

Appendix 28B
Mosquitoes and Other Vectors

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APPENDIX 28B

Mosquitoes and Other Vectors

Table 28B-1
Mosquitoes and Other Vectors Found in Tehama, Glenn, and Colusa Counties

Vector	Seasonal Activity	Preferred Host	Preferred Habitat
Mosquitoes			
<i>Culex</i> sp. (<i>apicalis</i> , <i>boharti</i> , <i>tarsalis</i> , <i>territans</i> , <i>thriambus</i> , <i>pipiens</i> , <i>erythrothorax</i> , and <i>stigmatosoma</i>): some of these mosquitoes can transmit the encephalitis (sleeping sickness) virus to humans	Active in spring, summer, and fall; attack at dusk and after dark	Birds, mammals, humans, amphibians, and reptiles <i>Culex boharti</i> is not known to bite humans	Wetlands, duck clubs, rice fields, irrigated crops, along the edges of slow streams, rock pools, isolated ponds, and hoofprints along streams and creeks
<i>Anopheles</i> sp. (<i>freeborni</i> , <i>punctipennis</i> , and <i>franciscanis</i>): these mosquitoes can transmit the malaria parasite to humans	Active in spring, summer, and fall – is a pest in the Sacramento Valley beginning in late winter until early fall	Mammals and humans	Rice fields wetlands, duck clubs, and rain pools
<i>Ochlerotatus</i> sp. (<i>nigromaculis</i> , <i>melanimon</i> , <i>sierrensis</i> , <i>sticticus</i> , <i>cataphylla</i> , <i>fitchii</i> , <i>hexodontus</i> , <i>tahoensis</i> , and <i>increditus</i> complex): <i>sierrensis</i> can transmit the dog heartworm parasite; <i>melanimon</i> is involved in the encephalitis virus cycle	Active in spring, summer, and fall; attack early in the morning, at dusk, and into the evening	Mammals and humans	Oak woodlands, wetlands, duck clubs, pastures, ditches, ponds, pools, densely shaded water sources
<i>Aedes</i> sp. <i>vexans</i> and <i>hemiteus</i> : painful and persistent biters; known to fly many miles from their breeding sources	Active in spring, summer, and fall; attack early in the morning, at dusk, and into the evening	Mammals and humans	Shaded areas and cold woodland pools; usually do not enter dwellings
<i>Orthopodomyia signifera</i> : a vector of encephalitis	Active in spring and summer	Mammals and humans	Willows and cottonwoods (treeholes), in holes that contain water year-round
<i>Culiseta</i> sp. (<i>incidens</i> , <i>inornata</i> , and <i>particeps</i>): moderately aggressive biters	Active in spring, summer, and fall; attack in the evening or in the shade during the day	Mammals and humans	Shaded areas (clean pools and streams)
Ticks			
Western black-legged tick (<i>Ixodes pacificus</i>): transmits Lyme Disease	Active from October to July	Larvae and nymphs feed on lizards, birds, and mammals; adults feed on large mammals (deer, fox) and humans	Areas of high humidity; usually found in grassy areas, in brush, or in wooded areas

Vector	Seasonal Activity	Preferred Host	Preferred Habitat
Pacific coast tick (<i>Dermacentor occidentalis</i>): transmitter of Colorado tick fever and Tularemia	Active from November to June	Larvae and nymphs feed on small rodents; adults feed on large mammals, especially deer	Areas of high humidity
American dog tick (<i>Dermacentor variabilis</i>): transmitter of Rocky Mountain spotted fever	Active from May to August	Larvae, nymphs, and adults feed on larger mammals like dogs	Areas of high humidity
Bees			
European honeybee (<i>Apis mellifera</i> *): commonly used by beekeepers for honey production and pollination of crops	All seasons	Humans, pets, and domestic and wild animals	In enclosed areas such as tree or wall cavities, and culverts and pipes; and in exposed areas such as under bridges and in trees and shrubs
Yellowjackets			
Western yellowjacket (<i>Vespula pennsylvanica</i>): a major pest species in California	Active in summer	Humans	Garbage receptacles in picnic areas; abandoned rodent burrows, house walls and attics
German yellowjacket (<i>Vespula germanica</i>): not native to California, but has become established in Sacramento, Glenn, and Colusa counties	Expected to be active in spring and summer (nests decline in late August to September)	Humans	Hollow walls, attics, or aerial nests
Stinging Ants			
Southern fire ant (<i>Solenopsis spp</i>)	Active in late spring, summer, and early autumn	Will sting humans and domestic and wild animals; feed on sap and bark of nut trees, and farm crops	Nest in moist soil often found in housing developments, irrigated farmland, and orchards; or adjacent to watering holes on rangelands, lakes, ponds and streams
Red imported fire ant (<i>Solenopsis invicta</i>)	Active in late spring, summer, and early autumn	Will sting humans and domestic and wild animals; feed on sap and bark of nut trees, and farm crops	Nest in moist soil often found in housing developments, irrigated farmland, and orchards; or adjacent to watering holes on rangelands, lakes, ponds and streams

*The Africanized honey bee is the result of cross-breeding the African honey bee with the European honey bee. It is more aggressive than the European honey bee. The Africanized honey bee entered California in 1994, and has been found in Los Angeles in 1998. Most counties in Southern California are considered colonized by Africanized honey bees (Los Angeles County West Vector Control District, 2004). As of November, 2011, no sign of them exists in Northern California (Center for Invasive Species Research, University of California, Riverside).

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**Table 28B-2
Diseases Associated with Mosquitoes, Ticks, and other Vectors**

Disease Name	Description of Disease
Encephalitis	<p>Encephalitis, also known as sleeping sickness, is caused by a virus that can cause inflammation of the brain. Severe cases can result in mental retardation, motor impairment, or death. Mosquitoes become infected while feeding on birds that harbor the virus; they can then transmit the virus to other animals. California vectors are the encephalitis mosquito (<i>Culex tarsalis</i>) and the wetlands mosquito (<i>Ochlerotatus melanimon</i>) (Sacramento-Yolo Mosquito and Vector Control District, 2004).</p> <p>There are several virus agents of encephalitis in the northern United States: West Nile virus, Eastern equine encephalitis^a, Western equine encephalitis^b, St. Louis encephalitis^c, La Crosse encephalitis^a, dengue^a, and yellow fever^a, all of which are transmitted by mosquitoes. Another virus, Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks (American Mosquito Control Association, 2004).</p>
Malaria	<p>Malaria, caused by a protozoan (a single-celled organism), attacks red blood cells. Malaria is a flu-like illness that causes chills/fever/sweating and reoccurs every 2 to 3 days. The malaria parasite can cause liver and kidney damage, or death. Mosquitoes become infected while feeding on other humans that harbor the parasite. California vectors are the western malaria mosquito (<i>Anopheles freeborni</i>), the woodland malaria mosquito (<i>Anopheles punctipennis</i>), and the coastal malaria mosquito (<i>Anopheles hermsi</i>). Ten to 15 human cases of malaria are reported annually; most of these cases are from individuals who became infected outside of the U.S. (Sacramento-Yolo Mosquito and Vector Control District, 2004).</p>
Canine Heartworm	<p>Canine heartworm is caused by a worm that damages the lungs and heart of a dog. Symptoms are not evident until later stages of the disease. Dogs may develop a chronic cough, tire easily, and accumulate fluid. The heartworm parasite can cause lung, liver, and kidney damage, or death. Mosquitoes attain worms by feeding on infected dogs, coyotes, or foxes. California vectors are the western treehole mosquito (<i>Ochlerotatus sierrensis</i>), the western malaria mosquito (<i>Anopheles freeborni</i>), and <i>Aedes. vexans</i> (Sacramento-Yolo Mosquito and Vector Control District, 2004).</p>
Lyme Disease	<p>Lyme Disease is a bacterial infection that is transmitted by the Western black-legged tick in California. Early symptoms may include head and muscle aches, sore throat, nausea, fever, stiff neck, or fatigue. Approximately 50 percent of infected people develop a rash at the bite site, which sometimes resembles a bulls-eye. Later symptoms may involve the skin, eyes, heart, nervous system, brain, or joints. Early detection is important in the treatment of Lyme Disease (Sacramento-Yolo Mosquito and Vector Control District, 2004).</p>
West Nile Virus	<p>West Nile Virus has more than 70 identified viruses. It includes West Nile Fever, West Nile Encephalitis (affects the brain), and West Nile Meningitis (affects brain and the membrane around it) (American Mosquito Control Association, 2004).</p> <p>West Nile virus can be caused by viruses and bacteria, including viruses transmitted by mosquitoes. Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with a skin rash and swollen lymph glands. More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and rarely, death. Mosquitoes acquire the virus from infected birds and then transmit the virus to people. Sixteen California counties have confirmed cases of the virus. On July 22, 2004, state health officials added Sacramento, Butte, Kings, Mendocino, San Diego, San Joaquin, Tehama, and Tulare counties to the list of California counties with confirmed cases. As of October 20, 2004, 763 people have been diagnosed with West Nile virus in California, including 10 in Tehama County, 2 in Glenn County, and 1 in Yolo County (Sacramento-Yolo Mosquito and Vector Control District, 2004).</p>

^a Is not found in California (American Mosquito Control Association, 2004).

^b Is found in California (American Mosquito Control Association, 2004).

^c The last human case in California was 1997 (American Mosquito Control Association, 2004).

Sources:

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Table 28B-3
Other Potential Vectors and Nuisance Problems

Species Name	Habitat	Associated Problems
Biting Midges, also called Biting Gnats, Punkies, and No-See-Ums (<i>Ceratopogonidae</i>)	Salt and freshwater habitats (mud, salt marshes, and intertidal sand)	Painful bites; possible allergic reaction
Non-Biting Aquatic Midges, also called Blind Mosquitoes and Fuzzy Bills (<i>Chironomidae</i>)	Swift moving streams, deep slow moving rivers, stagnant ditches, and in lakes and ponds that are rich in decomposing organic matter	Large swarms interfering with outdoor activities
Backpacker's Disease, also called Beaver Fever (<i>Giardia</i>)	Surface water	Intestinal parasite that causes the diarrheal illness giardiasis
Swimmer's Itch (<i>cercarial dermatitis</i>)	Snails in shallow waters	Mild to severe skin rash
Horse and deer flies (<i>Tabanidae</i>)	Saltmarshes, swamps, bogs, and areas along the edges of ponds, lakes, and streams	Painful bites
Conenose Bug (<i>Triatoma protracta</i>)	Wood rat nests	Bites may not be painful; severe allergic reaction in some individuals
Liver Fluke (<i>Fasciola hepatica</i>)	Snails in shallow waters	Liver parasite that causes an infection of the bile ducts and liver

Sources: Apperson, Waldvogel, and Bambara, 2006; Bartlett, 1999; CDC, 2010, 2012; Greenberg and Klotz, 2002; Hairston, No Date; North Carolina Extension Integrated Pest Management Program, No Date; Rutledge-Connelly, 2005.

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