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Marine Conservation Policy Capstone Final Report

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Introduction

This report documents a capstone internship completed with the Peconic Estuary Partnership and focused on how mosquito management, habitat protection, and community science work together across the Peconic Estuary. The work centered on direct coordination with PEP staff and partner organizations to document how mosquito control decisions are made and how data-driven programs function in practice.

The findings presented in this report are based primarily on direct interviews and working meetings with key partners, including Suffolk County Vector Control, The Nature Conservancy, the Town of East Hampton Trustees, and the Peconic Estuary Partnership Outreach Team (Suffolk County Vector Control, 2017–2025; Suffolk County Vector Control Staff, personal interviews, 2024–2025; The Nature Conservancy Staff, personal interviews, 2024–2025). These conversations served as the main source of information throughout the internship and helped document real-world operational practices, decision-making processes, and program development challenges.

Through this work, the internship documented how mosquito breeding hotspots are identified, how tidal cycles and field data guide spray timing, and how larvicide selection is based on mosquito life stage (Suffolk County Department of Health Services). This background provided the foundation needed to understand the Accabonac Harbor Mosquito Larvae Hotspot citizen science program and its role in reducing unnecessary pesticide use while still protecting public health. The internship also examined how the Accabonac Harbor program was established and sustained over time. This included understanding how volunteer data are collected, reviewed, and transferred to Vector Control staff, as well as identifying challenges

related to staffing capacity, volunteer coordination, and long-term program maintenance.

These lessons directly informed the materials developed for this report, which are included in the appendix and designed to support replication of the program at other sites across the estuary.

Program Overview & Success

Suffolk County Vector Control is responsible for protecting public health across a large and diverse landscape that includes extensive salt marsh systems. Salt marshes in Suffolk County provide important benefits, including flood protection, water filtration, and wildlife habitat. Healthy marshes help absorb storm surge, improve water quality by trapping nutrients and sediments, and support a wide range of fish and bird species. When marsh hydrology is altered by blocked tides, dikes, or poor drainage, these ecosystem services are reduced and standing water can persist, creating ideal conditions for mosquito breeding (Adams et al., 2021).

Mosquito production in salt marshes is a public health concern and is managed by Suffolk County Vector Control, which operates through the Suffolk County Department of Health Services. The program's goal is to protect public health, and pesticide use is one of several tools available. Rather than spraying on a fixed schedule, treatment decisions are based on tide timing, field sampling, and targeted application only where mosquito production is confirmed (Suffolk County Department of Health Services). In salt marshes, mosquito breeding is closely tied to lunar tides. Full moon and new moon tides occur approximately every two weeks and can flood the upper marsh. When this happens, mosquito eggs hatch in shallow pools of standing water. Vector Control reviews tide charts ahead of time to identify which

tides are most likely to produce mosquitoes. Field sampling is typically conducted one to two days before or after these high tide events, when larvae are easiest to detect. As a result, staff and volunteers only go into the field during periods when mosquitoes are most likely to be present. Over a typical season, this results in app Sampling is conducted using standard dip methods. A small dipper is used to collect water from pooled areas in the marsh. Each dip records whether mosquito larvae are present, how many are observed, and the stage of larval development. Larvae are grouped by stage, from newly hatched larvae to pupae that are close to emerging as adults. Eggs are not always visible, but their presence is inferred when early-stage larvae appear shortly after a flooding event. Sampling results are reviewed against established treatment thresholds. If larvae are sparse, scattered, or likely to disappear due to drying conditions or upcoming tides, no treatment occurs. If larvae are concentrated or repeatedly found in the same locations, those areas may be considered for treatment.

Suffolk County prioritizes mosquito control at the larval stage, which is the most effective point in the mosquito life cycle to reduce adult populations. When early-stage larvae are detected, products containing *Bacillus thuringiensis israelensis* (Bti) are commonly used. Bti is a naturally occurring bacteria that mosquito larvae ingest while feeding, causing them to die. These products are most effective shortly after egg hatch and have limited impacts on non-target species. When larvae are more developed, insect growth regulators such as methoprene may be used to prevent larvae from developing into adults. Larvicides are typically applied as granules that settle into shallow standing water where larvae are present. In some cases, multiple products are used to address a mix of larval stages. Applications are often conducted by helicopter to cover large marsh areas efficiently. Adult mosquito spraying is used far less

frequently and is generally limited to periods of elevated disease risk, as it does not prevent future breeding. Adult mosquito spraying is used far less often and is generally limited to times of increased disease risk. These treatments reduce adult mosquitoes but do not prevent future breeding, which is why larval control remains the County's preferred strategy.

Because Suffolk County manages thousands of acres of wetlands, Vector Control does not have the capacity to maintain high-resolution mosquito breeding maps for every marsh on a weekly basis during the breeding season. Historically, this limitation has resulted in large spray blocks that treated entire marsh systems even when mosquito production was limited to smaller areas (Suffolk County Vector Control, 2017–2025). This operational constraint helped drive interest in more targeted, data-driven approaches. In 2017, a new approach was piloted at Accabonac Harbor in East Hampton. The Mosquito Larvae Hotspot Program was launched by The Nature Conservancy in partnership with Suffolk County Vector Control and the East Hampton Town Trustees, with support from the Peconic Estuary Partnership. The goal of the program was to reduce unnecessary pesticide use by collecting site-specific field data to better guide treatment decisions. A trained volunteer group, known as the Monday Morning Mosquito Samplers, was established to collect larval data using the same methods as Vector Control staff. Sampling was timed around lunar tides, and volunteers recorded larval presence, abundance, development stage, and precise GPS locations. These data were submitted directly to Vector Control staff and mapped using GIS to support operational decision-making. Prior to the pilot program, approximately 2,500 acres at Accabonac Harbor were treated annually using large spray blocks. Following implementation of hotspot-based monitoring, the number of acres treated declined steadily. By 2025, treatment had been reduced to approximately 100

acres while still maintaining effective mosquito control (Suffolk County Vector Control, 2017–2025). These reductions resulted in lower pesticide use and operational cost savings, including reduced helicopter flight time and has been recognized by regional reporting, including coverage by The Peconic Bathtub (Young, 2024).

The data also showed that mosquito breeding was consistently concentrated along the upland edge of the marsh. This information has been useful not only for mosquito control but also for planning future marsh restoration. It is also important to note that hotspot treatment addresses mosquito symptoms, not root causes. In many areas, ongoing mosquito production is linked to poor marsh drainage. For this reason, mosquito management works best when paired with long term marsh restoration efforts (East Hampton Town Trustees, 2024).

Accabonac Harbor Mosquito Monitoring & Treatment Summary		
Year	Number of Sampling Days	Acres Treated (Suffolk County Vector Control)
2017	Pilot year	~2,500 acres prior to hotspot targeting
2019	8	Substantially reduced from baseline
2020	6	Reduced through hotspot only treatments
2021	6	Targeted hotspot spraying
2022	4	Targeted hotspot spraying
2023	7	Targeted hotspot spraying

2024	9	Low acreage, hotspot only
2025	11	~100 acres

Table 1. Summary of annual sampling effort and acres treated at Accabonac Harbor following implementation of the Mosquito Larvae Hotspot Program. (Source: Suffolk County Vector Control, 2025)

Overall, the Accabonac Harbor pilot demonstrates that well-coordinated citizen science can meaningfully improve mosquito management. At the same time, the program highlights the importance of reliable volunteers, ongoing training, and sustained coordination to maintain data quality and long-term success.

Materials Developed

A major outcome of this internship was the development of a complete set of practical materials designed to support the expansion of the Mosquito Larvae Hotspot Program beyond Accabonac Harbor. All materials were developed using direct input from program partners and grounded in observed, real-world program operations. Conversations with Suffolk County Vector Control staff, The Nature Conservancy, and Peconic Estuary Partnership staff helped ensure that the materials reflect how the program actually functions, rather than how it might work in theory.

The **Setting Up Your Program Guide** was developed to support a future site coordinator. It walks through early coordination with Suffolk County Vector Control, defining and mapping a project area, identifying sampling locations, setting a seasonal schedule based on tidal cycles, and securing basic equipment and funding. This guide reflects lessons learned through direct

observation of the Accabonac program, particularly the importance of early coordination, clear roles, and realistic expectations for volunteers and staff.

The **General Factsheet** was created as a simple outreach and recruitment tool. Its purpose is to clearly explain why the program matters, what volunteers are being asked to do, and how their data directly influences mosquito control decisions. The language and structure were shaped by feedback from partners who regularly engage with the public, and it is intended for use at community meetings, through email outreach, and by local organizations helping recruit volunteers.

The **Volunteer Training Manual** provides detailed, field-ready guidance for mosquito larvae sampling. It includes step-by-step dipping protocols, larval stage identification, safety considerations, and instructions for using the Survey123 mobile data collection app. This manual draws heavily from training materials originally developed by The Nature Conservancy and from direct discussions with Vector Control staff about data quality expectations. It is intended to support both in-person training workshops and ongoing reference during the mosquito season, helping ensure that volunteer-collected data remains consistent and operationally useful.

The **Grant Proposal Template** was developed in response to a recurring challenge identified during the internship: the lack of dedicated funding for coordination and volunteer support. The template provides a ready-to-use framework for securing one-season funding for a site coordinator, volunteer training, field equipment, and sampling operations. It is designed to be adaptable for use by municipalities, nonprofits, or community organizations seeking to host or support a monitoring site.

In addition to the toolkit, the internship produced a **Viability and Site Selection Report** to guide strategic program expansion across the Peconic Estuary. This report combined data from Suffolk County Vector Control, New York State protected lands databases, and publicly available GIS layers to identify salt marsh sites with existing mosquito treatment activity and feasible public access. The analysis focused on areas where hotspot-based monitoring could realistically improve current management practices rather than creating new operational burdens.

The site selection process was strengthened through conversations with members of the Peconic Estuary Partnership Citizen Advisory Council. These discussions helped identify community groups, civic associations, and regional organizations already active in estuary-related work and capable of supporting volunteer recruitment and program coordination. By pairing spatial analysis with local knowledge, the site selection report moves beyond mapping alone and provides a realistic assessment of where the program could succeed.

Together, these materials are intended to function together to support a coordinator. The toolkit supports day-to-day program setup, volunteer recruitment, and training, while the site selection report provides the strategic context needed to choose appropriate locations and partners. For a future site coordinator, these resources reduce startup uncertainty, clarify expectations, and provide a clear pathway for implementing a successful Mosquito Larvae Hotspot Program elsewhere in the Peconic Estuary.

Findings & Recommendations

A key finding of this internship was the identification of Flanders, Southampton as the strongest candidate for expanding the Mosquito Larvae Hotspot Program beyond Accabonac

Harbor. Using the GIS-based Viability and Site Selection Report included in the appendix, potential sites across the Peconic Estuary were evaluated based on operational feasibility, access, and community capacity. While five sites met basic criteria, Flanders consistently ranked highest when these factors were considered together.

Flanders is an active mosquito treatment area, meaning Vector Control already has documented mosquito production and operational familiarity with the site. This makes it well suited for hotspot-based monitoring, where volunteer data can be directly used to refine existing spray blocks rather than establish a program in a completely new area. Adequate public access is also available, allowing volunteers to safely reach sampling locations without complex permission or landowner coordination, which is critical for maintaining consistent sampling. The site's central location within the Peconic Estuary makes it relatively easy to access for both volunteers and coordinating partners. This reduces logistical barriers and increases the likelihood of reliable participation over the course of the mosquito season. Flanders is also designated as a potential Environmental Justice area by NYS, meaning expanded mosquito monitoring and reduced pesticide exposure could provide meaningful community benefits while supporting public health equity goals.

Equally important, Flanders has strong local community capacity, which is essential for a successful citizen science program. Representatives from the Flanders, Riverside, and Northampton Community Association (FRNCA) are active members of the Peconic Estuary Partnership's Citizen Advisory Council and have an established presence within the community. This level of engagement and organization is needed to recruit volunteers, communicate with residents, and sustain the program over time.

Based on these findings, this report recommends prioritizing Flanders as the next pilot site for program expansion. Focusing resources on one well-supported location will allow the Mosquito Larvae Hotspot Program to be tested, refined, and documented as a replicable model before expanding to additional sites identified in the site selection analysis. In addition, the report identifies regional organizations that can provide technical, coordination, and outreach support as the program expands. These regional resources are critical for maintaining continuity across sites and reducing the burden on any single community group.

Together, these findings show that successful expansion of the Mosquito Larvae Hotspot Program depends on more than identifying mosquito breeding areas. It requires sites with existing treatment activity, safe access, strong community capacity, and regional support. By prioritizing Flanders and pairing site selection with clear tools and partnerships, this report provides a practical and achievable path for the next phase of program growth.

Conclusion

This report demonstrates that targeted, data-driven mosquito management can protect public health while significantly reducing pesticide use in sensitive salt marsh systems. By aligning mosquito control efforts with tidal cycles, field-based larval sampling, and clear treatment thresholds, Suffolk County Vector Control has shown that routine blanket treatment is not always necessary to effectively manage mosquito populations. Long-term monitoring at Accabonac Harbor shows a clear shift away from broad spray blocks toward more targeted, data-informed treatments.

The Accabonac Harbor Citizen Science Pilot Program provides strong evidence that trained volunteers can play a meaningful role in this process. Volunteer-collected data improved the County's ability to identify mosquito breeding hotspots, reduce treated acreage, lower operational costs, and limit chemical exposure while maintaining effective mosquito control. The consistency of results over multiple seasons confirms that this approach is reliable, operationally useful, and appropriate for expansion when the right site conditions and partnerships are in place. Work completed during this internship also shows that this level of success depends on strong coordination and trusted relationships. It is important to highlight that this project was only able to document the program's history, compile long-term data, and develop practical resources because of the Peconic Estuary Partnership's unique role as a connector across agencies, conservation organizations, and local communities. PEP's position within the region made it possible to bring together Suffolk County Vector Control, The Nature Conservancy, municipal partners, and community groups in a way that supports open communication and shared problem-solving.

The program also highlights important limitations. Sustained success depends on ongoing volunteer recruitment, training, and coordination, as well as continued staff oversight to maintain data quality. In addition, hotspot-based treatment addresses where mosquitoes are breeding but does not address why breeding persists in certain areas. Long-term reductions in mosquito production will require investments in marsh restoration and improved hydrology, and mosquito monitoring data should be used to help inform those restoration priorities.

It is important to note that this level of documentation and resource development was only possible because of the Peconic Estuary Partnership's unique role as a regional connector.

PEP maintains trusted working relationships with Suffolk County Vector Control, conservation organizations, municipal partners, and community groups across the estuary. This position allowed this report to capture how data, decision-making, and coordination function together in practice. The project reflects how PEP leverages these relationships to translate community-collected data into information that directly supports mosquito management decisions.

Building on the demonstrated success at Accabonac Harbor, this report presents a practical framework for expanding citizen science mosquito monitoring across the Peconic Estuary. The GIS-based site selection analysis and partner outreach conducted during the internship provide a structured approach for identifying sites with existing treatment activity, safe access, and community capacity. Together, the history of the program, the supporting data, and the tools developed through this work show how the Peconic Estuary Partnership leverages its role as a trusted regional convener to support more targeted mosquito control while advancing healthier and more resilient coastal wetlands.

Sources

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Appendix Items

1. Toolkit

1a. Setting Up Your Program

This section provides a step-by-step framework for establishing a Mosquito Larvae Hotspot Citizen Science Program that is compatible with targeted treatment protocols.

1. Confirm Program Viability with Vector Control

Initial coordination with Suffolk County Vector Control is essential. Vector Control staff must confirm that the proposed site is suitable for hotspot based larvicide treatment and that citizen collected data can be operationally used. This conversation should occur before volunteer recruitment or field planning begins.

Key outcomes:

- Confirmation that the site can be treated using targeted spray blocks
- Agreement on data standards and review process
- Identification of a Vector Control point of contact

2. Define and Map the Project Area

Clearly identify the geographic extent of the program area using GIS or base maps.

Tasks include:

- Delineating marsh boundaries and upland edges
- Confirming public ownership or access permissions
- Identifying safe access points for volunteers
- Determining whether permits or landowner approvals are required

This step ensures volunteer safety and avoids delays during the field season.

3. Identify and Prioritize Sampling Locations

Within the mapped area, identify standing water features likely to support mosquito breeding.

Focus on:

- Upper marsh edge pools
- Depressions with poor drainage
- Areas known to hold water after extreme high tides

Sampling locations should be distributed across the site to capture spatial variability rather than clustered in one area. It is important to connect with locals to understand where known hotspot areas are.

4. Configure the Survey123 Data Collection App

The program relies on standardized digital data collection using ESRI Survey123.

Recommended actions:

- Coordinate with The Nature Conservancy, the original developer of the mosquito sampling app
- Confirm required data fields including GPS location, larval stage, counts, and notes
- Test the survey in the field prior to volunteer deployment

Consistency in data entry is critical for Vector Control review and mapping.

5. Establish Sampling Dates Based on Tidal Cycles

Sampling dates are driven by lunar and extreme high tide events during mosquito season.

Steps:

- Coordinate with Vector Control to identify tides requiring dip data
- Confirm the seasonal sampling window
- Communicate dates to volunteers well in advance

Most programs require approximately 8 to 10 sampling dates per season.

6. Secure Equipment and Funding

Gather basic field equipment prior to training.

Standard equipment includes:

- Mosquito dippers
- Waders or boots
- GPS enabled smartphones or tablets
- Safety gear

Explore grant funding and equipment donations through partners such as Peconic

Estuary Partnership, The Nature Conservancy, and Suffolk County Vector Control. Please see Section E for a draft grant application seeking project funding for a site coordinator with estimated costs associated.

7. Recruit and Train Volunteers

Volunteer recruitment should emphasize reliability, comfort in wetland environments, and commitment to scheduled sampling dates.

Training workshops should cover:

- Program goals and public health context
- Field safety and access rules
- Dip sampling techniques

- Larval stage identification
- Use of the Survey123 app

Hands on field training is strongly recommended.

8. Coordinate Ongoing Sampling

Once the season begins, maintain regular communication with volunteers.

Best practices include:

- Reminder emails or texts before sampling dates
- Clear meeting locations and timing
- Rapid data upload following sampling
- Feedback from Vector Control when treatments are or are not triggered

Consistent coordination ensures high-quality data and long-term program success.

1b. General Factsheet

Why This Matters

Mosquito control protects public health, but spraying large areas is not always necessary. Suffolk County Vector Control manages thousands of acres of wetlands and needs more site specific data to make smart, targeted decisions.

That is where citizen scientists come in.

What Volunteers Do

Trained volunteers help by:

- Sampling standing water in local marshes
- Checking for mosquito larvae
- Recording what they find using a simple phone app
- Submitting data that Vector Control uses to decide if treatment is needed

Your data directly influences when and where pesticides are applied.

Proof It Works

This program is modeled after a long running pilot at Accabonac Harbor with The Nature Conservancy and local partners.

Results from the pilot:

- Fewer acres sprayed
- Fewer treatment days
- Lower costs for Suffolk County taxpayers
- Less pesticide used in sensitive wetlands

In many cases, high-resolution data shows treatment may be unnecessary.

Time Commitment

- Late spring through summer
- About once per week during high tide or moon tide events
- 1 to 2 hours per sampling day
- About 8 to 10 days per season

Dates are scheduled in advance.

1c. Volunteer Training Manual



Photo credit: The Nature Conservancy

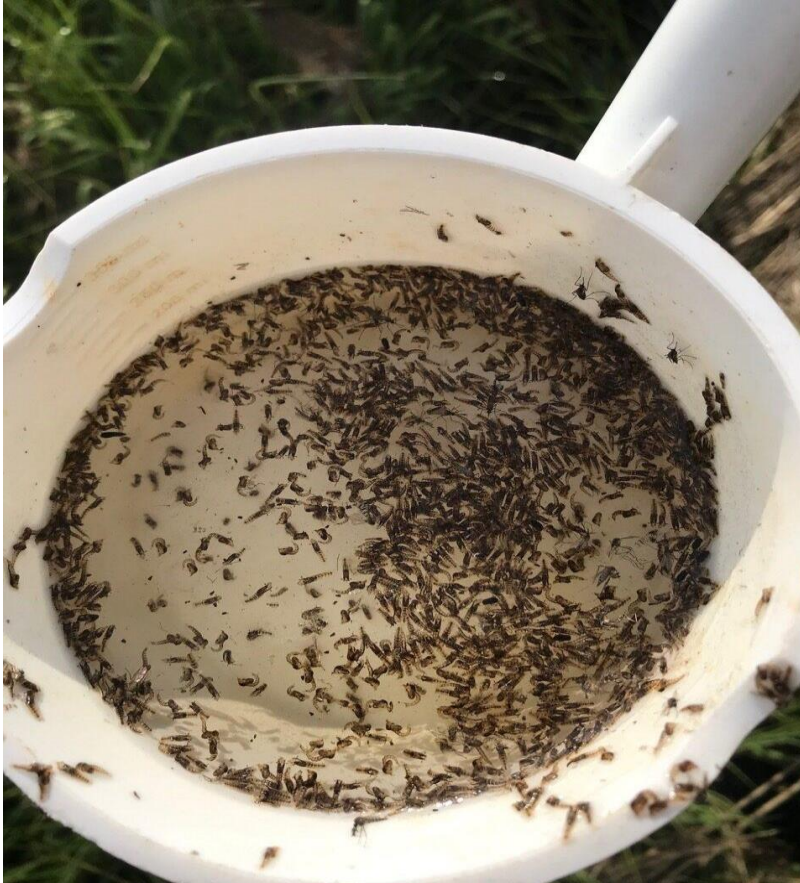


Photo credit: The Nature Conservancy

This section provides detailed, field-ready guidance for volunteers conducting mosquito larvae sampling using a smartphone and the Survey123 mobile app. Consistency in methods and observations is critical because volunteer data directly informs treatment decisions by Vector Control. Information is adapted from guides originally developed by The Nature Conservancy.

Larval Dipping Protocols and Field Technique

Larval dipping is the core field activity of the program. Accurate results depend on careful approach, correct technique, and repeated sampling within each site.

- Move slowly and deliberately to avoid vibrations that cause larvae to dive

- Avoid casting shadows over the water surface
- Approach with the sun in front of you when possible
- Sample the windward side of pools during windy conditions

Mosquito larvae are most often found near the surface and along edges, not in open deep water.

Focus sampling on microhabitats most likely to support breeding:

- Shallow, pooled water in marsh depressions
- Upper marsh edge and upland fringe
- Areas with emergent vegetation or debris
- Pannes or potholes that dry between lunar tides

Avoid large creeks, flowing ditches, or deep open water, which rarely support larvae.

Different habitats require different dipping approaches. Volunteers are trained to select the appropriate technique based on site conditions:

- **Simple scoop:** Quick scoop at the water surface. Most commonly used in salt marshes
- **Shallow skim:** Skimming along the surface among vegetation or debris
- **Flow in method:** Press dipper into shallow substrate and allow water to flow in
- **Partial submersion:** Hold dipper still near vegetation to draw larvae in
- **Complete submersion:** Quick plunge below the surface for active or diving larvae

Each sampling location should include multiple dips to capture variability.

Number of Dips

- Standard effort is 5 to 10 dips per sampling location
- Larger wetlands or suspected treatment areas may require additional dips

- Sampling should be spread across the site rather than concentrated in one spot
Review the short Art of the Dip training videos that show how to properly dip for mosquito larvae, where to sample in the marsh, and how to avoid disturbing larvae before sampling. These videos are meant to support training and act as a refresher during the season. Volunteers are encouraged to watch the playlist before their first sampling day and revisit it as needed.

Training playlist:

<https://www.youtube.com/playlist?list=PLMo7gORxrRhWCjCKsdxTLKQWPtQtrYwHo>



Photo Credit: Esri.com <https://www.esri.com/en-us/arcgis/products/arcgis-field-maps/>

Survey123 and your smartphone

All field data are collected using **Survey123 for ArcGIS** on a smartphone. This ensures standardized data entry and immediate georeferencing.

Downloading the App on smartphone

Volunteers should download the app prior to the first field day:

- Open the App or Play Store on your smartphone
- Search for “Survey123 for ArcGIS”
- Download and install the app

Program coordinators will provide a survey link by email. Opening the link on the smartphone and selecting “Open in the Survey123 field app” connects the device to the correct monitoring form.

Permissions

When first opening the app, volunteers must allow:

- Location services to record GPS position
- Camera access for optional site photos

These permissions are required for proper data submission.

Completing a Survey Entry

At each sampling location, volunteers will:

1. Open the Survey123 app
2. Select the mosquito monitoring survey
3. Complete all required fields before submission

Entries should be reviewed carefully before submitting to avoid missing information.

Identifying Mosquito Larval Stage and Why It Matters

Correct identification of larval stage is one of the most important data elements collected by volunteers.

Mosquito Development Stages

Mosquitoes develop through:

- Larval Stage 1
- Larval Stage 2
- Larval Stage 3
- Larval Stage 4
- Pupae

Each stage looks similar but represents different timing and treatment implications.

Importance of Larval Stage Identification

Larval stage information allows Vector Control to:

- Determine whether breeding is recent or advanced
- Select the appropriate larvicide type
- Decide whether treatment is necessary at all
- Avoid spraying when larvae are too sparse or development is incomplete

Early stage larvae may not require treatment if drying conditions or upcoming tides are expected to interrupt development.

Volunteers receive printed visual references to support accurate stage identification.

Find more information on life stages: <https://www.ocvector.org/mosquitoes>

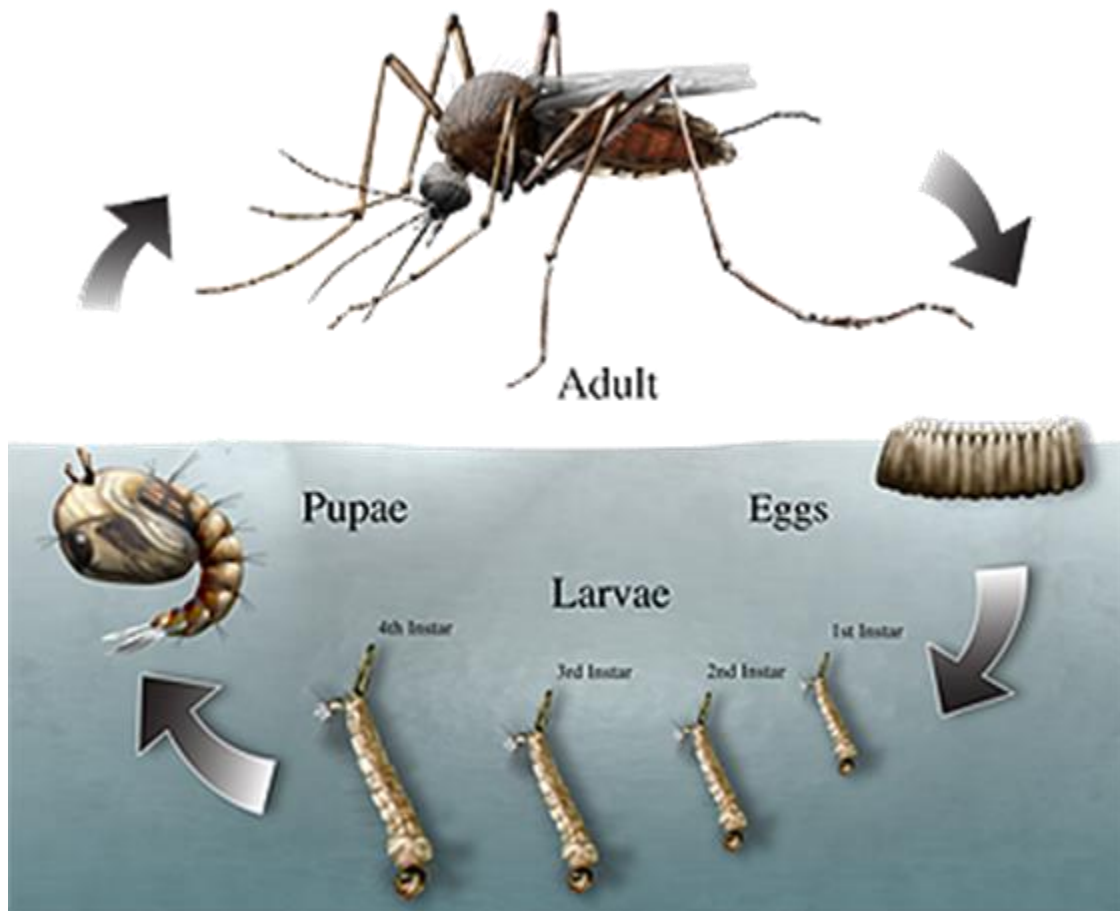


Photo: <http://www.ocvector.org/mosquitoes.html>

In addition to the presence or absence of larvae, volunteers must collect contextual information that supports treatment decisions.

Each survey entry includes:

- Positive or negative dip result
- Larval stage present
- Approximate number of larvae by stage

Volunteers also record:

- Marsh condition such as flooded, pooled, or drying
- Extent of breeding such as spotty or widespread

- Habitat type, including salt marsh, upland edge, or depression
- Notes on vegetation, drainage, or unusual conditions

Optional photos may be included to document site conditions.

These details provide essential context that helps Vector Control interpret larval counts and decide whether treatment is warranted.

Data Quality Expectations

Volunteer data are used directly to modify spray blocks and determine whether larvicide applications occur. Accuracy and consistency are therefore critical.

Best practices include:

- Completing all required fields
- Avoiding estimates when counts can be reasonably observed
- Using notes to explain unusual conditions
- Submitting data promptly after sampling

High quality data allow mosquito management to remain targeted, efficient, and environmentally responsible.

SECTION C - Viability & Site Selection Report

Mapping Vector Control's Mosquito Management Priorities in the Peconic Estuary to

Identify Sites for Citizen Science Program

1. Abstract

This section identifies suitable salt marsh locations within the Peconic Estuary for expanding the volunteer based Mosquito Larvae Hotspot Program. A GIS- based approach was used to integrate spatial data on protected lands, aerial mosquito spray sites, and town and hamlet boundaries, with a focus on areas with public access or simplified permission requirements. The analysis identified five priority sites for potential expansion: Riverhead, Flanders, Napeague, Northwest Harbor, and Greenport West.

The results provide the Peconic Estuary Partnership with a practical planning tool to guide outreach, coordinate with landowners, and allocate partner and volunteer efforts more efficiently in support of Suffolk County Vector Control. The project also establishes a clear framework for identifying and engaging community groups through existing regional partnerships, highlighting the importance of local capacity for program sustainability. A series of maps were produced, including western estuary, North Fork, and South Fork views, along with an estuary wide overview map, to support site evaluation, partner coordination, and future replication of the program across the Peconic Estuary.

2. Data

Basemap

- **Source:** Esri, Maxar, Earthstar Geographics, GIS User Community
- **Original Form:** Online web basemap
- **Format:** Raster imagery
- **Content:** High-resolution aerial imagery
Peconic Estuary Boundary
- **Source:** [Peconic Estuary Partnership \(PEP\)](#), National Estuary Program
- **Original Form:** Shapefile
- **Format:** Vector polygon feature class
- **Content:** Official boundary of the Peconic Estuary
- **Function:** Used to clip all other datasets to the study area
Protected Lands (NYPAD)
- **Source:** New York Natural Heritage Program – [New York Protected Areas Database](#)
- **Original Form:** Geospatial database
- **Format:** Vector Polygon feature class
- **Content:** Ownership status (municipal, county, state, federal, nonprofit, private)
- **Functions/Tools:** Used to assess public accessibility for dip netting; clipped to estuary boundary; attributes relabeled
Aerial Spray Polygons (Mosquito Control Sites)
- **Source:** [Suffolk County Vector Control](#)
- **Original Form:** KML file
- **Format:** Converted to vector polygon feature class
- **Content:** Polygon areas identified for aerial mosquito control treatment

- **Functions/Tools:** Converted using *KML to Layer* tool; reprojected, clipped to study area; attributes edited, dissolved by site, and consolidated for analysis

Town and Hamlet Boundaries

- **Source:** Suffolk County GIS Open Data Portal (opendata.suffolkcountyny.gov)
- Original Form: Shapefile
- **Format:** Vector polygon feature class
- **Content:** Boundaries for towns and hamlets
- **Functions:** Dissolved by name, spatially joined to unify township data, clipped to estuary boundary; Springs hamlet removed.

3. Methodology

This project aimed to pinpoint ideal salt marsh locations within the Peconic Estuary for a volunteer-led mosquito dip-netting program. The goal was to find spots with easy public access. We used a Geographic Information System (GIS) to integrate various spatial datasets, helping to narrow down viable sites, prioritize marshes already impacted by aerial mosquito spraying, and identify nearby community groups for potential outreach. Our process involved several key steps. We started by cleaning and standardizing the aerial spray data provided by Suffolk County Vector Control, converting it into usable formats and clarifying ownership details for each site. Then, to ensure relevance, we used spatial joins to pinpoint areas where protected lands, aerial spray sites, and hamlet boundaries all overlapped. This allowed us to focus specifically on protected parcels within active spray zones and recognized communities.

Finally, we refined our data by clipping everything to the Peconic Estuary boundary and dissolving spatial features to simplify them, for instance, combining smaller spray zones into larger site-level units. We also meticulously cleaned all attribute fields, standardizing labels and re-labeling key information, especially ownership details, to assess access suitability. After removing the pilot site (Accabonac Harbor) and reprojecting all layers for consistent analysis, we identified five prime locations. These sites were then visualized as part of a map-based tool, designed to guide future field assessments and volunteer coordination efforts.

4. Results

Our analysis successfully identified five locations within the Peconic Estuary that are suitable for expanding the Mosquito Larvae Hotspot Program. We effectively used GIS-based workflow to pinpoint areas with public access or simplified permissions, while also prioritizing marshes already subject to aerial mosquito spraying.

The identified sites:

Riverhead, Town of Riverhead

Flanders, Southampton

Napeague, East Hampton

Northwest Harbor, East Hampton

Greenport West, Southold

These locations provide the Peconic Estuary Partnership with a focused starting point for outreach, landowner coordination, and efficient allocation of future sampling efforts.

5. ID Community Partnerships

For the Mosquito Larvae Hotspot Program to continue and grow, it is important to identify local communities and community groups that could help run the program over the long term. While regional partners can support planning and coordination, the program works best when it is rooted in the community closest to the marsh. Local groups are often better positioned to recruit volunteers, organize regular sampling, communicate with residents, and maintain relationships with landowners and mosquito control staff.

The Peconic Estuary Partnership works closely with community groups, local governments, and nonprofit partners across the estuary. These existing relationships provide a strong foundation for expanding the program. As part of this project, potential community partners were identified using existing information and contact lists associated with the Peconic Estuary Partnership's Citizen Advisory Council (CAC). These groups represent organizations already engaged in estuary issues and community-based environmental work, making them strong candidates for supporting or hosting a mosquito monitoring program.

Riverhead, Town of Riverhead: Riverhead Bay Community Association, North Fork Environmental Council, Riverhead Conservation Advisory Council

Flanders, Southampton: Flanders, Riverside & Northampton Community Association, Inc. (FRNCA), Southampton Trustees, The Flanders Bay Community Preservation Fund Advisory Board, Southampton Town Conservation Advisory Council

Napeague, East Hampton: Napeague Bay Civic Association, Napeague Property Owners Association (NPPOA)

Northwest Harbor, East Hampton: Northwest Harbor Property Owners Association, Northwest Harbor Association, East Hampton Trails Preservation Society, Napeague State Park Staff & Volunteers

Greenport West, Southold: Greenport Village Civic Association, West Dublin Neighborhood Association, North Fork Environmental Council

Moving forward, targeted investment will be needed to support one of these community groups in fully taking on the program for implementation. This includes building capacity, providing training, supporting coordination, and ensuring access to technical guidance and data sharing. Establishing one well supported, community led site will create a replicable model for future locations. Program setup, participation, and outcomes should be tracked over time so lessons learned can be used to refine the toolkit and improve future expansions of the Mosquito Larvae Hotspot Program across the Peconic Estuary.

6. Discussion

These findings provide the Peconic Estuary Partnership with a clear roadmap to expand the Mosquito Larvae Hotspot Program. The resulting maps pinpoints key locations across the estuary and serves as a practical planning tool. It can be used to guide outreach efforts, streamline coordination with landowners, and ensure that sampling efforts are focused where they are most needed. This project demonstrates a straightforward GIS based method for identifying priority marsh areas for community

based mosquito monitoring that supports Suffolk County Vector Control. It allows potential monitoring sites to be compared using accessible public data and supports decision making through clear, visual, map based outputs.

The project also highlighted several challenges. Much of the acquired data required significant cleanup before it could be used effectively, and the volume of available public datasets was initially overwhelming. Despite these limitations, the workflow successfully narrowed a large number of parcels into a manageable set of realistic options for future monitoring and program expansion.

Successful expansion also depends on local capacity, trust, and consistent coordination.

Community groups differ in size, mission, and ability to take on new responsibilities.

Potential partners were identified using contact lists and information associated with the Peconic Estuary Partnership's Citizen Advisory Council, providing an important starting point for outreach. Targeted investment in one priority location as a pilot site will allow the program to be tested, refined, and documented as a model that can be replicated elsewhere in the estuary.

Because of its central location in the Peconic Estuary, its designation as a NYS environmental justice area, and the presence of an active community association, Flanders, Southampton site stands out as a strong candidate for early program replication. The Flanders Riverside North Community Association is already engaged in local issues and community coordination, making it well positioned to support volunteer recruitment, communication, and ongoing program activities. Exploring partnerships in

Flanders first would support equity goals while testing a community-led model in an area where mosquito management and public health concerns are especially relevant.

In addition to site specific community groups, several regional organizations can support implementation across all locations by providing continuity, technical and financial assistance, and coordination.

Overall Support Groups

- **Peconic Estuary Partnership**

Provides overall coordination, regional planning, partner connections, and long term program support.

- **Peconic Estuary Partnership Citizen Advisory Council**

Connects civic groups and residents across the estuary and supports outreach and partner identification.

- **Peconic Baykeeper**

Brings experience in field monitoring, volunteer engagement, and public communication.

- **Surfrider Foundation**

Offers experience with volunteer driven monitoring, community organizing, and coastal advocacy.

- **Cornell Cooperative Extension**

Provides science-based education, technical guidance, and training support.

By pairing strong site selection with intentional investment in community capacity, beginning with a well-supported location such as Flanders, the Mosquito Larvae

Hotspot Program can move toward a sustainable, community-led model. Tracking program setup, participation, and outcomes at this initial site will help refine training materials, coordination tools, and outreach strategies, strengthening the toolkit for future expansion across the Peconic Estuary.

SECTION D: Conclusion

This report demonstrates that targeted, data driven mosquito management can protect public health while significantly reducing pesticide use in sensitive salt marsh systems.

By aligning mosquito control efforts with tidal cycles, field based larval sampling, and clear treatment thresholds, Suffolk County Vector Control has shown that routine blanket mosquito treatment is not always necessary to effectively manage mosquito populations.

The Accabonac Harbor Citizen Science Pilot Program provides strong evidence that trained volunteers can play a meaningful role in this process. Volunteer collected data improved the County's ability to identify true mosquito breeding hotspots, reduce treated acreage, lower operational costs, and limit chemical exposure, all while maintaining effective mosquito control. The consistency of results over multiple seasons confirms that this approach is reliable, scalable, and operationally useful.

At the same time, the program highlights important limitations. Sustained success depends on ongoing volunteer recruitment, training, and coordination, as well as continued staff oversight to ensure data quality. In addition, hotspot treatment addresses the symptoms of mosquito production rather than the underlying causes.

Long term reductions in mosquito breeding will ultimately require investments in marsh restoration and improved hydrology.

Building on the demonstrated success at Accabonac Harbor, this report presents a practical framework for expanding citizen science mosquito monitoring across the Peconic Estuary. The GIS based site selection approach provides a clear planning tool to guide expansion in a way that is strategic, efficient, and grounded in ecological and logistical realities. Together, these findings show that partnerships between agencies, conservation organizations, and local volunteers can deliver smarter mosquito control while supporting healthier, more resilient coastal wetlands.

1d. Grant Proposal Template

This proposal is intended to serve as an example framework for future grant applications seeking to fund a dedicated Site Coordinator for the Mosquito Larvae Hotspot Program.

The one-season pilot outlined above demonstrates the staffing, training, and operational support required to successfully operate a citizen science mosquito monitoring site. In future applications, this framework may be expanded to request multi-season or multi-site funding to support a Site Coordinator role with increased responsibilities, including volunteer recruitment and retention, coordination with multiple agencies, data management, and integration of findings into restoration planning.

By documenting this model, this framework provides a scalable template that can be adapted for NGOs, municipalities, or public agencies interested in supporting long-term mosquito management, community science, and salt marsh restoration efforts.

A Proposal to Support a One-Season Mosquito Larvae Citizen Science Pilot Submitted by:

Peconic Estuary Partnership

Submitted to: _____

The Ask

The Peconic Estuary Partnership respectfully requests **\$8,000** from _____ to support the **setup and implementation of a one-season Mosquito Larvae Hotspot Citizen Science pilot** at a salt marsh site in Suffolk County. Requested funds will directly support volunteer recruitment and training, field equipment, weekly sampling operations, volunteer refreshments, and limited

seasonal coordination necessary to deliver actionable data to Suffolk County Vector Control during a single mosquito season.

The Need

Mosquito-borne illness remains a public health concern across coastal Long Island, particularly in Suffolk County where salt marshes provide ideal breeding conditions. Mosquito control has historically relied on broad-scale aerial larvicide applications across entire marsh systems. While effective, this approach often treats areas where mosquito breeding is limited or absent and results in unnecessary pesticide exposure and public cost.

Field experience has shown that mosquito breeding is concentrated in discrete hotspots, typically where tidal flow is restricted and standing water persists. Identifying and targeting these locations allows mosquito control efforts to remain effective while reducing pesticide use and environmental impacts.

Since 2017, the Mosquito Larvae Hotspot Program at Accabonac Harbor has demonstrated that trained volunteers can reliably collect time-sensitive field data that directly informs mosquito control decisions. Weekly citizen sampling has reduced acres treated, improved transparency between residents and government, and generated data now used to inform marsh restoration planning.

This proposal applies that proven model at a new site for a single season, focusing resources on direct field implementation rather than administrative expansion.

Program Background and Model

The Mosquito Larvae Hotspot Program was developed through partnerships between conservation organizations, local governments, and Suffolk County Vector Control. Volunteers

are trained to sample pooled marsh water using standardized dip protocols, identify mosquito eggs and larval life stages, and record observations using a mobile data collection platform.

Sampling occurs weekly during the peak mosquito season, typically across approximately 14 weeks aligned with high-risk tide events. Data collected by volunteers is transmitted to Suffolk County Vector Control in time to inform operational spray decisions. This allows Vector Control staff to adjust spray blocks, target only confirmed breeding areas, and select larvicides appropriate to mosquito life stage.

At Accabonac Harbor, this approach has resulted in reduced pesticide application, taxpayer cost savings, improved public trust, and identification of priority areas for wetland restoration.

Why Peconic Estuary Partnership

For more than 25 years, the Peconic Estuary Partnership has coordinated estuary protection and restoration efforts across the East End of Long Island as one of 28 federally designated National Estuary Programs. PEP maintains long-standing partnerships with local governments, conservation organizations, and Suffolk County Vector Control.

For this pilot, PEP will provide administrative oversight and program management, allowing requested funds to be directed almost entirely toward field implementation, volunteer engagement, and data collection. The program relies on existing protocols, established relationships, and proven methods.

Project Plan: One-Season Pilot Implementation

Goal

Implement a one-season Mosquito Larvae Hotspot Citizen Science pilot that generates reliable, site-specific data to inform mosquito control decisions, reduce unnecessary pesticide application, and build local capacity.

Objective 1: Site Selection and Seasonal Setup

- Confirm a pilot marsh site with documented mosquito issues and clear access
- Establish sampling locations, access points, and a weekly schedule aligned with tide events

Objective 2: Recruit, Train, and Support Volunteers

- Recruit and train approximately six volunteers through an in-person workshop
- Provide light refreshments during weekly sampling to support volunteer retention

Objective 3: Weekly Sampling and Data Delivery

- Conduct weekly mosquito larvae sampling for approximately 14 weeks
- Transmit data in a timely manner to Suffolk County Vector Control
- Prepare a brief end-of-season summary memo using in-kind support

Timeline

- **Spring:** Site confirmation, recruitment, logistics, and training
- **Summer:** Approximately 14 weeks of weekly sampling and data delivery
- **Fall:** End-of-season summary and evaluation

Budget: One-Season Mosquito Larvae Citizen Science Pilot

Total Request: \$8,000

Category	Cost	Notes
Seasonal Site Coordinator stipend and mileage	\$2,000	Weekly coordination and field logistics
Volunteer refreshments	\$1,000	Coffee and snacks for ~14 weeks

Category	Cost	Notes
Sampling equipment and safety supplies	\$1,500	Dip cups, nets, protective gear
Educational and training materials	\$500	Printed protocols and guides
Training workshop materials	\$500	Volunteer training supplies
Training refreshments	\$500	Light refreshments
Outreach print materials	\$1,000	Recruitment materials
Digital volunteer recruitment	\$1,000	Online outreach
TOTAL PROJECT COST	\$8,000	

Measuring Success

Success will be measured by:

- Completion of approximately 14 weekly sampling events
- Recruitment and retention of at least six trained volunteers
- Timely delivery of data to Suffolk County Vector Control
- Evidence that sampling informed mosquito control decisions
- Qualitative feedback from volunteers and partners

The one-season pilot outlined above demonstrates the minimum staffing, training, and operational support required to successfully operate a citizen science mosquito monitoring site.

In future applications, this framework may be expanded to request multi-season or multi-site funding to support a Site Coordinator role with increased responsibilities, including coordination with multiple agencies, data management, and integration of findings into restoration planning.

By documenting a functional pilot model, this framework provides a scalable template that can be adapted for foundations, municipalities, or public agencies interested in supporting long-term mosquito management, community science, and salt marsh restoration efforts.

Conclusion

This one-season Mosquito Larvae Hotspot Citizen Science pilot represents a focused, cost-effective opportunity to apply a proven model at a new site while minimizing overhead and administrative costs. By directing resources toward volunteer training, field implementation, and real-time data delivery, the project generates immediate public health and environmental benefits.

With support from _____, the Peconic Estuary Partnership can demonstrate how community-based data collection supports smarter mosquito management while building local stewardship and trust.

2. Viability & Site Selection Report

Mapping Vector Control's Mosquito Management Priorities in the Peconic Estuary to Identify Sites for Citizen Science Program

1. Abstract

This section identifies suitable salt marsh locations within the Peconic Estuary for expanding the volunteer based Mosquito Larvae Hotspot Program. A GIS- based approach was used to integrate spatial data on protected lands, aerial mosquito spray sites, and town and hamlet boundaries, with a focus on areas with public access or simplified permission requirements. The analysis identified five priority sites for potential expansion: Riverhead, Flanders, Napeague, Northwest Harbor, and Greenport West.

The results provide the Peconic Estuary Partnership with a practical planning tool to guide outreach, coordinate with landowners, and allocate partner and volunteer efforts more efficiently in support of Suffolk County Vector Control. The project also establishes a clear framework for identifying and engaging community groups through existing regional partnerships, highlighting the importance of local capacity for program sustainability. A series of maps were produced, including western estuary, North Fork, and South Fork views, along with an estuary wide overview map, to support site evaluation, partner coordination, and future replication of the program across the Peconic Estuary.

2. Data

Basemap

- **Source:** Esri, Maxar, Earthstar Geographics, GIS User Community
- **Original Form:** Online web basemap

- **Format:** Raster imagery
- **Content:** High-resolution aerial imagery

Peconic Estuary Boundary

- **Source:** [Peconic Estuary Partnership \(PEP\)](#), National Estuary Program
- Original Form: Shapefile
- **Format:** Vector polygon feature class
- **Content:** Official boundary of the Peconic Estuary
- **Function:** Used to clip all other datasets to the study area

Protected Lands (NYPAD)

- **Source:** New York Natural Heritage Program – [New York Protected Areas Database](#)
- **Original Form:** Geospatial database
- **Format:** Vector Polygon feature class
- **Content:** Ownership status (municipal, county, state, federal, nonprofit, private)
- **Functions/Tools:** Used to assess public accessibility for dip netting; clipped to estuary boundary; attributes relabeled

Aerial Spray Polygons (Mosquito Control Sites)

- **Source:** [Suffolk County Vector Control](#)
- Original Form: KML file
- **Format:** Converted to vector polygon feature class
- **Content:** Polygon areas identified for aerial mosquito control treatment
- **Functions/Tools:** Converted using *KML to Layer* tool; reprojected, clipped to study area; attributes edited, dissolved by site, and consolidated for analysis

Town and Hamlet Boundaries

- **Source:** Suffolk County GIS Open Data Portal (opendata.suffolkcountyny.gov)
- Original Form: Shapefile
- **Format:** Vector polygon feature class
- **Content:** Boundaries for towns and hamlets
- **Functions:** Dissolved by name, spatially joined to unify township data, clipped to estuary boundary; Springs hamlet removed.

3. Methodology

This project aimed to pinpoint ideal salt marsh locations within the Peconic Estuary for a volunteer-led mosquito dip-netting program. The goal was to find spots with easy public access. We used a Geographic Information System (GIS) to integrate various spatial datasets, helping to narrow down viable sites, prioritize marshes already impacted by aerial mosquito spraying, and identify nearby community groups for potential outreach.

Our process involved several key steps. We started by cleaning and standardizing the aerial spray data provided by Suffolk County Vector Control, converting it into usable formats and clarifying ownership details for each site. Then, to ensure relevance, we used spatial joins to pinpoint areas where protected lands, aerial spray sites, and hamlet boundaries all overlapped. This allowed us to focus specifically on protected parcels within active spray zones and recognized communities.

Finally, we refined our data by clipping everything to the Peconic Estuary boundary and dissolving spatial features to simplify them, for instance, combining smaller spray zones into larger site-level units. We also meticulously cleaned all attribute fields, standardizing labels and

re-labeling key information, especially ownership details, to assess access suitability. After removing the pilot site (Accabonac Harbor) and reprojecting all layers for consistent analysis, we identified five prime locations. These sites were then visualized as part of a map-based tool, designed to guide future field assessments and volunteer coordination efforts.

4. Results

Our analysis successfully identified five locations within the Peconic Estuary that are suitable for expanding the Mosquito Larvae Hotspot Program. We effectively used GIS-based workflow to pinpoint areas with public access or simplified permissions, while also prioritizing marshes already subject to aerial mosquito spraying.

The identified sites:

Riverhead, Town of Riverhead

Flanders, Southampton

Napeague, East Hampton

Northwest Harbor, East Hampton

Greenport West, Southold

These locations provide the Peconic Estuary Partnership with a focused starting point for outreach, landowner coordination, and efficient allocation of future sampling efforts.

5. ID Community Partnerships

For the Mosquito Larvae Hotspot Program to continue and grow, it is important to identify local communities and community groups that could help run the program over the long term. While regional partners can support planning and coordination, the program works best when it is rooted in the community closest to the marsh. Local groups are often better positioned to

recruit volunteers, organize regular sampling, communicate with residents, and maintain relationships with landowners and mosquito control staff.

The Peconic Estuary Partnership works closely with community groups, local governments, and nonprofit partners across the estuary. These existing relationships provide a strong foundation for expanding the program. As part of this project, potential community partners were identified using existing information and contact lists associated with the Peconic Estuary Partnership's Citizen Advisory Council (CAC). These groups represent organizations already engaged in estuary issues and community-based environmental work, making them strong candidates for supporting or hosting a mosquito monitoring program.

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Overall Support Groups

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Offers experience with volunteer driven monitoring, community organizing, and coastal advocacy.

- **Cornell Cooperative Extension**

Provides science-based education, technical guidance, and training support.

By pairing strong site selection with intentional investment in community capacity, beginning with a well-supported location such as Flanders, the Mosquito Larvae Hotspot Program can move toward a sustainable, community-led model. Tracking program setup, participation, and outcomes at this initial site will help refine training materials, coordination tools, and outreach strategies, strengthening the toolkit for future expansion across the Peconic Estuary.

3. Maps

Overview Map

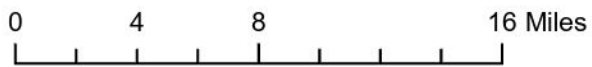
North Fork

Western Estuary

South Fork 1

South Fork 2

Overview of Five Potential Sites



1:400,000

Potential Sites

Site Name

- FLANDERS
- GREENPORT WEST

- NAPEAGUE
- NORTHWEST HARBOR
- RIVERHEAD
- Towns
- Peconic Estuary Boundary










Possible Site: North Fork

Jade Blennau

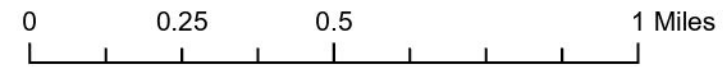


Potential Sites

Site Name

-  FLANDERS
-  GREENPORT WEST
-  NAPEAGUE
-  NORTHWEST HARBOR
-  RIVERHEAD
-  Town
-  Peconic Estuary Boundary

1:20,000



Possible Sites: Western Estuary

Jade Blennau

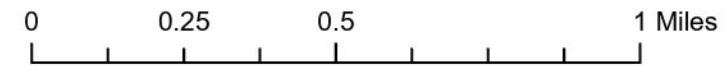


Potential Sites

Site Name

- FLANDERS
- GREENPORT WEST
- NAPEAGUE
- NORTHWEST HARBOR
- RIVERHEAD
- Town
- Peconic Estuary Boundary

1:20,000



Possible Sites: South Fork pt.1

Jade Blennau



Potential Sites

Site Name

- FLANDERS
- GREENPORT WEST
- NAPEAGUE
- NORTHWEST HARBOR
- RIVERHEAD
- Town
- Peconic Estuary Boundary

1:34,000



Possible Site: South Fork pt.2

Jade Blennau



Potential Sites

Site Name

- FLANDERS
- GREENPORT WEST
- NAPEAGUE
- NORTHWEST HARBOR
- RIVERHEAD
- Town
- Peconic Estuary Boundary

1:35,000

