

1. Disease History and Threat Assessment to Humboldt County

West Nile Virus (WNV) is an *arbovirus*, or insect-transmitted pathogen that is spread through the bite of infected mosquitoes. A strain of WNV that infected people in Israel in 1998 was found to have caused illness and death in humans in New York City in 1999. In 2000 and 2001, there was a slow spread along the eastern seaboard and states along the Gulf of Mexico. The mid-western spread of WNV in 2002 reached major proportions, with 45 states reporting human and veterinary cases. A total of 3,950 clinical human cases of WNV resulting in 250 deaths have been reported in the U.S. as of January, 2003. The first human case of WNV in California was confirmed in Ontario, California in August, 2002. To date, there have been no human deaths in California from WNV.

The disease cycle primarily involves mosquitoes and birds. Avian feeding mosquitoes spread the virus through the wild bird population, causing about 120 types of wild birds to become the host species, capable of carrying the virus. Certain particular mosquitoes act as primary vectors, capable of transmitting WNV through the healthy avian population. Other mosquitoes are secondary vectors, feeding incidentally on birds, and also biting man and domestic animals such as horses. Humans and horses are dead-end hosts, defined as incapable of spreading the disease any further.

West Nile Virus causes *encephalitis*, a swelling of the tissue surrounding the brain. Two other forms of arboviral disease, Saint Louis Encephalitis (SLE) and Western Equine Encephalitis (WEE) have been tracked in California over the past forty years. They are spread through a specific mosquito called *Culex tarsalis*, the “Western Encephalitis Mosquito”.

Control and eradication efforts by mosquito abatement districts in California’s Central Valley and southern desert regions have effectively controlled these arboviral diseases throughout the state. The mosquito species *Culex* has been identified throughout the U.S. as a major vector of WNV, and the primary target of control and eradication efforts by mosquito abatement districts in an effort to halt WNV.

The presence of the species *Culex* mosquito in Humboldt County becomes one of the key components in deciding a strategy of control and defense against the possible spread of WNV. There has been no previous history of arboviral disease risk such as SLE or WEE in Humboldt County. The extent to which the *Culex* mosquito may be present in Humboldt County is not accurately known. About 97% of the mosquito species inventory within Humboldt County involves other mosquito species, not normally implicated in the WNV transmission cycle.

Vector control responsibilities including mosquito control and abatement lie within the purview of the Division of Environmental Health of the Public Health Branch, Department of Health and Human Services. There is one full time employee assigned as Vector Control Officer, whose role consists of complaint response and advising

residents about vertebrate and insect vectors common to Humboldt County. A mosquito control program that involved a contractual spray agreement with the City of Eureka was in place for seven years, ending in 1996. A county truck and sprayer were used to apply pesticide to control nuisance vector species in and around the City of Eureka. Pesticide application to control public health vector threats must be accomplished by a state certified Vector Control Technician (H&SC Section #116180), and the currently employed Vector Control Officer maintains this required certification.

It is possible that WNV will affect domestic animals and humans in Humboldt County.

The following case situations may apply:

- Scenario A has the disease being acquired elsewhere in California or the U.S., and being “imported” into the county. In this instance, the risk is very low, since humans and animals are dead end hosts, and the disease cannot be transmitted further.
- Scenario B has migratory birds with the virus entering the county along the Pacific flyway migratory route. This situation is very likely, with the key to disease transmission being the presence of the competent vector mosquito. The answer here will require adequate mosquito surveillance and species identification, discussed later in this plan.
- Scenario C, the most severe case, has the resident wild bird population acting as a reservoir as well as a competent vector mosquito population in abundance. This would lead to numerous domestic animal and human cases, and require significant intervention to protect public and veterinary health. Control strategy options are listed later within this plan.

2. Public Education and Outreach

The first and most important step in protecting the public health of Humboldt County residents is insuring that they are well informed, armed with an understanding of the disease, the knowledge to protect themselves, and ability to make wise decisions. It is equally important that county leadership, health providers, and response personnel be aware of the effects and ramifications of surveillance strategies and treatment options.

Towards this end, the following recommendations should be placed into effect through the spring and summer season:

- A public education campaign emphasizing the need for homeowners, ranchers, landowners, municipalities, and industry to help control mosquitoes by eradicating habitat, the possible breeding sites that would cause problems if left unchecked. Motor vehicle tires, water buckets, ornamental ponds, wading pools, and birdbaths, if untended, become likely breeding spots for

mosquitoes. The *Culex* mosquito, the most likely disease vector, is well known as preferring this urban habitat. A number of affected state and county governments have adopted a “Fight the Bite” campaign, emphasizing this source control strategy as very important in disease control.

- Provide information on the unlikelihood of the spread of the WNV to Humboldt County based on the lack of the abundance of the *Culex* species mosquito and lack of human and animal cases of other arboviruses such as WEE and SLE known to exist in California. Inform what is being done to monitor for the spread of the disease through state and local programs such as bird and mosquito surveillance and reporting of human and animal (horses) cases of encephalitis. Tell where to get additional information (PHB, DEH, Veterinary, and DHS contacts).
- Pass advice about protection and exposure strategies that will protect people from all mosquitoes. These steps may include repairing window screens, safe use of repellent sprays containing DEET, and limiting activities where possible at daybreak and dusk. Advise hikers, birdwatchers and other target audiences that their activities around the bay edge, coastal wetlands, and creeks with bogs may have a greater population of mosquitoes present and pose greater risk.
- Remind residents that natural biological controls are present and should be enhanced when possible. Dragonfly larvae, three-spine stickleback, and other naturally occurring aquatic species eat mosquito larvae. Native birds, dragonflies, and bats feed on enormous numbers of adult mosquitoes. The Arcata Marsh is an excellent example of natural controls providing an effective biological mosquito control ecosystem.
- Advise clinicians, medical care providers, and the general public about actual rates of infection from WNV in the general population. The National Centers for Disease Control (CDC) states that one in one hundred fifty people that are bitten by a WNV infected mosquito develop clinical symptoms. The remainder feels nothing or slight “summer flu” like symptoms.
- Although those over the age of 55 are a risk group for possible infection, children are not considered an at-risk group, and very few infections have been reported in this age group.
- Outreach to schools, medical professionals, municipal jurisdictions, veterinarians, and interested public groups. Use a spokesperson and distribute literature to insure that a large cross section of the public sector is aware of the facts surrounding WNV.

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- Develop press kits and public service announcements with basic information on the national and California state history of WNV along with local monitoring and surveillance programs. Describe the thresholds at which specific actions would take place, and list the participating county and state agencies and local jurisdictions. Coordinate with Humboldt County Health Officer and OES to use press releases as an information tool when the action levels change.
- Consider the development of a web page on the Humboldt County website that could be devoted to the status of WNV monitoring and surveillance, public information, and medical bulletins as appropriate. Develop this web page to supplement the California State WNV web site (www.westnile.ca.gov) that would contain the most up to date information on the status of WNV in Humboldt County. Create a link from the Humboldt County WNV web page to the California State WNV website.

3. Human and Veterinary Case Surveillance

Human Case Surveillance

The monitoring and reporting of human cases of encephalitis is under the guidelines of the CA Department of Health Services and the National Centers for Disease Control (CDC). A series of parameters are used to determine case definition. A medical care provider reports suspect or confirmed cases to the local Public Health Branch. Medical providers are mandated to report human cases of encephalitis per Health and Safety Code, Sections 120260-121140. Human medical evaluation is beyond the scope of this plan, and medical surveillance information falls to the Public Health Nursing Supervisor. Contact points include:

Jennifer Richmond, R.N.	Communicable Diseases	268-2128
Karen Ross, R.N.	Director, Public Health Nursing	268-2167
Jeff Arnold	PHB Branch Director	268-2121
Ann Lindsay, M.D.	Health Officer	268-2181

Any questions from the public sector regarding possible symptoms, treatment, or suspected infection with WNV should always be directed to the appropriate medical care provider of the person's choice or the Public Health Nursing staff. All after hours calls are taken by the Sheriff's Office dispatcher and forwarded to the Public Health staff.

Veterinary Case Surveillance

The CA Department of Food and Agriculture, Animal Health and Food Safety Services Branch will conduct any WNV veterinary monitoring and surveillance. A letter is sent annually to all veterinary and large animal clinicians discussing the clinical symptoms of

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all arboviral diseases including WNV and detailing reporting requirements to the state. The local point of contact for the CA Dept. of Food and Agriculture is Dr. Richard Peterson, DVM, available at 826-1658 (voice mail).

Veterinary impacts of West Nile Virus are most profound in horses. The effects of WNV define it as a febrile illness, causing the horse to lie down. Once a horse is down, a vet may choose to confer with the owner and euthanize the animal. This fear of exposure to WNV and possible loss of the animal has caused great concern among horse owners nationwide. An equine WNV vaccine has been developed and distributed, with some eight million doses administered nationwide within the past several years.

Reporting of possible encephalitis cases in horses is a crucial part of case surveillance. As any suspect case of equine WNV is confirmed, it may cause a change in the response action level in the county. Humboldt County Environmental Health has an excellent rapport with veterinarians in the county due to the cooperative efforts of the rabies control program. This liaison should be strengthened in order to insure that notification of possible or confirmed equine cases is passed to county health officials as soon as possible. A letter to the practicing veterinarians of Humboldt County emphasizing the need to report suspected or confirmed cases of WNV is recommended.

4. Mosquito and Bird Surveillance in Humboldt County

Wild Bird Surveillance

Wild birds act as sentinel species of the spread of WNV. New York quickly discovered that death in crows precedes human cases of WNV by about six weeks. California has established a dead bird surveillance program within the Viral and Rickettsial Disease Laboratory (VRDL) in Berkeley. Submitted birds are tested for viral isolation at the Dept of Food and Agriculture CAHFS laboratory, U.C. Davis campus. Certain species of birds have higher mortality and therefore are better identified as sentinels. At this time, the corvids (crows, ravens, jays), raptors (hawks, eagles, owls), and finches are being accepted for testing by VRDL as part of the WNV bird surveillance program. As of January, 2003 there have been no positive birds in California.

Humboldt County participated in the California WNV dead bird surveillance program in 2002 and will continue to do so as an importance component in our surveillance plan. When a report of a dead wild bird is received, the caller is referred to the WNV Dead Bird Hot-Line at 1-877-WNV-BIRD (1-877-968-2473). The staff at VRDL in Berkeley will decide if the species and condition of the bird warrants transport and lab testing. If the specimen is thought to be viable, then VRDL contacts Environmental Health and asks that we assist by processing and shipping the bird.

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Address of Lab: California Animal Health and Food Safety Central Laboratory
ATTN: WNV
University of California, Davis
West Health Sciences Drive
Davis, CA 95616
(530) 752-8709

Division of Environmental Health will pick up the bird approved for shipping from the location or have the bird brought to the office. Birds held overnight should be refrigerated, but not frozen. Shipping arrangements are made by VRDL to use an overnight carrier, typically *United Parcel Service*, for transport to the Davis Laboratory.

Care should be exercised when handling and packing the specimen birds for shipment. Latex gloves should be worn and the bird double bagged as instructed by VRDL. We use Styrofoam shipping cartons packed in cardboard boxes. These shipping containers are stored and available at the Division of Environmental Health. Birds are shipped on dry or wet ice as directed by VRDL. Personnel at the Division of Environmental Health confirm the species and general condition of the bird before packing and shipping. Instructions and shipping labels/documents are available at the Vector Control desk.

Mosquito Surveillance

There is currently no structured mosquito larva or adult surveillance program in place in Humboldt County. A search of historical records and recent field evaluations based on complaints verify that a majority of Humboldt County's mosquito species fall into one of three categories:

- The "Spring Freshwater Mosquito", *Ochleratatus increpitus* complex, emerges from fresh water vernal pools and bogs along river and creek drainages beginning in February and running through June. This large, dark mosquito with white stripes on black legs is a nuisance species, particularly along the Samoa Peninsula, Lanphere Dunes, and Mad River drainage. As freshwater sources dry up in late spring, the emergence tapers off. It will then be confined to areas like the marsh beside South Bay Elementary School in Eureka and the industrial park bordering Erickson Road in Arcata, and continue through the summer. There is no record of involvement of this mosquito in WNV transmission and it is believed to be a very poor disease vector.
- The "Salt Marsh Mosquito", *Aedes dorsalis*, emerges from salt or brackish water sources near the bay edge, beginning in early July and running through late October. This is a medium sized tan mosquito and is a voracious biter, qualifying it as a nuisance vector when numbers are allowed to grow significantly. Flooded fields in the Hookton Slough U.S. Fish and Wildlife Sanctuary produced very large numbers of this species during the summer of 2002, causing a flurry of complaints from nearby residents along Table Bluff.

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This species has been implicated as a possible secondary vector of arboviral diseases such as SLE and WEE elsewhere in California. That suggests the females will feed on avian and mammal hosts if available. There is no record of this species spreading WNV afield in the U. S., nor any record of SLE or WEE transmission in Humboldt County.

This species of mosquito is also prevalent in the Arcata Marsh at the north end of Humboldt Bay. In that case, natural predators attack larval and adult forms, maintaining an excellent balance without further intervention or controls becoming necessary.

- The “Tree-hole Mosquito”, *Aedes sierrensis*, is an inland species emerging, as the name suggests, from the water cradled in the crotch or trunk of hardwood trees like TanOak or Madrone. It is tolerant of the natural tannins present in the water, and able to persist until the sources evaporate in late spring or early summer. Present in the Redwood, Hoopa, and Butler Valleys and surrounding hills, it has no record of vector competence in humans, but has been identified as a vector for canine heartworm (dirofilaria).

The mosquito surveillance program that will be put into place by personnel at the Division of Environmental Health has one specific target genus of mosquito. The genus *Culex* will be the target, present as *Culex pipiens/quinqüefasciatus* or *Culex tarsalis*

- *Culex tarsalis*, the “Western Encephalitis Mosquito”, has been found in small numbers within Humboldt County in the past. It has never been the subject of eradication efforts such as a spray program. It will develop in a variety of water sources, but is commonly found around agricultural operations. This medium sized, tan to brown mosquito, is recognized by a white stripe on the proboscis and white bands at the joints of the back legs. In Humboldt’s climate it will usually emerge in late June or early July. Coastal temperatures allow development from egg to adult in fifteen to twenty one days. It will bite both birds and mammals when seeking a blood meal.
- *Culex pipiens*, the “Northern House Mosquito” is a medium sized brown mosquito with dark scaled, unbanded legs and proboscis. Although implicated as a major WNV vector nationally, there is little evidence of a continual presence in Humboldt County. The mosquito will feed from birds or mammals, and often develops to adult stages within urban sources like birdbaths, stagnant pools, and tires. It will enter homes as an adult, and has a history of involvement elsewhere in California as a competent disease vector.

Surveillance Techniques and Locations

The surveillance program will use two techniques. Larval dipping and light traps or CO₂ baited traps to catch adults. Personnel at Environmental Health will identify the larvae or adult mosquitoes to genus level. Any assistance required for identification is available

from CA Vector Biologists in Redding or through VRDL, Berkeley. Humboldt County is encouraged to participate in the mosquito pool sampling program administered by VRDL, where identified *Culex* adults from the trapping programs are sent to VRDL Berkeley Laboratory for virus isolation.

Three traps will be deployed at the outset of the surveillance program, one miniature light trap and two EVS CO2 style traps. An area is selected where adult emergence is likely and the battery-powered traps will be secure from tampering. The trap is deployed in the late afternoon and recovered the following morning. Samples are removed from the catch net, sorted, and identified. Larval dipping will be used as a collection technique in areas known for mosquito production beginning in March and continuing throughout the summer months. When possible, Global Positioning System (GPS) coordinates will be taken at the site of the trap set or larva dip to correlate species information and plan control strategy as may be required.

The following areas are recommended for larval and adult surveillance:

- Palco (Eureka) Marsh, foot of Del Norte, Eureka
- Arcata Marsh Interpretative Center
- Indian Slough at the Eureka Municipal Golf Course
- South Bay Elementary School
- HBMWD well station, West End Road, Mad River
- Vernal pools near Samoa County Boat Ramp, North Spit
- Manila Community Services District treatment ponds
- Lanphere Dunes Recreation Area
- Hookton Slough USFWS Refuge

Additional areas may be identified using remote sensing technology, public input, or other means of identifying areas of potential emergence

Other jurisdictions within Humboldt County are encouraged to assist in surveillance efforts. City of Eureka, City of Arcata Environmental Services, USFWS Hookton Slough, and Redwood National and State Parks are being approached about basic larval dipping and possible field identification. These and other jurisdictions/agencies can also provide information on adult emergence and participate in control strategy planning within their areas of influence.

5. Mosquito Control Measures

When surveillance results indicate that a significant emergence of an identified vector species of mosquito will occur that would contribute to significant veterinary or human health risk, then, at the direction of the Humboldt County Health Officer or Board Of Supervisors, control measures would be undertaken. Other response triggers or recommendations may also initiate these measures. This may include recommendations from the CA Department of Health Services when endorsed by the appropriate county authority.

Larval Mosquito Controls

Larvacide controls are available and considered a best practice strategy. Typically, if a mosquito source can be identified and treated in a larval state, the treatment area is one-twentieth the size of one treated once adult emergence has occurred. When chemical larvacide application is required as a control measure, it is far less expensive and proves far less of an impact on the biological resources that an adult application later. Assuming that habitat source control is not an option and the natural biological controls are not able to adequately keep pace with emergence, then larval controls are the next step.

The most benign of these is called BTI, or *bacillus thuringiensis israelensis*. BT is a naturally occurring soil bacteria “tagged” with a species-specific toxin affecting the digestion of larval mosquitoes and black flies. It is broadcast in granular format, sinks through the water column to the bottom, and releases the bacteria into the water where larval development is interrupted. Limitations include it being somewhat less effective on *Culex* than other species, frequent reapplication, labor-intensive methods of application over large areas, and it is affected by high organic loading in the water. This product will affect the biodiversity of the treated waterway to a limited extent when compared to untreated areas. A small amount of BTI is on hand at the Division of Environmental Health.

The next larvacide option is methoprene, an insect growth regulator or IGR. Methoprene limits the larval production of chitin, the material for its outside shell. This occurs between the third and fourth stage (or instar) of larval development. Since the shell does not harden, the mosquito larva dies. Methoprene comes in several formats, granular for broadcast over a moderate sized area, packets for sewers and sumps, and as a liquid that can be sprayed from a truck or aerial application. It is a fairly expensive but readily available treatment option that can be stockpiled and held until application requirements are at hand.

The liquid form of methoprene can be applied with the Whitmere Micro-Gen truck mounted spray apparatus that the county has in storage. Limitations include a greatly increased impact on the aquatic biodiversity of the treated water when compared to an untreated area. This can result in a dramatic impact to birds and fish that rely on the treated aquatic species as a food source. There is no methoprene available at Division of Environmental Health, but ordering a minimal amount as a response strategy is encouraged.

Adult Mosquito Controls

Adulticide application kills adult mosquitoes that have emerged or are emerging from the surface of a water source. The chemical mode of action is a neuro-toxin or cholinesterase inhibitor, directly affecting the central nervous system of the insect. These are “broad spectrum” pesticides, that have effective kill rates on both beneficial

and pest species. All mosquito control agencies realize that adulticide application is the strategy of last resort, and apply under strict application guidelines to assure the most effective dissemination and least impact on the human population and other non-target species.

Humboldt County Division of Environmental Health has used a pyrethrum-based adulticide called resmethrin (4%) mixed with a synergist called piperonyl butoxide (12%), sold under the product name of *Scourge*. This is placed undiluted as a ready to spray liquid in the Whitmere Micro-Gen spray apparatus on a truck mounted unit. Droplet size analysis and calculations involving wind, temperature, and inversion determine application rate. The geography must allow for dispersal of the material over the target area with a minimum of off-site delivery and maximum suspension time for droplets in air. This technique was employed for nuisance control of the “Spring Freshwater Mosquito” and the Salt Marsh Mosquito” between 1990 and 1997 under contract between the City of Eureka and Humboldt County Environmental Health.

A discussion of these treatment measures would not be complete without weighing the political and philosophical ramifications of pesticide intervention as a defensive strategy in Humboldt County. Presence of WNV that is actually infecting domestic animals and humans in the county will place heavy pressure on decision-makers and the options available may include chemical intervention. Nonetheless, there is a large and vocal contingent within Humboldt County that will raise objection to this strategy, regardless of the perceived risk to veterinary and human health. This will require a forum for dialogue during the decision making process, using the media to keep the public sector fully informed, and full accountability for any and all times and areas of any chemical dispersal.

Humboldt County has not relied on any pesticide application as part of its vector control mosquito abatement program for seven years. No human health threat had been identified from mosquitoes commonly found here. Basic public outreach targeted source-reduction strategies, enhancing biological controls, and avoiding areas and times at which they may prove a nuisance. Many county citizens applaud these techniques as both biologically and fiscally responsible. Continuing and increasing these control strategies, validated with adequate surveillance and case monitoring, will insure that pesticide intervention will be deliberate, measured, and targeted only to the extent necessary to insure adequate protection of public and veterinary health.

6. County Department/Division Responsibility

Roles and responsibilities for the implementation of this plan will be as follows:

The Humboldt County Department of Health and Human Services (DHHS) will be responsible for the overall implementation of this plan. Within the department, the Public Health Branch Director will report to DHHS Director as may be required. Within the Public Health Branch, the following roles and responsibilities are assigned:

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Public Health Branch Director: Overall plan coordination, reporting to the Humboldt County Board of Supervisors as conditions or changes in action status warrant, liaison with other county departments/divisions, receiving and correlating reports from within the branch. Make recommendations on response options as conditions change based on surveillance or other information.

Humboldt County Health Officer: Review and analyze WNV human illness reports from within the county and from the CA Department of Health Services. Utilize Public Health Nursing staff resources to respond or conduct outreach to the medical community within the county. Recommend to the Humboldt County Board of Supervisors that a declaration of medical "State of Emergency" be declared (H&SC 101040 and 101475) when and if required by the circumstances.

Public Health Nursing Director: Use Communicable Disease Nurses and other skilled staff to assess degree of threat posed by reports of WNV human illness and report findings to Humboldt County Health Officer. Public Health Nursing staff will educate callers about the nature of the disease, mode of transmission, and prevention of infection to humans. Callers will be referred to appropriate agencies or Division of Environmental Health for additional information.

Division of Environmental Health Director: Supervision of Vector Control Program including all aspects of surveillance and detection of WNV. Pass pertinent findings to Public Health Branch Director and Health Officer, with any recommendations on actions to be undertaken based on these findings. Coordinate all aspects of the public outreach and information program portions of this plan, including authoring press releases and distribution once approved by Public Health Branch Director. Supervise all aspects of any mosquito abatement program steps that may be undertaken, and report results to Health Officer and Public Health Branch Director.

Vector Control Officer: Establish and maintain a mosquito surveillance program and report findings at least weekly to the Environmental Health Division Director. Make recommendations based on results of the surveillance. Continue participation in the CA Department of Health Services WNV dead wild bird surveillance program. Conduct public outreach and information sessions, develop and distribute literature, and develop and update a web page for the Humboldt County web site to maintain public awareness about WNV. Coordinate with other jurisdictions within the county to accomplish surveillance objectives. Continue to maintain Vector Technician certification required for the public health application of pesticides. Advise Division of Environmental Health Director about any change of condition or situation, which may require an increased action level of the response plan. Apply chemical larvacide or adulticide as required using safe, legal methods when directed by higher authority within the county. Complete reports of pesticide application for Humboldt County Agriculture Commissioner and other appropriate legal authority as required.

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In addition to the Public Health Branch of DHHS, the following Humboldt County Departments will participate in the plan as follows:

The Office of Emergency Services: Upon declaration of a “State of Emergency” by the Humboldt County Board of Supervisors or other competent authority, the OES shall mobilize and man the Humboldt County Emergency Operations Center to the extent necessary to provide communications and coordination assistance as required. Mandates of Annex E, Humboldt County Operations Plan shall apply.

Humboldt County Agriculture Commissioner: Assist in monitoring any reports of WNV infection from local veterinarians, farms and ranches, or other private owners of horses or other affected livestock. Pass pertinent information to Public Health Branch Director and Division of Environmental Health Director. Receive and analyze reports of chemical pesticide use and pass recommendations on application safety to Division of Environmental Health.

Humboldt County Counsel: Receive and review any documentation relating to legal Notice to Abate mosquito sources issued to private property owners in Humboldt County. Assist authoring and reviewing any contractual language necessary to allow the mutually beneficial application of chemical pesticides in cities, federal or state owned lands, sovereign Native American lands, or other jurisdictions within Humboldt County if required under the plan.

Humboldt County Public Works Department: When requested, Public Works Department will support pesticide application needs with a truck suitable for the mounting and installation of mobile spray equipment supplied by the Public Health Branch.

Humboldt County Administrative Office: Receive reports of action levels and response strategies employed under this plan from Public Health Branch Director and report to Humboldt County Board of Supervisors as required. Assist in procurement of in-county and outsource materials and personnel that may be required by an increase in response action levels required under the plan

7. Response Thresholds and Action Levels:

The following thresholds and action levels are defined by the California State Mosquito-Borne Virus Surveillance and Response Plan developed by the CA Department of Health Services.

These disease risk thresholds and conditions apply when implementing the Humboldt County West Nile Virus Monitoring and Response Plan:

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Threshold Level One: No known threat of WNV to humans or domestic animals.

- Average or below normal spring and/or summer rainfall.
- Typical mosquito abundance is at normal or low levels.
- No reports of WNV infection from birds or other wildlife.
- No virus isolation from *Culex* or other mosquito species.
- No human or domestic animal WNV case reports in the county or the state.
- No virus isolation reported statewide from mosquito pools
Minimum Isolation Rate (MIR \leq 0/1000) in the county.

Level One Action: (Activities begin Spring, 2003)

- Division of Environmental Health (DEH) will initiate and maintain education and public outreach programs.
- DEH will initiate and maintain mosquito surveillance efforts.
- DEH will maintain liaison with State of California, county agencies, and other jurisdictions within Humboldt County. DEH will submit weekly surveillance reports to Public Health Branch Director and Humboldt County Health Officer.
- DEH will inventory chemical larvicide and adulticide materials, test equipment and order any supplemental supplies that are needed.
- DEH will correspond with local veterinarians in the county to insure timely reporting of any suspect or confirmed domestic animal cases of WNV.
- DEH will continue to participate in the CA Department of Health Services VRDL West Nile Dead Bird Monitoring Program (beginning April 1, 2003).

Threshold Level Two: Emergency Planning

- Above average spring or early summer rainfall resulting in abundant, persistent, and widespread breeding sources for mosquitoes.
- Identified vector species of mosquitoes including *Culex* or other competent vectors as defined by DHS VRDL are found in abundance in breeding sources within Humboldt County, particularly near urban areas.
- Virus isolation from a submitted mosquito pool (MIR of $<5/1000$)
In Humboldt County or an adjacent county (Del Norte, Shasta, Trinity, Mendocino, or Lake Counties).
- Chicken flock sero-conversion reported in Shasta, Del Norte, or Lake County.
- Virus isolation from a submitted dead bird carcass from Humboldt County.
- One equine case of WNV acquired within the state of California.
- One human case of WNV acquired within the state of California.

Level Two Action:

In addition to the activities outlined in Level One, the following steps will be taken:

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- DEH will enhance public education and outreach using media and print to disseminate WNV awareness and prevention information to a wide audience throughout Humboldt County.
- Public Health Nursing will continue liaison with medical care providers, hospitals, and clinics to insure they are aware of case definition and case reporting requirements for WNV.
- DEH will increase surveillance activities including additional personnel and equipment resources as required to track development of *Culex* and other possible vector species within Humboldt County.
- DEH Vector Control personnel will initiate larval control of mosquito species of *Culex* or other competent WNV vector species within Humboldt County as identified by DEH staff, DHS VRDL, or state vector biologists. Daily summaries of larvacide application activity will be passed to the Environmental Health Division Director.
- DEH Vector Control will submit comprehensive and detailed proposals to Director DEH and Public Health Branch Director for any necessary chemical adulticide application to control identified vector species.
- Division of Environmental Health Director will review and modify this response plan as required and establish communications with Humboldt County Office of Emergency Services. DEH Director will increase the frequency of reports to Public Health Branch Director and Humboldt County Health Officer if conditions warrant.
- Public Health Branch Director will designate staff to research and develop contractual agreements for mosquito abatement with cities and other jurisdictions within Humboldt County. These contracts will discuss the mutually beneficial chemical treatment options that may become necessary to protect the public health of the population. All aspects of any chemical treatment program including methods, costs and objectives will be thoroughly addressed to the satisfaction of all parties.

Threshold Level Three: Epidemic Conditions

- Identified adult populations of genus *Culex* or other competent vector mosquitoes are found to be continually emerging or newly discovered within Humboldt County.
- Mosquito pool virus isolation exceeds MIR >5/1000 in Humboldt or adjacent county (Del Norte, Trinity, Mendocino Counties).
- Four or greater WNV sero-conversions per flock of 10 chickens.
- Two or more equine cases of WNV acquired in the county.
- One or more human cases of WNV acquired in the county.
- Sentinel bird species die-off or other marker of virus detection within an urban area within Humboldt County.

Level Three Action:

In addition to the activities outlined in Levels One and Two, the following steps will be taken:

- The public information outreach and media campaign will continue to update residents and medical care providers on the most current status of WNV cases that relate to Humboldt County. Tools will include press releases, public service announcements, and interviews with key decision-makers in Humboldt County DHHS.
- Decisions involving the use of chemical adulticide mosquito sprays as a necessary control measure to protect human health will be explained in detail to the leadership and citizens of Humboldt County before any active treatment begins.
- The Vector Control Officer at Division of Environmental Health will begin a program of comprehensive, targeted adulticide chemical pesticide application as may be required to control adult populations of emergent *Culex* and other identified vector mosquito species in Humboldt County.
- Public Health Nursing staff will conduct active human WNV case detection and investigation as directed using PHN protocols.
- The Humboldt County Office of Emergency Services will maintain communication with Public Health Branch Director, activate the County Emergency Operations Center (EOC) as necessary, and implement the appropriate Annexes of the Humboldt County Emergency Operations Plan (EOP) when and if conditions warrant.
- The Humboldt County Health Officer and Humboldt County Board of Supervisors will determine if a declaration of a “State of Emergency” or “Local Emergency” is required by the circumstances including human WNV case incidence and the measured degree of success of mosquito abatement efforts. (Authority at H&SC Sections 101040, 101475, and Government Code Section 8558)
- Public Health Branch Director shall advise staff to seek all avenues of available emergency or grant funding as required to supplement county expenditures used for disease control and mosquito abatement efforts for the control of WNV in Humboldt County.
- Public Health Branch Director shall task staff with researching formation of a mosquito and vector control district or mosquito abatement district in Humboldt County.

At the close of the active mosquito season (approximately late-October) a report shall be assembled and prepared by Public Health Branch, Department of Agriculture, and other pertinent departments and divisions in Humboldt County. This report is to be delivered to the Humboldt County Board of Supervisors and shall describe the activities relating to control and effects of WNV in the county over the past season.