



City of Hampton

Gambusia holbrooki Relocation Program

General Description

City of Hamptons Environmental Service is responsible for Integrated Mosquito Management within the City of Hampton, Va. and takes a broad spectrum approach to this task. Along with implementing the typical Cultural, Mechanical, and Chemical means to control mosquito populations, we utilize another pillar to our program, the Biological or bio-rational means of control.

Biological controls can vary from semi-large insectivores like Little Brown Bats and Purple Martin Swallows that eat adult mosquitoes to micro bacteria (i.e. *Bacillus sphaericus* and *Bacillus israelensis*) designed to rupture the gut of mosquito larvae. Eliminating mosquito population levels when they are still in the juvenile stage is the preferred method; therefore eliminating the adult stage which is the only stage that the mosquito can bite and transmit West Nile Virus, Eastern Equine Encephalitis, Zika Virus and other mosquito borne arboviruses.

Program Addition

A very effective aquatic bio-rational approach to mosquito control when used correctly is the *Gambusia holbrooki* or mosquito fish. This process is only effective if a program utilizes the fish correctly by placing the fish in aquatic environments that have no large predatory fish or birds that can reduce a *Gambusia holbrooki* population quickly. Another good operating practice is to choose aquatic environments that do not have flows, currents or deep edges, which contain mosquito larvae or pupae. Picking the correct locations and environments is paramount to a successful *Gambusia holbrooki* relocation program.

Hamptons Environmental Services, if accepted into the program, will utilize *Gambusia holbrooki* in small bodies of water and floodwaters that do not outlet to larger waterways. Shallow wetland retention basins, home fish ponds, permanent and temporary floodwaters, woodland pools and dead end half pipe and grassed drainage ditches are preferable locations for this process.

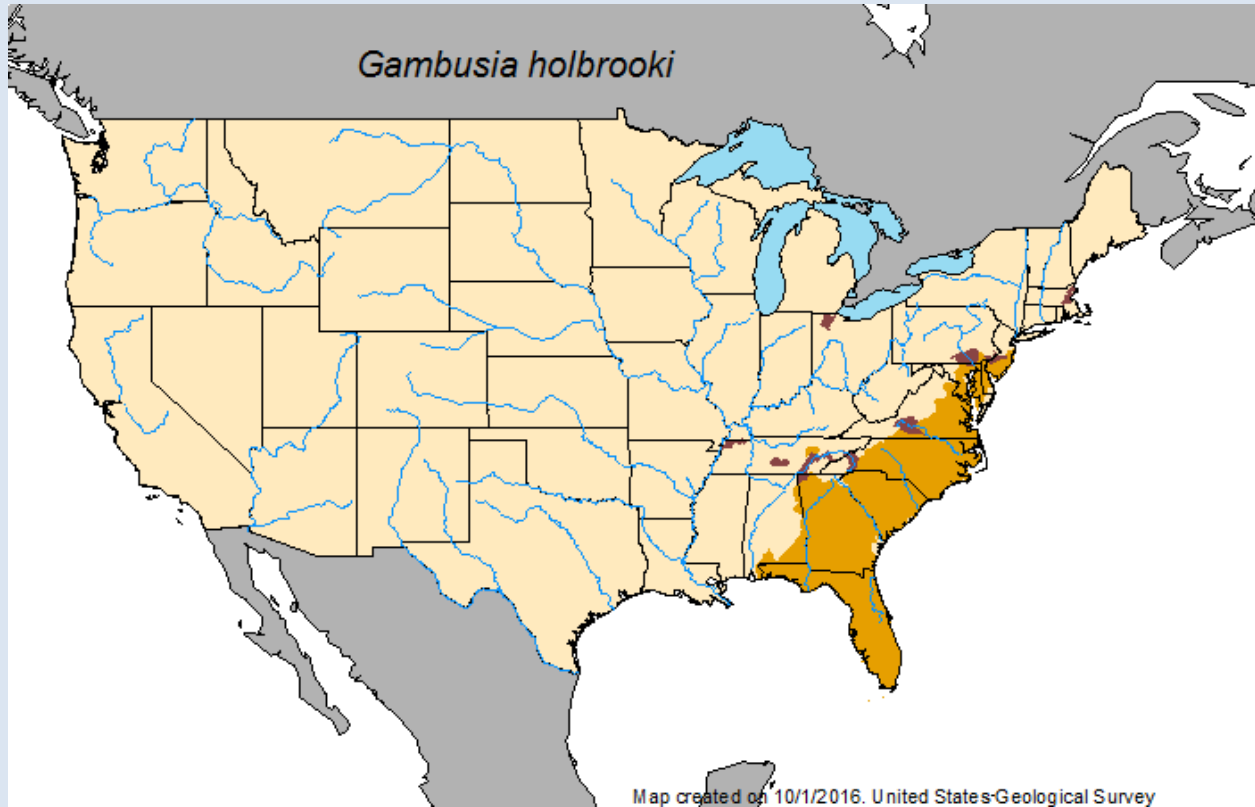
***Gambusia holbrooki* (Eastern Mosquitofish)**

Gambusia holbrooki are native to the east coast of the United States from Delaware to the tip of mainland Florida and inland to Alabama and Tennessee. Along with *Gambusia affinis* they have been used for mosquito larvae control for several years. *Gambusia* are sexually dimorphic, males tend to be smaller growing usually around 1.5" while the females are a bit larger and more robust reaching a length of around 2.5". Males have an elongated anal fin and females typically have a black stripe near the eye, both help identify the orientation.

Gambusia are viviparous meaning they birth their young live which gives them an advantage because the young are born ready to swim and eat and elude predation to an extent. Females tend to gestate for around 24 days and larger females can birth from 60-300 in each brood.

Below is a map indicating native reaches and a picture of the *Gambusia holbrooki*:

USGS Website map indicating native range of *Gambusia holbrooki* (Eastern Mosquitofish)



***Gambusia holbrooki* (Eastern Mosquitofish)**

Responsible Personnel

The Environmental Services manager and biologist will make the decisions where all *Gambusia holbrooki* relocations will occur. Once again this tactic will only be used in dead end water sources and only at the Environmental Services division discretion.

Site Assessment

All aquatic environments will be assessed prior to *Gambusia holbrooki* release. Assessments will be based on location, necessity, detriment to environment, and aquatic longevity.

Location-Locations will ultimately be decided by management with site assessments and field observations from senior technicians. Each site must be a dead end location, meaning the aquatic environment does not outfall to the stormwater system, large pond or lake, or any creek or estuary.

Necessity- This will depend specifically on the environments ability to consistently producing significant numbers of mosquito larvae. Historic knowledge and observations along with typical larval surveillance operations using visual assessments utilizing a mosquito control industry accepted dipper. A single dip containing ten or more larvae will be the threshold to qualify as a possible site for release.

Detriment to Environment- If an aquatic environment is assessed and meets the two previous criteria, a general bio-monitoring operation of the aquatic environment will occur. The monitoring will entail on-site observation of existing flora and fauna contained in the environment. Rejection can occur if the site contains small amphibian larvae or eggs, other beneficial insects and their larvae, existing fish or excessive algae that will die when temperatures elevate displacing dissolved oxygen. If the site tends to stay wet for long periods, tends to continuously produce mosquitoes and has no other beneficial or sensitive aquatic life, then the site will be acceptable for *Gambusia holbrooki* placement.

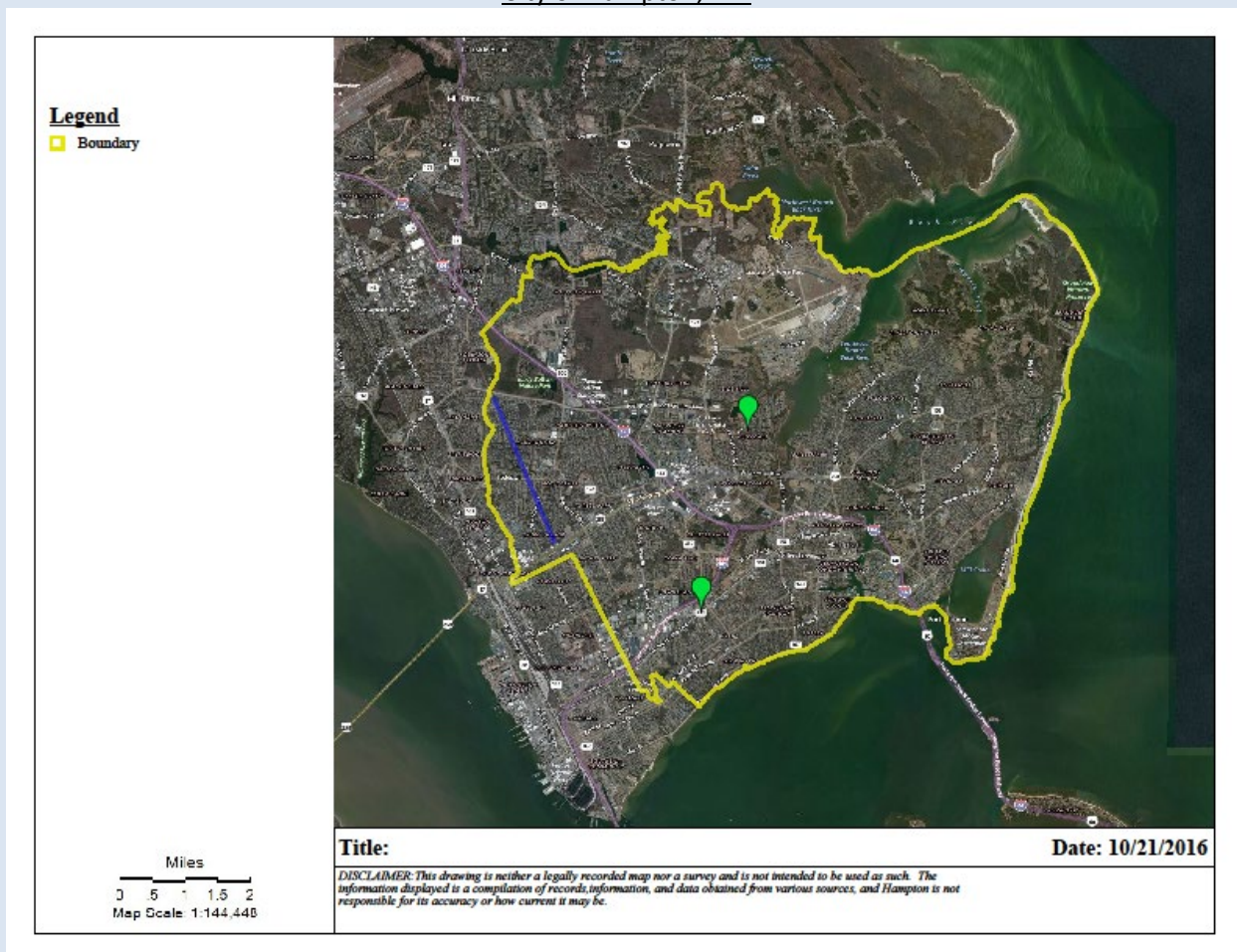
Aquatic Longevity-All sites meeting the three previous qualifications will then be assessed for aquatic longevity. Short term flooding sites that historically dry within short periods of time will automatically be disqualified. Flooding sites that typically stay wet for longer periods of time (i.e. 30 days or more) will be assessed for placement. All dead end ditches, stormwater management facilities (also referred to as BMP's) and fish ponds that contain standing water throughout the year will be assessed for placement as well. Each aquatic environment where *Gambusia holbrooki* will be placed will be reassessed during drought events and if aquatic environments recede or dry up, *Gambusia holbrooki* will be re-captured and released in the aquatic environments that they originated for later reuse.

Gambusia holbrooki Source

The City of Hamptons Environmental Services has observed *Gambusia holbrooki* during field surveillance in all freshwater and some brackish ditches, ponds, creeks and retention basins. Many new stormwater management facilities will possess *Gambusia holbrooki* within the first three months of inception. The fish would be considered prolific in this region and there are many man made sources from which the fish can be trapped or netted for relocation. There are three spots which will be documented as sources for *Gambusia holbrooki*. Two are city owned retention basins or BMP's and one ditch which runs the length of the city and is both fresh and brackish water. Below are the GIS locations of these sites. The **green** icons mark the War Memorial BMP and Burbank Middle School BMP, the **purple** line indicates the Government ditch from Hamptons Roads Center Parkway to Mercury Blvd.

All *Gambusia holbrooki* will be captured from and returned to these sites if treatment location is eliminated. The two BMP sites are fresh water ponds with elevated outfall structures while the Government Ditch is a freshwater ditch that quickly converts to saltwater past the Mercury Blvd. outfall.

City of Hampton, VA.



Program Logistics

Initial stocking procedures will be on an “add, observe and adjust” basis. All initial areas will be assessed daily for a week period to verify efficacy and establishment. Then the site will be re-assesses a month later for continued efficacy and possible restocking if required.

*For each small fish pond two (2) females and two (2) males will be stocked

*For every small grassed ditch two (2) females and (2) two males per 50 linear feet of continuous ditch will be stocked.

*For all retention basins and woodland pools two (2) females and two (2) males will be stocked per every 100 square foot section.

Minnow traps and dip nets will be the primary source of initial *Gambusia holbrooki* capture. No mechanical tanks or reservoirs will be used to permanently or temporarily house *Gambusia holbrooki* populations. All relocations will be conducted immediately after capture utilizing an aerated minnow bucket or container for transport.

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