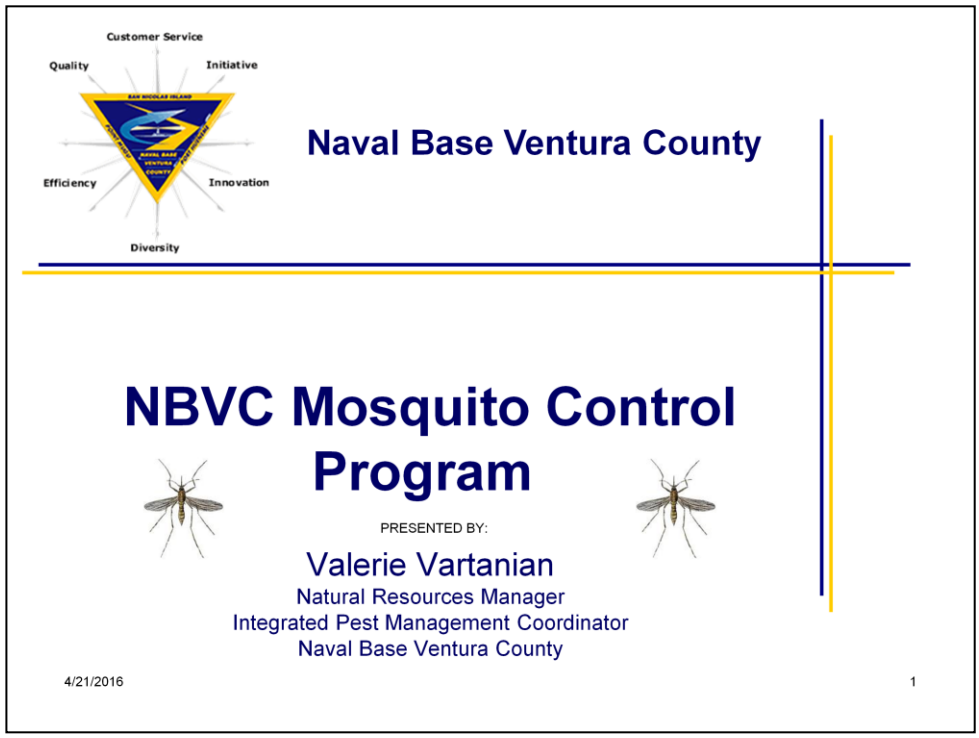
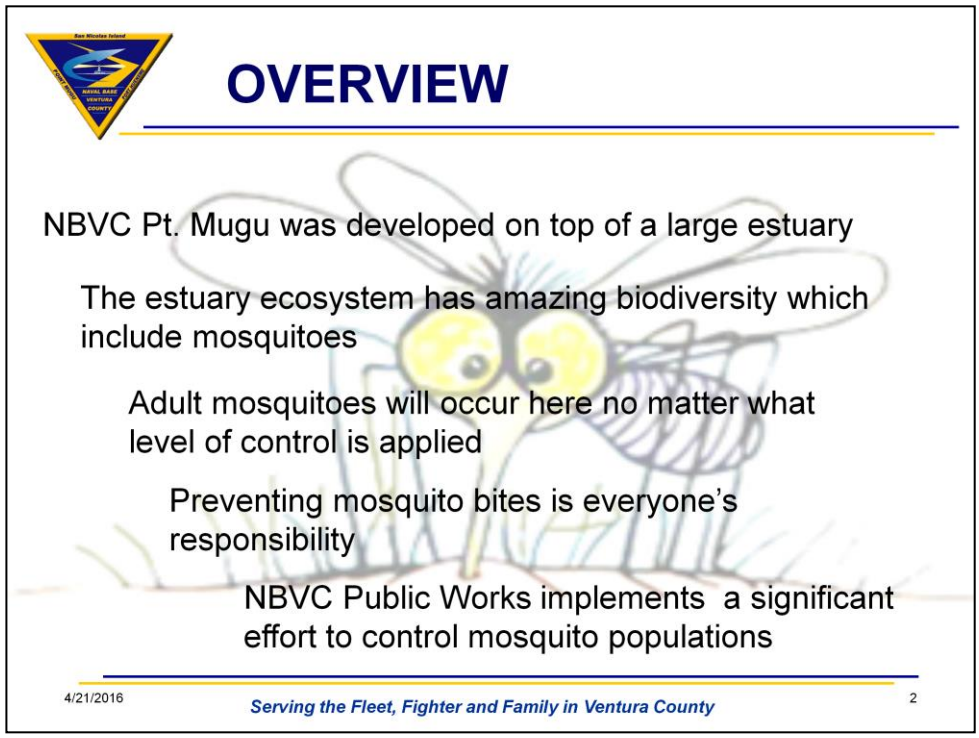
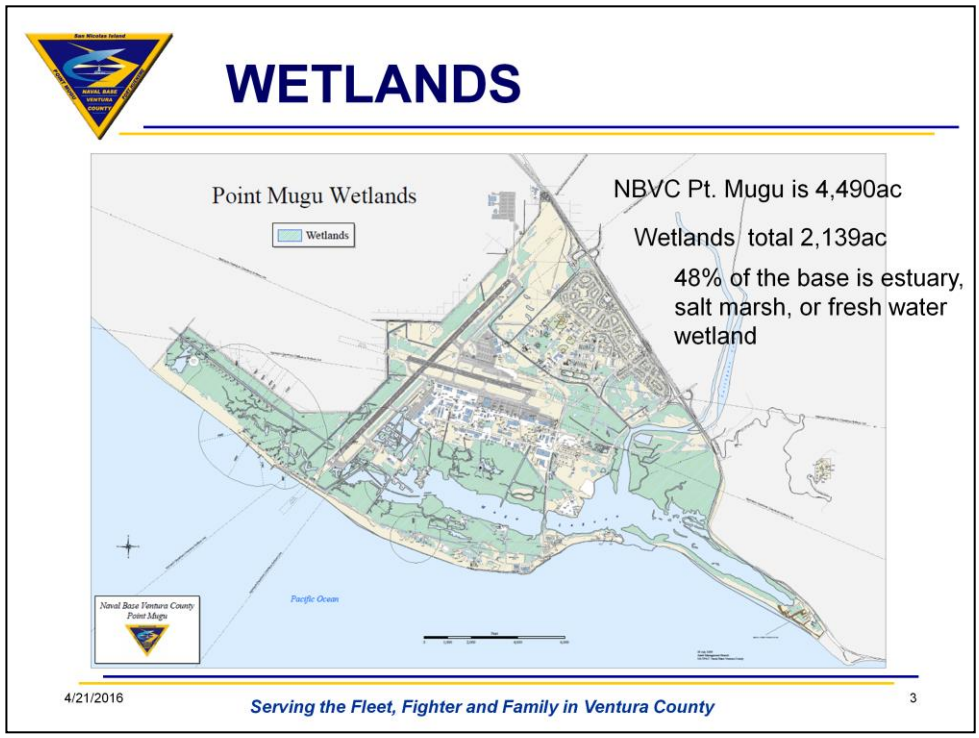


Goals for this presentation:

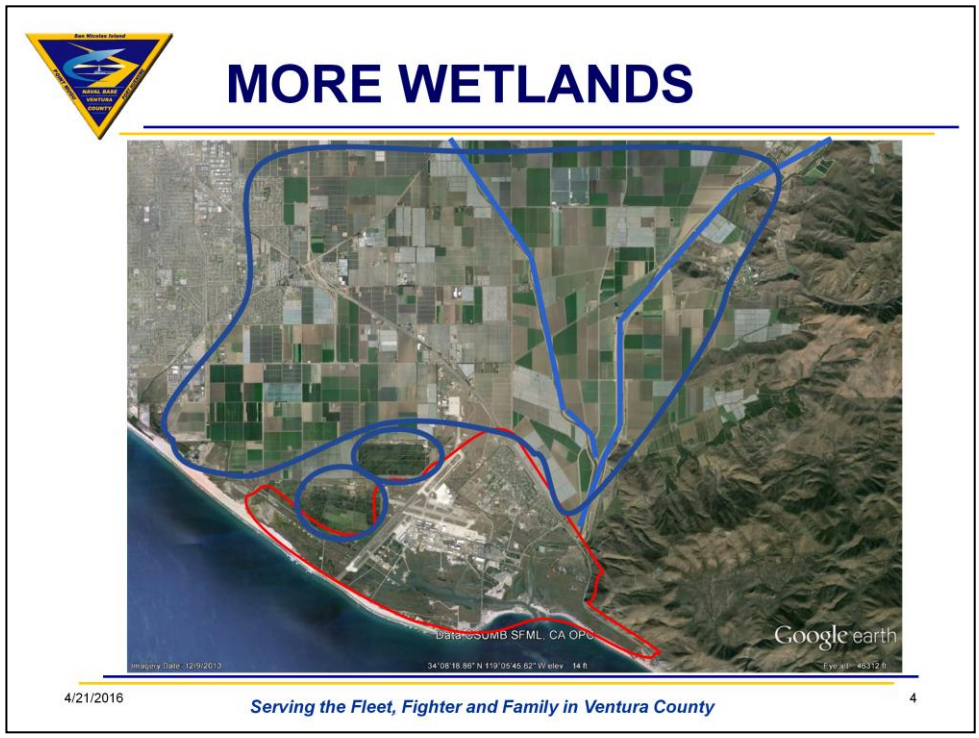
1. Become familiar with the natural wetland ecosystem at NBVC Pt. Mugu.
2. Know the types of water sources for mosquitoes in the area
3. Learn the 2 most prevalent mosquito types on base
4. Become familiar with the protocols for mosquito treatment on base
5. Know the laws that regulate chemical use for mosquito treatment
6. Learn what you can do to help identify mosquito sources
7. Learn what you can do to protect yourself, families, and staff from mosquito bites



There is a lot of water in and around NBVC. Historically this area was part of a much larger lagoon/estuary system that ran along the coast up to Santa Barbara. The Mugu Lagoon is the largest salt water marsh in southern California. This is an amazing and very rare coastal ecosystem. In order to protect this valuable ecosystem, NBVC follows the guidelines in the Integrated Natural Resources Mgt. Plan each year for guidance on managing the wetlands and wildlife on base. Mosquitoes are just one of many organisms that live in this ecosystem. However, for protection of the health of base personnel NBVC employs an extensive mosquito control program. We follow the mandated Integrated Pest Management (IPM protocols. IPM is a method of setting priorities and goals for controlling pests while minimizing harm to people and the environment. Control methods start from least toxic, like keeping food properly stored to avoid attracting ants, to most toxic if the other methods didn't work like using pesticides or herbicides. The first stage of IPM in controlling disease-spreading mosquitoes is to eliminate their breeding grounds, fresh water!

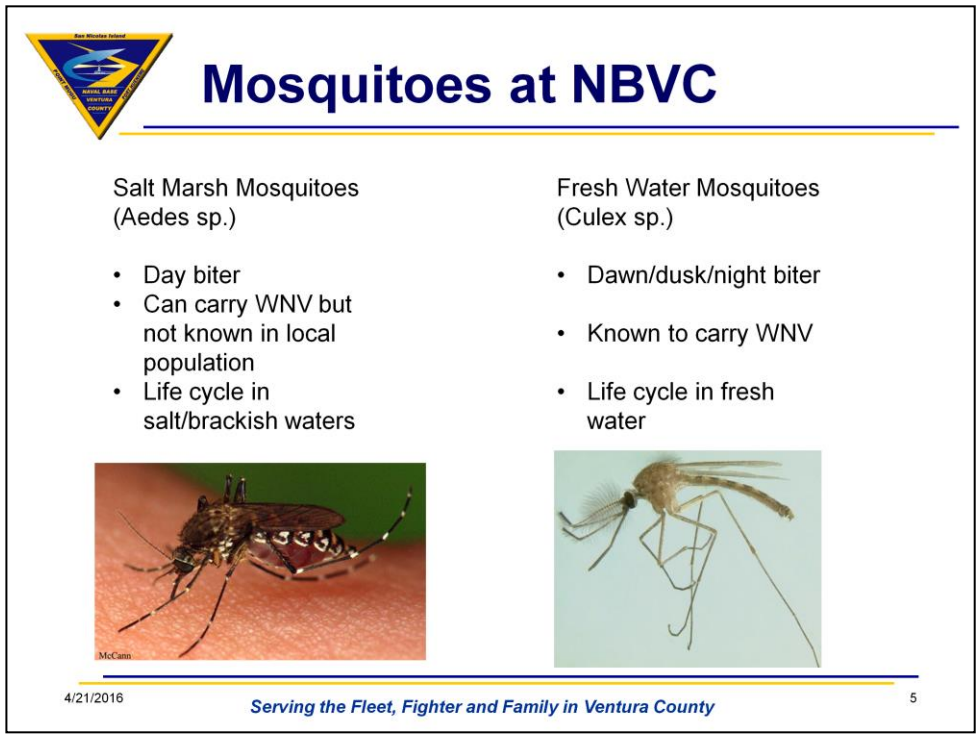


Nearly half of the base is wet. Mostly the wet is salt water that flows through tidal channels 4 x a day. There is some fresh water on base (you can see Calleguas Creek enters the base on the east), and even that is higher in salinity than normal fresh water ponds. Most of the fresh water sources on base are human related like pipe leaks, rain or dew pooled up in toys or equipment, overwatered landscapes… NBVC, however, is not the only water source in the area.



Looking just outside of the base there are additional sources of water (CLICK). Calleguas Creek and Revolon Slough drain the Santa Monica and Santa Susana mountains. (CLICK) there are 2 duck hunting clubs adjacent to the base. They begin to fill their ponds with fresh water pumped from groundwater sources in August, the height of the mosquito season. (CLICK) and then there's all those agricultural fields with irrigation.

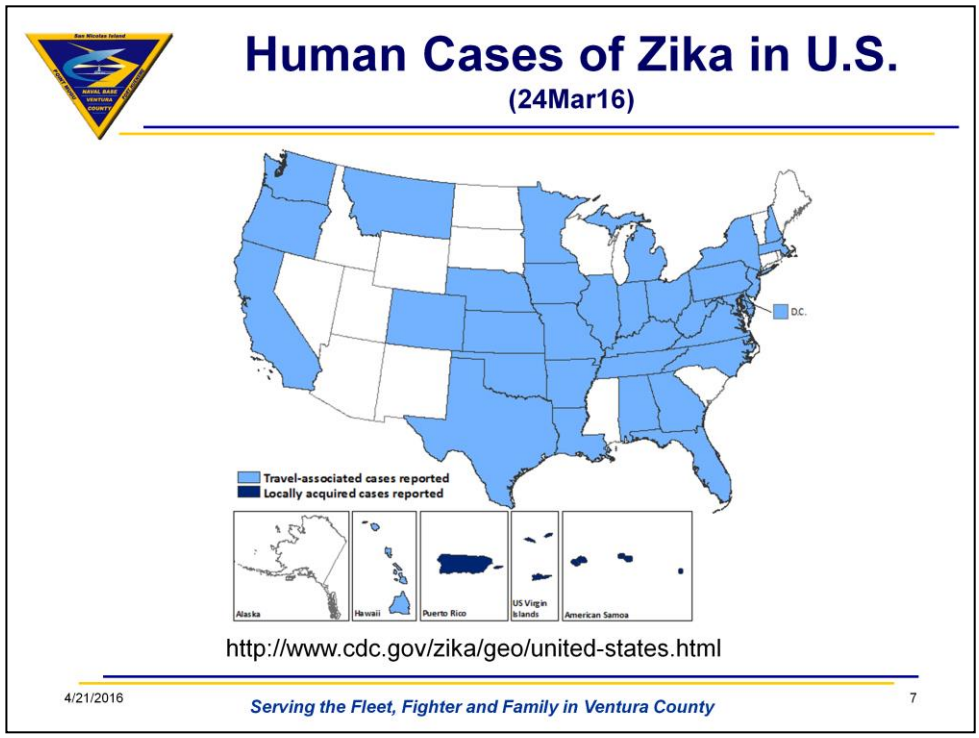
There are many sources of mosquitoes, not just the estuary on NBVC.



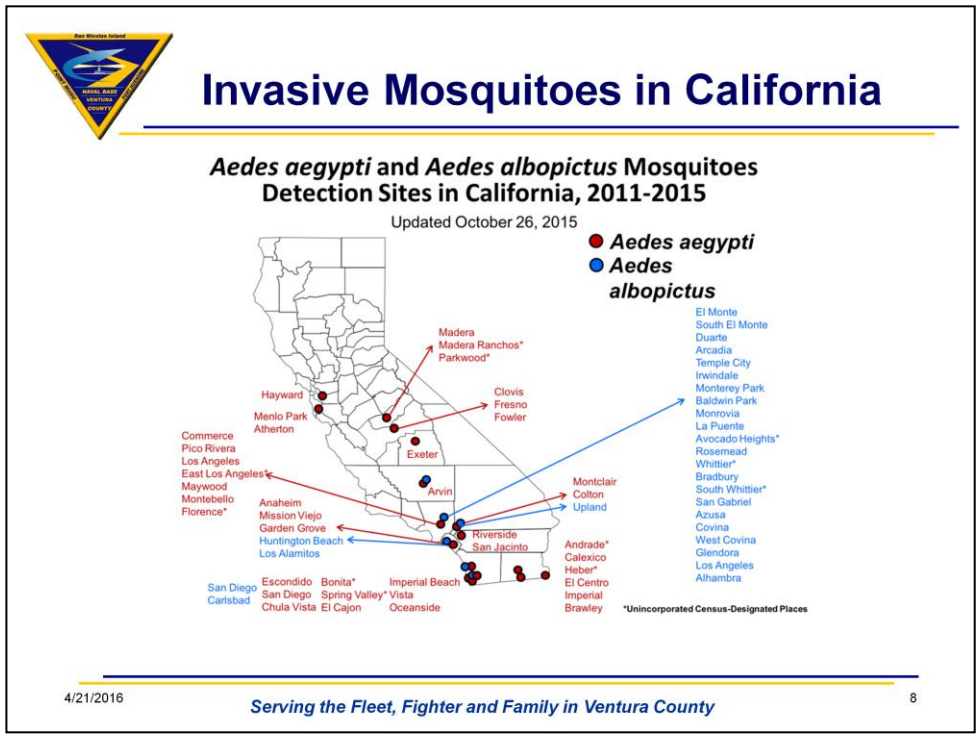
So here are the 2 main types of mosquitoes on base: Salt Marsh and Fresh Water. The salt marsh species are not known to be vectors for most diseases like West Nile Virus (WNV). They bite during the day and are considered a nuisance. The fresh water mosquitoes are associated with carrying disease and usually come out dusk and dawn with some species coming out at night. These are the ones we are most concerned about and work to control.

There are 2 species of invasive mosquito reported in the US since 2011 and a few counties in California: Aedes aegypti (Yellow Fever Mosquito, Africa) and Aedes albopictus (Asian Tiger Mosquito, Asia).
Both species carry Dengue, Chikungunya, and Zika viruses. Both are in the same genus as the native Aedes taeniorhincus (Salt Marsh Mosquito) and have similar habits in that they are aggressive biters that come out during the day. The difference is that the invasive mosquitoes breed in fresh water, not salt marshes.

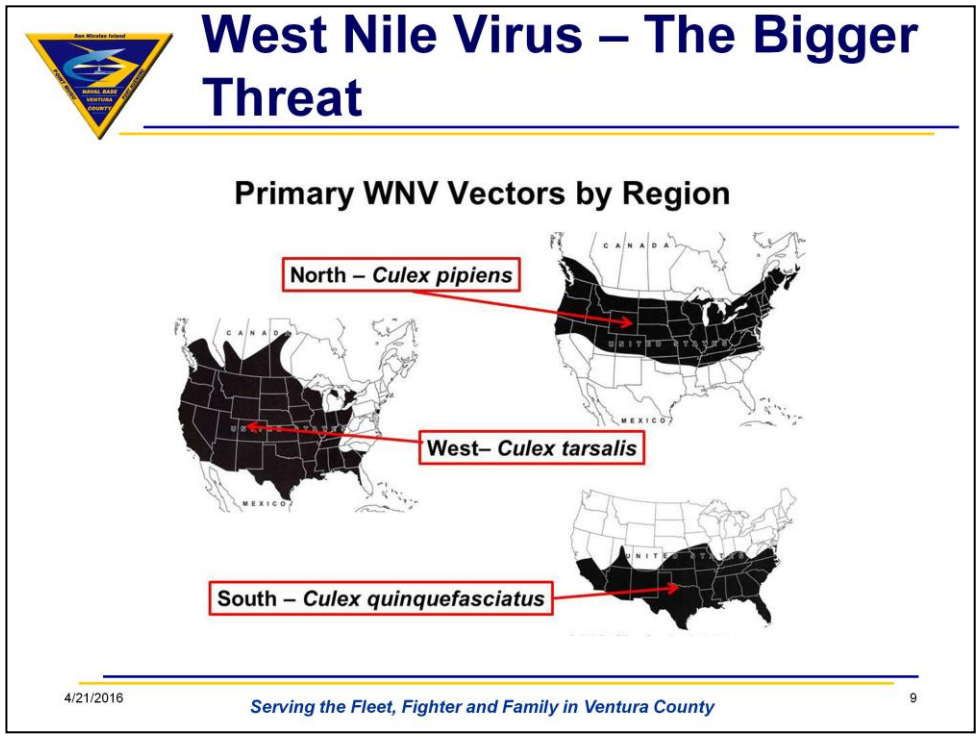
A. aegypti is more problematic of the 2 in that it prefers small fresh water sources indoors and around human modified areas. It's eggs can withstand desiccation for a couple weeks to maybe a year.



Most of the Zika cases in the U.S. are associated with travelers who contracted the Zika virus from areas with Zika virus in the human population. There are only 2 cases to date (24Mar16) where the Zika virus may have been transmitted from one person to another through sexual contact in the U.S. There are no cases of Zika in Ventura County.



Though the invasive mosquitoes have have been reported in counties nearby, none have been detected here in Ventura County (24Mar16). That could mean there are none or they are in such low numbers, none have been detected. There have also been no cases of Zika infected people entering Ventura County. No mosquitoes, no virus = no threat. The bigger threat of disease in this area transmitted by mosquito is West Nile Virus.



West Nile virus (WNV) is a mosquito-borne disease that was originally found in Africa. In 1999, it was detected in the eastern United States (New York City); since then the virus has spread throughout the United States and is well established in most states, including California. Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.

WNV has been detected in 65 different mosquito species in the U.S. (CDC 2012), though it appears that only a few Culex species drive epizootic and epidemic transmission. The most important vectors are Cx. pipiens in the northern half of the country, Cx. quinquefasciatus in the southern states, and Cx. tarsalis in the western states where it overlaps with the Cx. pipiens and quinquefasciatus.

West Nile Virus

CDPH West Nile Virus Cases - 2015

	Human Cases	Deaths
Ventura	6	2
State Total	**860**	**77**
US Total	**2060**	**119**

California Department of Public Health http://westnile.ca.gov/reports.php

Culex quinquefasciatus

Culex tarsalis

4/21/2016 *Serving the Fleet, Fighter and Family in Ventura County* 10

The risk of getting WNV through blood transfusions or organ transplants is very small. Transmission during pregnancy from mother to baby or transmission to an infant via breastfeeding is extremely rare. WNV is not spread through casual contact such as touching or kissing a person with the virus, or by breathing in the virus.

WNV affects the central nervous system. Less than 1% of individuals (about 1 in 150 people) infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. Symptoms may last several weeks, and neurological effects may be permanent. WNV infection can be fatal. Up to 20% of people (1 in 5) who become infected will display symptoms which can include fever, headache, body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms generally last for a few days, although some people have been sick for several weeks. Approximately 80% of people (4 out of 5) who are infected with WNV will not show any symptoms.

These fresh water breeding mosquitoes are the bigger threat to health on base. NBVC implements an extensive surveillance and treatment program aimed to reduce the numbers of annoyance mosquitoes and eliminate fresh water breeding sites for vector mosquitoes.

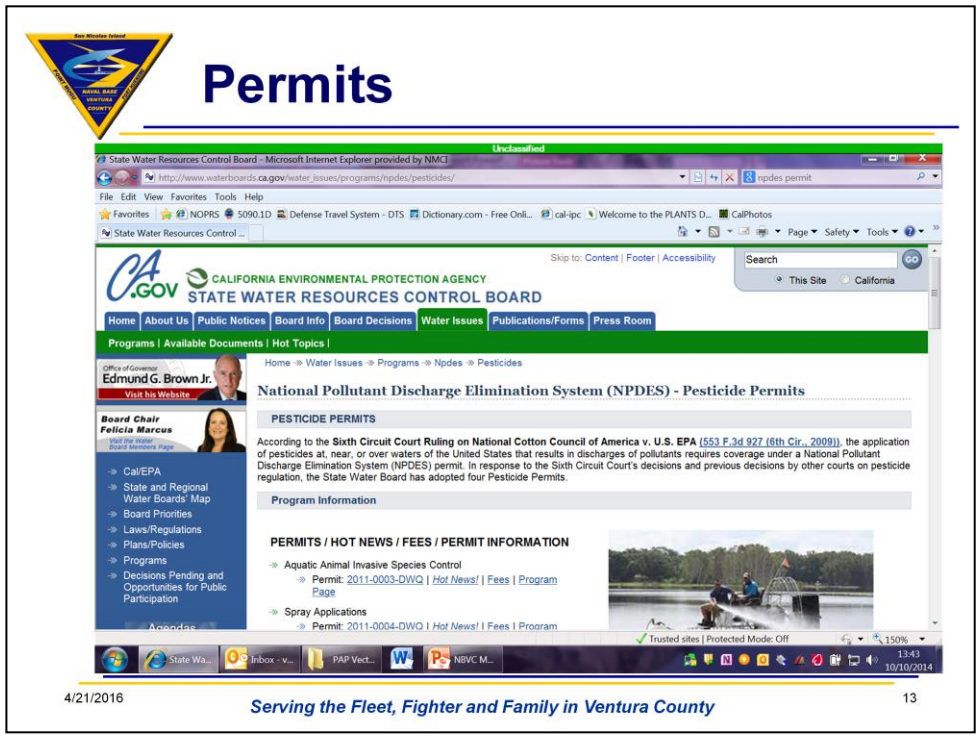
Typically, surveillance starts in April. All of the red dots indicate areas where we look for mosquito larvae. Each dot is a starting point, crews will walk further around that area to check for mosquito larvae. When larvae are found (a single larvae will trigger treatment), we treat the waterways in those areas. The tidal channels themselves do not support mosquito breeding due to the constant movement of deeper water. Mostly the mosquitoes will find a ponded area to breed. That's where we focus our attention when it comes to surveillance and treatment. Treatment is triggered when larvae are found. Sometimes, larvicide will be placed in known hotspots before we find larvae just to get the bait blocks out and activated.

Dipping cups are used to sample the water and get a sense for how many larvae are in the pools. If we find any, we treat the site with larvicide briquettes. The briquettes contain a bacteria that only affects mosquitoes. The larvae feed on the briquette and the bacteria gets into the gut and destroys the lining of the stomachs. They die within days. Other larvicides we use are insect growth inhibitors, they do not allow the larvae to emerge as adults.

In spite of larvicide applications there will be times when large numbers of adults emerge. In that case, we look where there is a high density swarm for a potential water source. In many cases there will be a water leak or other source of fresh water. It is important to report any water leaks around housing or work sites. Larvicide will be added to the puddle to keep any new emergence from happening.

If there are high concentrations near buildings and no apparent water source, we will use backpack sprayers to apply an adulticide in and around buildings. Mosquitoes will hide in vegetation and lawns, so these are the areas targeted for spraying. The adulticide only lasts a few days, but it will kill all adults it comes into contact or who land in the vegetation after spraying.

Ultra low-volume (ULV) fogging is a popular, but ineffective method for controlling adults. The only mosquitoes that will be killed are ones that fly into the fog. We had a complaint one year that more mosquitoes were seen after the fogging than before. There are also many environmental issues with fogging related to drift, especially in wetlands. And, as you remember from the first slide, it's hard to keep anything that drifts in the air from getting into the waters on base. Pesticides that drift into the water are considered a violation to the Clean Water Act.



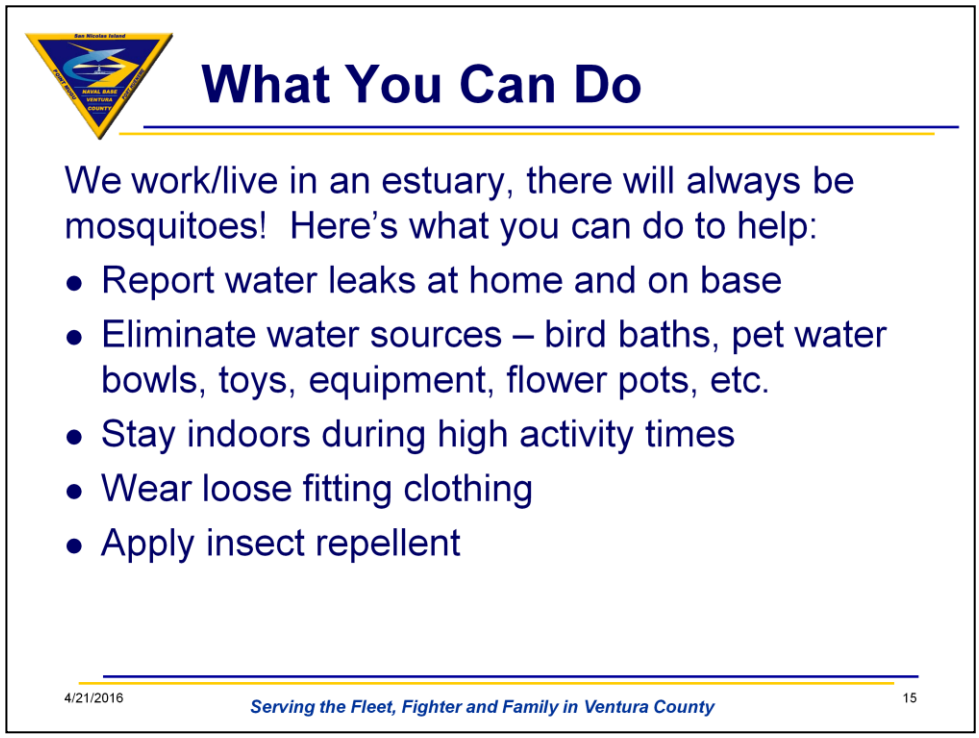
There are now additional regulations on what chemicals (herbicides and pesticides) we can apply to directly water. These permits allow us to apply only certain chemicals using specific protocols. In addition we have to send water samples in each time we apply the pesticides, which is very expensive for the base. The regulations also make if very clear that no drift from any other chemical can enter the water.

For these reasons, and primarily the ineffectiveness of the treatment, we do not use fogging as a control for mosquitoes.

NBVC's Mosquito Control Program includes stakeholders on and off base. We meet with all involved parties prior to the mosquito season and once again after the season to discuss what went well, what didn't work, and what we can do next year. The white papers provide in depth information regarding mosquitoes and their control on NBVC. These pages are distributed to everyone who is interested or will need to answer questions from their constituency. They are distributed to EMS personnel, Housing, MWR, and anyone else who asks.

The 2 main websites allow anyone to check on the most updated information related to diseases spread by mosquitoes.

The message is critical to managing mosquitoes on base. Some people may have a low tolerance to insect interactions. 1 bite is too many. We cannot eliminate all mosquitoes and so mosquitoes biting are just a normal part of the spring and summer season here at NBVC Pt. Mugu. This is the message that needs to be repeated to everyone inquiring about mosquitoes. We are working on acceptable thresholds for mosquitoes based on other areas of the country with similar habitats and seasons. IPM mandates that tolerance of various types of environmental pests is required before triggering control actions, especially actions that use chemicals for control.



So, what can you do to help and protect yourself!? No matter how extensive or successful our mosquito control program is, there will always be mosquitoes here. Make sure you are not contributing to the problem. Police your living/working environment indoors and out and eliminate breeding sources. Report water leaks and repair leaks around your home. Avoid high activity times for mosquitoes, but if you go out, dress appropriately.

Tires
Holes/depressions in the ground or paved surfaces
Rain barrels
Pottery
Rain gutters
Toys
Bird feeders
Bird baths
Pet dishes
Hanging plants
Yard décor – shells, coconut, ceramic statues
Metal, plastic barrel drum lids
Tree notch
Leaf axis
Bamboo
Gutters, floor drains

Potted plants

Dish under potted plants

Bowl of water with plant

Bromeliads

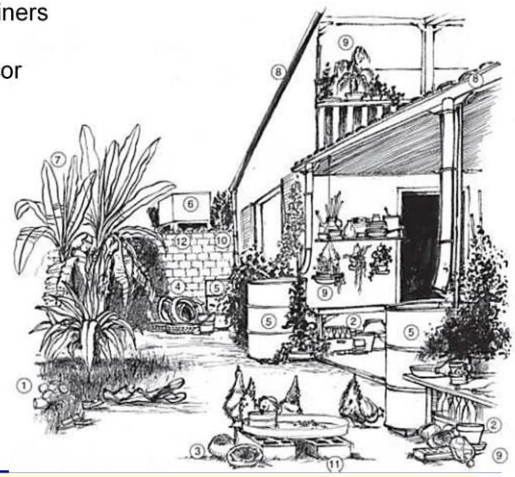
Floor drains

Toilets

Breeding Sites

1) Discarded Cans / Plastic containers
2) Bottles
3) Coconut husks, sea shells, decor
4) Tires
5) Barrels
6) Water storage tanks
7) Plant axils
8) Roof gutters
9) Flower pot saucers
10) Broken bottles
11) Holes in constructions blocks
12) Cracks in block walls

Any natural or human-made container/depression capable of holding 1 Tablespoon of water



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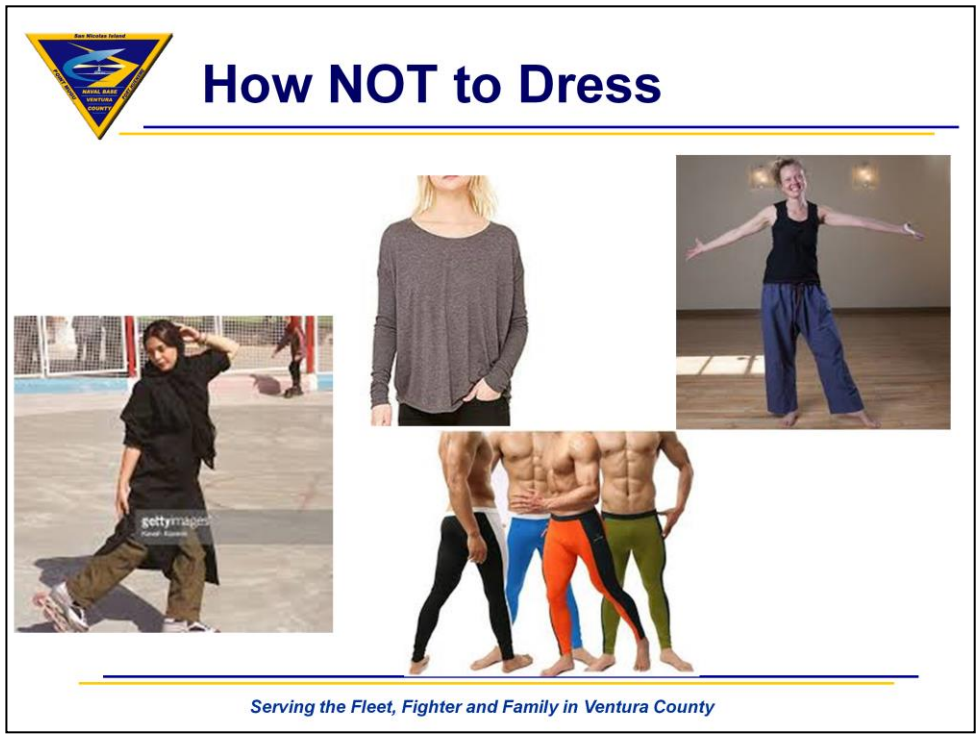
Here's another visual for where to look for sites outdoors. Look at number 11 – who would think to look there for water?!

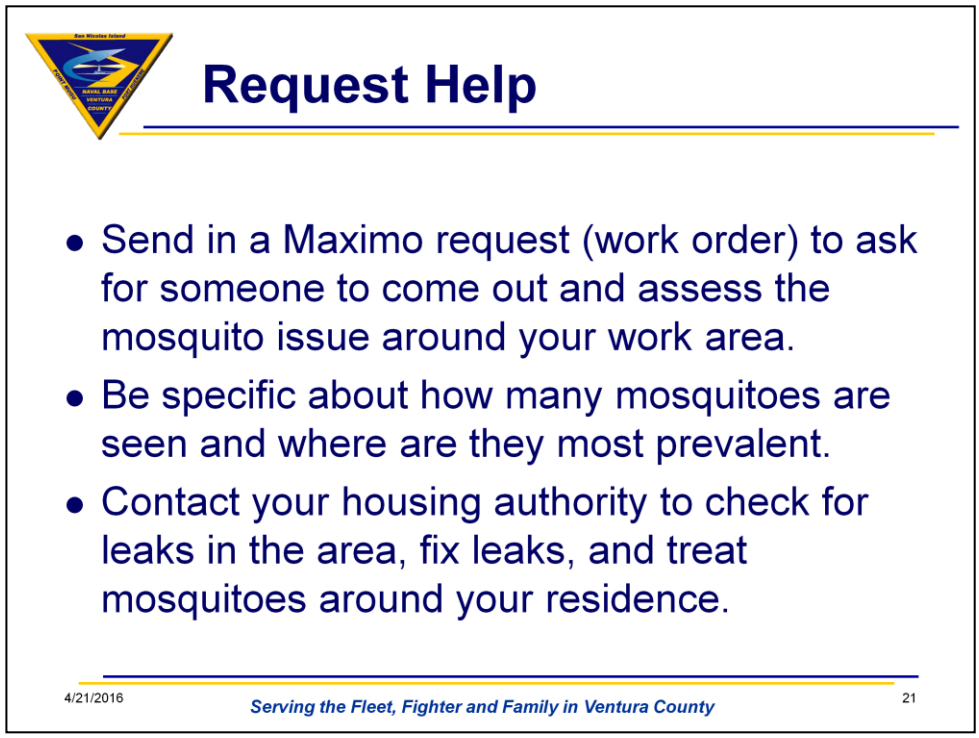
Appropriate clothing is loose fitting, thick or tight woven materials, light in color, covers as much skin as possible.

CLICK- Or stay cool and wear netting!



What's wrong with these pictures?

- Baggy clothes, good, however dark colored and arms exposed
- Thin woven top, tight on shoulders and arms
- Yoga pants, need I say more?
- Good loose pants, but the tank top?

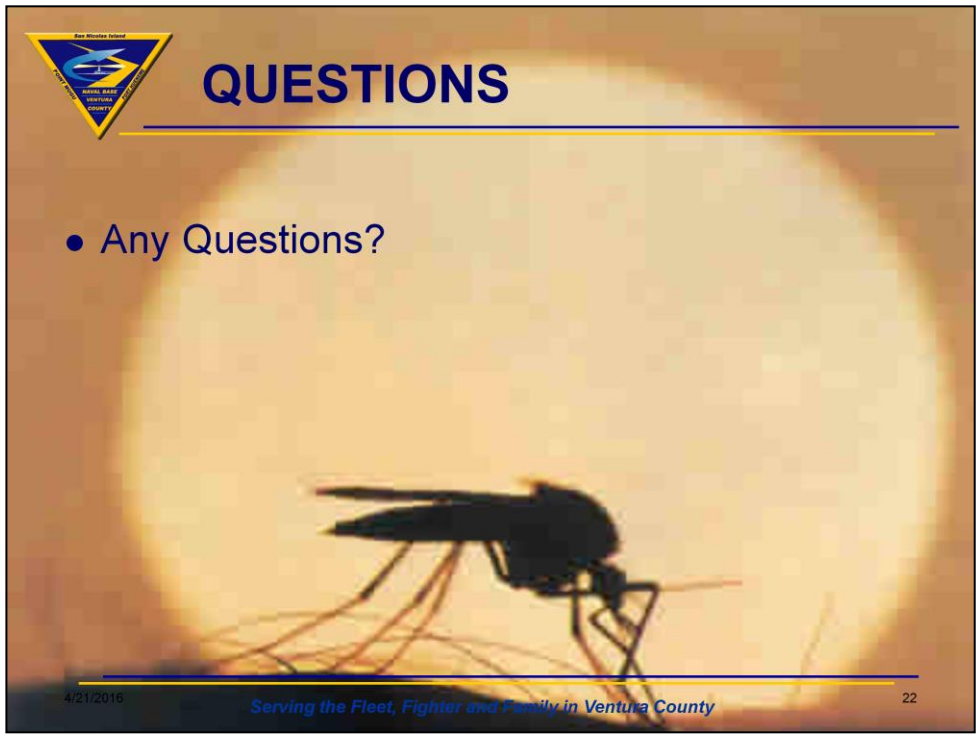


In the work areas, submit a work order to have base pest managers alerted to your specific problem area. Call Public Works trouble desk at 805-989-8888. Be very specific about the type of problem. Some people have a low threshold to mosquitoes or any insect. For example, we had a call from State Parks saying that their employees were being "eaten alive" by "swarms" of mosquitoes. When I asked the supervisor who made the call for his employees exactly how many, he said he'd ask and get back to me. A few days later he called and apologized telling me that his employees said there were several mosquitoes and they had received one bite.

In housing, Lincoln housing is responsible for repairing water leaks (like broken sprinklers, especially in empty housing) and treating mosquitoes through their own pest management services. Lincoln Military Housing (LMH) maintenance line at 888-578-4141.

Please take precautions for working or living in an area with mosquitoes. But, if there seems to be a high number of mosquitoes in an area, definitely place a Maximo request to have it

assessed.



Mosquitoes are a natural part of a wet environment. People who live in these environments, like Florida or other southern wet, humid states, are familiar with protecting themselves from mosquito bites. Mosquito season is a naturally occurring part of our yearly cycles. Protect yourself and your family, and help the base by reporting potential mosquito habitat.

Questions?