conduct maintenance from one side only in any given year. Alternate sides each year or if possible leave one side undisturbed indefinitely.
- c. For ditch and canal cleaning/dredging - Ditch and canal clearing or dredging should only be conducted when necessary to maintain flows or capacity. If it is not possible to retain vegetation on both ditch banks during excavation, vegetation should be maintained on one bank. When cleaning is necessary, remove vegetation or silt only below the water line, lifting the spoils straight up, and placing them away from the ditch banks to avoid disturbing the banks and burrows. Before filling an existing canal or ditch, the ditch or canal shall be de-watered for two weeks. This waiting period will allow any GGS in the vicinity to relocate to other areas and will lessen the risk of mortality to GGS. Ditches should only be filled between May 1 and October 1.

3) Minimize Vehicle Access

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GGs are vulnerable to road kill death due to their habit of basking on ditch and canal banks, and access roads. GGS are most likely to bask on roadsides in the early spring and on cool mornings. In order to minimize the number of vehicular caused kill deaths:

- a. Restrict motor vehicle access and travel on and around the canals and ditches and rice fields to maintenance or other official vehicles. Movement of heavy equipment will be confined to existing roadways to the greatest extent practicable to minimize habitat disturbance.
 - b. Exclude motorcycles and off-road vehicle activity along the edges of rice fields.
 - c. Avoid putting new roads on levees immediately next to the water supply and drainage systems.
 - d. Brief field hands on the importance of avoiding running over snakes with farm vehicles.
 - e. Participate in any programs intended to minimize illegal trespass and vandalism in the rice fields.
- 4) Rodent Control
- a. Minimize rodent control as much as possible.
 - b. Leave rodent burrows and soil crevices wherever possible to provide GGS retreats and wintering sites.
 - c. Avoid discing or scraping canal and ditch banks which could remove burrows or trap or kill snakes.
 - d. Rodent baits are preferred over fumigants as rodent control. When using approved fumigants for the control of rodents on canal and ditches, the water user shall follow instructions found on the label and any applicable State or Federal laws and regulations. In areas where there is GGS habitat, the use of fumigants to control rodents should be used only from May 1 to October 1.
 - e. These guidelines do not prohibit other methods of rodent control. However, the flood control and water conveyance agencies, and rice growers should consult with the USFWS and CDFG to determine whether adverse impacts to GGS would be likely to occur and, if so, to develop suitable measures to reduce such impacts.
- 5) Public Safety and Health

Notwithstanding, the BMP's set forth above, it may be necessary and/or legally required of the water user to maintain water conveyance systems, including canals, ditches and levees, to

APPENDIX C – RICE FARMING

provide for public health and safety and/or property protection. In maintaining these irrigation facilities under these circumstances, full consideration where practical, will be given to consider feasible alternatives which may limit impacts to the GGS.

3. Publications

Flood control and water conveyance agencies, and rice growers should manage rice consistent with the production guidance provided in:

- a. *Integrated Pest Management for Rice*, Second Edition, published by the Regents of the University of California
- b. United States Environmental Protection Agency County Pesticide Interim Measures Bulletins
- c. The current University of California Pest Management Guidelines

These publications are designed to reduce impacts of pest control on non-target species. Also, all water users should follow all state and local regulations regarding chemical use.

Take resulting from pesticide (includes herbicides, rodenticides, fungicides, bio-controls) use is not a covered activity and remains subject to the state and federal endangered species acts and other federal and state regulations which apply to pesticide use.

APPENDIX D

**MEMORANDUM ON THE NBHCP FEE
BY EPS FOR THE NATOMAS BASIN CONSERVANCY**



**Economic &
Planning Systems**
*Real Estate Economics
Regional Economics
Public Finance
Land Use Policy*

MEMORANDUM

To: John Roberts, *Natomas Basin Conservancy*
From: Tim Youmans, Georgette Lorenzen, and Allison Shaffer
Subject: Natomas Basin Habitat Conservation Plan; EPS #10175
Date: May 29, 2001

At the request of the Natomas Basin Conservancy (NBC) and the City of Sacramento, EPS has revised the Natomas Basin Habitat Conservation Plan (NBHCP) fee based on a number of factors that are detailed below. The proposed fee also takes into consideration the Agreement to Settle Litigation (or the "Settlement Agreement") adopted by the Sacramento City Council in May 2001 that allows for development of 1,668 acres.

As a result there are essentially two fee levels proposed: the Base fee, which is similar to the current NBHCP fee with noted changes as described below, and a second fee that is the Base fee plus a land acquisition premium that is intended to reflect the projected increase in land prices in zones where habitat acres are directed to be purchased as indicated in the Settlement Agreement.

Figure 1 below presents the proposed NBHCP fee including both the Base fee amount and the Base fee amount plus Settlement Land Acquisition (LA) Premium fee amount. The proposed fee level continues to assume the current HCP mitigation requirement of one half acre of mitigation land for each gross acre of developed land. Therefore the fee as shown reflects 50 percent of the cost per acre of habitat mitigation as shown in **Figure 1**. The Base Fee component and the Settlement LA Premium component are discussed in more detail below.

The Base fee is comprised of fee components for five funds: Land Acquisition (LA), Restoration and Enhancement (RE), Administration/O&M, O&M Endowment, and a Supplemental Endowment fund for land acquisition. The first four funds have historically been included in the NBHCP fee program. The fifth fund, Supplemental Endowment fund for land acquisition, is a newly recommended fund that will address judicial concerns regarding the ability of the NBC to purchase the last mitigation acres once all fees are paid. In other words, it will provide a contingency that will either allow the NBC to purchase mitigation acres in advance of requirements or provide a cushion in the case that land prices are higher than what the NBHCP fee allows for in acquisition costs.

SACRAMENTO
1750 Creekside Oaks Dr., Ste. 290 Phone: 916-649-8010
Sacramento, CA 95833-3647 Fax: 916-649-2070
www.epsys.com

BERKELEY DENVER
Phone: 510-841-9190 Phone: 303-575-8112
Fax: 510-841-9208 Fax: 303-623-1294

Figure 1
Proposed NBHCP Fee
Including the Settlement Land Acquisition Premium

Item	Cost per Acre of Habitat (a)	Mitigation Fee per Acre of Development (b)= (a) x 0.5
<u>Base Cost/Fee</u>		
Land Acquisition Cost (LA)		
Land Cost	\$4,750	\$2,375
Transaction Costs & Contingency	\$1,250	\$625
Total Land Acquisition Cost	\$6,000	\$3,000
Restoration/Enhancement (RE)	\$736	\$368
Administration/O&M	\$3,110	\$1,555
O&M Endowment Fund	\$1,600	\$800
Supplemental Endowment Fund	\$300	\$150
Fee Collection Administration (2%)		\$120
Subtotal	\$11,746	\$5,993
<u>Land Acquisition (LA) Premium</u>		
Land Acquisition Cost Premium		
Land Cost	\$6,250	\$3,125
Transaction Costs & Contingency	\$1,645	\$822
Fee Collection Administration (2%)		\$81
Subtotal LA Premium	\$7,895	\$4,028
Total		\$10,021

The following briefly describes the major revisions to the NBHCP Base fee.

NBHCP BASE FEE

The proposed Base fee is estimated based on an updated cash flow analysis prepared by EPS in connection with the revised HCP and preparation of the Environmental Impact Study (EIS). The cash flow analysis was last updated in July 2000. The Base fee cash flow analysis incorporates updates based on the revised HCP and other revisions such that the cash flow modeling more accurately reflects the experience and projected operations of the NBC. These updates include:

- **Rice Revenue Projections:** Rice revenues were modeled to more precisely match current estimates of projected revenue over the next two years.

- **Revised Administrative Cost Estimates:** Administrative costs were revised based on the current budget estimates of the NBHCP.
- **Fund Balance Adjustments:** The cash flow analysis was adjusted such that beginning balances in 2001 match actual fund balances of the NBHCP as of December 31, 2000.
- **Transfer from O&M/Admin to Restoration & Enhancement:** The HCP fee program, since conception, was structured to allow transfers of funds between the Land Acquisition, Restoration & Enhancement, and Administration/O&M funds based on any surpluses or deficits that might exist in those funds. Currently, the O&M/Administration fund has operating surpluses due to operating and administrative efficiencies of the NBC while the revenues for Restoration & Enhancement need to be supplemented over the next few years due to higher than anticipated restoration and enhancement costs for marsh lands. Not only is the cost to restore and enhance managed marsh significantly higher than the original plan estimated, it is also anticipated that managed marsh restoration and enhancement obligations will be far more intense and concentrated than provided in the original plan due to a more condensed period of development activity. Therefore, a transfer from the O&M/ Administration fund to the Restoration & Enhancement fund was assumed in 2003 and 2004 in the cash flow model.
- **Hunting Revenues:** The NBC has recently entered into a contract for the management of hunting operations on NBC lands. Based on projected revenues to the NBC from the providers of these services, projected hunting revenues were revised to reflect a more realistic projection of the likely net operating income. The current cash flow analysis assumes \$12 per hunting acre whereas the July 2000 update assumed hunting revenues of approximately \$37 per hunting acre.
- **Administrative Costs Post-Land Acquisition:** Previous versions of the financial analysis have assumed that administration costs would be reduced by 67 percent after all mitigation lands have been acquired. Based on discussions with the NBC and information provided by John Roberts, we have come to the conclusion that it is unrealistic to assume a significant decrease in administrative costs once all land acquisition has been completed. Therefore we have assumed a 15 percent reduction in administration costs. The reduction allows for a decrease in legal expenses, but leaves intact funding for most other administrative expenses. This revision to administration costs over the long term represents approximately a 20 percent increase in the Admin./O&M expenditures on an annual basis. However, the Admin./O&M fee is a relatively small component, approximately 16 percent, of the overall fee program including the Settlement Agreement Premium for land acquisition.
- **Acceleration of Fees Paid (Grading Permits Pulled):** Past cash flow model analyses have assumed a 50- year development absorption schedule for the 17,500 acres of planned development in the Natomas Basin. Historical development over the last three years has been substantially greater than anticipated by the original cash flow analysis. Given recent market trends, it is likely that development activity will continue to be at higher levels than originally projected. Even if the market slows, and as a result development activity also slows, there is a very high probability that developers will pull grading permits even if they do not plan to develop the property in the immediate future in order to avoid future delays in the permitting process due to the legal

challenges to the NBHCP fee. Therefore, the current cash flow analysis assumes a 15-year development period, during which grading permits are projected to be pulled and the NBHCP fees paid. Actual development may substantially lag the grading permit stage.

CASH FLOW ANALYSIS

The assumption tables for the cash flow analysis are presented in **Figure 2** through **Figure 4**. A summary of the cash flow analysis is shown in **Figure 5** and **Figure 6**. The detailed cash flow analysis is presented in **Appendix A**.

SETTLEMENT LAND ACQUISITION PREMIUM

The City of Sacramento and Sutter County are currently revising the Habitat Conservation Plan to address judicial findings made by United States District Court for the Eastern District of California. In order to allow some increment of development to occur prior to the ultimate resolution of the litigation, specified parties including the City of Sacramento, environmental interest groups, and certain developer groups have entered into the "Agreement to Settle Litigation" (the Settlement Agreement) as of May 15, 2001.

The Settlement Agreement allows for the City of Sacramento to issue "Urban Development Permits" that will allow grading on 1,668 acres within the Natomas Basin. Mitigation land acquisition can only be accomplished in restricted areas within the Natomas Basin. This will likely result in increased land cost, therefore necessitating higher fees. Based on recent comparable transactions in the areas or zones specified in the Settlement Agreement, it is estimated that the per acre cost for habitat land is approximately \$11,000 per acre. The Base Fee assumes \$4,750 per acre cost for habitat land. Therefore, the fee schedule proposed herein includes a premium of \$6,250 per acre for the cost of habitat land bringing the total land cost per habitat acre to \$11,000. Transaction costs and contingencies are then added to the estimated acquisition cost for a total cost per acre of habitat land of \$13,895. The Land Acquisition fee component is 50 percent of the cost per acre of habitat land based on the mitigation ratio of 0.5 acre of habitat to 1.0 acre of development.

The NBC currently has acquired 258 acres of mitigation lands in excess of the number of mitigation acres required to mitigate the impacts of development within the Natomas basin under grading permits issued by the City to date. Therefore, an additional 576 acres in particular zones as specified in the Settlement Agreement will need to be acquired.

Figure 2
Natomas Basin HCP
Land Acquisition and Restoration/Enhancements Cost
and Acquired Habitat Land Utilization Assumptions

Base Case 17,500 acres of development 1/2 acre of mitigation land per gross acre of developed land 25% marsh
--

Part A - Assumptions				Notes:
Inflation	0.0%			
Interest Rate	3.0%			
Land Acquisition Values per Acre	<u>Land Value</u>	<u>Permitted by Plan</u>	<u>Assumed in Financial Analysis</u>	
In-Basin Lands	\$4,750	80%	100%	Estimated \$4,500-\$5,500 per acre range Estimated \$2,500-\$3,500 per acre range per Recent Experience of NBHCP
Out-of-Basin Lands	\$3,000	20%	0%	
Average Land Value (1)	\$4,750	Use In-Basin Land Value		
Plus Transaction Costs & Contingency	\$1,250	per Acre		
Average Land Acquisition Cost	\$6,000	per acquired acre		Beginning 1/1/01
Estimated Use of In-Basin Lands				
Marsh	25%			
Existing Rice	50%			
Other/Upland	25%			
Total Initial Use	100%			
Rice Converted to Marsh		After year 5, 324 acres in marsh 25% thereafter		
Rice Lands				
Uplands/Fallow	10%			
Leased for Other Crops	0%			
Leased Rice Base Land	90%			
Total Rice Lands	100%			
Initial Restoration/Enhancement	<u>Use of Land</u>	<u>Initial Costs</u>	<u>Weighted Cost (\$)</u>	
Expended At Time Land Is Acquired				
Marsh (2)	0%	\$0	\$0	Note (3)
Existing Rice	75%	\$0	\$0	Note (3)
Dry Converted to Rice	0%	\$0	\$0	Note (3)
Other Upland	25%	\$0	\$0	Note (3)
Subtotal	100%		\$0	
Expended At Time Land Is Converted				
Rice/Other Converted to Marsh	25%	\$2,482	\$621	Note (4)
Site Specific Plan Costs			\$116 per acre	Based on initial Site Specific Plan for 1,297 acres
Average Cost per Habitat Acre			\$736	Weighted average cost per acre

assumptions1

Source: Natomas Basin Conservancy

- (1) Assumes all acquisition occurs at the average in-basin land value.
- (2) Initial use of marsh land estimated at 0% because NBHCP estimates that little to no marshland is available for acquisition. However, rice land will be converted to marsh land.
- (3) The initial costs of marsh, existing rice, dry land converted to rice and other upland have been set to zero as no initial restoration or enhancement costs are anticipated.
- (4) The current estimate of \$2,482 per acre is calculated from the May 2001 cost estimate of \$2.13 million for 858 acres and is based on creation/maintenance of habitat for the giant garter snake and the Swainson's hawk.
- (5) The cost of restoration and enhancement is weighted by the percent of acres assumed to be converted or used for that particular land use.

Figure 3
 Natomas Basin HCP
 Operations & Maintenance Assumptions

Base Case 17,500 acres of development 1/2 acre of mitigation land per gross acre of developed land 25% marsh
--

Part A - Assumptions Con't		Notes:	
Operations & Maintenance Costs			
Marsh	\$281 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates Based on Wildlands, Inc. Estimates alfalfa, safflower, etc. Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates	
Upland/Fallow	\$18 per acre		
Land Leased for Planted Rice Base	\$3 per acre		
Land Leased for Other Crops	\$3 per acre		
Other	\$0 per acre		
Hunting	\$0 per acre		
Misc./Monit./Adapt. Management	\$27 per acre		
Special Assessment & Property Tax Costs			
<u>Sacramento County</u>			
Reclamation District #1000	\$13.1 per acre	Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Assumes average assessed value of land at \$2,400 per acre Assumes average assessed value of land at \$2,400 per acre	
NCMWA	\$0.4 per acre		
SAFCA O&M Assessment #1	\$5.7 per acre		
CSAI Safety Lights	\$0.1 per acre		
Property Tax [1]	\$25.6 per acre		
Subtotal Sacramento County	\$45 per acre		
<u>Sutter County</u>			
Reclamation District #1000	\$13.1 per acre		
NCMWC	\$0.4 per acre		
Property Tax	\$24.0 per acre		
Subtotal Sutter County	\$37 per acre		
Administrative Costs			
During Development	\$447,695 per year	Figure 5 for detail phased in over 3- 5 years	
After All Land Acquired	\$380,541 per year		
Operations & Maintenance Revenues			
Crop Land Leases			
<u>Through 2002</u>			
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices	\$135 - \$210 range
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices	\$75 - \$100 range
<u>2003 +</u>			
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices	\$135 - \$210 range
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices	\$75 - \$100 range
Hunting			
Hunting Revenue per Acre	\$12 per acre		Based on Wildlands Estimate for initial Site Plan

"assumptions2"

Source: Natomas Basin Conservancy

[1] Includes G.O. bond assessment.

Figure 4
Natomas Basin HCP
Estimated Annual Natomas Basin Conservancy (NBC) Administrative Costs

	Annual Cost	Notes
<u>Administrative Expenses</u>		
Staff	\$150,000	
Benefits	\$49,500	
Board Expense	\$6,000	
Subtotal	\$205,500	
<u>Office Expense</u>		
Rent	\$15,000	
Telephone	\$1,700	
Copying & Printing	\$16,000	
Office Supplies	\$5,000	
Postage	\$600	
Equipment	\$2,500	
Auto Expense	\$6,500	
Subtotal	\$47,300	
<u>Miscellaneous Expense</u>		
Insurance	\$23,000	Liability and E&O
Accounting	\$16,500	
Legal	\$60,000	
Corporate Taxes	\$1,000	
Subtotal	\$100,500	
Contract Work/ Public Education/ Publications/Monitoring/Reports, etc.	\$36,000	
Subtotal Costs	\$389,300	
Contingency	\$58,395	15% Contingency
Total Administration During Habitat Acquisition Phase	\$447,695	
Total Administration After Habitat Acquisition	\$380,541	[1]

"admin"

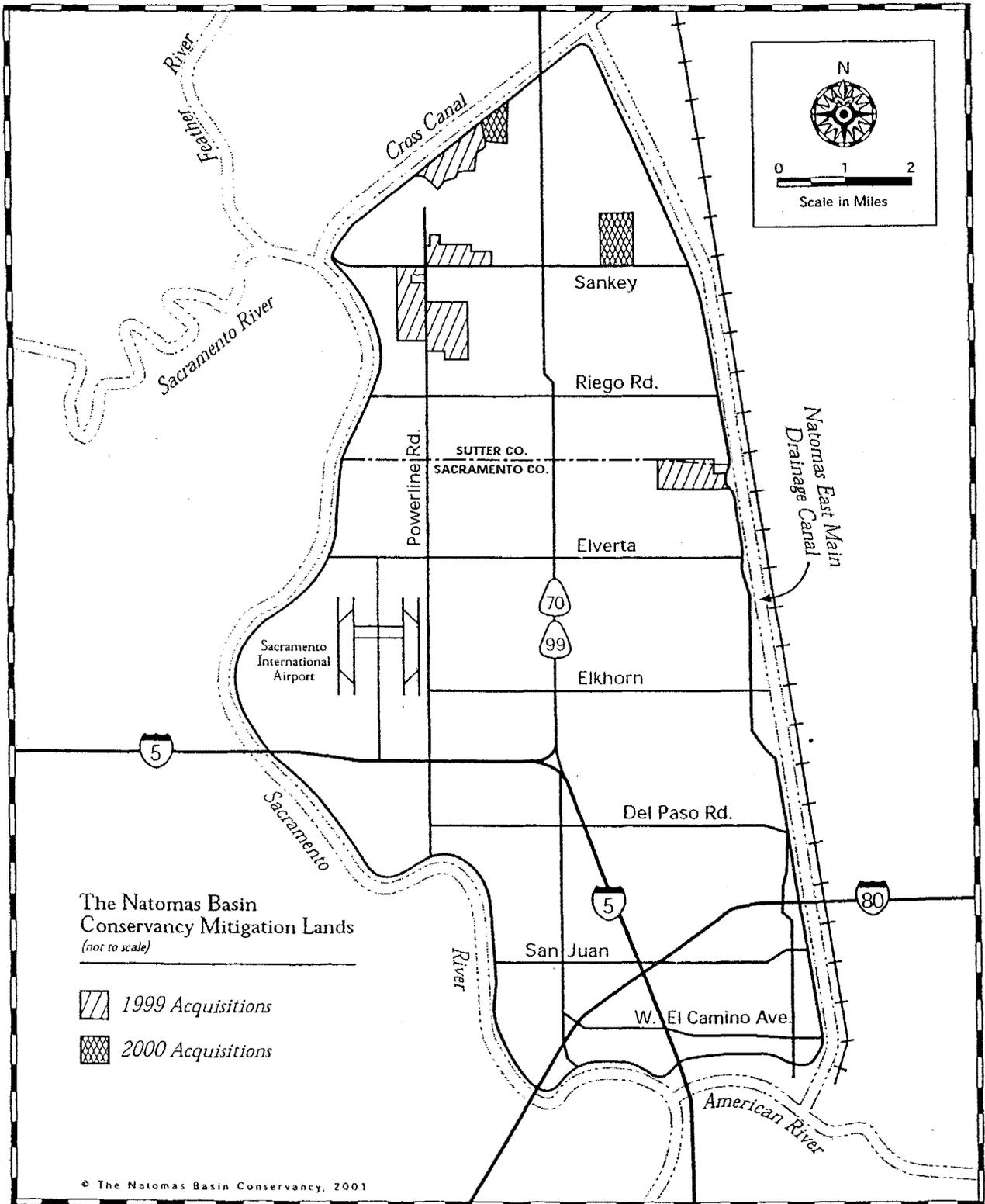
Source: NBC FY 2001 budget estimate

[1] Administrative costs are reduced by 15% after all habitat lands have been acquired.

THE NATOMAS BASIN CONSERVANCY

2001

Base Map



The Natomas Basin
Conservancy Mitigation Lands
(not to scale)

-  1999 Acquisitions
-  2000 Acquisitions

APPENDIX E

**RECOMMENDED TIMING AND METHODOLOGY FOR
SWAINSON'S HAWK NESTING SURVEYS IN
CALIFORNIA'S CENTRAL VALLEY**

BY THE SWAINSON'S HAWK TECHNICAL ADVISORY COMMITTEE

RECOMMENDED TIMING AND METHODOLOGY FOR SWAINSON'S HAWK NESTING SURVEYS IN CALIFORNIA'S CENTRAL VALLEY

Swainson's Hawk Technical Advisory Committee

May 31, 2000

This set of survey recommendations was developed by the Swainson's Hawk Technical Advisory Committee (TAC) to maximize the potential for locating nesting Swainson's hawks, and thus reducing the potential for nest failures as a result of project activities/disturbances. The combination of appropriate surveys, risk analysis, and monitoring has been determined to be very effective in reducing the potential for project-induced nest failures. As with most species, when the surveyor is in the right place at the right time, Swainson's hawks may be easy to observe; but some nest sites may be very difficult to locate, and even the most experienced surveyors have missed nests, nesting pairs, mis-identified a hawk in a nest, or believed incorrectly that a nest had failed. There is no substitute for specific Swainson's hawk survey experience and acquiring the correct search image.

METHODOLOGY

Surveys should be conducted in a manner that maximizes the potential to observe the adult Swainson's hawks, as well as the nest/chicks second. To meet the California Department of Fish and Game's (CDFG) recommendations for mitigation and protection of Swainson's hawks, surveys should be conducted for a ½ mile radius around all project activities, and if active nesting is identified within the ½ mile radius, consultation is required. In general, the TAC recommends this approach as well.

Minimum Equipment

Minimum survey equipment includes a high-quality pair of binoculars and a high quality spotting scope. Surveying even the smallest project area will take hours, and poor optics often result in eye-strain and difficulty distinguishing details in vegetation and subject birds. Other equipment includes good maps, GPS units, flagging, and notebooks.

Walking vs Driving

Driving (car or boat) or "windshield surveys" are usually preferred to walking if an adequate roadway is available through or around the project site. While driving, the observer can typically approach much closer to a hawk without causing it to fly. Although it might appear that a flying bird is more visible, they often fly away from the observer using trees as screens, and it is difficult to determine from where a flying bird came. Walking surveys are useful in locating a nest after a nest territory is identified, or when driving is not an option.

Angle and Distance to the Tree

Surveying subject trees from multiple angles will greatly increase the observer's chance of detecting a nest or hawk, especially after trees are fully leafed and when surveying multiple trees

in close proximity. When surveying from an access road, survey in both directions. Maintaining a distance of 50 meters to 200 meters from subject trees is optimal for observing perched and flying hawks without greatly reducing the chance of detecting a nest/young. Once a nesting territory is identified, a closer inspection may be required to locate the nest.

Speed

Travel at a speed that allows for a thorough inspection of a potential nest site. Survey speeds should not exceed 5 miles per hour to the greatest extent possible. If the surveyor must travel faster than 5 miles per hour, stop frequently to scan subject trees.

Visual and Aural Ques

Surveys will be focused on both observations and vocalizations. Observations of nests, perched adults, displaying adults, and chicks during the nesting season are all indicators of nesting Swainson's hawks. In addition, vocalizations are extremely helpful in locating nesting territories. Vocal communication between hawks is frequent during territorial displays; during courtship and mating; through the nesting period as mates notify each other that food is available or that a threat exists; and as older chicks and fledglings beg for food.

Distractions

Minimize distractions while surveying. Although two pairs of eyes may be better than one pair at times, conversation may limit focus. Radios should be off, not only are they distracting, they may cover a hawk's call.

Notes and Species Observed

Take thorough field notes. Detailed notes and maps of the location of observed Swainson's hawk nests are essential for filling gaps in the Natural Diversity Data Base; please report all observed nest sites. Also document the occurrence of nesting great horned owls, red-tailed hawks, red-shouldered hawks and other potentially competitive species. These species will infrequently nest within 100 yards of each other, so the presence of one species will not necessarily exclude another.

TIMING

To meet the minimum level of protection for the species, surveys should be completed for at least the two survey periods immediately prior to a project's initiation. For example, if a project is scheduled to begin on June 20, you should complete 3 surveys in Period III and 3 surveys in Period V. However, it is always recommended that surveys be completed in Periods II, III and V. Surveys should not be conducted in Period IV.

The survey periods are defined by the timing of migration, courtship, and nesting in a "typical" year for the majority of Swainson's hawks from San Joaquin County to Northern Yolo County. Dates should be adjusted in consideration of early and late nesting seasons, and geographic differences (northern nesters tend to nest slightly later, etc). If you are not sure, contact a TAC member or CDFG biologist.

Survey dates Justification and search image	Survey time	Number of Surveys
--	-------------	-------------------

I. January-March 20 (recommended/optional)	<i>All day</i>	<i>1</i>
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Prior to Swainson's hawks returning, it may be helpful to survey the project site to determine potential nest locations. Most nests are easily observed from relatively long distances, giving the surveyor the opportunity to identify potential nest sites, as well as becoming familiar with the project area. It also gives the surveyor the opportunity to locate and map competing species nest sites such as great horned owls from February on, and red-tailed hawks from March on. After March 1, surveyors are likely to observe Swainson's hawks staging in traditional nest territories.

II. March 20 to April 5	<i>Sunrise to 1000 1600 to sunset</i>	<i>3</i>
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Most Central Valley Swainson's hawks return by April 1, and immediately begin occupying their traditional nest territories. For those few that do not return by April 1, there are often hawks ("floaters") that act as place-holders in traditional nest sites; they are birds that do not have mates, but temporarily attach themselves to traditional territories and/or one of the site's "owners." Floaters are usually displaced by the territories' owner(s) if the owner returns.

Most trees are leafless and are relatively transparent; it is easy to observe old nests, staging birds, and competing species. The hawks are usually in their territories during the survey hours, but typically soaring and foraging in the mid-day hours. Swainson's hawks may often be observed involved in territorial and courtship displays, and circling the nest territory. Potential nest sites identified by the observation of staging Swainson's hawks will usually be active territories during that season, although the pair may not successfully nest/reproduce that year.

III. April 5 to April 20	<i>Sunrise to 1200 1630 to Sunset</i>	<i>3</i>
---------------------------------	---	----------

Although trees are much less transparent at this time, activity at the nest site increases significantly. Both males and females are actively nest building, visiting their selected site frequently. Territorial and courtship displays are increased, as is copulation. The birds tend to vocalize often, and nest locations are most easily identified. This period may require a great deal of "sit and watch" surveying.

IV. April 21 to June 10	<i>Monitoring known nest sites only Initiating Surveys is not recommended</i>	
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Nests are extremely difficult to locate this time of year, and even the most experienced surveyor will miss them, especially if the previous surveys have not been done. During this phase of nesting, the female Swainson's hawk is in brood position, very low in the nest, laying eggs, incubating, or protecting the newly hatched and vulnerable chicks; her head may or may not be visible. Nests are often well-hidden, built into heavily vegetated sections of trees or in clumps of mistletoe, making them all but invisible. Trees are usually not viewable from all angles, which may make nest observation impossible.

Following the male to the nest may be the only method to locate it, and the male will spend hours away from the nest foraging, soaring, and will generally avoid drawing attention to the nest site. Even if the observer is fortunate enough to see a male returning with food for the female, if the female determines it is not safe she will not call the male in, and he will not approach the nest; this may happen if the observer, or others, are too close to the nest or if other threats, such as rival hawks, are apparent to the female or male.

V. *June 10 to July 30 (post-fledging)*

Sunrise to 1200

3

1600 to sunset

Young are active and visible, and relatively safe without parental protection. Both adults make numerous trips to the nest and are often soaring above, or perched near or on the nest tree. The location and construction of the nest may still limit visibility of the nest, young, and adults.

APPENDIX F

**CONSERVATION GUIDELINES FOR THE
VALLEY ELDERBERRY LONGHORN BEETLE**

BY THE U.S. FISH AND WILDLIFE SERVICE

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

9 July 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor compensation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (*Federal Register* 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (*Sambucus* species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, compensation is required (refer to Table 1). Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no compensation is required for removal of elderberry plants with no exit holes and no stems measuring 1.0 inch or greater in diameter at ground level. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization and compensation measures should be proposed as described below.

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.
2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.
3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.

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4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

1. Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.
2. Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.
3. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.
4. The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.
5. Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a compensation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the compensation ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate compensation as outlined in Table 1.

1. **Monitor.** A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

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2. **Timing.** Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.
3. **Transplanting Procedure.**
 - a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.
 - b. Excavate a hole of adequate size to receive the transplant.
 - c. Excavate the plant using a Vemeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the compensation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.
 - d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.
 - e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.
 - f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

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Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the compensation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Compensation ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the compensation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the compensation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the compensation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the compensation area. Only stock from local sources should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The compensation area is suited for riparian forest habitat. Associated natives adjacent to the compensation area are box elder (*Acer negundo californica*), walnut (*Juglans californica* var. *hindsii*), sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), willow (*Salix gooddingii* and *S. laevigata*), white alder (*Alnus rhombifolia*), ash (*Fraxinus latifolia*), button willow (*Cephalanthus occidentalis*), and wild grape (*Vitis californica*).

Compensation (based on ratios in Table 1):

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- Transplant the two elderberry plants that will be affected to the compensation area.
 - Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
 - Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):
 - 5 saplings each of box elder, sycamore, and cottonwood
 - 5 willow seedlings
 - 5 white alder seedlings
 - 5 saplings each of walnut and ash
 - 3 California button willow
 - 2 wild grape vines
- Total: 40 associated native species
- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for compensation plantings. The compensation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The compensation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the compensation area are willow (*Salix* species), blue oak (*Quercus douglasii*), interior live oak (*Q. wislizenii*), sycamore, poison oak (*Toxicodendron diversilobum*), and wild grape.

Compensation (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the compensation area.
- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):
 - 20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

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- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for compensation plantings. The compensation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Compensation Area—Provide Habitat for the Beetle in Perpetuity

The compensation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site compensation areas where appropriate.

1. **Size.** The compensation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 compensation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 compensation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the compensation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed compensation area.

No area to be maintained as a firebreak may be counted as compensation area. Like the avoidance area, the compensation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the compensation area and the adjacent lands. For example, herbicides and pesticides are often used on orchards or vineyards. These chemicals may drift or runoff onto the compensation area if an adequate buffer area is not provided.

2. **Long-Term Protection.** The compensation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the compensation area must be arranged. Compensation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the compensation area; and the applicant must receive approval from the Service that the compensation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation

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easement, or deed restrictions protecting the compensation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the compensation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the compensation area. The Service must be provided with written documentation that funding and management of the compensation area (items 3-8 above) will be provided in perpetuity.

3. Weed Control. Weeds and other plants that are not native to the compensation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.
4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the compensation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.
5. Litter Control. No dumping of trash or other material may occur within the compensation area. Any trash or other foreign material found deposited within the compensation area must be removed within 10 working days of discovery.
6. Fencing. Permanent fencing must be placed completely around the compensation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be repaired/replaced within 10 working days if it is found to be damaged. Some compensation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.
7. Signs. A minimum of two prominent signs must be placed and maintained in perpetuity at the compensation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

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Monitoring

The population of valley elderberry longhorn beetles, the general condition of the compensation area, and the condition of the elderberry and associated native plantings in the compensation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If mitigation is done in stages (i.e., not all mitigation is implemented in the same time period), each stage of mitigation will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.
2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.
3. An evaluation of the elderberry plants and associated native plants on the site, and on the compensation area, if disjunct, including the number of plants, their size and condition.
4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and compensation areas.
5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Assistant Field Supervisor for Endangered Species, Sacramento Field Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles

or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the compensation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Field Office should be provided with a copy of the receipt from the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the compensation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Field Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 979-2120 (Sacramento Valley Branch), or (916) 979-2752 (Coast Bay Delta Branch), or (916) 979-2728 (San Joaquin Branch), or (916) 979-2749 (Forest Ecosystems Branch), or write to:

U.S. Fish and Wildlife Service
Ecological Services
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

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Table 1: Compensation ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes Y/N (quantify)	Elderberry Seedling Ratio ¹	Associated Native Plant Ratio ²
non-riparian	stems $\geq 1"$ & $\leq 3"$	No:	1:1	1:1
		Yes:	2:1	2:1
non-riparian	stems $> 3"$ & $< 5"$	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems $\geq 5"$	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems $\geq 1"$ & $\leq 3"$	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems $> 3"$ & $< 5"$	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems $\geq 5"$	No:	4:1	1:1
		Yes:	8:1	2:1

¹ Ratios in the *Elderberry Seedling Ratio* column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

² Ratios in the *Associated Native Plant Ratio* column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

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Literature Cited

- Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service; Sacramento, California.
- Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.
- USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.
- USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.