



## WEST NILE VIRUS



Protect yourself from West Nile virus and other mosquito-borne illnesses by avoiding mosquito bites with the following precautions:

- Avoid mosquito-prone areas at dawn and dusk
- Wear clothing that covers your skin
- Apply insect repellent that contains DEET and use according to the label directions

West Nile virus is typically active in Southern Nevada and Arizona in mid to late summer. It is an uncommon disease that is transmitted from the bite of an infected mosquito. It typically causes flu-like symptoms but can also cause severe illness and even death. It cannot be transmitted person-to-person.

Birds are the natural host for West Nile virus and many birds die each year from the disease. Numerous dead birds can indicate the disease is active in the area. Visitors who think they have seen unusual numbers of dead birds that may be related to West Nile virus can contact the park's Visitor Center at 702-293-8990 to report the location and description of the birds. Visitors should not touch dead birds!



# West Nile Virus Response Plan

August 2008

## ***Issue:***

Mosquitoes collected from several areas in the Las Vegas Valley have tested positive for West Nile virus and at least one person in Clark County has fallen ill from the virus in August 2008. Mohave County Arizona has not yet had any positive detections in mosquitoes or humans in 2008, but the virus is active in other parts of Arizona and has resulted in at least one human death this year. This is similar to the disease outbreak witnessed in mid or late summer for each of the last five years and it is presumed that future years will exhibit a similar pattern and need for action.

## ***Background:***

West Nile virus is a mosquito-borne disease that was first detected in the United States in 1999 and has since spread across the continent. According to the Southern Nevada Health District, it was first detected in Nevada in 2003. In 2007 there were 12 confirmed human cases in Nevada, with 3 of those cases in Clark County. Similarly, Arizona Division of Public Health Services reports that the virus was first detected in Arizona in 2003, with 97 confirmed human cases statewide and one of those cases in Mohave County in 2007.

The West Nile virus is spread through the bite of infected mosquitoes, which acquire the virus by feeding on infected birds. Birds are the natural host of the organism and bird → mosquito → bird is the normal vector sequence. The disease is not spread from human to human.

While mosquitoes and most of the bird species implicated in its vector sequence are native species, the West Nile virus itself is considered a non-native organism to the North American continent.

The chances of a human becoming ill from the disease are very low. First, there is a relatively low incidence of occurrence in mosquito populations even where the virus is active. Second, of the 17 mosquito species in southern Nevada, only a few of those species feed on humans. Third, of the humans infected with West Nile virus, only about 20% develop West Nile fever (characterized by a moderate to high fever and flu-like symptoms) and even fewer develop the more severe West Nile encephalitis or meningitis (characterized by high fever, severe neurological symptoms and can rarely result in death).

While most attention will be given to the human health risks of this disease, its potential impacts to wildlife are significant. High bird mortality has been common throughout the United States and Canada, with particularly high mortality rates found in the corvid family (crows, jays, and

related species). Some raptors are also highly susceptible. While West Nile virus is most common in birds, it also affects other animals and has been detected in over 290 bird species, 34 mammal species, and 2 captive reptile species. The implications of West Nile virus for wildlife populations are not fully known at this time.

## **NPS Policy and Guidance:**

The National Park Service Management Policies (2006) offer the following guidance:

- Section 4.4.5 Pest Management
  - Section 4.4.5.1 Pests “Pests are living organisms that interfere with the purposes or management objective of a specific site within a park, or that jeopardize human health or safety...Native pests shall be allowed to function unimpeded, except as noted below...(such as) ..Manage a public health hazard when advised to do so by the U.S. Public Health Service (which includes NPS Public Health Service and Centers for Disease Control), or to otherwise protect against a threat to human safety.”
  - Section 4.4.5.2 Integrated Pest Management Program “The Service conducts an Integrated Pest management Program (IPM) to reduce risks to the public, park resources and the environment.”
  - Section 4.4.5.3: Pesticide Use "The decision to incorporate a chemical, biological, or bio-engineered pesticide into a management strategy is based on a determination by a designated IPM Specialist that it is necessary and that all other available options are either not acceptable or not feasible."
- Section 8.2.5.5. Public Health Program
  - The Service will work to identify public health issues and disease transmission potential in the parks and to conduct park operations in ways that reduce or eliminate these hazards.

National Park Service’s West Nile Virus Policy Statement (see website below):

*Mosquito management efforts will be initiated only when a clear and defined threat to park resources and/or human health has been determined through a consultation process with experts, and where human health is concerned, when advised to do so by the U.S. Public Health Service (NPS Public Health Program and Centers for Disease Control). Nuisance mosquitoes will not be managed unless specific and exceptional situations arise.*

*Management decisions on how to reduce risk from WNV and associated management strategies to humans, the resource and the environment are site specific. Reducing the risk involves decreasing the chance of a human/animal from contracting the disease and/or reducing the risk of pesticide exposure. Risk reduction should include a variety of short and long term management actions such as: education of staff and visitors, monitoring /surveillance programs, sanitation programs, reduction of non-natural (man-made) habitat, site restoration, initiating periodic park or specific site closures, insecticide application, request funding for future*

surveys; or no action. Note that requests for insecticide applications (adulticide or larvicide) use will be considered after all other pest management tools have been reviewed and it has been determined through the NPS IPM Program and technical advisors that the pesticide is a necessary component in order to reduce risk of WNV on the site.

### **Lake Mead NRA Response:**

- **Source Reduction:** Eliminate artificial mosquito breeding areas.
  - Assign park or concessions staff at each facility to do a walk through of facilities after rain events to assure that no water remains standing longer than 3 days in containers, stored boats, tires, etc. Rain water has the greatest likelihood of accumulating during late summer with recurrent monsoonal rain events. Accumulated water that cannot be emptied should be reported to Alice Newton, the Park's Integrated Pest Management Coordinator.
  - The 8 sewer lagoons at the park are inspected weekly and are not known to harbor mosquito larvae. Utility system operators will be reminded to specifically look for mosquito larvae and mosquitoes during their weekly inspections. Report any mosquito larvae or activity to Steve Spearman, Facility Environmental Protection Specialist and Alice Newton the Park's Integrated Pest Management Coordinator.
  - The Native Plant Nursery produces several wetland plant species that require rooting in standing water that may serve as breeding habitat for mosquitoes. For localized control in the containers and beds, the Nursery staff routinely uses a product called Mosquito Dunks by Summit Chemical Company that contain a bacterium called *Bacillus thuringiensis v. israelensis* that produces a toxin specific to mosquito larvae. This treatment is approved annually through the NPS Pesticide Use Proposal system and the use will continue. In addition, nursery staff will be reminded to be on the lookout for mosquito larvae and mosquitoes in this and other areas of the plant nursery where water may pond.
  
- **Education:** Advise park staff, cooperators, and visitors to protect themselves from mosquito bites. Signs should be posted on campground bulletin boards, visitor contact stations, and other areas throughout the park to advise visitors to protect themselves from West Nile virus by avoiding mosquito bites. Advisories should include the following recommendations:
  - Avoid mosquito prone areas and times of day (dawn and dusk)
  - Wear clothing that covers the skin
  - Apply mosquito repellent that contains DEET and use according to the instructions on the container.
  
- **Surveillance:** Advise park staff, cooperators, and visitors to be on the lookout for dead birds particularly raptors, ravens, crows, and jays. Dead birds should not be touched, handled or transported. Visitors should report dead birds to the Alan Bible Visitor Center at 702-293-8990. Visitor Center and other park or concessions staff should report locations of dead birds to Ross Haley, Wildlife Branch Chief, for investigation and possible collection and/or testing. Dead birds can also be a sign of other, more virulent

diseases like Avian Influenza. Ross will follow established protocols issued by the National Park Service's Office of Public Health and Wildlife Health Program.

- **Control:** Open water environments with waves and wind, such as most of Lakes Mead and Mohave, are not good environments for mosquito breeding. The relatively sluggish water in the Upper Overton Arm and Las Vegas Wash areas have some potential for standing water and suitable breeding habitats (although dysfunctional urban swimming pools in the surrounding communities are by far the most likely culprits). At this time, we do not anticipate any wide scale spraying for mosquito control in the park. If the NPS is approached by state or county officials regarding spraying for mosquitoes on park land, the decision tree in Appendix XX will be utilized to consider the request.

### ***Additional Information Sources:***

#### **National Park Service Employees only:**

Inside NPS at <http://inside.nps.gov/publichealth/zed/wnv/wnv.htm>

#### **Public:**

Centers for Disease Control at <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

Arizona Dept of Public Health at <http://www.westnileaz.com>

Nevada Dept of Agriculture at [http://agri.nv.gov/Animal2\\_west\\_nile\\_virus\\_new.htm](http://agri.nv.gov/Animal2_west_nile_virus_new.htm)

Southern Nevada Health District at

[http://www.southernnevadahealthdistrict.org/west\\_nile\\_virus/west\\_nile\\_index.htm](http://www.southernnevadahealthdistrict.org/west_nile_virus/west_nile_index.htm)

### ***Appendices:***

- A. Rack Card for Visitors
- B. Poster for Visitor Bulletin Boards
- C. Frequently Asked Questions
- D. Decision Process for Pesticide Use for Mosquito Control
- E. Standard Operating Procedure for Collection and Testing of Dead Birds

*Prepared August 26, 2008 by S. Dingman, Biologist, Lake Mead NRA*

## Appendix A: Rack Card for Visitors

The following concept design will be developed into a rack card for distribution to visitors at visitor centers and other similar venues. The Division of Interpretation is responsible for final layout, production, and distribution.

### Front Side

[Graphics identity header]

Avoid mosquito bites to protect yourself from West Nile virus and other mosquito borne illnesses:

- Avoid mosquito-prone areas at dawn and dusk
- Wear clothing that covers your skin
- Apply insect repellent that contains DEET and use according to the label directions

[fight the bite logo]

West Nile virus is a mosquito borne illness that has been found in Nevada and Arizona since 2003. Each year, several people become from this virus. Most experience flu-like symptoms and soon recover, but for some people the disease progresses to West Nile Encephalitis – a serious and sometimes fatal condition. The disease cannot be transmitted person-to-person.

West Nile virus is transmitted through the bite of an infected mosquito, which has fed on an infected bird. Birds are the natural host of the virus but many birds die each year from the disease. Dead birds -- especially crows, ravens, jays, and some raptors – can be indicators that the disease is active in the area.

**Visitors who think they have seen unusual numbers of dead birds in the park that may be related to West Nile virus can contact the park's Visitor Center at 702-293-8990 to report the location and description of the birds. Visitors are urged not to touch dead birds!**

### Back Side

#### Do Your Part

Reduce artificial mosquito breeding habitats at home. In desert communities, swimming pools that are not maintained are a primary breeding habitat for mosquitoes in urban areas.

Report stagnant water or "green" swimming pools....

.... in Southern Nevada communities by calling 702-759-1220.

.... in Arizona communities by calling 1-800-314-9243

#### Learn more

Centers for Disease Control at  
<http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

Arizona Dept of Public Health at  
<http://www.westnileaz.com>

Nevada Dept of Agriculture at  
[http://agri.nv.gov/Animal2\\_west\\_nile\\_virus\\_new.htm](http://agri.nv.gov/Animal2_west_nile_virus_new.htm)

Southern Nevada Health District at  
[http://www.southernnevadahealthdistrict.org/west\\_nile\\_virus/west\\_nile\\_index.htm](http://www.southernnevadahealthdistrict.org/west_nile_virus/west_nile_index.htm)

## Appendix B. Poster for Visitor Bulletin Boards

The following concept design will be developed into a small poster for display on visitor bulletin boards and similar locations throughout the park. Campgrounds, picnic areas, and places where people gather in the evening hours will be the highest priority sites for posting. The Division of Interpretation is responsible for final layout, production, and distribution.

[NPS Graphics Identity header]

Protect yourself from West Nile virus and other mosquito-borne illnesses by avoiding mosquito bites with the following precautions:

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Birds are the natural host for West Nile virus and many birds die each year from the disease. Numerous dead birds can indicate the disease is active in the area. Visitors who think they have seen unusual numbers of dead birds that may be related to West Nile virus can contact the park's Visitor Center at 702-293-8990 to report the location and description of the birds. Visitors should not touch dead birds!

## **Appendix C. Frequently Asked Questions**

### **MOSQUITOES, WEST NILE VIRUS, AND ENCEPHALITIS**

#### **What is West Nile Encephalitis?**

“Encephalitis” means an inflammation of the brain and is considered a serious illness that can be fatal. It can be caused by bacteria and viruses, including viruses transmitted by mosquitoes. West Nile Encephalitis is an infection of the brain caused by West Nile Virus (WNV), a virus commonly found in Africa, West Asia, and the Middle East. It is closely related to St. Louis Encephalitis Virus, also found in the United States. Most people infected with the West Nile Virus never develop symptoms but about 20% develop a mild illness with “flu-like” symptoms. Only a few people will develop the more severe symptoms of West Nile Encephalitis. The elderly and persons with weakened immune systems are most at risk of developing severe illness from West Nile Virus.

#### **How is it passed from mosquitoes to people?**

Mosquitoes become infected when they feed on virus-infected birds. The West Nile Virus may circulate only a few days in a bird. After an incubation period of 10-14 days, infected mosquitoes can transmit West Nile Virus to humans or other animals. Disease symptoms do not develop in everyone that is bitten by an infected mosquito.

#### **How long has West Nile Virus been in the United States?**

It is not known how long the virus has been in the United States, but the Centers for Disease Control and Prevention (CDC) scientists first detected it in the eastern U.S. during the summer of 1999. From there it quickly spread across the country. It was first detected in Arizona and Nevada in 2003.

#### **How do people get West Nile Encephalitis?**

Transmission comes through the bite of a mosquito (primarily the *Culex* species) that is infected with the West Nile Virus. The virus is located in the mosquito's salivary glands. The virus cannot be transmitted from person to person and, you cannot get the disease from birds.

#### **Is there a vaccine against West Nile Virus?**

Vaccines are under development, but there is no human vaccine for the West Nile Virus at this time.



**What precautions is the National Park Service taking to prevent an outbreak of West Nile Encephalitis in its park units?**

All National Park Service areas are working in cooperation with their federal and local mosquito management and health agencies. The local cooperators for Lake Mead NRA are the Southern Nevada Health District and the Arizona Department of Public Health.

**Does the National Park Service actively manage mosquitoes in its park units?**

Sometimes. Under certain circumstances, native species such as mosquitoes are managed to decrease populations when a public health emergency has been declared. The localized application of larvicides and adulticides for the management of native mosquitoes is allowed if all other control options have been exhausted and that use has been approved through the NPS Integrated Pest Management program.

**What can park visitors or park employees do to increase their awareness and prevent becoming infected with the West Nile Virus?**

Mosquito activities increase at dawn and dusk. Be aware of mosquitoes if you're out during these times.

- Help eliminate temporary mosquito habitat and stagnant fresh water (flowerpots and buckets, stopped-up rain gutters, discarded cans, etc.)
- Learn about mosquitoes. Avoid going into heavy mosquito areas at dusk. Do not wear cologne or perfume, smells that may attract mosquitoes.
- Long-sleeved shirts, long pants, a hat, and gloves can provide increased protection from mosquitoes.
- The use of an insect repellent on clothes or sparingly on exposed skin can decrease encounters with mosquitoes. A repellent with 20% to 30% DEET (N,N-diethyl-met-toluamide) as the active ingredient works the best. Follow label directions for safe and effective use.
- Report (but do not handle) dead birds to park staff for investigation and possible collection and testing by a Park Biologist.

**Where can I get more information on West Nile Virus and other mosquito-borne diseases?**

Centers for Disease Control at <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

Southern Nevada Health District at [http://www.southernnevadahealthdistrict.org/west\\_nile\\_virus/west\\_nile\\_index.htm](http://www.southernnevadahealthdistrict.org/west_nile_virus/west_nile_index.htm)

Nevada Dept of Agriculture at [http://agri.nv.gov/Animal2\\_west\\_nile\\_virus\\_new.htm](http://agri.nv.gov/Animal2_west_nile_virus_new.htm)

Arizona Dept of Public Health at <http://www.westnileaz.com>

## Appendix D. Decision Process for Pesticide Use for Mosquito Control

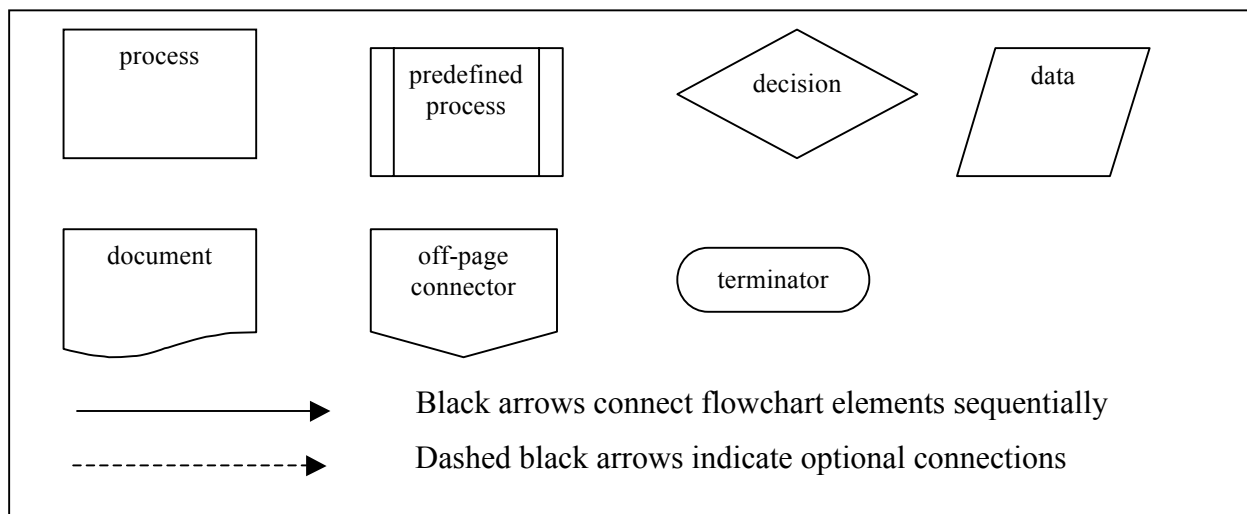
The intent of these flowcharts is to have developed (and documented) proactively the decision making process we will use if/when the park is approached by local communities or health districts about the application of pesticide for mosquito larvae or adult control in the park. The Division of Resource Management, in cooperation with the Park's Public Health Officer, is responsible for implementing and/or revising this decision process.

POLICY DIRECTION (taken from [http://inside.nps.gov/publichealth/zed/wnv/wnv\\_policy.htm](http://inside.nps.gov/publichealth/zed/wnv/wnv_policy.htm))

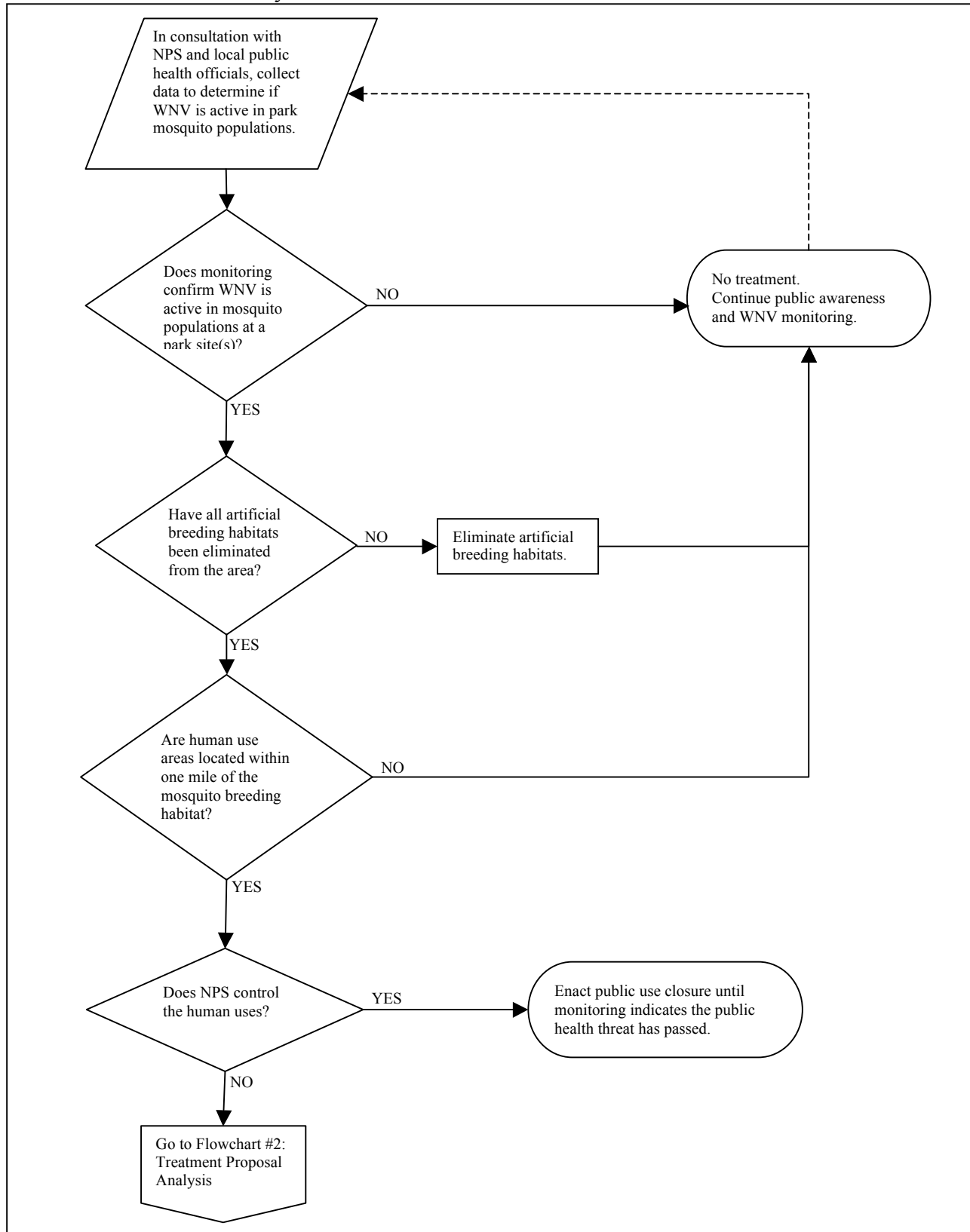
Management decisions on when and how to evaluate risks from WNV and associated management strategies will be determined on a site-by-site basis, in accordance with NPS Management Policies 2001. This evaluation shall be based on parameters specific to the site which include, but are not limited to: site use, confirmed presence of WNV in birds and/or mosquito populations (scientific testing), presence of competent vectors, mosquito predators, associated monitoring/surveillance data, site ecology, presence of rare or endangered species, weather patterns and temperature. In addition, mosquito management efforts will be initiated only when a clear and defined threat to park resources and/or human health has been determined through a consultation process with experts, and where human health is concerned, when advised to do so by the U.S. Public Health Service (NPS Public Health Program and Centers for Disease Control). Nuisance mosquitoes will not be managed unless specific and exceptional situations arise.

Management decisions on how to reduce risk from WNV and associated management strategies to humans, the resource and the environment are site specific. Reducing the risk involves decreasing the chance of a human/animal from contracting the disease and/or reducing the risk of pesticide exposure. Risk reduction should include a variety of short and long term management actions such as: education of staff and visitors, monitoring /surveillance programs, sanitation programs, reduction of non-natural (man-made) habitat, site restoration initiating periodic park or specific site closures, insecticide application, request funding for future surveys; or no action. Note that requests for insecticide applications (adulticide or larvicide) use will be considered after all other pest management tools have been reviewed and it has been determined through the [NPS IPM Program](#) and technical advisors that the pesticide is a necessary component in order to reduce risk of WNV on the site.

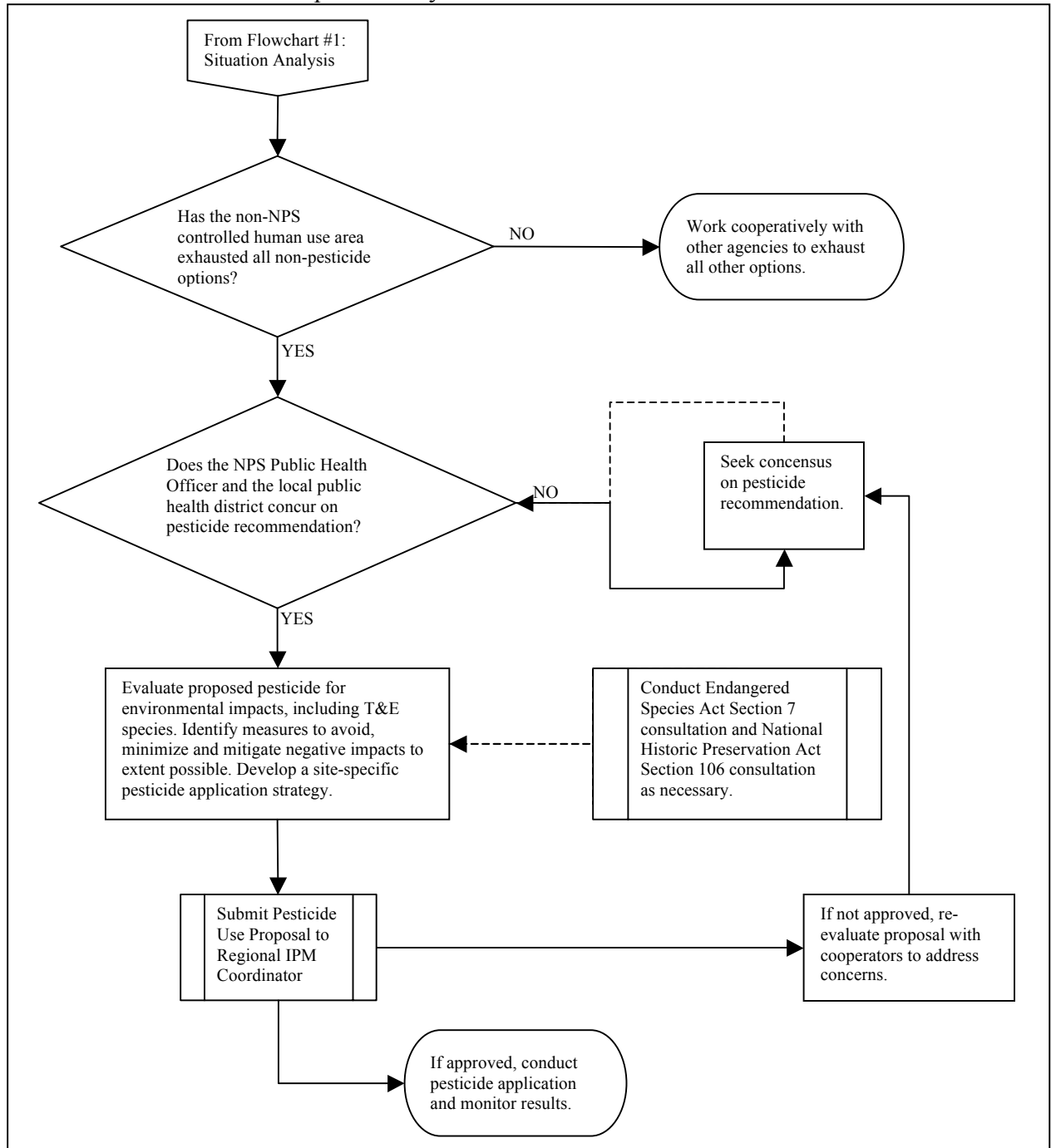
### Key to flowchart symbology



Flowchart 1: Situation Analysis



## Flowchart #2: Treatment Proposal Analysis



## Appendix E. Standard Operating Procedure for Collection and Testing of Dead Birds

The Division of Resource Management has the responsibility for implementing this SOP.

There are multiple diseases that may result in bird mortality, and may be transmitted to humans via handling of dead birds. In our area the most common avian disease agent that is transmissible to humans is West Nile virus, but there are other more virulent diseases that are also a possibility. Of particular concern is Highly Pathogenic Avian Influenza (HPAI) which has not yet been detected in the United States but has resulted in high wildlife and human mortality in other parts of the world and is a widely recognized risk for a global pandemic.

For the protection of visitors, park staff/cooperators, and the park's wildlife resources, the following procedures will be used for dealing with fresh dead birds with no visible signs of decomposition and no obvious cause of death:

- Visitors are encouraged to report dead bird sightings (especially large numbers of dead birds) to the Visitor Center by calling 293-8990. Locations and descriptions should be provided. Visitors should not touch or transport dead birds!
- Staff and cooperators who receive a report of dead birds, or who see dead birds themselves, should report the sighting to Ross Haley, Branch Chief for Wildlife Resources. Ross can be reached at [ross\\_haley@nps.gov](mailto:ross_haley@nps.gov), office: 702-293-8950, or cell: 702-249-6234. Ross will make arrangements for a trained and qualified resource management staff member to inspect and appropriately collect or dispose of the bird(s).
- If staff or cooperators are unable to reach Ross and the bird(s) are in an area with a high possibility for contact with visitors, the following steps should be taken:
  - Put on gloves, preferably rubber or nitrile, before handling the bird(s)
  - If possible, use a shovel to pick up the bird or use your gloved hands.
  - Put the bird in a zipper top plastic bag if available, or wrap in a plastic bag of some kind and secure it as airtight as possible by the best means available. If using your hand, turn the collection bag inside out, place gloved hand in bag, grab bird, pull bag over bird and seal.
  - Transport the bagged bird out of the visitor use area by the best means possible, but avoid transporting in the passenger compartment of a vehicle (e.g. use the bed of a pickup if possible).
  - If possible, take the bagged bird to a nearby secured administrative area (e.g. local maintenance yard, Hilltop yard, etc.) but do not put it in a building of any kind. Put a tag on the bag that says "Dead bird – Do not touch" and put it in the shade. If you cannot take it to a secured outdoor area, put it in a garbage dumpster.
  - Turn gloves inside out as you remove them and dispose of used gloves in a zipper top bag in a closed garbage can. Disinfect any surfaces in contact with the dead bird (e.g. shovel and pickup bed). Thoroughly wash hands and any exposed skin.
  - Report the bird(s) to Ross as soon as possible. Provide both the original location and where you moved it to.
- Ross Haley or assigned Resource Management staff will follow the inspection, collection, and disposal procedures outlined in the NPS Avian Flu intranet site: <http://inside.nps.gov/publichealth/intra/ai/aiindex.htm>