

# HACCP Plan for Mosquitofish Stocking

HACCP Step 1 - Activity Description	
<b>Facility:</b> Indian River Mosquito Control District	<b>Site:</b> Aquatic Habitats
<b>Project Coordinator:</b> Michael Hudon	<b>Project Description:</b> Stocking Mosquitofish
<b>Site Manager:</b> Doug Carlson	
<b>Address:</b> 5655 41st Street Vero Beach, Fl. 32967	
<b>Phone:</b> 772-562-6534	

<b>Project Description</b> (Who, What, Where, When, How & Why)
<p>The Indian River Mosquito Control District (IRMCD) in Indian River County Florida uses scientific mosquito control techniques to control pestiferous and disease carrying mosquitoes while protecting the environment and containing costs to the taxpayers.</p> <p>As part of an Integrated Pest Management (IPM) strategy using various methods to prevent and control mosquitoes, IRMCD periodically stocks the native Eastern Mosquitofish (<i>Gambusia holbrooki</i>) in ephemeral pools within the district. <i>Gambusia</i> are voracious predators of mosquito larvae.</p> <p><i>Gambusia</i> are obtained from mosquito impoundment areas within the district and relocated to small water bodies in the district which have no fish and have historically held water for 1 month or greater period of time.</p> <p>Another native species Sailfin Molly (<i>Poecilia latipinna</i>) is often found mixed in with the <i>Gambusia</i>. This species also preys on mosquito larvae and while Mollies are not our primary choice for biocontrol they are not discarded when stocking. All fish should be greater than 0.5cm in length.</p> <p>As a important strategy to minimize the risk of moving hazardous organisms, IRMCD obtains our stock material from mosquito impoundments which are typically filled with brackish water. Transport water is passed through a fine mesh. The high salt content (&gt;15ppt) of these waters minimizes the risk of transplanting many of the hazardous species listed here with the exception of <i>Tilapia</i> and <i>Green Mussel</i> which can tolerate these salinities.</p>

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## HACCP Step 2 - Potential Hazard Identification

**Vertebrates:**

- Tilapia
- Cichlids
- Walking Catfish
- Armored Catfish

**Invertebrates:**

- Green Mussel

**Plants:**

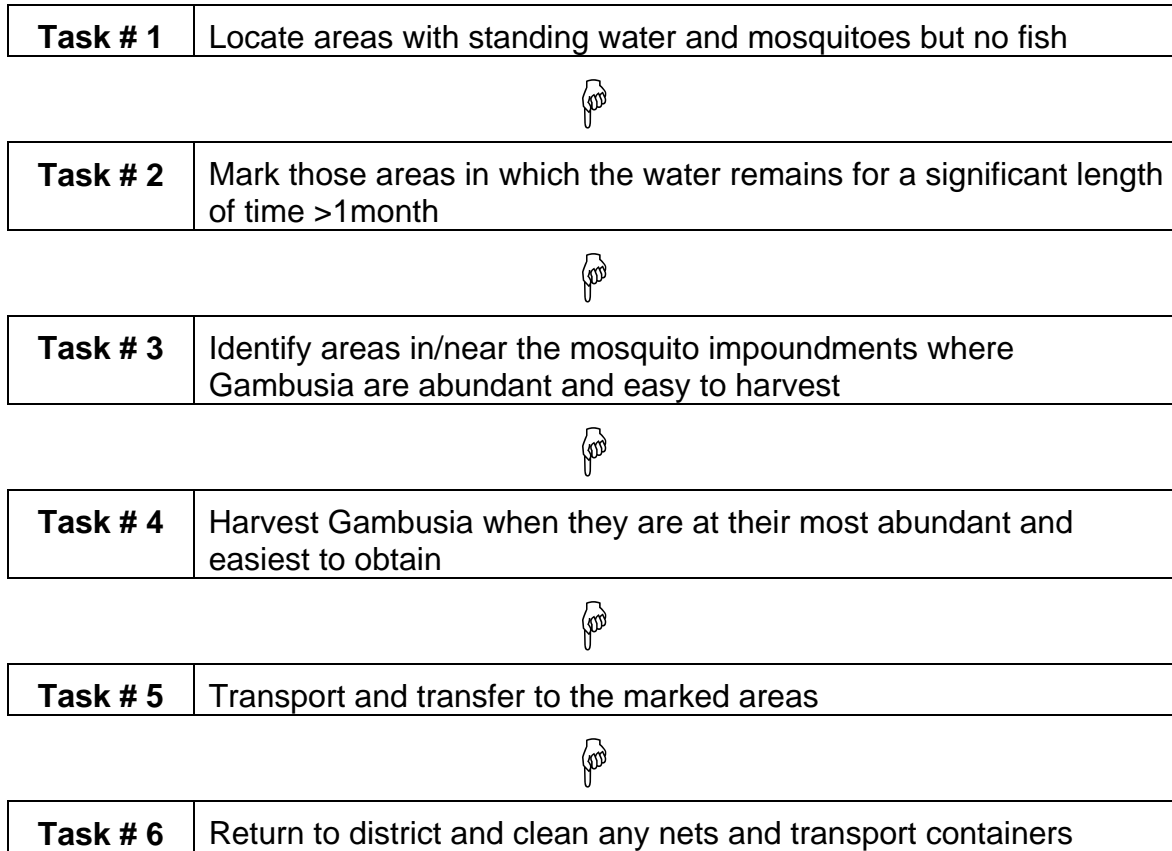
- Hydrilla

**Other Biologics:**

**Others:**

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## HACCP Step 3 - Flow Diagram



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### HACCP Step 4 - Hazard Analysis

Task	Hazard	Probable?	Justification	Control Measures	CCP?
Locate areas with standing water and mosquitoes but no fish	Invertebrate: Green Mussel	No	Areas are ephemeral		No
	Vertebrate: Tilapia	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Cichlids	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Walking Catfish	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Armored Catfish	No	Little chance of this vertebrate hitchhiking on a person		No
	Plant: Hydrilla	Yes	Plant material could cling to your boots	Visually inspect and remove any plant material from boots	No
Mark those areas in which the water remains for a significant length of	Invertebrate: Green Mussel	No	Areas are ephemeral		No
	Vertebrate: Tilapia	No	Little chance of this vertebrate		No

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time >1 month			hitchhiking on a person		
	Vertebrate: Cichlids	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Walking Catfish	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Armored Catfish	No	Little chance of this vertebrate hitchhiking on a person		No
	Plant: Hydrilla	Yes	Plant material could cling to your boots	Visually inspect and remove any plant material from boots	No
Identify areas in/near the mosquito impoundments where Gambusia are abundant and easy to harvest	Invertebrate: Green Mussel	No	Observations are made from dry land.		No
	Vertebrate: Tilapia	No	Observations are made from dry land.		No
	Vertebrate: Cichlids	No	Observations are made from dry land.		No
	Vertebrate: Walking Catfish	No	Observations are made from dry land.		No
	Vertebrate: Armored Catfish	No	Observations are made from dry land.		No

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	Plant: Hydrilla	No	Observations are made from dry land.		No
Harvest Gambusia when they are at their most abundant and easiest to obtain	Invertebrate: Green Mussel	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	Yes
	Vertebrate: Tilapia	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	Yes
	Vertebrate: Cichlids	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	Yes
	Vertebrate: Walking Catfish	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish,	Yes

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				plants, and debris	
	Vertebrate: Armored Catfish	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	Yes
	Plant: Hydrilla	Yes	May be in the same area as Gambusia	Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	Yes
Transport and transfer to the marked areas	Invertebrate: Green Mussel	No	Harvested fish have already been visually sorted to eliminate this organism		No
	Vertebrate: Tilapia	No	Harvested fish have already been visually sorted to eliminate this organism		No
	Vertebrate: Cichlids	No	Harvested fish have already been visually sorted to eliminate this		No

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			organism		
	Vertebrate: Walking Catfish	No	Harvested fish have already been visually sorted to eliminate this organism		No
	Vertebrate: Armored Catfish	No	Harvested fish have already been visually sorted to eliminate this organism		No
	Plant: Hydrilla	Yes	Plant material could cling to your boots	Visually inspect and remove any plant material from boots	No
Return to district and clean any nets and transport containers	Invertebrate: Green Mussel	No	Little chance of this organism hitchhiking on a person		No
	Vertebrate: Tilapia	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Cichlids	No	Little chance of this vertebrate hitchhiking on a person		No
	Vertebrate: Walking Catfish	No	Little chance of this vertebrate		No

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			hitchhiking on a person		
	Vertebrate: Armored Catfish	No	Little chance of this vertebrate hitchhiking on a person		No
	Plant: Hydrilla	Yes	Plant material could cling to your boots	Visually inspect and remove any plant material from boots	No

# HACCP Plan for Mosquitofish Stocking

## HACCP Step 5 - HACCP Plan

### **Critical Control Point #1:**

**Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain**

#### **Significant Hazards:**

Invertebrate: Green Mussel

#### **Control Measures:**

Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris

#### **Limits for Control Measures:**

Zero Tolerance

#### **Monitoring: What?**

Presence of anything but Gambusia

#### **Monitoring: How?**

Visual Inspection

#### **Monitoring: Frequency?**

Before leaving each harvest site

#### **Monitoring: Who?**

All the members of the Harvest team

#### **Evaluation & Corrective Actions:**

If too much non-Gambusia organisms and material, dump everything back where it was harvested

#### **Supporting Documentation:**

### **Critical Control Point #2:**

**Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain**

#### **Significant Hazards:**

Vertebrate: Tilapia

#### **Control Measures:**

Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris

#### **Limits for Control Measures:**

Zero Tolerance

#### **Monitoring: What?**

Presence of anything but Gambusia

#### **Monitoring: How?**

Visual Inspection

#### **Monitoring: Frequency?**

Before leaving each harvest site

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<b>Monitoring: Who?</b> All the members of the Harvest team
<b>Evaluation &amp; Corrective Actions:</b> If too much non-Gambusia organisms and material, dump everything back where it was harvested
<b>Supporting Documentation:</b> <div style="background-color: #4b4b00; height: 20px; width: 100%;"></div>
<b>Critical Control Point #3:</b> <b>Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain</b>
<b>Significant Hazards:</b> Vertebrate: Cichlids
<b>Control Measures:</b> Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
<b>Limits for Control Measures:</b> Zero Tolerance
<b>Monitoring: What?</b> Presence of anything but Gambusia
<b>Monitoring: How?</b> Visual Inspection
<b>Monitoring: Frequency?</b> Before leaving each harvest site
<b>Monitoring: Who?</b> All the members of the Harvest team
<b>Evaluation &amp; Corrective Actions:</b> If too much non-Gambusia organisms and material, dump everything back where it was harvested
<b>Supporting Documentation:</b> <div style="background-color: #4b4b00; height: 20px; width: 100%;"></div>
<b>Critical Control Point #4:</b> <b>Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain</b>
<b>Significant Hazards:</b> Vertebrate: Walking Catfish
<b>Control Measures:</b> Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
<b>Limits for Control Measures:</b> Zero Tolerance

# HACCP Plan for Mosquitofish Stocking

<b>Monitoring: What?</b> Presence of anything but Gambusia
<b>Monitoring: How?</b> Visual Inspection
<b>Monitoring: Frequency?</b> Before leaving each harvest site
<b>Monitoring: Who?</b> All the members of the Harvest team
<b>Evaluation &amp; Corrective Actions:</b> If too much non-Gambusia organisms and material, dump everything back where it was harvested
<b>Supporting Documentation:</b> <div style="background-color: #4b4b0b; height: 20px; width: 100%;"></div>
<b>Critical Control Point #5:</b> <b>Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain</b>
<b>Significant Hazards:</b> Vertebrate: Armored Catfish
<b>Control Measures:</b> Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
<b>Limits for Control Measures:</b> Zero Tolerance
<b>Monitoring: What?</b> Presence of anything but Gambusia
<b>Monitoring: How?</b> Visual Inspection
<b>Monitoring: Frequency?</b> Before leaving each harvest site
<b>Monitoring: Who?</b> All the members of the Harvest team
<b>Evaluation &amp; Corrective Actions:</b> If too much non-Gambusia organisms and material, dump everything back where it was harvested
<b>Supporting Documentation:</b> <div style="background-color: #4b4b0b; height: 20px; width: 100%;"></div>
<b>Critical Control Point #6:</b> <b>Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain</b>
<b>Significant Hazards:</b>

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Plant: Hydrilla	
<b>Control Measures:</b> Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris	
<b>Limits for Control Measures:</b> Zero Tolerance	
<b>Monitoring: What?</b> Presence of anything but Gambusia	
<b>Monitoring: How?</b> Visual Inspection	
<b>Monitoring: Frequency?</b> Before leaving each harvest site	
<b>Monitoring: Who?</b> All the members of the Harvest team	
<b>Evaluation &amp; Corrective Actions:</b> If too much non-Gambusia organisms and material, dump everything back where it was harvested	
<b>Supporting Documentation:</b>	
<b>Facility:</b> Indian River Mosquito Control District	<b>Activity:</b> Stocking Mosquitofish
<b>Address:</b> 5655 41st Street Vero Beach, Fl. 32967	
<b>Signature:</b>	<b>Date:</b>

# HACCP Plan for Mosquitofish Stocking

## HACCP Checklist:

### Stocking Mosquitofish

**Facility** Indian River Mosquito Control District  
**Site** Aquatic Habitats  
**Coordinator** Michael Hudon  
**Manager** Doug Carlson  
**Address** 5655 41st Street, Vero Beach, Fl. 32967

- Task # 1: Locate areas with standing water and mosquitoes but no fish**
- Task # 2: Mark those areas in which the water remains for a significant length of time >1month**
- Task # 3: Identify areas in/near the mosquito impoundments where Gambusia are abundant and easy to harvest**
- Task # 4: Harvest Gambusia when they are at their most abundant and easiest to obtain**

#### **CRITICAL CONTROL POINT**

- Hazards were contained  
Hazards: Invertebrate: Green Mussel
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
- Control limits were maintained  
Control Limits: Zero Tolerance
- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Hazards were contained  
Hazards: Vertebrate: Tilapia
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris

## HACCP Plan for Mosquitofish Stocking

- Control limits were maintained  
Control Limits: Zero Tolerance
- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Hazards were contained  
Hazards: Vertebrate: Cichlids
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
- Control limits were maintained  
Control Limits: Zero Tolerance
- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Hazards were contained  
Hazards: Vertebrate: Walking Catfish
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
- Control limits were maintained  
Control Limits: Zero Tolerance
- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Hazards were contained  
Hazards: Vertebrate: Armored Catfish
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
- Control limits were maintained  
Control Limits: Zero Tolerance

## **HACCP Plan for Mosquitofish Stocking**

- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Hazards were contained  
Hazards: Plant: Hydrilla
- Control measures were implemented  
Control Measures: Harvested Gambusia are visually sorted in smaller containers removing all unwanted fish, plants, and debris
- Control limits were maintained  
Control Limits: Zero Tolerance
- Corrective actions were (performed if necessary)  
Corrective Actions: If too much non-Gambusia organisms and material, dump everything back where it was harvested
  
- Task # 5: Transport and transfer to the marked areas**
  
- Task # 6: Return to district and clean any nets and transport containers**