

9.0 PUBLIC HEALTH (MOSQUITO ABATEMENT)

This chapter analyzes the public health effects of the project, particularly with regard to mosquito abatement. The chapter discusses historical and existing efforts to monitor and control mosquito populations in the project area, as well as regional and site-specific issues pertaining to mosquito and disease control as a background for assessing the impacts of the project on mosquito populations and mosquito abatement efforts. Other than potential impacts from mosquitoes, the proposed project is not expected to impact public health or safety. Mosquitoes are an important part of the biological food chain for fish and birds. However, this section focuses on public nuisances associated with mosquitoes and diseases, including West Nile Virus (WNV), transmitted to humans by mosquitoes.

9.1 AFFECTED ENVIRONMENT

9.1.1 Marin/Sonoma Mosquito & Vector Control Agency

The Marin/Sonoma Mosquito & Vector Control Agency (MSMVCA) maintains a small but highly trained unit responsible for the prevention, elimination or control of mosquitoes and other arthropods known to be potential carriers of infectious diseases, or presenting a public nuisance. The MSMVCA received most of its revenue from property taxes. In 2004, residents voted to expand service to the entire population of both counties. The area covered grew from 960 to 2,300 square miles, with a human population of 715,000. Before the expansion, district employees responded to approximately 3,000 service requests from the public each year. MSMVCA efforts are primarily focused on controlling mosquitoes that can transmit malaria, WNV and several types of encephalitis, or cause a substantial nuisance in surrounding communities (MSMVCA website: <http://www.msamosquito.com>).

The decision to control mosquitoes as a nuisance to human populations is based on a number of factors, including the number of service calls received from a given locality, the proximity of mosquito sources to population centers, the availability of funds for abatement, the density of mosquito larvae present in a mosquito production source, and the number of adult mosquitoes captured per night in light traps. Once a recurring mosquito production source has been identified, abatement schedules are often adopted and maintained for that source.

9.1.2 Mosquito-Borne Diseases

Compared with the historical levels of mosquito-borne diseases in humans, levels of mosquito-borne diseases now in California are extremely low. These diseases, including encephalitis and malaria, however, are still present or could be readily reintroduced (Bohart and Washino 1978, Sacramento-Yolo County Mosquito Abatement and Vector Control District 1990).

Most recently, the spread of West Nile Virus (WNV) has increased concern over mosquito abatement for the protection of wildlife, domestic animals, and humans. WNV is transmitted to humans and animals through a mosquito bite. Mosquitoes become infected when they feed on infected birds. The California Department of Health Services (CDHS), in collaboration with the University of California, Davis, California Department of Food and Agriculture, local mosquito and vector control districts and other state and local agencies, has launched a comprehensive surveillance program to monitor for WNV in California.

WNV has been detected in animals in numerous northern California counties. In Marin and Solano counties, as of November 16, 2005, a total of 89 birds had tested positive for WNV, one of which was found close to the project site (in the Cemetery Marsh area directly west of the site). No human cases of WNV have been reported within Marin and Solano counties (personal communication with Eric Hawk, Project Supervisor and Field Biologist, MSMVCA, dated November 18, 2005).

9.1.3 Mosquito Species in the Project Area

The primary mosquitoes produced in Marin and Solano counties are encephalitis mosquito (*Culex tarsalis*), winter salt marsh mosquito (*Ochlerotatus squamiger*, formerly *Aedes squamiger*), salt marsh mosquito (*Ochlerotatus dorsalis*, formerly *Aedes dorsalis*), and winter marsh mosquito (*Culiseta inornata*) (personal communication with Eric Hawk, Project Supervisor and Field Biologist, MSMVCA, dated November 18, 2005).

O. squamiger and *O. dorsalis* have long flight ranges (up to 30 miles), are very aggressive biters of humans and other animals, and have been known to carry California encephalitis. A few specimens of *O. squamiger* found in pools in southern California have tested positive for WNV, however this species is not considered a primary WNV vector. In general, *O. squamiger* and *O. dorsalis* are considered less likely to carry diseases than fresh or brackish marsh mosquitoes. However, all mosquitoes can cause allergic reactions in certain humans and are generally considered a nuisance (www.msquasquito.com).

C. tarsalis and *C. inornata* prefer fresh to brackish water, and cause more localized problems. *C. tarsalis* is a potential carrier of WNV and St. Louis encephalitis, among other diseases. *C. inornata* can also carry WNV (www.msquasquito.com). The control of the latter two species is a high priority (personal communication with Eric Hawk, Project Supervisor and Field Biologist, MSMVCA, dated November 18, 2005).

9.1.4 Favorable Environmental Conditions for Mosquitoes

All species of mosquitoes require standing water to complete their growth cycle; therefore, any body of standing water represents a potential mosquito breeding site. Areas that pond surface water but are flushed by daily tides are not stagnant for periods sufficient for mosquito larvae to mature; therefore, such areas are not likely to be

mosquito production sources. Similarly, ponds that are subject to constant wind-driven wave action are also unlikely to produce many mosquitoes.

Water quality affects the productivity of a potential mosquito-breeding site. Typically, greater numbers of mosquitoes are produced in water bodies with poor circulation, higher temperatures, and higher organic content (and therefore with poor water quality) than in water bodies having good circulation, lower temperatures, and lower organic content (Collins and Resh 1989). Irrigation and flooding practices may also influence the level of mosquito production associated with a water body. Typically, greater numbers of mosquitoes are produced in water bodies with water levels that slowly increase or recede than in water bodies with water levels that are stable or that rapidly fluctuate. Emerging vegetation in standing ponds also provides good mosquito protection and habitat. Additionally, the types of vegetation growing in standing ponds can have major effects on mosquito production. For instance, mosquitoes will not reproduce in areas with an abundance of California cordgrass, but they will reproduce in areas growing saltgrass and pickleweed (Maffei, Wes. Manager. Napa County Mosquito Abatement District. Napa, California. March 4, 2002—telephone conversation cited in Napa River Salt Marsh Restoration Project Draft Environmental Impact Report/Environmental Impact Statement, Jones & Stokes; February 2003).

Mosquitoes are adapted to breed during periods of temporary flooding and can complete their life cycles before water evaporates and predator populations become well established. Poor drainage conditions that result in ponding water and water management practices associated with the creation of seasonal wetlands for waterfowl use result in the types of flooding that can produce problem numbers of mosquitoes. Permanent bodies of open water that have good water quality (good circulation, low temperatures, and low organic content) typically sustain stable nutrient content and support rich floral and faunal species diversity, including mosquito predators and pathogens. Wave action across larger bodies of water physically retards mosquito production by inhibiting egg-laying and larval survival (Maffei, Wes. Manager. Napa County Mosquito Abatement District. Napa, California. March 4, 2002—telephone conversation cited in Napa River Salt Marsh Restoration Project Draft Environmental Impact Report/Environmental Impact Statement, Jones & Stokes; February 2003).

9.1.5 Existing Conditions in the Project Area

Standing water at the site provides mosquito breeding habitat and the proximity of the Bahia community to a mosquito source has made this an ongoing public health concern in the past. The former pump at the site helped with water management and therefore helped to keep mosquito populations down in the area. When the pump collapsed (shortly after MAS/DFG acquired the property in 2003), the MSMVCA was required to increase its mosquito abatement efforts at the site. In recent years, the MSMVCA has routinely sprayed the site with larvaecide. In 2004, sprayings took place approximately every week using an air boat. Helicopter sprayings have also been used in the past (personal communication with Eric Hawk, Project Supervisor and Field Biologist, MSMVCA, dated November 18, 2005). The worst mosquito conditions occur on site as

water levels recede and vegetation begins to emerge, creating prime mosquito habitat. As noted above, mosquitoes appear to prefer saltgrass and pickleweed vegetation for breeding. Therefore, areas of the site that contain pickleweed, such as Mahoney Spur, tend to pose a greater mosquito concern.

Within the past year, the MSMWCA has observed a significant decline in mosquito populations at the site. They have received few calls from the Bahia community and this is the first year in many that the agency has not sprayed larvaecide. The agency attributes the noticeable decline in mosquitoes in the project area to the deeper and year-round persistence of water on-site, due to overtopping of the levees. The deeper water at the site also leads to greater wind-wave action and this also inhibits mosquito reproduction (personal communication with Eric Hawk, Project Supervisor and Field Biologist, MSMVCA, dated November 18, 2005).

9.2 CRITERIA FOR DETERMINING SIGNIFICANCE OF EFFECTS

The project would be considered to have a significant impact if habitat changes would necessitate substantially increasing levels of mosquito abatement programs to maintain mosquito populations at pre-project levels. Habitat changes that could result in a substantial decline of available mosquito breeding habitat or greater efficiency of the two-county MSMVDA program could result in beneficial impacts for public health.

9.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

9.3.1 Proposed Project

A stated objective of the Proposed Project is to minimize the conditions favorable for mosquito production by developing appropriate hydrologic regimes. Lowering and breaching the levees will re-introduce tidal flow to the project site, thereby reducing the quantity of small pools of standing water with dense vegetation which offer prime mosquito breeding habitat. Better water circulation, more wind-wave action, lower water temperatures, reduced organic content and emergent vegetation, and more saline water are all expected to reduce mosquito reproduction. Reducing the mosquito problem at the site will also reduce the burden on the MSMVCA to provide mosquito abatement. The Proposed Project will not impact the numbers of people who visit the site or come into contact with mosquitoes. Recreational users of the site are now, and are expected to remain, primarily local Bahia residents. The Proposed Project will therefore result in a beneficial impact to public health and no mitigation is required.

9.3.2 No Project Alternative

This alternative would retain existing conditions for mosquito production. Although there already appears to be limited tidal exchange occurring at the site (from levee overtopping), however, compared to the Proposed Project, the No Project Alternative would result in less water circulation, less wind-wave action, higher temperatures, higher

organic content and emergent vegetation, and less saline waters, all of which are more favorable conditions for mosquitoes. In the long term, lack of maintenance for levees would result in the levees being breached and the site opened to tidal influence, creating conditions less favorable for mosquitoes. Therefore, the end result would be similar to the Proposed Project, but it may take considerably longer for full tidal exchange to occur under the No Project..

Public Health Impact-2. Compared to the Proposed Project, the No Project Alternative would result in less water circulation, less wind-wave action, higher temperatures, higher organic content and emergent vegetation, and less saline waters, all of which are more favorable conditions for mosquitoes.

Significance: Since this impact is equivalent to existing conditions and the alternative will result in the project not being implemented, it is considered less than significant and no mitigation measures are proposed.

9.3.3 Alternative 1 (Reduced Fill Removal from East Bahia)

Alternative 1 is anticipated to have a beneficial impact on public health, similar to the Proposed Project.

9.3.4 Alternative 2 (No Fill Removal from East Bahia)

Alternative 2 is anticipated to have a beneficial impact on public health, similar to the Proposed Project.