PLANNING ASSISTANCE TO STATES

SECTION 22 of Water Resources Development Act of 1974

Lakes Management Plan for
Silver Lake and Lake Comegys

Funded in part by DNREC

June 2023

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Executive Summary

The City of Rehoboth Beach requested assistance from the U.S. Army Corps of Engineers (USACE) under Section 22(a) (1) of the Water Resources Development Act of 1974 (WRDA 1974), as amended (42 U.S.C. 1962d-16) (Section 22 of the WRDA), in the form of comprehensive planning for the establishment of a Lake Management Plan for Silver Lake and Lake Comegys. The request was made on behalf of the City of Rehoboth Beach, Town of Dewey Beach, Delaware Department of Natural Resources and Environmental Control (DNREC) and Sussex County, Delaware. The City of Rehoboth Beach requested that the plan be consistent with Section 1.0 of the EPA's "2010 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve Guidance."

This Lakes Management Plan identifies and discusses jurisdictional code requirements and provides clarity on ownership and maintenance requirements and expectations. The plan also helps to better understand the water quality of the lakes and establish best management practices that provide for environmental protection and public safety. The objectives of the Lakes Management Plan are to:

1. Investigate the hydrology of the watershed and the hydrological connection between the two lakes, to support the water level management plan;
2. Address lake level management, to include flooding into the basements on the south and east end and water deficiencies in the northwest reach (results in lake becoming a mud flat and an impediment to recreation);
3. Address shoreline management including for the riparian buffer. Additionally, develop invasive species management recommendations for Silver Lake and Lake Comegys. This will allow stakeholders to work with DNREC to address problems with phragmites, bamboo and other invasive species in order to create a more uniform, natural riparian buffer around both lakes; and
4. Establish ownership and jurisdiction of the shoreline around Silver Lake and Lake Comegys using publicly available information in order to facilitate communication between property owners with the various jurisdictions and communicate the various regulations and requirements that govern development surrounding the lake.

Not all of the data needed to complete the plan objectives are available; therefore, the plan provides short-term and long-term goals that the partners and stakeholders can work towards to collect the needed data. This plan has been developed to be a living document, maintained by the partners to mark progress towards the objectives or redefine objectives, as necessary, to successfully manage the lake based on a unified vision for the maintenance and improvement of the lakes. It is suggested that partners assess progress towards the short-term and long-term goals annually and reassess the objectives every 5 years.

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1 Background

On June 28, 2019, the City of Rehoboth Beach requested assistance from the U.S. Army Corps of Engineers (USACE) under Section 22(a) (1) of the Water Resources Development Act of 1974 (WRDA 1974), as amended (42 U.S.C. 1962d-16) (Section 22 of the WRDA), in the form of comprehensive planning for the establishment of a Lake Management Plan for Silver Lake and Lake Comegys (Figure 1.1). The request was made on behalf of the City of Rehoboth Beach, Town of Dewey Beach, Delaware Department of Natural Resources and Environmental Control (DNREC), and Sussex County, Delaware.

The City of Rehoboth Beach requested that the plan be consistent with Section 1.0 of the EPA's "2010 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve Guidance." More specifically, subsection 1.2-7 of this guidance includes the "establishment or restoration of permanent riparian buffers, floodplains, wetlands and other natural features, including vegetated buffers or soft bioengineered stream banks." This plan lays out recommendations that the partners can implement to restore and preserve riparian buffers surrounding the lake.

The plan identifies and discusses jurisdictional code requirements and provides clarity on ownership and maintenance requirements/expectations. The plan also helps to better understand the water quality of the lakes and establish best management practices that provide for environmental protection and public safety.

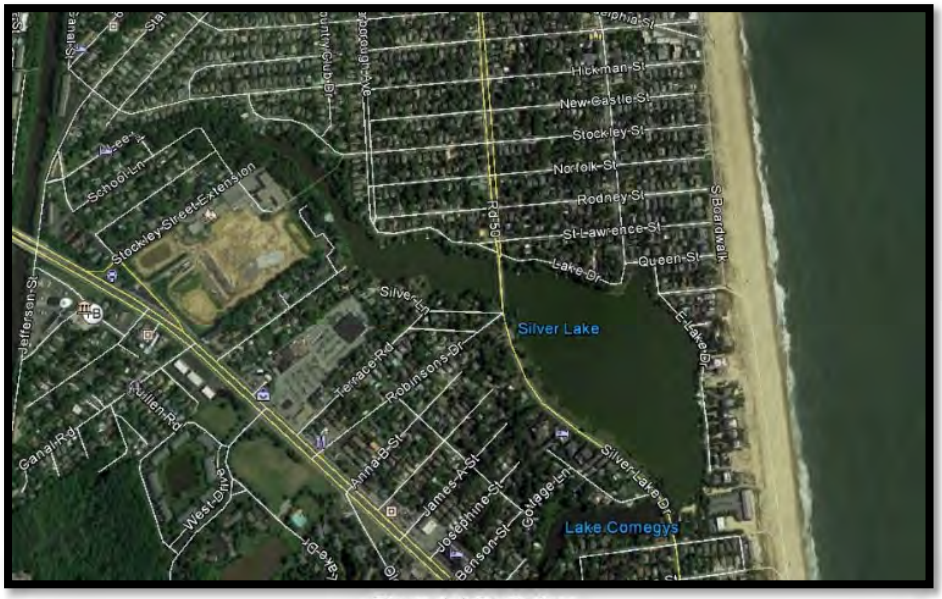

Figure 1.1 Study Area

1.1 Authority

The development of the plan is authorized under Section 22 of WRDA 1974, as amended. Section 22 authorizes USACE to cooperate with a State, a group of States, or a non-Federal interest working with a State or a group of States in the preparation of comprehensive plans for the development, utilization, and conservation of the water and related resources of drainage basins, watersheds, or ecosystems, including plans to comprehensively address water resource challenges. A comprehensive plan may extend across State boundaries provided all States agree.

The amounts allocated to Section 22(a) assistance count against the maximum of not more than $5,000,000 in Federal funds that may be expended in any one year in any one State.

1.2 Location and History

Geological studies indicate that the lakes were formed when groundwater filled sink holes that formed in unconsolidated sediments in low spots in the sandy flatlands (DGS 1960). There has been speculation that Silver Lake and Lake Comegys were formed by receding glaciers; however, glacial ice did not advance into Delaware (DGS 1998).

Both lakes have the distinction of being the closest freshwater bodies to the Atlantic Ocean in the United States (SOLA3 2017). Silver Lake was used as a camp by the Nanticoke Tribe when fishing for shellfish from the ocean in the summer. Colonial ship captains used Silver Lake as a source of fresh water (City of Rehoboth Beach 2020). Until the 1800s, the lakes were joined and were a part of a larger wetland, which was drained over the course of the development of the area. In 1933 the lakes were designated as a waterfowl refuge. The spillway to the ocean was constructed to manage water levels for fish and game. A 1977 survey of state-owned coastal resources listed both lakes as public lands.

In 2017, Delaware Department of Natural Resources and Environmental Control (DNREC) completed the Silver Lake Aquatic Habitat Enhancement Project which entailed redistributing approximately 1,500 cubic yards of sediment dredged from the upper part of the lake to the shoreline, behind biodegradable logs. DNREC landscaped the bank with a native vegetative buffer to improve aesthetics and habitat (City of Rehoboth Beach 2020).

Silver Lake is approximately 43 acres and Lake Comegys is approximately 3.7 acres. Silver Lake is in the City of Rehoboth Beach, Town of Dewey Beach, and unincorporated areas of Sussex County. Lake Comegys is in the Town of Dewey Beach and unincorporated areas of Sussex County. The shorelines of Silver Lake and Lake Comegys are approximately 10,544 feet and 2,541 feet in length, respectively. Approximately 60% of the Silver Lake shoreline is in the City of Rehoboth Beach, 35% is within unincorporated areas of Sussex County, and 5% is within the Town of Dewey Beach. Approximately 49% of Lake Comegys shoreline is in the unincorporated areas of Sussex County, with approximately 51% in the Town of Dewey Beach.

The waters of both lakes fall under the jurisdiction of DNREC. DNREC has jurisdiction over the Silver Lake subaqueous land up to the ordinary highwater mark (OHW); however, with several jurisdictional boundaries abutting the lake, each have different code requirements relative to landscaping, vegetative buffers, soil stabilization and erosion management; however, there is inconsistency among the jurisdictions in the lakes' riparian areas, which are crucial to water quality and quantity control. Additionally, invasive species are becoming established in the riparian areas. Figure 1.2 shows the jurisdictional boundaries surrounding Silver Lake and Lake Comegys.

Figure 1.2. Jurisdictional boundaries around Silver Lake and Lake Comegys

While there have been disputes as to ownership and management responsibilities for the lakes, in 2013 it was determined that the State owns both lakes. As development and redevelopment of the lakes' watersheds continue, water quality and water level management have become topics of concern. DNREC has begun to control development along the lakes up to the ordinary highwater mark, by applying the state subaqueous lands law (7 Del. Code Chapter 72) and associated regulations. This oversight, through permits and subaqueous leases, has helped address improvements or repairs to existing or proposed structures including docks, piers and shoreline stabilization. While riparian rights and the rights of individual property owners are currently not clear this has generally allowed owners to undertake maintenance of existing structures and build new structures. Although gazebos are prohibited under current regulation, DNREC has considered structures constructed before 2013 as covered under the previous regulations and requirements, i.e., before the state established jurisdiction over the lakes.

The riparian areas surrounding the lake and ocean outfall from Silver Lake to the Atlantic Ocean in the Town of Dewey Beach need to be maintained into the future. Through this planning process, it has been verified that DNREC is responsible for the ownership and maintenance of the outfall structure from Silver Lake to the Atlantic Ocean (see Appendix A). This plan lays out the goals and recommendations for managing the riparian areas and outfall structure into the future.

The existing environmental resources for Silver Lake and Lake Comegys have not been extensively sampled and catalogued. DNREC, Division of Fish and Wildlife has not completed vegetative, bird, habitats, invasive species, endangered species, and other surveys for either lake. Existing water quality and species lists were developed utilizing federal and state database searches, website searches, and direct communication with federal, state, and local individuals familiar with the sites.

1.3 Problems and Opportunities

1.3.1 Problems

The problems at Silver Lake and Lake Comegys are:

1. Multiple jurisdictions surround the lake and shorelines with inconsistent management of shorelines and stormwater.
    a. The lakeward limits of the properties surrounding the lake are unknown, resulting in shoreline management that is not uniform, thereby allowing for encroachment on the lake (e.g., illegal gazebos) and establishment of invasive species.
    b. Shorelines alternate between sections of common reed (*Phragmites australis*) and other invasive species including bamboo; DNREC established-shoreline habitat; homeowner parking spaces, driveways and mowed lawns; and at least one area of reclaimed land along a private residence.

2. The degree of connection between Silver Lake and Lake Comegys is unknown and may affect the management water levels.
    a. Homeowners claim that high water levels in the lake result in flooding in the basements of homes on the south and east of the lake.
    b. Low water levels result in a reduction of recreational activities at the northern stretch of Silver Lake.

1.3.2 Opportunities

This study provides the opportunity to develop a lakes management plan for Silver Lake and Lake Comegys to clarify jurisdiction and support the needs of the City of Rehoboth Beach, the Town of Dewey Beach, Sussex County, DNREC, and local homeowners including:

1. Coordinate shoreline management in order to protect and improve the shoreline habitat of Silver Lake and Lake Comegys. DNREC's role will be to provide support guidance related to the State's Subaqueous Regulations to the OHW.
2. Improve DNREC's ability to manage the Silver Lake water levels to avoid and minimize flooding in the basements of homes on the south and east of the lake while facilitating recreational activities at the northern stretch of Silver Lake.
3. Improve the ability of the project partners to collectively address invasive species, riparian buffer management, stormwater and lake water quality.

1.4 Project Partners and Stakeholders

The non-federal project partners are the City of Rehoboth Beach, the Town of Dewey Beach, Sussex County, and the DNREC. Their combined funding for this effort totals $100,000. This consists of a $50,000 Surface Water Matching Planning Grant from DNREC obtained by the City of Rehoboth Beach and matching funds from the City of Rehoboth Beach, Town of Dewey Beach, and Sussex County. Each of these local sponsors provided one-third, or $16,667 in matching funds. The primary sponsor, the City of Rehoboth Beach, received the local funds and provided them to the USACE.

Stakeholders include all those individuals or groups who currently receive or in the future will receive benefit from the lakes and the improvement of the lakes through the implementation of the lakes management plan but who have not provided financial or in-kind support to the development of or implementation of the lakes management plan. Beneficiaries of this project include homeowners, birdwatchers, fishermen, park visitors, and others as well as local businesses who may see increased revenue because of increased use of or enjoyment of the lakes as a result of the implementation of the lakes management plan.

The non-profit organization Save Our Lakes Association 3 (SOLA3) is a stakeholder which has an active interest in the management of Comegys and Silver Lakes and a third lake, Lake Gerar to the north of Silver Lake. SOLA3 alliance members include the City of Rehoboth Beach Homeowners' Association, Country Club Homeowners' Association, Lake Comegys Homeowners' Association, Draper Subdivision Homeowners' Association, and The Citizens Coalition.

2 Purpose and Objectives

2.1 Purpose

The purpose of the study is to develop a lakes management plan for the City of Rehoboth Beach, the Town of Dewey Beach, Sussex County, and DNREC. The lakes management plan is a living plan and guidance document that will allow the project partners and stakeholders to establish a unified vision for the maintenance of the lakes and to coordinate lake management efforts among jurisdictions.

2.2 Objectives

The objectives focus on lake water levels; management of the lakes across multiple jurisdictions; and property ownership. Specific objectives include the following:

1. Investigate the hydrology of the watershed and the hydrological connection between the two lakes, to support the water level management plan.
2. Address lake level management, to include flooding into the basements on the south and east end and too little water in northwest reach, which results in lake becoming a mud flat and an impediment to recreation.
3. Address shoreline management including for the riparian buffer. Additionally, develop invasive species management recommendations for Silver Lake and Lake Comegys. This will allow stakeholders to work with DNREC to address problems with phragmites, bamboo and other invasive species in order to create a more uniform, natural riparian buffer around both lakes.
4. Establish ownership and jurisdiction of the shoreline around Silver Lake and Lake Comegys using publicly available information in order to facilitate communication between property owners with the various jurisdictions and communicate the various regulations and requirements that govern development surrounding the lake.

Because the data needed to complete these objectives are not available, the plan provides short-term and long-term goals that the partners and stakeholders can work towards, to collect the needed data. This plan has been developed to be a living document, maintained by the partners to mark progress towards the objectives or redefine objectives, as necessary, to successfully manage the lake based on a unified vision. It is suggested that partners assess progress towards the short-term and long-term goals annually and reassess the objectives every 5 years.

3 Lake Management Regulatory Review

Understanding the local, county, state, and federal regulatory requirements governing the work in and along Silver Lake and Lake Comegys and management of stormwater entering the lakes will help facilitate the following:

- increased clarity on the regulatory requirements that affect the lake across multiple jurisdictions
- increased consistency of those regulatory requirements (as warranted or appropriate) to help facilitate communication between property owners and the regulatory agencies
- enabling the consideration of further management recommendations.

Although lake restoration and management are environmentally positive actions, they are often regulated by Federal, State and Local rules, laws, or ordinance; thus, permits or approvals will likely be needed to implement the various elements of the management plan.

3.1 Federal

3.1.1 Clean Water Act, Section 404

Waterways and wetlands regulated under Section 404 of the Clean Water Act are referred to as Waters of the United States. Examples of Waters of the United States include tidal waters (up to the high tide line) as well as most non-tidal waterbodies (up to their OHW) and wetlands. This includes most types of streams, as well as ditches that were constructed to replace water courses. The National Wetlands Inventory map for the lakes is provided in Figure 3.1.

While an official jurisdictional determination by the USACE would be needed to confirm regulatory limits, Silver Lake, Lake Comegys, and most wetlands adjacent to these lakes are likely considered Waters of the United States, to the OHW. According to the Clean Water Act (33 CFR Section 328.3), the OHW is defined as:

> *The term "ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

As such, the disposal of dredged or fill material and certain types of work in these water bodies is regulated under Section 404 of the Clean Water Act (i.e., USACE Section 404 permits).

Further information can be found in 33 CFR Chapter 2 Part 328 (available at https://www.ecfr.gov/current/title-33/chapter-II/part-328). Figure 3.1provides wetlands according to the National Wetlands Inventory.

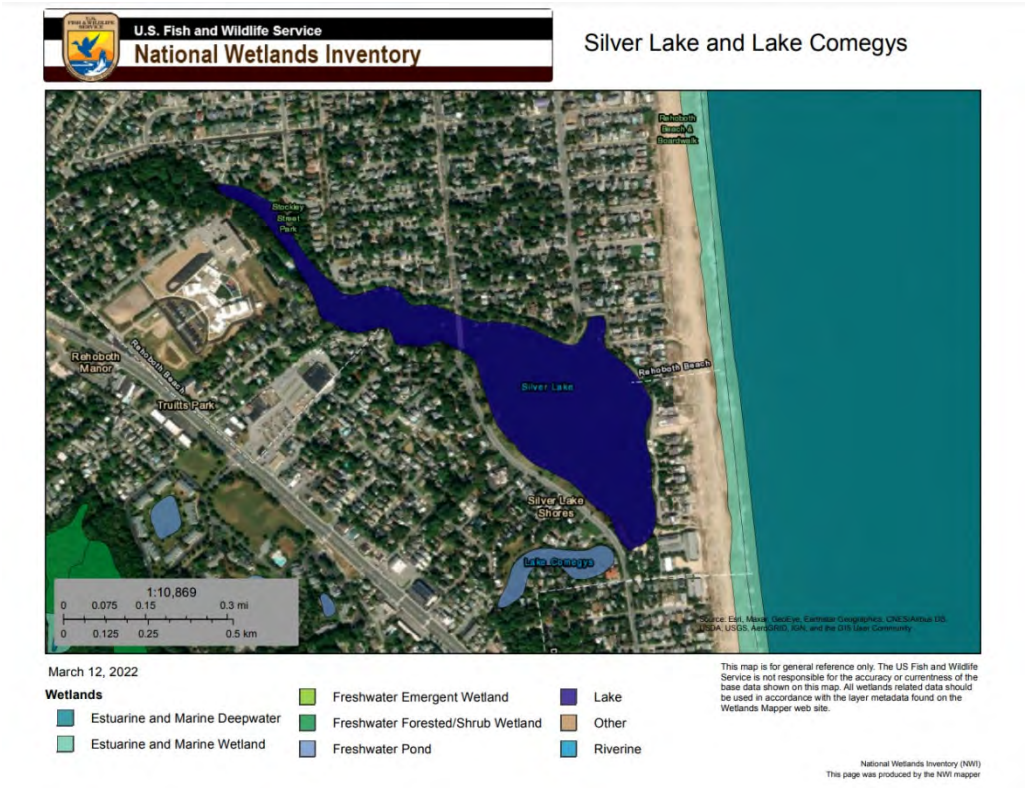

Figure 3.1 National Wetlands Inventory Map for Silver Lake and Lake Comegys

Section 404 permits can be issued as individual permits, nationwide permits (NWPs), or State Programmatic General Permits (SPGPs). The basic form of authorization is the individual permit.

Processing such permits involves evaluation of individual, project specific applications in what can be considered three steps: pre-application consultation (for larger projects), formal permit application review, and decision-making.

NWPs are a type of general permit that have been issued by the regulation (33 CFR Part 330) for certain specified activities nationwide. NWPs have been established to reduce the regulatory reporting burden for specific activities that have no more than minimal impacts to the aquatic environment. If certain conditions are met, the specified activities can take place without the need for review under an existing regional or individual permit. It is anticipated that most work in Silver Lake and Lake Comegys will likely qualify for an NWP.

SPGPs are administered by a state agency and designed to eliminate duplication of effort between Corps districts and states, as well as to make the permitting process more efficient with flexibility as to the geographic region covered and whether nationwide permits are revoked.

Contact Information for jurisdiction questions and permits: Contact the USACE Regulator-of-the-Day at 215-656-6728 or email napregulatory@usace.army.mil for general questions, permit status, or other requests.

3.1.2 Rivers and Harbors Act, Section 10

Waterways and wetlands regulated under Section 10 of the Rivers and Harbors Act are termed "navigable waters of the United States" which generally include all waters and wetlands subject to the ebb and flow of the tide, and those waters which are, have been, or could be used in the future for the transport of interstate or foreign commerce. While an official jurisdictional determination by USACE would be needed to confirm regulatory limits, it seems unlikely that these lakes would be considered "navigable waters of the United States", as defined in Section 10 of the Rivers and Harbors Act, because they do not appear to be subject to tidal flow and do not appear to be susceptible for use for interstate or foreign commerce. Further information can be found in 33 CFR Chapter 2 Part 329 (available at https://www.ecfr.gov/current/title-33/chapter-II/part-329).

Contact Information for jurisdiction questions and permits: Contact the USACE Regulator-of-the-Day at 215-656-6728 or email napregulatory@usace.army.mil for general questions, permit status, or other requests.

3.1.3 Coastal Zone Management Act

The Federal Consistency program was established by Congress in 1972 as part of the Coastal Zone Management (CZM) Act. Every coastal or Great Lakes state with a Coastal Management Program implements Federal Consistency within its approved federal coastal zone boundary. Delaware's federal coastal zone encompasses the entire state.

Federal Consistency requires that projects conducted directly by a Federal agency, projects authorized by a Federal permit and some projects implemented with Federal funds be consistent with the enforceable Delaware Coastal Zone Management policies. This would include Clean Water Act Section 404 permits issued by USACE for work in the lakes. Once the USACE makes a consistency determination for a project it is reviewed by the DNREC Coastal Program staff in close coordination with other State agencies. If projects are consistent with state coastal policies, a Federal Consistency concurrence is issued.

Work in Silver Lake and Lake Comegys that qualifies for USACE Section 404 NWPs will have a CZM approval programmatically issued by the State of Delaware.

Contact the USACE Regulator-of-the-Day at 215-656-6728 or email napregulatory@usace.army.mil for questions about coastal zone consistency determinations for Section 404 permits.

Contact Delaware Coastal Programs, Regulatory Programs at 302-739-9283 or https://dnrec.alpha.delaware.gov/coastal-programs/coastal-management/federal-consistency/ for more information about Delaware's Federal Consistency Program and Delaware's Coastal Zone Management Policies.

3.2 State

3.2.1 Regulations Governing the Use of Subaqueous Lands (7 DE Admin. Code 7504)

Delaware regulates all non-tidal rivers, streams, lakes, ponds, bays, and inlets (up to the OHW) under the Subaqueous Lands Act (7 Del. Code, Chapter 72) and the Regulations Governing the Use of Subaqueous Lands (7 DE Admin. Code 7504). This includes most types of streams, as well as ditches that were constructed to replace water courses. As they are subaqueous lands, work in Silver Lake and Lake Comegys is regulated under the Subaqueous Lands Act and the Regulations Governing the Use of Subaqueous Lands. The State of Delaware defines the OHW as (7 Del. Code, Chapter 72, Section 7202, Definitions):

> *"Ordinary high-water mark" means, for nontidal waters, the line at which the presence and action of water are so continuous in all ordinary years so as to leave a distinct mark on a bank either by erosion or destruction of terrestrial* (nonaquatic) vegetation, or that can be determined by other physical or biological means.

The activities regulated in these waters include the placement of any structure in, on, over or under subaqueous lands (including docks, piers, buoys, ramps, dolphins, pilings, dams, culverts, bridges, etc.), as well as the laying of any pipeline or utility line (electric, telephone, fiber optic, water, sewer, gas, etc.), bank or channel stabilization structures (rock veins, grade controls, rip-rap, groins, gabions, breakwaters, bulkheads, bio-logs/vegetation), any dredging, filling, excavating or extracting of materials, or establishing an anchorage for mooring more than two vessels.

Delaware law requires that a permit be obtained prior to conducting the above activities in tidal wetlands, as well as tidal and non-tidal waters within the State. Therefore, a permit must be obtained from DNREC Wetlands and Subaqueous Lands Section prior to beginning any of the above activities in, on, or over Silver Lake or Lake Comegys.

In their letter dated October 18, 2013, DNREC states that it will be applying the state's subaqueous lands law (7 Del. Code Chapter 72) and associated regulations for the management of Silver Lake and Lake Comegys. DNREC Subaqueous Lands, through permits and subaqueous leases, will address any improvements or repairs to existing or proposed structures including docks, piers and shoreline stabilization. This approach allowed owners to undertake maintenance of existing structures and build new structures; however, new gazebos were prohibited. Maintenance above the plane of OHW that does not involve an expansion of the existing footprint of the structure, or the disturbance of subaqueous lands may take place without a DNREC permit.

Applicants can use the Wetlands and Subaqueous Lands Permit Application Form for projects that require a subaqueous lands permit, contact the Wetlands and Subaqueous Lands Section (302-739-9943) for assistance (see also https://dnrec.alpha.delaware.gov/water/wetlands-subaqueous/permits/)

3.2.2 Marina Regulations (7 DE Admin. Code 7501)

Marina regulations would apply to any single parcel on Silver Lake or Lake Comegys with five or more boat slips. According to 7 DE Admin. Code 7501.22, "Any commercial, public, recreational,

or private marina that is on or adjacent to the water and: 1) contains five or more slips, or 2) provides berthing for one or more headboats."

Contact DNREC Wetlands and Subaqueous Lands Section 302-739-9943 for more information.

3.2.3 Clean Water Act, Section 401

The US CWA requires states to certify that the discharge of dredged or fill material into waters of the United States, including wetlands, which is authorized by the federal government, will not violate the State Water Quality Standards. A project-specific application for Water Quality Certification (WQC) is generally required for all projects requiring an individual permit from the USACE, as well as for certain projects that qualify for a Corps Nationwide Permit but are located in environmentally sensitive areas.

DNREC has waived the need for a 401 WQC for work in Silver Lake and Lake Comegys that qualifies for certain USACE NWPs. If the project does not qualify for a NWP with a waived 401 WQC, it must be requested as part of the Subaqueous Lands permit.

Applicants can use the Wetlands and Subaqueous Lands Permit Application Form for projects that require a 401 WQC review, contact the Wetlands and Subaqueous Lands Section (302-739-9943) for assistance (see also https://dnrec.alpha.delaware.gov/water/wetlands-subaqueous/permits/).

3.2.4 Clean Water Act, Section 402, National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) permit program was created by the Clean Water Act, in 1972. Except for pre-treatment and federal facilities, management of the program is delegated to DNREC under Section 402 of the CWA, and Delaware State Law (7 Del. Code, Chapter 60). The NPDES regulates point sources that discharge pollutants into the waters of Delaware. It helps ensure that the state's water bodies can meet their designated uses, such as providing drinking water, being safe for swimming or fishing, or supporting aquatic life.

NPDES permits limit the discharges of pollutants to protect the waters that receive them. The health of a water body is measured by its attainment of designated uses. If potential pollutants in a NPDES discharge are reduced to levels that allow receiving waters to meet applicable designated uses then, in effect, the pollutant discharge has been eliminated.

DNREC typically, issues individual or general NPDES permits to commercial or industrial facilities, or to municipalities, for the discharge of pollutants to surface waters. General permits are issued for a given state-wide activity such as the discharge of stormwater associated with industrial activities. The forthcoming municipal separate stormwater separate system (MS4) general permits may standardize certain stormwater management activities of the three jurisdictions if/when they become regulated under the permit(s). Individual permits are permits developed and issued on a case-by-case basis for activities not covered by general permits.

Contact the Surface Water Discharges Section at 302-739-9946, within the DNREC Division of Water for more information on the need for a permit for discharges in Silver Lake or Lake Comegys.

The Sussex Conservation District (SCD) is delegated to administer the State of Delaware's Sediment and Stormwater Regulations in Sussex County. SCD reviews and inspects the construction and maintenance of projects that disturb an area of more than 5,000 square feet.

3.3 Sussex County

The Sussex County Planning & Zoning Office (https://sussexcountyde.gov/planning-zoning) is responsible for administering the land use process within unincorporated areas of the county. This includes unincorporated areas abutting Silver Lake and Lake Comegys. The following are building and zoning regulations related to buffers and easements that apply to waterfront lots. Contact the Sussex County Planning and Zoning Office at (302) 855-7878 for more information and comprehensive requirements for land development and construction. Stormwater requirements can be found in Appendix A.

3.3.1 Wetlands

Sussex County requires a wetland statement prior to final site plan approval and a wetland delineation if wetlands are present.

3.3.2 Buffers and Easements

The Sussex County Zoning Regulations Part II, General Legislation / Zoning, Article XXV, Supplementary Regulations, § 115-181 Yards and open spaces generally) require that "[t]he right-of-way and easement to the dedicated area adjacent to a natural body of water shall be 50 feet in width. Said right-of-way and easement shall extend from the nearest county or state road to the dedicated area. These fifty-foot parcels shall be required so as to conform to a Master Land Use Plan approved by the County Council. Where two applicants request zoning for adjacent tracts, they may meet these requirements by joint dedication."

The Sussex County Zoning Regulations (Part II, General Legislation / Zoning, Article XXV, Supplementary Regulations§ 115-186 Boathouses, docks, and piers) requires the following:

"Projection of docks, wharves and piers into waterways beyond the waterway line, lot lines or established bulkhead lines or the placing of mooring piles or buoys shall be limited by applicable county ordinances, state laws and applicable regulations of the United States Army Corps of Engineers, and in no case shall a dock, wharf, pier or pile project more than 10% of the width of the waterway." In contrast, the state limit is 20% of the waterbody width.

"Groins, levees, bulkheads, piling, breakwaters and other similar structures shall be erected and maintained in accordance with applicable location and construction standards of the county, the state and the United States Army Corps of Engineers."

Sussex County building code requires that for "buildings located on lots adjacent to waterways…, the front of such lots may be determined by the Commission. In the event that a Commission ruling makes a rear yard adjacent to the street line, an additional depth of rear yard may be required by the Commission, and an additional setback of accessory buildings from the street line may be required" (Sussex County, DE / Part II, General Legislation / Zoning / General Table of Height, Area and Bulk Requirements Sussex County [See also § 115-156A]).

The Sussex County Buffer Ordinance addresses properties that are being subdivided or developed in the future. These requirements have no impact on existing subdivisions or development and would not apply to properties surrounding the Lakes. See Sussex County, DE / Part II, General Legislation / Zoning / Article I General Provisions, § 115-4 Definitions and word usage and Sussex County, DE / Part II, General Legislation / Zoning / Article XXV Supplementary Regulations, § 115-193 Resource protection. Stormwater/Erosion and Sediment Control

The SCD is delegated to administer the State of Delaware's Sediment and Stormwater Regulations in Sussex County. SCD reviews and inspects the construction and maintenance of projects that disturb an area of more than 5,000 square feet.

3.4 City of Rehoboth Beach

In the City of Rehoboth Beach, permits are required anytime you are doing work on your property other than minor repairs, carpeting, painting, and wallpaper (https://www.cityofrehoboth.com/businesses/permits-inspections). The following are building and zoning regulations related to buffers and landscaping for waterfront lots. Contact the City of Rehoboth Beach Building & Licensing at 302-227-6181 x222 for more information and comprehensive requirements for land development and construction. Stormwater requirements can be found in Appendix A.

3.4.1 Buffers and Landscaping

The City of Rehoboth Beach Zoning, Special Provisions regulations require a minimum of 50% of the gross lot area and 50% of the front yard setback area of every building lot shall remain as natural area (City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning / Article V Special Provisions, § 270-21. Natural area, floor area ratio and lot coverage). The Special Provisions also establish a no-build buffer within 10 feet of the OHW mark of Silver Lake, which shall remain a natural area as follows:

> *"In all zoning districts, the area of land located within a distance of 10 feet from the ordinary high-water mark of Lake Gerar or Silver Lake is deemed to be a no-build buffer and shall remain a natural area as defined in § 270-4. To the extent this required no-build buffer forms a portion of a buildable lot, such area may be counted toward any requirement for natural area contained elsewhere in this chapter. This section shall supersede any provision of this Code which might otherwise permit a structure, a part of a structure, projection from a structure, fence or screen to occupy any portion of the required no-build buffer (*City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning / Article *V Special Provisions, § 270-42.1 Required no-build buffer around lakes*)*."*

OHW for Silver Lake is defined as 6.0 feet above NAVD 88 (City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning, Article I General Provisions § 270-4, Definitions).

3.4.2 Stormwater/Erosion and Sediment Control

The City of Rehoboth Beach stormwater and erosion control requirements are stricter than the State and County requirements. The City of Rehoboth Beach requires activity disturbing 1,000 square feet of land area or more to follow established regulations. Detailed stormwater requirements are in Appendix A.

3.5 Town of Dewey Beach

The following are building and zoning regulations related to buffers and landscaping for waterfront lots in the Town of Dewey Beach. Contact the Town of Dewey Beach Building and Zoning at 302-227-6363 for more information and comprehensive requirements for land development and construction. Stormwater requirements can be found in Appendix A.

3.5.1 Buffer and Landscaping

The Town of Dewey Beach requires that a "minimum of 15% of gross lot area dedicated to planting and beautification area; a minimum of 50% of this requirement shall be located in the front yard,

notwithstanding that not more than 50% of the front yard shall be required to be planted" for the "Neighborhood Residential" zone which is adjacent to the lakes. (Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning, Article XI Administrative Provisions, § 185 Bulk Zoning Standards, Table 2).

The Town of Dewey Beach Zone regulations require that a landscape plan prepared by a licensed architect is submitted with building permit applications and that vegetation used as buffer yards be approved by the Town prior to installation (Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning § 185-91 Landscaping). The preliminary site plan is required to show required setbacks and buffer yards (Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning, Article XI Administrative Provisions, § 185-76 Preliminary site plan requirements).

3.6 Previous Recommendations for Lake Management-Related Code Revisions

3.6.1 State

The 2019 Sussex County Comprehensive Plan, 2020 Rehoboth Beach Comprehensive Development Plan, and 2018 Town of Dewey Beach Comprehensive Land Use Plan[1], as well as the 2012 City of Rehoboth Beach Lakes Report, were reviewed for recommendations for code changes that would contribute to the management of Silver Lake and Lake Comegys and none were identified.

3.6.2 Sussex County

The 2019 Sussex County Comprehensive Plan was reviewed for recommendations for code changes that would contribute to the management of Silver Lake and Lake Comegys (Table 3.1).

[1] While the Sussex County Comprehensive Plan, Rehoboth Beach Comprehensive Development Plan, and Town of Dewey Beach Comprehensive Land Use Plan are not specifically related to Silver Lake and Lake Comegys, these plans were reviewed for recommendations that have the potential to benefit the lakes.

Table 3-1. Recommendations for Code Changes from the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Wetland Buffers	The County will consider evaluating the County's buffer requirement for wetlands and based on the type of wetland, will consider establishing a minimum buffer distance for adequate protection efforts, and for optimal protect efforts. These distances would be consistent with adequate and optimal buffer distances established by DNREC.	Unknown	It is recommended that the County coordinate these efforts with the Town of Dewey Beach and City of Rehoboth Beach for consistency.
Trees/Fish and Wildlife Habitat	Strategy 5.1.1.6 The County would like to consider the creation of an ordinance designed to protect established, mature, healthy trees during the construction of new developments to better preserve existing trees and green space.	Unknown	Protecting mature trees within the Silver Lake and Lake Comegys watersheds would contribute to water quality improvements. The County should coordinate these efforts with the Town of Dewey Beach and City of Rehoboth Beach for consistency.
Natural Resources/Wildlife Habitat	Strategy 5.1.1.1 Revisit code to determine if modifications are needed to open space requirements or if incentives can be developed to promote less fragmentation of open space. Strategy 5.1.1.4 Review County Code to determine improvements to the requirements and location of the Conservation Zone. Strategy 5.1.1.5 Revaluate County Code definition of Open Space to determine if modifications need to be made relating to the calculation of open space.	Unknown	Protecting open space within the Silver Lake and Lake Comegys watershed would contribute to water quality improvements. It is recommended that the County coordinate these efforts with the Town of Dewey Beach and City of Rehoboth Beach for consistency.
Open Space/Wildlife Habitat	Strategy 5.1.2.2 Review the appropriate sections of Sussex County's zoning and subdivision codes to determine if amendments are needed that will better help protect groundwater, waterways, sensitive habitat areas, and other critical natural lands in Sussex County.	Unknown	Protecting sensitive habitat and natural lands within the Silver Lake and Lake Comegys watershed would benefit wildlife in this developed area. It is recommended that the County coordinate these efforts with the Town of Dewey Beach and City of Rehoboth Beach for consistency.

3.6.3 City of Rehoboth Beach

The 2012 City of Rehoboth Beach Lakes Management Plan and the 2020 City of Rehoboth Beach Comprehensive Development Plan were reviewed for recommendations for code changes that would contribute to the management of Silver Lake and Lake Comegys (Table 3.2 and Table 3.3).

Table 3-2. Recommendations on Code Changes from the 2012 City of Rehoboth Beach Lakes Management Plan

Resource Concern	Previous Recommendation	Status	Comments
No Build Buffer	The City of Rehoboth Beach Code will be amended to establish a "No-Build Buffer" for all properties within the City that border on Silver Lake or Lake Gerar. This no-build area will extend inland 10 feet as measured from the lake's water edge and must be maintained as a natural area as currently defined by the City Code, e.g., auxiliary structures will be prohibited in the "No-Build Buffer".	Code Change Complete	Sussex County and the Town of Dewey Beach should consider standardizing their codes and regulations to this.
Yard Watering System	The City of Rehoboth Beach Code will be amended to prohibit the installation of any yard watering system on private property within 10 feet of the lake's water edge. The City Code will be amended to require site plan review for any residential structure that is built or substantially renovated whose foundation is within 25 feet inland of the lake's water edge.	Code Change Required	Prohibiting yard watering systems within 10 feet of the lake's water edge is likely to have some benefit to water quality in the lakes. These efforts should be coordinated with the Town of Dewey Beach and Sussex County.

Table 3-3. Recommendations on Code Changes from the 2020 City of Rehoboth Beach Comprehensive Development Plan

Resource Concern	Previous Recommendation	Status	Comments
Green infrastructure	Consider a City policy requiring that all municipal facilities, City-funded projects, and City infrastructure projects be constructed, renovated, operated, maintained, and deconstructed using green building, low-impact development (LID), green infrastructure, and conservation landscaping principles and practices.	Unknown	Retrofitting City and School District facilities adjacent to the lakes and within the lakes' watersheds may provide additional water quality benefits.
Wetland	Evaluate the feasibility of adopting an upland wetland buffer requirement as part of the City's land development regulations.	Unknown	There are some wetlands at the northern end of Silver Lake. If there is the potential for development in this area, this type of regulation would benefit habitat and water quality.

3.6.4 Town of Dewey Beach

The 2018 Town of Dewey Beach Comprehensive Land Use Plan was reviewed for recommendations for code changes that would contribute to the management of Silver Lake and Lake Comegys (Table 3.4).

Table 3-4. Recommendations on Code Changes from the 2018 Town of Dewey Beach Comprehensive Land Use Plan

Resource Concern	Previous Recommendation	Status	Comments
Native Plantings	Consider examining the Zoning and related Municipal Code regarding open spaces, planting of native plants and trees, and reduction of untreated stormwater runoff	Complete	The Town includes the protection of native trees within the Town Code and native planting in the Town's right of way and wetlands. The Town actively partners with the Center for Inland Bays. The Town Code includes protection of trees and tree stands throughout the Town. Code section 173-1 thru 7, and recent Ordinance 803 (adopted April 1, 2023) which adds requirements for replacement of trees and expands penalties.

3.7 Evaluation

A review of the partners' planning documents indicates that all jurisdictions are considering code changes that are not directly related to the lakes, but would benefit the lakes (Table 3.1, Table 3.2, Table 3.3, and Table 3.4). Common themes among these recommendations include code changes to protect natural resources, open space, trees, and native plantings and also to implement wetland buffers. The partners would likely benefit by coordinating changes.

Standardizing permitting requirements across all jurisdictions would also help manage the lakes' shorelines. The sponsors could develop a joint permit application and centralized permit application system (maybe a centralized website) to be used by all jurisdictions, the State, Sussex County, City of Rehoboth Beach, Town of Dewey Beach, and USACE. This would make it easier for residents to apply for all appropriate permits and comply with all requirements for all jurisdictions.

The follow sections provide some specific inconsistencies in the partners' codes noted during the regulatory review.

3.7.1 Definition of Ordinary High Water

In conducting the regulatory review, inconsistencies in the OHW definitions and shoreline management regulations have been identified. Standardized definitions of OHW would allow uniform shoreline management of the lakes across all jurisdictions.

The following summarizes the OHW definitions for the various jurisdictions.

- The Federal definition of OHW is "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." (33 CFR Section 328.3)
- The State definition of OHW for nontidal waters is "the line at which the presence and action of water are so continuous in all ordinary years so as to leave a distinct mark on a bank either by erosion or destruction of terrestrial (nonaquatic) vegetation, or that can be determined by other physical or biological means." as (7 Del. Code, Chapter 72, Section 7202, Definitions)
- A Sussex County definition of OHW was not identified.

- The City of Rehoboth Beach definition of OHW is defined as 6.0 feet above NAVD 88 (City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning, Article I General Provisions § 270-4, Definitions).
- A Town of Dewey Beach Definition of OHW was not identified.

The State and Federal definitions are similar, and no change would be needed. Because the State is the owner of the lake, it is recommended that the State conduct a survey of the OHW mark. The County, City of Rehoboth Beach, and Town of Dewey Beach could standardize their definitions of OHW based on a state survey of the lake, which would help to standardize water permitting requirements across all jurisdictions. The proposed OHW survey could be established in conjunction with the desired ocean outfall-driven water level. Since there is control of the elevation it would make sense to use that elevation as the baseline for the OHW.

3.7.2 Buffer and Yard Requirements

The following are the sponsors' definitions for buffer and yard requirements for riparian lakes habitat or for Silver Lake and Lake Comegys.

- The City of Rehoboth Beach has the most conservative yard regulations that "require a minimum of 50% of the gross lot area and 50% of the front yard setback area of every building lot shall remain as natural area." (City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning / Article V Special Provisions, § 270-21. Natural area, floor area ratio and lot coverage).
- The City of Rehoboth Beach Special Provisions also establish a no-build buffer within 10 feet of the OHW mark of Silver Lake. (City of Rehoboth Beach, DE / The Code / Part II: General Legislation / Zoning / Article V Special Provisions, § 270-42.1 Required no-build buffer around lakes)
- The Town of Dewey Beach requires a "minimum of 15% of gross lot area dedicated to planting and beautification area; a minimum of 50% of this requirement shall be located in the front yard, notwithstanding that not more than 50% of the front yard shall be required to be planted". (Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning, Article XI Administrative Provisions, § 185 Bulk Zoning Standards)
- The Town of Dewey Beach Zone also requires that a landscape plan prepared by a licensed architect is submitted with building permit applications and that vegetation used as buffer yards be approved by the Town prior to installation (Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning § 185-91 Landscaping).
- Sussex County has easement regulations that require that "The right-of-way and easement to the dedicated area adjacent to a natural body of water shall be 50 feet in width…" (Sussex County Zoning Regulations Part II, General Legislation / Zoning, Article XXV, Supplementary Regulations, § 115-181 Yards and open spaces generally)
- While Sussex County has buffer for non-tidal wetlands these apply to new development only and do not apply to Silver Lake (Sussex County, DE / Part II, General Legislation / Zoning / Article XXV Supplementary Regulations, § 115-193 Buffer zones…) but not for lakes.

Standardizing the buffer regulations to be compatible with the City of Rehoboth Beach regulations would help to improve riparian habitat surrounding the lakes. Improving riparian habitat would help to slow overland runoff and trap pollutants, which would likely contribute to improving the

lakes' water quality. Additional hydrological modeling would determine how much water is contributed to the lake via overland runoff or storm drains (see Section 7 for additional detail).

3.7.3 Stormwater/Erosion Control Requirements

Currently all construction is subject to State and SCD regulations. These require the SCD to review and inspect construction and maintenance of projects that disturb an area of more than 5,000 square feet. The City of Rehoboth Beach has additional regulations for activities that disturb 1,000 square feet of land area or more.

3.8 Recommendations/Goals for Lake Management-Related Code Revisions

Short Term (< 5 years)

The State, County, City of Rehoboth Beach, and Town of Dewey Beach should consider the following recommendations to standardize and unify regulatory requirements. These would be goals for the next 5 years.

- Standardize the definition of OHW with the State definition of OHW (which is similar to the Federal definition of OHW).
    - As the owner of the lakes, the State should conduct a survey to confirm the OHW elevation for both lakes.
    - Revise county and local regulations according to the State survey of OHW.
    - Use OHW to establish the desired ocean outfall-driven water level.
- Clearly identify "water dependent facilities" for consistency across jurisdictions.

Long-term (> 5 years)

The State, County, City of Rehoboth Beach, and Town of Dewey Beach should consider the following recommendations to standardize and unify regulatory requirements. These would be goals for the next 5 to 10 years.

- Project partners should develop means to coordinate permitting where jurisdictions overlap.

4 Riparian Habitat/Buffer and Species

4.1 Existing Conditions

4.1.1 Riparian Habitat

Silver Lake and Lake Comegys are primarily bordered by mowed lawns fringed with a mixture of native and ornamental trees and herbaceous plants. The northwestern part of Silver Lake (west of the Turtle Footbridge) is a forested area dominated by pines. Some species that occur in this area include Virginia pine (*Pinus virginiana*), loblolly pine (*Pinus taeda*), eastern red cedar (*Juniperus virginiana*), oak (*Quercus sp.*), red maple (*Acer rubrum*), river birch (*Betula nigra*), catawba (*Catalpa* sp.), cattails (*Typha* sp.), spotted jewelweed (*Impatiens capensis*), and rose mallow (*Hibiscus moscheutos*).

There are also native wetland plantings at the living shoreline area. There is a small patch of native wildflower plantings (e.g., black eyed Susan [*Rudbeckia hirta*] and purple coneflower, [*Echinacea purpurea*]) near the northeastern corner of Lake Comegys (a small sign marked this as a "conservation area").

4.1.2 Invasive Plants

Riparian invasive species is a concern predominately in the Town of Dewey Beach in the southeastern corner of Silver Lake, immediately east of Lake Comegys (Figure 4.1). The dominant species of concern are bamboo (unknown sp*ecies*) and common reed (*Phragmites australis*).

4.1.3 Wildlife

Silver Lake was designated as a state bird refuge in 1933. Silver Lake and Lake Comegys are within the Delaware statewide winter aerial waterfowl survey flights. Survey data specific to Silver Lake and Lake Comegys is not available and is not separated from data in the surrounding survey block. The location of these two water bodies within the Atlantic Flyway provides an important freshwater resource utilized by resident and migratory species. According to the ebird observation database search, 36 species of birds were observed in the month of January 2022 alone as documented in the Cornell Lab of Ornithology database (2022). Signs to educate the public about not feeding the wildlife and identify common resident bird species have been provided at public use areas near the lakes. Common wildlife species that can be observed include pond slider (*Trachemys scripta*), red ear slider (*Trachemys scripta elagans*), American bullfrog (*Lithobates catesbeianus*), double-crested cormorant (*Phalacrocorax auritus*), hooded merganser (*Lophodytes cucullatus*), and great blue heron (*Ardea herodias*).

Figure 4.1. Location where Bamboo is a Concern on the Riparian Area of Silver Lake, Town of Dewey Beach, DE

4.2 Previous Recommendations Related to Riparian Buffers

4.2.1 State

The 2019 Sussex County Comprehensive Plan was reviewed for recommendations that could improve riparian habitats and buffers surrounding Silver Lake and Lake Comegys (Table 4.1).

Table 4-1. State Recommendations on Riparian Habitats and Buffers in the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Plan Recommendation
Water Quality/Fish and Wildlife Habitat	State agencies have endeavored to identify and help preserve Delaware's "green infrastructure", which DNREC describes as a network of natural areas, parks, conservation areas, and working lands with conservation value that contribute to the health and quality of life in Delaware.	Existing Program	The State should consider including protection of Silver Lake and Lake Comegys in the green infrastructure program.
Trees	Delaware's Urban and Community Forestry Program is dedicated to preserving and enhancing Delaware's community forests, which play a critical role in our quality of life. Trees in towns and suburban areas provide a wide array of benefits including cleaner air and water, wildlife habitat, shade, erosion protection, and aesthetics. Delaware's Urban and Community Forestry Program offers technical and financial assistance programs to help municipalities, nonprofit groups, community associations, and homeowners to plant and care for trees.	Existing Program	The partners should coordinate with the Delaware Urban and Community Forest Program to implement tree protection programs in the Silver Lake and Lake Comegys watersheds. The partners should work together to educate the homeowners about the program.
Wetlands	State and federal regulations provide extensive protection to wetlands when wetlands are mapped accurately, and wetland regulations are actively enforced. Recognizing that wetlands throughout Delaware have disappeared due to development, DNREC and others offer both technical assistance and financial help to landowners who wish to restore wetlands, establish permanent wetlands on their property, or permanently conserve existing wetlands through conservation easements.	Existing Program	The partners should reach out to the landowners surrounding the lakes and educate them on opportunities for restoring riparian habitat.

4.2.2 Sussex County

The 2019 Sussex County Comprehensive Plan was reviewed for recommendations that could improve riparian habitats and buffers surrounding Silver Lake and Lake Comegys (Table 4.2).

Table 4-2: State Recommendations for Riparian Habitats and Buffers made in the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Natural Resources and Habitat	Objective 5.1.4 Coordinate with government agencies and non-governmental organizations to identify and protect natural resources and habitat. Strategy 5.1.4.1 Continue working with the State to identify opportunities for the State to acquire additional lands in Sussex County designated as Natural Areas. Strategy 5.1.4.2 Continue working with the Sussex County Land Trust to use funds collected from developers and funds leveraged from other sources to preserve more land and open space through conservation easements and fee simple acquisitions. Strategy 5.1.4.3 Work with DNREC, the Delaware Department of Agriculture, the Sussex County Land Trust, and non-profits to continue adding appropriate properties to the inventory of protected lands in Sussex County, particularly to link together existing state-owned forests and existing open space. Strategy 5.1.4.4 Consider methods to formulate stronger strategies for better protecting groundwater, waterways, sensitive habitat areas, and other critical natural lands in Sussex County. Strategy 5.1.4.5 Continue and expand partnerships with conservation organizations to manage preserves. Strategy 5.1.4.6 Consider options to better track the amount of open space and natural resource areas preserved by the County on an annual basis.	Ongoing	This plan works towards many of these goals.
Natural Resources	Objective 5.1.6 Promote education of citizens and elected officials of the County regarding the need to protect and preserve natural resources. Strategy 5.1.6.1 Support the Center for the Inland Bays and other conservation groups in their efforts to educate more people about the necessity of protecting tidal wetlands and other natural resources.	Unknown	This plan will promote education of citizens on the importance of the natural resources associated with Silver Lake and Lake Comegys.
Open Space	Objective 6.2.3 Continue work with resource protection programs, federal and state agencies, and other organizations to target and preserve open space. Strategy 6.2.3.1 Continue to facilitate the preservation of more undeveloped land. This	Unknown	Preserving open space within the watershed would benefit riparian habitat. This plan takes steps towards this goal.

Resource Concern	Previous Recommendation	Status	Comments
	should include working with the Sussex County Land Trust and other organization's efforts to preserve and expand open space access across the County. Strategy 6.2.3.2 Continue and expand partnerships with organizations to manage open space and recreation properties such as the James Farm.		

4.2.3 City of Rehoboth Beach

The 2012 City of Rehoboth Beach Lakes Management Plan and the 2020 City of Rehoboth Beach Comprehensive Development Plan were reviewed for recommendations related to riparian habitat surrounding Silver Lake and Lake Comegys (Table 4.3 and Table 4.4).

Table 4-3. Recommendations on riparian habitats and buffers made in the 2012 City of Rehoboth Beach Lakes Report

Resource - Concern	Previous Recommendation	Status	Plan Recommendation
Shoreline Stabilization	Lake bank stabilization of all property within the City should be required using the most appropriate environmental means. Not dissimilar to the existing legal requirements for sidewalks, all property owners who own property to the lake's water edge should be required, if not already in place, to install bank stabilization. Because of the different topographies, proposed means of stabilization should be approved by the City, in consultation with DNREC, on a parcel-by-parcel basis. Preference should be given to stabilization measures that are most consistent with other public objectives, including the provision of habitat for fauna and flora, and visual appeal. Therefore, stabilization use indigenous vegetation, supplemented as necessary by "bio logs" and the like. Use of boulders ("rip rap") would be a second-best solution, where conditions do not permit a more natural solution. New bulkheads have been prohibited for many years, and it is proposed that when existing bulkheads reach the end of useful life, they should, where possible, be replaced by the preferred stabilization measures. Where current stabilization is deemed inadequate, affected property owners s should be required to complete such stabilization within two years of notification or be required to maintain a ten foot, managed, no-mow zone extending from the lake's edge. The City of Rehoboth Beach Code will be amended to accomplish this.	Unknown	When homeowners submit applications for development and shoreline stabilization on the lake, the partners should educate them on living shoreline, native plantings, and other natural techniques for shoreline stabilization.

Resource - Concern	Previous Recommendation	Status	Plan Recommendation
Trees	Because of the demonstrated importance of trees to contaminant control such efforts need to be expanded, with particular attention given to the Silver Lake watershed. Not only should trees on public land be maintained and increased, but every effort needs to be made to maintain and increase trees on private land as well. In all instances, appropriate trees for our sea-side area and climate should be used.	Completed	See Delaware's Urban and Community Forestry Program. Protecting and planting trees surrounding the lake and watershed would help to improve riparian habitat and water quality.

Table 4-4. Recommendations on riparian habitats and buffers made in 2020 City of Rehoboth Beach Comprehensive Development Plan

Resource	Previous Recommendation	Status	Plan Recommendation
Forest Plan	Develop a comprehensive street tree planting and maintenance plan.	Unknown	See Delaware's Urban and Community Forestry Program. Protecting and planting trees surrounding the lake and watershed would help to improve riparian habitat and water quality.
Education	Encourage and support environmental best management practice initiatives with incentive programs.	Ongoing	The City of Rehoboth Beach should explore funding associated with State, Federal, and County programs.
Forest Plan	Investigate how to fund new and replacement street trees.	Unknown	See Delaware's Urban and Community Forestry Program. Protecting and planting trees surrounding the lake and watershed would help to improve riparian habitat and water quality.

4.2.4 Town of Dewey Beach

The 2018 Town of Dewey Beach Comprehensive Land Use Plan was reviewed for recommendations related to riparian habitats and buffers surrounding Silver Lake and Lake Comegys (Table 4.5).

Table 4-5. Recommendations on riparian habitats and buffers made in 2018 2018 Town of Dewey Beach Comprehensive Land Use Plan

Resource	Previous Recommendation	Status	Plan Recommendation
Natural Environment	Positively embrace its environmental stewardship and engage Coastal Delaware communities and stakeholders	Started	The Town enforces the building restrictions and planting and removal of trees for Lake Comegys and Silver Lake. Which works towards this goal. This plan additionally furthers this goal.
Urban Forestry	Continue to advance existing urban forestry planning and implementation effort	Started	The Town enforces the building restrictions and planting and removal of trees for Lake Comegys and Silver Lake. Protecting and planting trees surrounding the lake and watershed would help to improve riparian habitat and water quality. Also see Delaware's Urban and Community Forestry Program.

4.3 Evaluation

Lakeshore disturbance is an indicator of direct human alteration of the lakeshore. Lakeshore disturbance can range from minor (e.g., the removal of a few trees for a picnic area) to major (e.g., construction of a large lakeshore residential complex). Lakeshore disturbance increases sedimentation, alters native plant communities, and modifies substrates. These can result in fish, wildlife, and aquatic habitat and community's impacts.

Silver Lake lakeshore disturbance is characterized as major. While the shoreline is approximately 95% pervious and 5% impervious (based on a 25-foot buffer), most of the pervious surface is cultivated/mowed lawn.

Improving the riparian buffers and trees are important in reducing stormwater quantity, reducing pollutants, improving water quality, providing habitat, and stabilizing the shoreline. Currently there are no consistent requirements or best practices among the jurisdictions for riparian buffer, however, all jurisdictions recognize the importance of riparian buffers and trees. Sections 6 and 7 provide additional insight in the importance of trees throughout the lakes' watersheds, with specific recommendations related to trees provided in Sections 4.2 and 4.3.

4.4 Recommendations/Goals Related to Riparian Buffers

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to protect or improve riparian habitat.

- Start removing invasive species around the lakes
- Develop a vegetation map of the existing riparian habitats based on aerial photointerpretation. This would be a baseline effort to identify those riparian areas that need immediate attention, provide a guide for future actions and the development for developing a more detailed map and plan (see long-term goals).
- Educate homeowners on living shoreline techniques, native plantings, and other natural methods and best practices for shoreline stabilization, development, and landscaping surrounding the lakes. The following provide educational materials, tools, and training on these topics:
    - Living shorelines
        - Delaware living shorelines - https://www.delawarelivingshorelines.org/
        - DNREC Living shorelines - https://dnrec.alpha.delaware.gov/ watershed-stewardship/ wetlands/living-shorelines/
    - Native plantings
        - University of Delaware's Cooperative Extension Unit, Native Plants for Delaware Landscapes - https://www.udel.edu/academics/colleges/ canr/cooperative-extension/fact-sheets/native-plants-for-delaware-landscapes/
        - University of Delaware's Cooperative Extension Unit, Liveable Ecosystems - https://www.udel.edu/academics/colleges/canr/ cooperative-extension/fact-sheets/liveable-ecosytems-model-for-suburbia/
        - Delaware Native Plant Society - https://delawarenativeplants.org/

- Explore funding opportunities such as the USFWS Partners for Fish & Wildlife, and Delaware's Urban and Community Forestry, and DNREC's Nonpoint Source Section 319 programs and educate homeowners about these programs, as appropriate.
    - The USFWS Partners for Fish &Wildlife Program works with private landowners to improve fish and wildlife habitat on their lands. The program provides technical and financial assistance to private landowners to assist with projects that conserve or restore native vegetation, hydrology, and soils to provide an important habitat for rare, declining, or protected species.
    - Delaware's Urban and Community Forestry Program is dedicated to preserving and enhancing Delaware's community forests, which play a critical role in quality of life.
    - The DNREC Nonpoint Source Program administers a competitive grant program made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source pollution in Delaware.

Long-term (> 5 years)

Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect and restore riparian habitat.

- Ground-truth and update the vegetation map previously created with aerial photointerpretation.
- Use the ground-truthed vegetation map to develop uniform shoreline and riparian management recommendations across the jurisdictions.
- Use the ground-truthed vegetation map to develop location/site specific invasive species management recommendations.

5 Aquatic Habitat and Species

5.1 Existing Conditions

The "Trophic State" of a lake is a common approach for classifying the biological productivity in lakes. Lakes with high nutrient levels, high plant production rates, and an abundance of plant life are termed eutrophic, whereas lakes that have low concentrations of nutrients, low rates of productivity, and generally low biological biomass are termed oligotrophic. Lakes that fall in between these two conditions are called mesotrophic. Lakes naturally exist across all trophic categories; however, hypereutrophic or eutrophic conditions can be the result of human activity and can be an indicator of stress conditions. Eutrophication is a slow, natural part of lake aging, but human influences can increase the amount of nutrients entering lakes, accelerating the eutrophication process and related undesirable effects. Human activities such as poorly managed agriculture or suburbanization of watersheds can result in high levels of nutrients reaching lakes. This can lead to an increase in nuisance algae, excessive plant growth, murky water, lower levels of dissolved oxygen (DO), odor, and fish kills.

Limited water quality sampling data exists for Silver Lake and Lake Comegys however it is presumed that they are mesotrophic/eutrophic, shallow lakes, characterized by a littoral zone which supports appropriate habitat for macrophyte communities. Both microscopic and

filamentous algae blooms have been documented in Silver Lake. The water quality concerns associated with algae blooms are addressed in Section 6.

The sponsors have expressed concerns over the impact of illegal gazebos on aquatic habitat and species. While gazebos and docks can provide structure for some species, they can also have negative impacts on aquatic habitat and other species. These include reducing sunlight, changing local water flow patterns, and introducing chemicals from the construction materials by leaching into the lake (Kelty and Bliven 2003). Gazebo effects can result in changes in vegetation growth (Campbell and Baird 2009). Campbell and Baird (2009) found that 1) shading is higher and has an increased impact on the density of aquatic vegetation when a dock platform is closer to the water and 2) water clarity has the largest impact on vegetation diversity. Dock piles may cause local increases in erosion and sedimentation (Kelty and Bliven 2003).

No official records of fish population or recreational fishing surveys for either lake was identified. General project area document reviews and records associated with fish kills within Silver Lake has shown that the fish population and species expected to be found in both lakes include those species typically found in east coast freshwater ponds and lakes including largemouth bass (*Micropterus salmoides*), gizzard shad *(Dorosoma cepedianum*), white perch (*Morone americana*), American eel (*Anguilla rostrata*), black crappie (*Pomoxis nigromaculatus*), catfish spp. (Ictaluridae sp.), common carp (*Cyprinus carpio*), hickory shad (*Alosa mediocris*), and sunfish sp. *(Lepomis* sp.). As a migratory fish, to fish for and possess American eel is regulated in accordance with the Atlantic States Marine Fisheries Commission's Interstate Fishery Management Plan for American eel.

Silver Lake has experienced fish kills in the past. The most recent event was recorded in 2012 (City of Rehoboth Beach 2012). A total of 9 fish kills occurred at Silver Lake between 1982 and 2012. Three of these events involved multiple species and were attributed to low dissolved oxygen in the water column (characteristic of a eutrophic lake). Gizzard shad was identified as the most affected species in the other six events, which occurred primarily between March and early April. The fact that only gizzard shad were affected and that the fish kills occurred in early spring, it is suspected that low dissolved oxygen was not the cause of these fish kills (City of Rehoboth Beach 2012). Winter and Spring gizzard shad die offs is not an uncommon phenomenon throughout their range as this species is sensitive to cold temperatures, may be susceptible to disease and transmission during spawning congregation and other stressors experienced in late winter and into spring. The cause of these species-specific die offs in Silver Lake are unknown.

5.2 Previous Recommendations Related to Aquatic Habitat

5.2.1 State

The 2019 Sussex County Comprehensive Plan was reviewed for previous recommendations that could improve aquatic habitat and species in Silver Lake and Lake Comegys (Table 5.1).

Table 5-1 State Recommendations for Aquatic Habitat and Species made in the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Wetlands	Sussex County's coastal marine waters, marshes, freshwater streams, wetlands, upland forests and meadows are among the 125 different habitat types identified in Delaware by DNREC's 2015 Delaware Wildlife Action Plan (DEWAP). The DEWAP is a voluntary plan that is critical to helping Delaware fulfill its objectives to conserve its fish and wildlife and natural habitats for the future. The State Wildlife Grants (SWG) program assists state fish and wildlife agencies with conservation of all wildlife species covered in the plan and their associated habitats. By Congressional SWG requirements, each state and territory must revise the Wildlife Action Plan every 10 years to remain eligible for these funds.	Existing Program	The State should educate the homeowners surrounding Silver Lake on opportunities for restoring riparian habitat under this program. These impacts could help to improve habitat.
Aquatic Habitat	Sussex County's coastal marine waters, marshes, freshwater streams, wetlands, upland forests and meadows are among the 125 different habitat types identified in Delaware by DNREC's 2015 Delaware Wildlife Action Plan (DEWAP). The DEWAP is a voluntary program that is critical to helping Delaware fulfill its objectives to conserve its abundant fish and wildlife and natural habitats for the future. The State Wildlife Grants (SWG) program assists state fish and wildlife agencies with conservation of all wildlife species and their habitats. By Congressional SWG requirements, each state and territory must revise the Wildlife Action Plan every 10 years to remain eligible for these funds.	Existing Program	The State should consider including Silver Lake and Lake Comegys in the DEWAP and determine if the SWG can be used for the monitoring programs for aquatic habitat and species.

5.2.2 Sussex County

The 2019 Sussex County Comprehensive Plan was reviewed for recommendations that could improve aquatic habitat in Silver Lake and Lake Comegys (Table 5.2).

Table 5-2 Recommendations for Aquatic Habitat and Species made in the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Aquatic Habitat and Water Quality	Objective 5.3.1 Protect surface water and drinking water quality. Strategy 5.3.1.1 Consider developing a program for wetlands and waterways protection. Strategy 5.3.1.2 Support the State's goals and standards for surface and drinking water quality. Strategy 5.3.1.3 Identify an appropriate range of wetlands buffer distances based on location and context. Strategy 5.3.1.8 Work with agencies and landowners to determine additional protections of significant natural resources, like the Great Marsh.	Unknown	This plan works towards these recommendations.

5.2.3 City of Rehoboth Beach

The 2012 City of Rehoboth Beach Lakes Management Plan and the 2020 City of Rehoboth Beach Comprehensive Development Plan were reviewed for recommendations related to riparian habitat surrounding Silver Lake and Lake Comegys (Table 5.3).

Table 5-3 Recommendations for Aquatic Habitat and Species made in 2020 Rehoboth Beach Comprehensive Development Plan

Resource Concern	Previous Recommendation	Status	Comments
Silver Lake Aquatic Habitat Enhancement Project	Silver Lake Aquatic Habitat Enhancement Project - dredge accumulated debris from upper portion, create habitat on margins	Completed	Use data collected under this plan to identify similar opportunities throughout the lakes.

5.2.4 Town of Dewey Beach

The 2018 Town of Dewey Beach Comprehensive Land Use Plan was reviewed for recommendations related to riparian habitats and buffers surrounding Silver Lake and Lake Comegys and none were identified.

5.3 Evaluation

Because of the identified concerns with excessive algal blooms and presence of aquatic plant communities, a line intercept macrophyte survey, with established transects as described in Madsen (1999), should be considered. At each transect, information should be collected related

to species, composition, relative abundance, biomass and substrate at multiple depths along each transect line. Additionally, chlorophyll (an indirect measure of microalgae) and microcystin (a hepatotoxin produced by blue-green algae) are being recommended as a water quality parameter to monitor parameters (see Section 6). Once a baseline survey of vegetation is available, the impact of gazebos on the aquatic habitat and species can be further assessed.

Fishing is one of the primary recreational uses of Silver Lake and Lake Comegys. Additionally, a lake's fishery can define or be defined by the lake ecosystem. Therefore, both lakes can benefit from a fishery assessment every 5-10 years, or more often depending on funding availability. These surveys should include sampling at various depths and habitats, utilizing standard electrofishing, trap net, and gill net sampling methodologies. Table 5.4 provides various fish population metrics to assess and manage the fishery and evaluate the effectiveness of ongoing and future management measures within the lake and watershed.

Table 5-4 Fish Population Metrics to Assess and Manage Lake Fisheries

Example Fishery Metric	**Indication**
Species Population Composition	Balance of community
Age to length ratio	Growth patterns and health
Number or pounds of fish per acre	Productivity and health
Catch per effort	Fisheries success/productivity/recreation potential

5.4 Recommendations/Goals Related to Aquatic Habitat

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to protect or improve aquatic habitat and species.

- Develop short-term (identify baseline conditions on site) and long-term monitoring plans.
    - A line intercept macrophyte survey, with established transects as described in Madsen (1999) or similar (see Section 5.3)
    - Fisheries population survey (Table 5.4)
- Conduct short-term monitoring of aquatic vegetation and the fishery to establish baseline conditions.
- Identify funding to conduct long-term monitoring, e.g., the SWG.
- Work with SOLA3 and the University of Delaware to develop a plan and identify funding to expand the citizen science monitoring program.
- Work with stakeholders to develop a website to publish the monitoring results.
- Provide homeowners with recommendations to reduce the environmental impacts of docks and gazebos such as the following recommendations from Kelty and Bliven (2003):
    - Reduce shading by using decking materials such as grating or adding light tunnels or reflective materials on the deck bottoms. Where possible reduce the width of the decking or increase the height above the water.
    - "Consider alternatives to *[chromated copper arsenate]* CCA-treated lumber."

Long-term (> 5 years)

Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect or improve aquatic habitat and species.

- Conduct long-term monitoring to assess long-term trends in aquatic vegetation and the fisheries populations, so that problems can be identified.
- Expand the citizen science monitoring program.

6 Water Quality

6.1 Existing Conditions

A search of the Delaware State Water Quality Portal, EPA STORET, and EPA National Lake Assessment databases yielded no substantial existing water quality data or monitoring stations located at or near Silver Lake or Lake Comegys (USEPA 2021, USEPA 2012, UOD 2021). The University of Delaware Citizen Monitoring Program maintains two sampling sites on Silver Lake. Station RL01 is located mid-lake at the Lake Drive Bridge center and station RL04 is located near the lower end of the lake at the ocean outflow drain (UOD 2017-2020). These stations have been sampled during the summers of 2017 through 2020 but with irregular frequency (Mr. Edward Whereat personal communication). The Citizen Monitoring Program data has shown cyanobacteria blooms of potential toxic blue-green algae in Silver Lake throughout most of the summer seasons. These blooms appear to be chronic and dense at times. In addition, these data sets show intermittent elevated levels of Total Enterococcus bacteria correlated to increased rainfall events. These bacteria are associated with warm blooded animal wastes and are used as an indicator of risk for human water contact recreation.

Although comprehensive water quality and biological sampling data sets were not found for the two lakes, general observations and non-routine grab sampling efforts of onsite conditions do provide a picture of current conditions. Citizen and student-oriented sampling conducted through the Save Our Lakes (SOLA3) sampling program provide insightful data sets but have limitations for making sound management decisions as it relates to lake water quality conditions. They do however provide the community with a positive direct connection to the lakes and an educational platform.

While Silver Lake is not regularly monitored, water quality monitoring that occurred in 1979 and 2005 to assess the health of the lake indicated that there have been no significant changes in almost 30 years (DNREC 2008). This is based on a comparison of the following constituents:

- Phosphorus – a primary nutrient indicator
- Chlorophyll a – an indirect measure of algal density
- Secchi Depth – a measure of water clarity
- Microcystin – hepato-toxin produced by the microscopic *Microcystis* and *Anabaena,* which were observed in Silver Lake in 1979 (DNREC 2008).

The results indicate that the lakes are eutrophic, with high levels of microscopic algae, but are within the range of other urban lakes in Delaware (DNREC 2008, City of Rehoboth Beach 2012). In September 2007, a surface scum of blue-green algae was observed in Silver Lake. *Snowella* was identified as the potential dominant algae in this bloom (DNREC 2008). The growth of microscopic algae is promoted by nutrients from runoff and bottom sediment. Algae increase dissolved oxygen when there is daylight and consume oxygen at night and cloudy days, especially in warm weather. Filamentous algae had been documented covering the entire surface of the

water west of the “turtle bridge”. As of 2012, Silver Lake had not been affected by the invasive aquatic plant, Hydrilla (City of Rehoboth Beach 2012).

In a “good faith” effort to document baseline water quality conditions of Silver Lake, the City of Rehoboth Beach issued a contract with Envirotech Environmental Consulting, Inc to collect and analyze water samples from Silver Lake on 05 August 2022. The sampling report from this effort is provided in Appendix C. This single day sampling provides insight into lake water quality conditions at the time of sampling. However, single grab sampling efforts such as this, are unlikely to provide a complete understanding of changing water quality conditions seasonally and annually.

Standard water quality parameters were tested at two locations in Silver Lake in the in August 2022 sampling event. These include:

- E. coli
- Fecal coliform
- Alkalinity
- Ammonia as N
- Nitrate+ nitrite as N
- pH
- Total Kjeldahl nitrogen
- Total nitrogen as N
- Total phosphorus as P
- Total suspended solids
- Turbidity
- Dissolved oxygen

Results from this sample event indicate that all parameters tested were within the desirable range, with the exception of a deep sample with high turbidity and total suspended solids. These high readings could have resulted from the sampling equipment disturbing the sediments. While these results are promising, they do not provide insight to annual and seasonal variability The August sampling effort, although only a “snapshot” of current conditions, will be useful toward developing a more comprehensive, long-term monitoring plan at both lakes in the future.

Shoreline erosion and stormwater drainage contribute to both suspended and bottom sedimentation and shoaling in the western end of the lake, and to a lesser extent near the discharge pipes at King Charles Avenue. The Silver Lake sediments are fine silt and clay particles which are easily re-suspended by waves, stormwater, or wildlife and fish (City of Rehoboth Beach 2012).

DNREC advises that any untreated waterbody, such as Silver and Comegys Lakes could contain pathogens with the potential to make people ill. Silver Lake is expected to be consistent with other urban waterbodies that both support abundant waterfowl and wildlife and collect stormwater. Pet waste and contaminants from businesses, lawns, homes, and streets enter directly into the lake through untreated stormwater (City of Rehoboth Beach 2012).

6.2 Previous Recommendations Related to Water Quality

6.2.1 State

Recommendations on water quality made by the State and the status of those recommendations are provided in Table 6.1.

Table 6-1. State Recommendations on Water Quality from a 2013 Letter from DNREC to Homeowners Surrounding the Lakes

Resource Concern	Previous Recommendation	Status	Comments
Water Quality Monitoring	Conduct ongoing water quality monitoring to monitor trends. State to assess funding to add the Lakes to ongoing data collection with possible support from the volunteer citizens monitoring program managed through the University of Delaware.	Ongoing but infrequent sampling	Use this plan to work with the other sponsors to develop a sustainable long-term monitoring plan.

6.2.2 Sussex County

Recommendations on water quality made by Sussex County and the status of those recommendations are provided in Table 6.2.

Table 6-2 Recommendations on Water Quality from the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Water Quality and	Objective 5.3.1 Protect surface water and drinking water quality. Strategy 5.3.1.1 Consider developing a program for wetlands and waterways protection. Strategy 5.3.1.2 Support the State's goals and standards for surface and drinking water quality. Strategy 5.3.1.3 Identify an appropriate range of wetlands buffer distances based on location and context. Strategy 5.3.1.8 Work with agencies and landowners to determine additional protections of significant natural resources, like the Great Marsh.	Unknown	This plan provides recommendations to protect surface waters (e.g., protecting open space, protecting trees, improving riparian habitat, etc.). The County should work with the other sponsors to implement the goals and recommendations of this plan.

6.2.3 City of Rehoboth Beach

Recommendations on water quality made in the 2012 City of Rehoboth Beach Lakes Report and the status of those recommendations are provided in Table 6.3. None were identified in the 2020 City of Rehoboth Beach Comprehensive Development Plan

Table 6-3. Recommendations to Improve Water Quality in the 2012 City of Rehoboth Beach Lakes Report

Resource Concern	Previous Recommendation	Status	Comments
Water Quality Monitoring	Create a joint public-private "task force" to design a long-term plan – capitalizing on what has already been achieved. The main elements of such a plan are that it should be comprehensive and continuous. While one-time events/activities may be part of the plan – this must be a long-term effort.	Ongoing	The sponsors should consider creating a joint public-private "task force" to guide the implementation of this plan.
Water Quality Monitoring	Ensure that all reasonable steps are taken to prevent preventing construction site silt and other debris from entering storm drains. This may include silt-screening or graveled construction site access-ways, to accomplish this. [Silt-screening is not currently required by the City for most residential construction on a typical 5,000 square foot lot.].] Prevent construction site silt and other debris from entering storm drains. An overall review and discussion of sediment/contaminant control should be part of the building permitting process. CODE CHANGE REQUIRED	Code Change Complete for 1,000 SF	Sussex County and Town of Dewey Beach could consider standardizing to their codes and regulations with this one.
Fertilizer	Ensure the proper use of fertilizers and insecticides through a continuous public education program for homeowners and monitoring compliance of commercial applicators and lawn service companies, via their business licenses.	Unknown	The proper use of fertilizers and insecticides within the watersheds would help to protect water quality.
Construction Sites	The storage of construction materials on streets and public right-of-ways should be prohibited. Monitoring by the City is required to ensure that dirt and other contaminants do not enter the street and then storm drains. Enforcement actions should be taken – including stop-work orders, mandating remedial action, and penalties imposed.	Code change required?	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.
Construction Sites	Prevent contaminant leakage from construction site dumpsters. This needs to be monitored and enforced.	Code change required?	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.
Runoff	Reduce runoff from rain or yard watering systems, to reduce silt and other contaminants from entering into the stormwater drains.	Code change required?	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.
Runoff	Address the means of keeping rainwater on-property as part of the building permitting process.	Code change required??	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.
Yard Watering System	Additionally, the installation of any lawn watering system in the public right-of-way by private property owners should be prohibited. CODE CHANGE REQUIRED	Code change required	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.

Resource Concern	Previous Recommendation	Status	Comments
Impervious Surface	Where street curbing is not in place, and unless there are unique site-specific reasons to the contrary, private property owners should be prohibited from installing impervious paving in the public right-of-way. The City should continue its efforts to encourage the use of pervious alternatives for driveway construction.	Code change required?	Implementing this recommendation in the lake watersheds would help to improve water quality in the lakes.
Water Quality Monitoring	Petition the State/DNREC to include Silver Lake in their periodic routine monitoring system. This is essential in order to be able to determine the success of the proposed restoration activities and, at the minimum, to ensure that there is no deterioration from the lake's current condition that would prompt more intensive interventions.	Ongoing	Water quality monitoring continues to be infrequent. This plan recommends exploring options for funding long-term monitoring.
Dissolve Oxygen	With heightened public concern and interest prompted by the July 2012 major fish kill in Silver Lake but tempered by the recognition that there have been only 8 other documented fish kills in Silver Lake in the past 3 decades, an analysis of what additional means, beyond the recommendations cited above, could be taken to address the problem of low dissolved oxygen. An obvious example would be aerators similar to those that have been installed in Lake Gerar.	Ongoing	Long-term water quality monitoring would help to determine the need to address dissolved oxygen in the lakes.

6.2.4 Town of Dewey Beach

Recommendations on water quality made in the 2018 Town of 2018 Town of Dewey Beach Comprehensive Land Use Plan and the status of those recommendations are provided in Table 6.4.

Table 6-4. Recommendations for Water Quality, 2018 Town of Dewey Beach Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
TMDL requirements for Copper and Nutrients (N and P)	Implement a water pollution control strategy to reduce the pollution loading rate in order to meet TDML requirements	Not started	Integrate TMDL monitoring, water quality standards for excesses of TDML that can impact the lakes, determine flow with H&H modeling
Nutrient Reduction	Continue efforts to improve water quality through nutrient reduction	Ongoing	This plan provides recommendations to protect surface waters (e.g., protecting open space, protecting trees, improving riparian habitat, etc.). The County should work with the other sponsors to implement the goals and recommendations of this plan.

6.3 Evaluation

Typically, greater than 70% of all the existing water quality impairments affecting lakes are the result of Non-Point Source (NPS) loading as reported by the United States Environmental Protection Agency (USEPA 1999). Therefore, direct correlation exists between watershed disturbance and increased nutrient enrichment and lake aging known as eutrophication (NJHWPPC 2014). The volume of water, its temporal distribution (stormflow runoff) and the NPS pollutant loads associated with those lake inflows are affected by watershed size, land use and cover, topography, geology, and soil types. Silver Lake and Lake Comegys are hydrologically driven primarily by stormwater runoff with smaller inputs from groundwater and direct precipitation. Approximately 65% of the Silver Lake and Lake Comegys watersheds drain into the lakes via stormwater drains. As a result, both lakes are susceptible to nutrients, sediments, and other pollutants entering the lakes through stormwater outfalls on a landscape scale. This NPS loading affects (short- and long-term effects) the water quality and biology in both lakes.

The Silver Lake Watershed is approximately 46% impervious surface. The Lake Comegys Watershed is approximately 45% impervious surface. The impervious and pervious surface in the watersheds is provided in Figure 6.1. Land use in both watersheds is in Table 6.5. The majority of the land use in both watersheds is single family dwellings. Land cover in both watersheds is shown in Figure 6.2 and Table 6.6. The majority of land cover in the Silver Lake and Lake Comegys is tree canopy over turf grass and turf grass.

Figure 6.1. Pervious and impervious surface area in Sussex County

Table 6-5. Land use in the Silver Lake and Lake Comegys Watersheds

WATERSHED	LAND USE CATEGORY	ACRES	% OF WATERSHED
Silver Lake	Single Family Dwellings	254.0	68%
	Man-made Reservoirs and Impoundments	42.6	11%
	Institutional/Governmental	27.0	7%
	Multi Family Dwellings	17.6	5%
	Retail Sales/Wholesale/Professional Services	15.0	4%
	Other Urban or Built-up Land	4.7	1%
	Highways/Roads/Access roads/Freeways/Interstates	3.4	1%
	Inland Natural Sandy Areas	2.8	1%
	Other Commercial	2.0	1%
	Mixed Residential	1.1	0%
	Mixed Urban or Built-up Land	0.3	0%
	Recreational	0.3	0%
	TOTAL	**370.8**	**100%**
Lake Comegys	Single Family Dwellings	51.3	71%
	Multi Family Dwellings	6.0	8%
	Highways/Roads/Access roads/Freeways/Interstates	5.4	7%
	Natural Lakes and Ponds	3.9	5%
	Retail Sales/Wholesale/Professional Services	3.8	5%
	Mixed Urban or Built-up Land	1.7	2%
	Other Urban or Built-up Land	0.3	0%
	TOTAL	**72.4**	**100%**

Table 6-6. Land Cover in the Silver Lake and Lake Comegys Watersheds

WATERSHED	LAND COVERAGE	Acreage	% OF WATERSHED
Silver Lake	Tree Canopy over Turf Grass	85.51	23%
	Turf Grass	59.98	16%
	Impervious Structures	48.97	13%
	Impervious Roads	41.48	11%
	Water	41.00	11%
	Impervious, Other	40.31	11%
	Tree Canopy over Impervious	31.74	9%
	Pervious Developed, Other	12.87	3%
	Tree Canopy, Other	7.09	2%
	Forest	1.66	0%
	Natural Succession	0.18	0%
	Cropland	0.02	0%
	Wetlands, Terrene Non-forested	0.01	0%
	TOTAL	**370.82**	100%
Lake Comegys	Tree Canopy over Turf Grass	21.24	29%
	Turf Grass	12.55	17%
	Impervious Roads	9.48	13%
	Impervious Structures	8.66	12%
	Impervious, Other	8.19	11%
	Tree Canopy over Impervious	6.54	9%
	Water	3.26	5%
	Tree Canopy, Other	2.12	3%
	Pervious Developed, Other	0.37	1%
	Natural Succession	0.02	0%
	TOTAL	**72.44**	100%

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Figure 6.2. Land Cover in the Silver Lake and Lake Comegys Watersheds (see Table 6-6 for additional information)

Nutrients from runoff, particularly phosphorus, have the potential to accumulate in lake sediments. Those nutrients released from sediments under low oxygen (anoxic) conditions and nutrient pulses from stormwater can stimulate algae growth. Although algae are an important part of an aquatic food chain, high nutrient inputs and high temperatures can cause harmful algae blooms (HAB). HABs directly impact water quality, lake ecology, and have potential to produce algal toxins, which can negatively affect humans and wildlife (ITRC 2021).

Algae and cyanobacteria are a natural part of freshwater ecosystems and eutrophic conditions favor their growth. While many algal blooms are unsightly, but not toxic, some blooms of cyanobacteria can be harmful to people and animals. Exposure to cyanobacteria toxins may produce skin rashes, eye irritations, respiratory symptoms, gastroenteritis, and liver and kidney failure. The World Health Organization (WHO) established recreational exposure risk guidelines for chlorophyll-a, cyanobacterial cell counts, and microcystin used to determine risk of exposure to algal toxins. Chlorophyll-a concentrations and cyanobacteria cell counts can serve as proxies for the potential presence of algal toxins. An algal toxin, microcystin, has been detected in 39% of sampled lakes, but concentrations rarely reach moderate or high levels established by the WHO (<1% of lakes) or human health standards established by the United States Environmental Protection Agency.

As algae blooms develop in the lakes (typically in the summer), an assessment of the types (species) of algae, their densities, toxin production potential, and current toxin levels should be considered. Permanent or seasonal signage around the lakes warning of human health related risks associated with these toxins is a public safety consideration. (ITRC 2021)

Water quality and stormwater sampling can effectively identify water quality concerns. Stormwater sampling would support hydrologic storm flow and nutrient load studies. Stormwater sampling, whether instantaneous or continuous, should be completed prior to hydrologic modeling to allow calibration to observed events (see Section 7 for more detail).

Once water quality concerns have been identified through sampling and modeling as applicable, possible watershed and lake management actions can be developed. The North American Lake Management Society recommends implementing watershed approaches first to reduce and mitigate nutrient or sediment loading issues from continuing to impair a lake (NALMS 2021). As these efforts are implemented, restoration actions can then be pursued within the lakes themselves.

Field sampling and modeling are needed to identify baseline conditions, including the types and sources of water pollutants entering and impacting the lakes to determine which broader management efforts are necessary. The City of Rehoboth Beach has initiated that effort with their August 2022 sampling. The results of field sampling and hydrologic modeling can be used to develop a pollution budget that identifies internal and external pollution sources. The results can be used to identify and prioritize specific restoration sites (i.e., areas where habitat restoration would most benefit water quality). Because water quality is driven by stormwater influx from (i.e., approximately 65% of the watersheds drain to the lake via stormwater infrastructure), it cannot be assumed that only riparian and shoreline restoration are needed to improve water quality in Silver Lake and Lake Comegys.

An understanding of the existing and trending water quality and biological conditions of Silver Lake and Lake Comegys can only be accurately assessed utilizing focused long-term monitoring. Table 6.7 provides an example of water quality parameters that can be used to monitor for water

quality conditions. Sampling plans can be modified to focus on specific objectives. There are several methods that can be used to measure or estimate the nutrient and sediment flux from a watershed to a receiving lake, relate these loads to in-lake nutrient concentrations, and ultimately, algal and aquatic plant growth.

Table 6-7. Water Quality Metrics to Consider for a Water Quality Monitoring Plan for Silver Lake and Lake Comegys

Metric	WQ Problem
Nutrients	Algal Blooms, aquatic plant growth, Eutrophication assessment, biological productivity
Secchi Depth	Sediment loads, water transparency (turbidity), Eutrophication assessment
Chlorophyll and Microcystin	Potential for HABs, Eutrophication assessment
Temperature and Dissolved Oxygen, pH	Indicator of nutrient loading and health of the Lakes
Sediment release rates	Sediment loads, nutrient enrichment, biological productivity

Residents have expressed a desire for ongoing water quality monitoring to monitor any trends. In 2013, DNREC suggested that they can add the Lakes to their ongoing data collection with possible support from the volunteer citizens monitoring program managed through the University of Delaware. As previously noted in Section 6.1, lake sampling stations established under this program have been sampled during the summers of 2017 through 2020 but with irregular frequency. Citizen monitoring programs are valuable because they are educational and insightful but lack the detailed level of assessment to support lake management decisions.

6.4 Recommendations/Goals Related to Water Quality

Based on the evaluation, the following short-term and long-term goals are recommended to complete data gaps, so that the lakes can be managed cohesively in the future.

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to understand baseline conditions.

- Create a joint public-private “task force” to guide the implementation of this plan.
- Develop short-term (identify baseline conditions on site) and long-term water quality monitoring plans. Further develop the water quality sampling plan initiated by the City of Rehoboth Beach in 2022.
- Conduct short-term monitoring -establish baseline water quality conditions. It is recommended that monitoring should occur in the late spring and early fall to include the parameters provided in Table 6.7
- Explore funding to conduct long-term monitoring, e.g., the SWG.
- Work with SOLA3 and the University of Delaware to develop a plan and identify funding to expand citizen science monitoring program.

Long-term (> 5 years)

- Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect and improve water quality. Conduct long-term water quality monitoring and analyze trends
- Expand citizen science monitoring program
- Develop a plan to identify and address the areas of water quality concerns

7 Stormwater Management

7.1 Existing Conditions

Stormwater management systems discharge runoff and pollutants from both public and private property directly into the lakes. Therefore, it is important to educate the public about how their actions and what they do on their property directly affects the lakes. Figure 7.1 provides overland flow watershed delineation for Silver Lake and Lake Comegys. This watershed delineation is subject to change with additional information regarding stormwater infrastructure draining to (or away from) the lakes.

In the City of Rehoboth Beach, the city, DNREC and DelDOT have jurisdiction over stormwater management. The City of Rehoboth Beach is currently evaluating potential revenue sources to fund stormwater-related programs and projects.

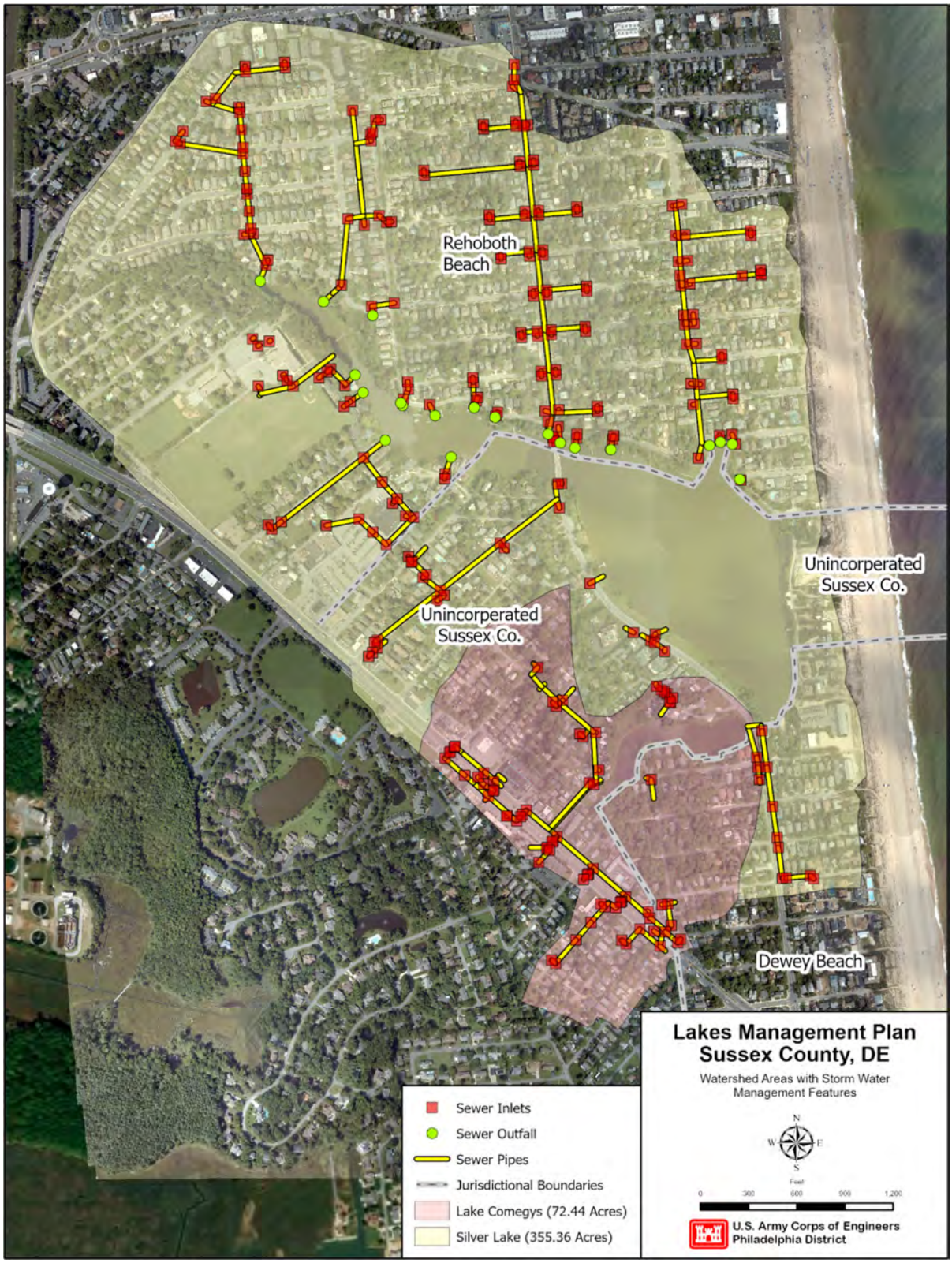

Figure 7.1. Silver Lake and Lake Comegys Overland Flow Watersheds with Stormwater Infrastructure

The overland topographic watershed of Silver Lake is approximately 324 acres. The watershed of Lake Comegys is approximately 41 acres. These estimates vary slightly from previously

reported drainage areas (e.g., 2020 Rehoboth Beach Comprehensive Development Plan), likely due to stormwater infrastructure influence unaccounted for due to lack of information at the time of this plan. It is estimated that there are 51 acres of impervious surface within the Silver Lake watershed. At least one Town of Dewey Beach stormwater pipe drains into Silver Lake. There are currently 23 stormwater outfalls within the City of Rehoboth Beach that drain into Silver Lake, which are fed by more than 150 street drains. Route 1 drains into Lake Comegys. During preparation of this plan, stormwater infrastructure was only verified for the City of Rehoboth Beach. Average annual precipitation is 45 inches in Delaware (City of Rehoboth Beach 2012). See Figure 7.2 for the location of the NOAA NWS precipitation station. Additionally, depth-duration-frequency precipitation data, compiled for use in later phases, as necessary, are summarized in Figure 7.3.

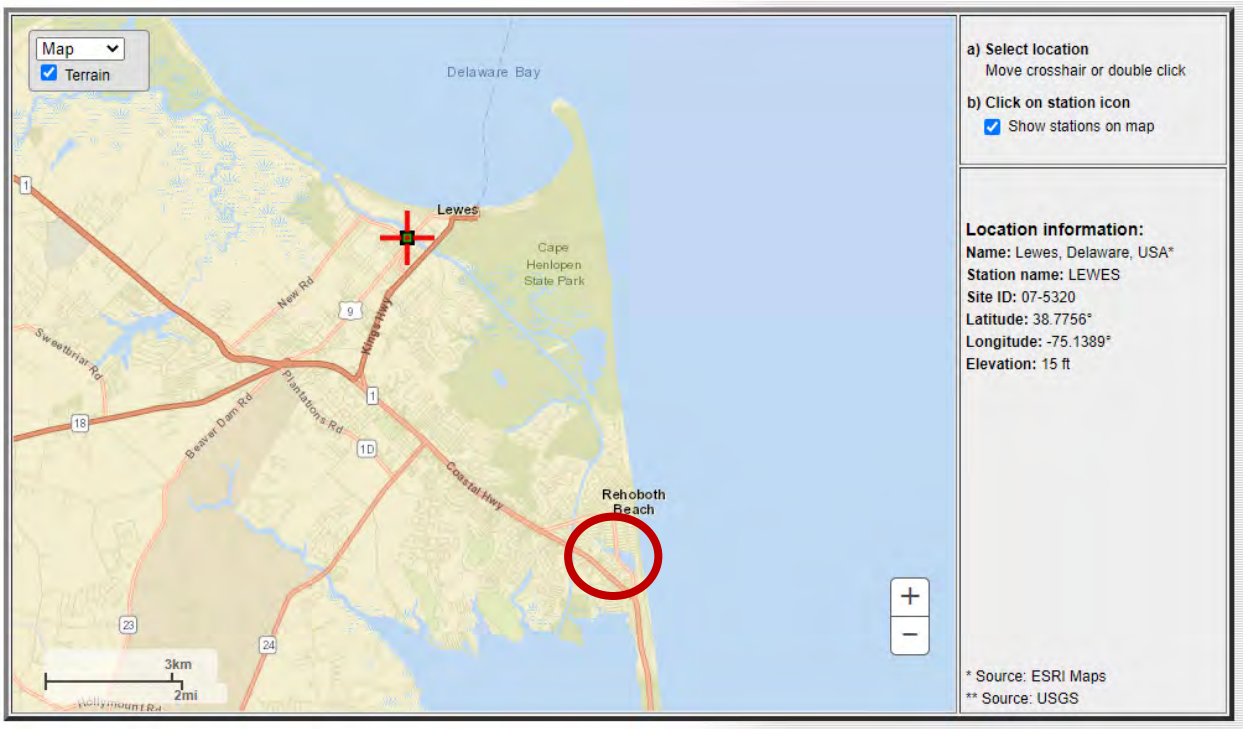

Figure 7.2. NOAA NWS Atlas 14 Precipitation Station at Lewes, DE (red cross) and Project Focus Area (red oval)

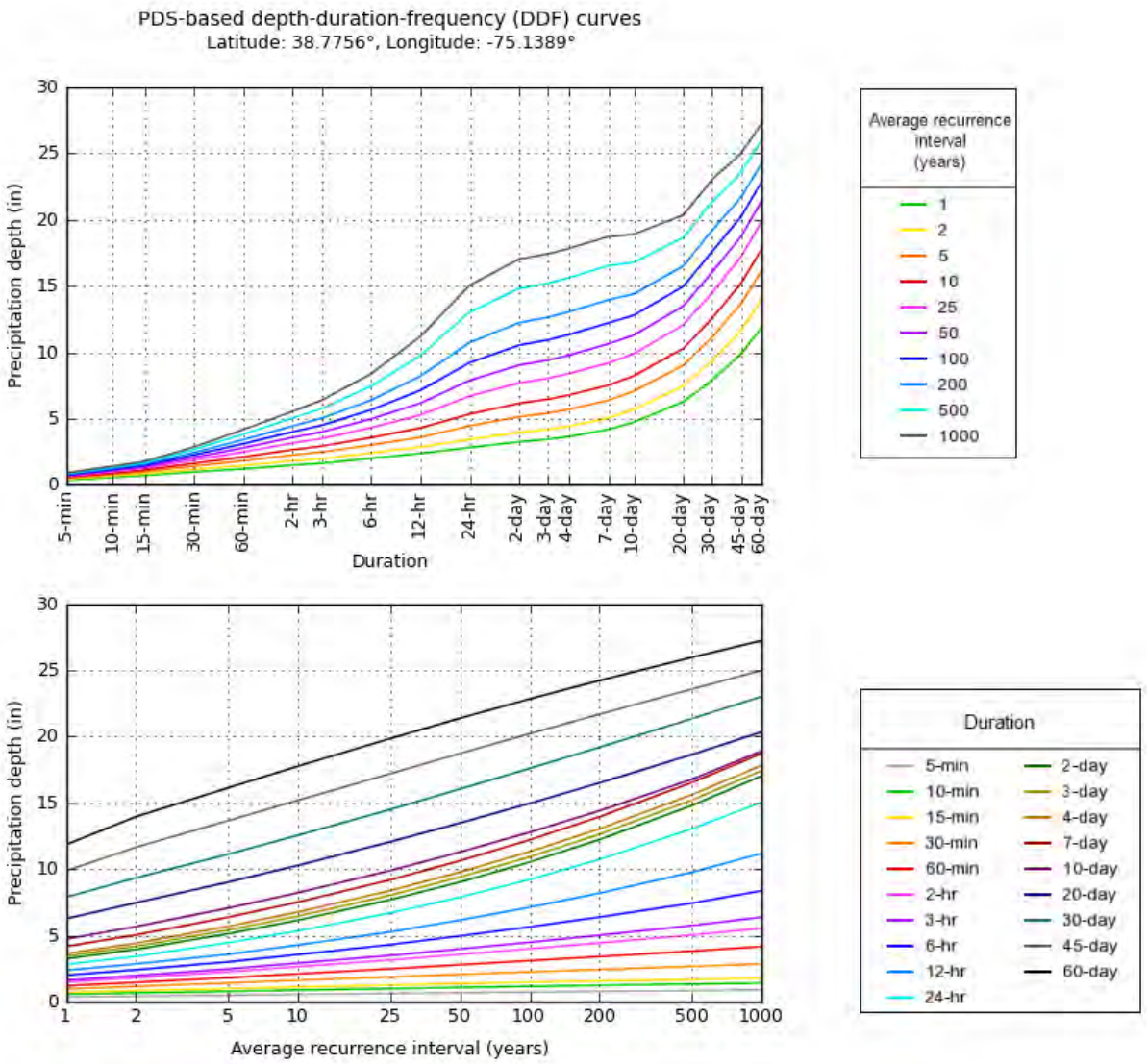

Figure 7.3. Precipitation Data from NOAA NWS Atlas 14, Volume 2, Version 3

Approximately 65% of contributory drainage area to both Silver Lake and Lake Comegys is a result of runoff through stormwater system/outfalls, with the remaining 35% a result of direct runoff from lake-adjacent properties.

7.2 Previous Recommendations Related to Stormwater

7.2.1 State

No previous recommendations for stormwater improvements, that would contribute to the management of the lakes, for or by the state were identified. Documents reviewed for state stormwater recommendations included 2019 Sussex County Comprehensive Plan, 2020 Rehoboth Beach Comprehensive Development Plan, 2018 Town of Dewey Beach Comprehensive Land Use Plan, and 2012 City of Rehoboth Beach Lakes Report

7.2.2 Sussex County

Recommendations on stormwater management made in the 2019 Sussex County Comprehensive Plan and the status of those recommendations are provided in Table 7.1.

Table 7-1 Recommendations on Stormwater Management 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Stormwater Runoff	Objective 5.3.4 Better manage stormwater runoff to preserve water quality. Strategy 5.3.4.1 Continue to support the Sussex Conservation District's Conservation Programs and its management and implementation of the Statewide stormwater regulations. Strategy 5.3.4.3 Continue participation in the stormwater regulatory advisory process with the State for the development of improved stormwater regulations.	Ongoing	
Stormwater Drainage and Management	Objective 7.4.1 Support State and Sussex Conservation District stormwater management efforts. Strategy 7.4.1.1 Continue participation in the stormwater regulatory advisory process with the State for the development of new stormwater regulations. Strategy 7.4.1.2 Support the Sussex Conservation District in the management and implementation of the Statewide stormwater regulations.	Ongoing	Consistency of regulations across jurisdictions added to this plan recommendations.
Filtration	Objective 7.4.2 Encourage site design that maximizes or optimizes infiltration and minimizes stormwater runoff. Strategy 7.4.2.1 Consider working with stakeholders to develop buffer incentives or a program for wetlands and waterways.	Unknown	This is consistent with local municipality considerations (e.g. City of Rehoboth Beach Comprehensive Plan).

7.2.3 City of Rehoboth Beach

Recommendations on stormwater management made in the 2012 Draft City of Rehoboth Beach Lakes Report and 2020 City of Rehoboth Beach Comprehensive Development Plan and the status of those recommendations are provided in Table 7.2 and Table 7.3.

Table 7-2. Recommendations on Stormwater Management from the 2012 Draft City of Rehoboth Beach Lakes Report

Resource Concern	Previous Recommendation	Status	Comments
Runoff	Renew public-private initiatives to educate the public that what they do to their property or allow to runoff their property directly affects the lakes. Companion and coordinated efforts are needed in the County's and Town of Dewey Beach's watershed areas.	Ongoing	Repeated in recommendations
Infrastructure	Accurate location and elevation data on the City's entire stormwater management system should be entered into the City comprehensive computer based mapping system and kept up to date.	Complete	

Resource Concern	Previous Recommendation	Status	Comments
Infrastructure	The City of Rehoboth Beach should commit to a long-term goal of upgrading the system to further prevent silt, debris, and oils from being discharged into the lakes. It is suggested that priority be given to the large pipe entering off of King Charles Ave as there is visible silting at that site. Further, the planned excavation of City streets associated with the construction of the ocean outfall wastewater system may present opportunities to also do upgrades to the stormwater system in the area of construction. Other proposed utility work in the City may provide similar opportunities.	Outfall and force main upgrades completed in 2019.	Comprehensive database would aid in prioritization

Table 7-3. Recommendations on Stormwater Management from the 2020 City of Rehoboth Beach Comprehensive Development Plan

Resource Concern	Previous Recommendation	Status	Comments
Stormwater Management Plan	Prepare a Citywide stormwater management plan.	Ongoing	
Point and non-point sources	Evaluate management of point and non-point pollution sources to develop solutions and improve efficiencies in preparation of possible future designation as a Municipal Separate Storm Sewer System (MS4) community.	Ongoing	
Impervious surface	Consider amending the City's zoning ordinance to define "impervious surface," provide classifications (i.e. impervious vs. pervious) for alternative types of pavement or other surfaces, and adjust street design requirements, floor area ratio, lot coverage requirements, and maximum allowable building areas to address the concerns and possible strategies raised by the Resilient Community Partnership Project regarding stormwater runoff issues created by impervious surfaces.	Ongoing	

7.2.4 Town of Dewey Beach

Recommendations on stormwater management made in the 2018 Town of Dewey Beach Comprehensive Land Use Plan and the status of those recommendations are provided in Table 7.4.

Table 7-4 Recommendations from the 2018 Town of Dewey Beach Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Flood prone areas	Developed Flood Management Plan	Main plan completed 2012	Included management for healthy Rehoboth Bay Wetlands. Flood water recommendations for Lake Comegys and Silver Lake have not started.
Stormwater sewage lines	Effort to clean and maintain, no strategic plan for routine maintenance, overall status of catch basins, culverts and stormwater sewer lines is unknown	Ongoing, affected flooding in high tides in 2016	Common maintenance plan for catch basins, culverts and sewer lines draining into the lakes. Ownership of the lines isn't known, drainage ditch system that feeds them is impaired
Stormwater solutions	Coordinating with USACE, state agencies to implement stormwater solutions both for Rehoboth Bay and King Charles Avenue; Memorandum of Understanding with DelDOT/other state agencies on the maintenance and repair of city's stormwater system	Recommended	The development plan should include comprehensive/combined stormwater management plan vis a vis Lake Comegys and Silver Lake, especially for King Charles Avenue. The Town of Dewey Beach owns small section of lakes boundaries, but coordination is important
Reduce flood damage	Read Avenue Project Living Shoreline along Rehoboth Bay	Completed 2020	Consider additional riparian buffer options for Lake Comegys and Silver Lake. Read Avenue Project, not Lake Comegys
Stormwater system rehabilitation	GIS Stormwater GIS Infrastructure Mapping	Complete	Combine mapping effort with those in other jurisdictions Mapping recommendations led to repair prioritization, $200k project completed
Water Resources Protection	Pursue Green Stormwater Infrastructure (GSI) where feasible, reduce runoff issues created by impervious surfaces	Ongoing effort	
Water Resources Protection	Pursue drainage easements along waterways and storm drains where needed	Not started	
Stormwater Infrastructure	- Consider negotiating and/or renegotiating appropriate Memoranda of Understanding with DelDOT and/or other State agencies for the routine inspection of, and repair, maintenance, and/or upgrading of the Town's stormwater drainage infrastructure -	Ongoing	

Resource Concern	Previous Recommendation	Status	Comments
Stormwater Infrastructure	Evaluate the feasibility of a stormwater fee structure that could be used to maintain, operate, and enhance the current aging and deficient stormwater collection and disposal system that is the responsibility of the Town	Not started	Repeated in recommendations
Stormwater Infrastructure	Ensure that any stormwater system improvements will be capable of handling future anticipated sea-level rise during their design lifetime	Not started	

7.3 Evaluation

Several existing studies/plans across the multiple jurisdictions recommend coordination for prioritization of stormwater improvement projects and/or coordinated fee structures for stormwater utilities. Additionally, multiple stormwater management improvements throughout the contributory watershed have been completed, or are underway, in recent years (e.g., mentioned within 2020 Rehoboth Beach Comprehensive Development Plan). Creation of a comprehensive database, across jurisdictions, for existing and planned stormwater infrastructure and data would provide multiple benefits. These include improved efficiency of sampling and modeling efforts through a singular repository for relevant data needs/reporting, and near real-time updating of prioritization following project completion and additional sampling/modeling efforts.

Recommendations for green infrastructure, where possible, is also a shared goal across multiple jurisdictions. Green infrastructure could be given preference where feasible through modified regulations at each level of government from City to State.

Further, coordinated public outreach across jurisdictions would provide consistent messaging to relevant stakeholders, allowing a unified voice for management of the lakes.

Long term maintenance of aging stormwater management infrastructure is a fairly widespread problem across the mid-Atlantic region. Although sometimes controversial, establishment of stormwater management fee, or stormwater utility, could setup of multijurisdictional funding stream for repairs that benefit all stakeholders through maintaining and improving quality of the lakes. Many municipalities in New Jersey, Pennsylvania, and Delaware, including in Wilmington and Newark, have adopted such fees in an effort to directly address stormwater issues while equitably distributing the associated costs across the watershed occupants. Additional information about the City of Newark, DE stormwater utility program can be found on their website (Stormwater-Utility-Storyboard (newarkde.gov)).

7.4 Recommendations/Goals Related to Stormwater

Based on the evaluation above, the following short-term and long-term goals were developed to complete data gaps, so that the lakes can be managed cohesively in the future.

Short-Term (< 5 years)

The following short-term goals will be aimed at completing data gaps.

- Compile single comprehensive database for detailed GIS/mapping information on stormwater system and outfalls for all jurisdictions to allow full understanding of inputs to both lakes.
- Identify outfalls that are potential largest contributors of nutrients/sediment/flow.
- Identify representative vegetation/residential drainage areas to reduce to manageable number for sampling/monitoring).
- Develop/update stormwater sampling plan to establish existing conditions including lab samples/nutrients, sediment, flow rates, frequency.
- Investigate combined jurisdictional stormwater infrastructure maintenance plans.
- Investigate combined jurisdictional stormwater management fee structure

Long-term (> 5 years)

The following long- term goals are aimed at continued management of the lakes.

- Revisit previous stormwater monitoring efforts, including further monitoring of stormwater conditions across several storm events to compile observed data to determine efficiency of improvement projects, and for calibration of hydrologic/nutrient modeling efforts in later phases
- Complete/update hydrologic and nutrient load modeling
- Prioritize/re-prioritize outfalls for potential stormwater treatment efforts following completed projects since 2020 Rehoboth Beach Comprehensive Development Plan adoption
- Develop annual/seasonal stormwater monitoring plan, including lab samples/nutrients, sediment, flow rates, frequency.
- Re-assess priority outfalls for potential stormwater treatment efforts, as necessary, as projects are completed.
- Continue to develop public education/outreach for combined community, including consistent educational materials across jurisdictions.
- Ensure sea-level change analysis is required for all proposed stormwater infrastructure projects, potentially through regulation updates.

8 Lake Water Levels

8.1 Existing Conditions

Silver Lake is primarily fed by direct precipitation, stormwater drainage, and groundwater ingress. A concrete control structure and outflow pipe discharging to the ocean is located at the southeast corner of the lake and serves to control lake levels. Though currently inoperable, when operable, the concrete control structure is operated via adjustable stop logs, or weir boards, whereby adding boards raises the lake level, and removing boards lowers the lake level. Lake levels also rise when debris accumulates on its protective metal grate impeding outflow.

There are competing interests between all parties about appropriate water levels. When water levels are high at the eastern (seaward) end of lake, the basements of adjacent residential structures are susceptible to flooding from the high groundwater tables, but mudflats in the western end of the lake are covered with water that is deep enough to navigate small boats. When the water level is low enough that basements are less susceptible to flooding, these mudflats are exposed and are not navigable for small boats and recreation. Balancing these competing interests would be a goal of the Lake Level Management Plan.

Sediment loads into the lake are also an identified concern and have been blamed for indirect effects on water levels (e.g., by causing blockages of the ocean outfall pipe, and reducing water depths). Sediment loading requires further assessment. It is likely that any coarse sediment would settle out well before making it to the outfall structure, and any suspended sediment would be readily transportable through the ocean outfall pipe. If the ocean outfall pipe is blocked, it is likely from sand intrusion from the ocean end, though additional sediment load from the lake itself could be exacerbating clogging. Sedimentation could be reducing depths through deposition, exacerbating the exposed mudflat issues, and contributing to the tenuous balancing act between water depth and basement susceptibility to flooding. Limited bathymetric survey data provided for areas of previous dredging efforts (near northwest end of lake), while sufficient to inform dredging contract, are insufficient for further analysis without subsequent as-builts and repeat surveys to determine approximate rates of sedimentation.

Based on a 1977 agreement is Delaware Department of Transportation, DNREC is the current owner/operator of the outlet structure from Silver Lake into the Atlantic Ocean in the Town of Dewey Beach (see Appendix A), however anecdotal evidence of other entities operating the structure are part of the public record. It is suspected that there is still some connection between Silver Lake and Lake Comegys (City of Rehoboth Beach 2012), though no direct connection is visible, nor mapped or detailed in the literature.

8.2 Previous Recommendations Related to Lake Water Levels

The 2012 City of Rehoboth Beach Lake Report indicates that Silver Lake water levels fluctuate with groundwater elevations. Increases in water levels following a storm from infiltration and stormwater are temporary and water levels stabilize back to a long-term static water table elevation. A surface discharge from the lake will occur if that elevation is higher than the elevation of the outlet structure. Drops in the water surface elevation of the lake during the summer months have also been associated with receding groundwater levels (City of Rehoboth Beach, 2012 Previous Recommendations and Status).

8.2.1 State

Recommendations on lake water levels made by the State in a 2013 letter to the homeowners and the status of those recommendations are provided in Table 8.1.

Table 8-1. State Recommendations on Lake Water Levels

Resource Concern	Previous Recommendation	Status	Comments
Dredging	Dredging in the western finger of the Lake. The proposal to pump a slurry of water and sediments from the western finger of the Lake into geo-tubes on either the school property or for use to stabilize eroding areas of the Lake shore is too costly given the minimal environmental benefit that would result -Since the October meeting we have also examined other alternatives which will be, upon further analysis, cost prohibitive. Currently we are considering a project that would involve excavation of material from the finger in combination with the potential placement of a small coffer dam at the mouth of the finger that would raise water levels. This approach would still present some sediment disposal challenges but it may provide a suitable result to the issues confronting the adjoining residents. We will be seeking information from the City regarding its storm drain inventory to assess the inputs to the Lake in order to further develop this alternative.	The State completed dredging and living shoreline stabilization project.	Additional investigation of sedimentation is warranted.

8.2.2 Sussex County

Recommendations on lake water level management made in the 2019 Sussex County Comprehensive Plan and the status of those recommendations are provided in Table 8.2.

Table 8-2 Recommendations on Lake Water Levels in the 2019 Sussex County Comprehensive Plan

Resource Concern	Previous Recommendation	Status	Comments
Flooding and Erosion	Objective 5.3.5 Reduce flooding and erosion. Strategy 5.3.5.1 Evaluate the effectiveness of the County floodplain ordinance to determine if modifications are needed. Strategy 5.3.5.2 Evaluate the effectiveness and consider implementation of the mitigation actions of the County's Hazard Mitigation Plan in order to reduce the County's risk to natural and human-made hazards. Strategy 5.3.5.3 Pursue Community Rating System status through FEMA to obtain lower flood insurance rates for homeowners. Strategy 5.3.5.4 Consider the evaluation of the future impacts of flooding as part of Sussex County's Mitigation Plan. Strategy 5.3.5.5 Support shoreline stabilization initiatives, such as the Partnership for the Delaware Estuary's Living Shoreline initiative and other similar programs.	Unknown	Shoreline stabilization could affect sedimentation rates, and overall usable depth of lakes.

8.2.3 City of Rehoboth Beach

Recommendations on lake water level management made in the 2012 Draft City of Rehoboth Beach Lakes Report and the status of those recommendations are provided in Table 8.3.

Table 8-3. Recommendations on Lake Water Levels., 2020 Rehoboth Beach Comprehensive Development Plan

Resource Concern	Previous Recommendation	Status	Comments
Dredging	The City will petition and collaborate with DNREC to accomplish the expeditious dredging and restoration of the currently silted-in western end of Silver Lake.	Completed	Follow-on re-surveys should be completed to determine efficacy.
Outfall	The City of Rehoboth Beach will petition the State to assume responsibility for maintaining the Silver Lake outfall drain system and to maintain an established lake level.	State has assumed responsibility	

8.2.4 Town of Dewey Beach

The 2019 Sussex County Comprehensive Plan, 2020 Rehoboth Beach Comprehensive Development Plan, and 2018 Town of Dewey Beach Comprehensive Land Use Plan, as well as the 2012 City of Rehoboth Beach Lakes Report, were reviewed for recommendations for water level management of Silver Lake and Lake Comegys and none were identified for the Town of Dewey Beach.

8.3 Evaluation

Review of provided/available information identified several data gaps across multiple critical inputs necessary for completion of originally scoped modeling and water level management concept plan development. The following subsections describe these gaps, with later sections describing path forward for potential data collection efforts.

Stormwater Inputs

Stormwater is a significant input to the sediment loading of the subject lakes. Previous sampling efforts, in conjunction with updated sampling post-project installation, could inform the stormwater portion of the hydrologic and sediment budget for the lakes.

Bathymetry

Limited bathymetric survey available for areas of previous dredging efforts provides a snapshot of sedimentation for a specific area. Full-scale bathymetric survey, particularly repeated across multiple years, would allow determination of sedimentation rates, which would directly impact any future water level management plans.

Storage Volume vs. Elevation

Comprehensive bathymetric survey data, combined with LiDAR data for above water topography, would allow determination of storage-elevation relationships across the range of managed water levels (i.e. high to low water) for both lakes. This information is critical for investigation of water level management options, including any outlet modifications.

Ocean Outlet Structure/ Ocean Outfall Pipe Information

DNREC is listed as the operator for the existing ocean outlet structure, however this structure is currently inoperable. Current information on this outlet structure and ocean outfall pipe from Silver Lake appears insufficient to propose specific management recommendations. There are uncertainties in both overall vertical datum and potential sedimentation and/or mineral buildup of the outlet structure and outfall pipe discharging to the ocean in the literature, in addition to interaction with the groundwater table. Both of these data are critical to assessment of water level management options.

Lake Interconnections

There is still sufficient uncertainty associated with the connection between Lake Comegys and Silver Lake to warrant further investigation. Verification of existing connection not only provides better understanding of current exchange of flow/sediment between lakes but is critical for assessment of any future water level management plans.

Proximate Basement Elevations

Impacts to structures adjacent to the lakes will guide any future water level management options. Comprehensive determination of the range of existing structure/basement elevations across the range of both existing and potential water level ranges is critical to future assessments.

8.4 Recommendations/Goals Related to Lake Water Levels

Based on the evaluation above, the following short-term and long-term goals were developed to address data gaps and continue analysis in support of cohesive management of the lakes moving forward.

Short Term (< 5 years)

The following goals are meant to compile data necessary to establish baseline data, inform future modeling efforts, and further understanding of water level management options.

- Collect continuous water level data via water level gages at Silver Lake, Lake Comegys, and the Ocean outfall to establish current range of water levels and inform future modeling efforts. Recommend continuous data loggers (e.g., Solinst Levelogger series, or equivalent) to capture sub hourly fluctuations.

Figure 8.1 - Example of water level data logger

  - Complete bathymetric survey for entire lake system (Silver and Comegys) to establish baseline data for future modeling efforts. Recommend bathymetry collected and processed using dual frequency sounder to allow differentiation between water depth and top/bottom of unconsolidated sediment. Bathymetric survey should also be tied to NAVD88 vertical datum.
  - Complete survey/assessment of existing outfall structure tied to NAVD88 vertical datum, including sedimentation within ocean outfall pipe
- Compile basement identification/homeowner outreach survey (type of basement, e.g., full vs. crawl space, etc.), followed by basement elevation surveys, or assumptions based on LIDAR data for all structures within identified range of water levels

Long-term (> 5 years)

The following goals are meant to build on data collection efforts to complete further analysis toward informing lake level management.

- Develop hydrologic modeling, water budget, and sediment budget to support water level management analysis
- Investigate options to manage lake level (e.g., changes to outlet structure, dredging, individual basement changes, etc.) with the goal of balancing competing interests.
- Develop recommendations for repeat bathymetric surveys to determine changes in deposition, dredging efficacy and inform dredging frequency recommendations
- Develop comprehensive Water Level Management Plan, including concepts for outlet structure modifications (if recommended).

9 Real Estate and Jurisdiction

9.1 Existing Conditions

The State of Delaware has title to Silver Lake and its subaqueous land and is responsible for maintenance of the outfall to the Atlantic Ocean in the Town of Dewey Beach (see Appendix A). However, some property owners claim property lines into the lake. Additionally, several

jurisdictional boundaries abut the lakes, each with different code requirements. This situation has resulted in conflicts relative to construction on Silver Lake; examples include:

- Docks and gazebo built in the lake of parcel without a state subaqueous land permit because the parcel owner had riparian rights into the lake. Sometimes these gazebos do not touch land (i.e., not constructed in the City's jurisdiction or the 10-foot no build buffer).
- Gazebos constructed in the lake with a state subaqueous land permit and into the City of Rehoboth 10-foot no build buffer.

Riparian rights do not preclude the need for a permit from the State. The State maintains jurisdiction on private subaqueous lands where those lands are in direct connect to the State waters. Structures do exist that predate the subaqueous regulations and are therefore considered grandfathered (until a change in configuration occurs). This includes fairly recent structures that pre-date the State's 2013 acknowledgement of ownership/jurisdiction.

The goal of the Real Estate and Jurisdiction component of the lakes management plan is to determine land ownership in and around the immediate buffer of Silver Lake and Lake Comegys, to improve coordination with lake management and regulations that affect the lake. Figure 9.1 shows all parcels within 300 feet of the shoreline of Silver Lake and Lake Comegys. A list of the parcels within 300 feet of the lake, the jurisdictions where they are located, and the parcel owners is provided in Appendix E.

The State of Delaware owns the subaqueous lands of the lake up to the OHW line. DNREC recognizes that several property owners have asserted rights to some subaqueous lands. These issues would likely be resolved on a case-by-cases basis as needed. Unless the state or the property owner have plans that could impact those rights, the State does not intend to undertake any further research into these claims. Should property owners come forward with plans that could affect subaqueous lands, the State would discuss it with the property owners. DNREC also committed to reaching out to any property owners in locations around the lakes, should the State initiate plans that could affect ownership (DNREC 2013). The only project envisioned at that time was dredging of the finger in Silver Lake.

Planning consultants (KCI) for the City of Rehoboth Beach conducted a GIS mapping analysis in 2020 to compare the City's Official Zoning Map to the future land use categories. KCI compared the most recent Sussex County parcel data and the City's Official Zoning Map. In doing this, KCI identified discrepancies in 41 parcels between the two data sets.

Management for environmental preservation of Silver Lake and Lake Comegys has been complicated because both lakes are situated in multiple jurisdictions and because the lakes are situated in three different development priority areas. This contrasts with a third freshwater lake, Lake Gerar, that is contained entirely within the boundaries of the City of Rehoboth Beach. Management of the lake and lake margins has been uniform allowing management of the lake for conservation and aesthetic appeal.

Strategies for State Policies and Spending (2020) uses a development map that includes data from county and municipal comprehensive plans to create Investment Priority Levels. Sussex County also has an interest in identifying priority areas for investment, to support development in the county. The 2018 Land Use Plan uses the priority investment levels and provides county and municipal maps for these areas. Silver Lake and Lake Comegys are bounded primarily by areas designated investment levels 2 and 3, with some smaller investment "out of play" areas.

Investment level 2 areas are less developed rapidly growing suburban and urban areas where infrastructure is in place or planned. Level 3 area are included in longer term growth plans but also include areas with environmental constraints. DNREC has established a riparian habitat restoration project in the largest of the “out of play” area on Silver Lake.

For Lake Gerar, virtually the entire margin of this lake is designated as development priority “out of play”. Furthermore, the lake has been protected by an agreement between the city and the DuPont Company. Due to this arrangement, the environmental stewardship of Lake Gerar has been easier to manage than for Silver Lake and Lake Comegys.

Figure 9.1. Land Parcels within 300 feet of the Shoreline of Silver Lake and Lake Comegys

9.2 Previous Recommendations Related to Real Estate

9.2.1 State

Real Estate and Jurisdiction recommendations for the State are in Table 9.1. The recommendations were taken from the 2019 Sussex County Comprehensive Plan and from a letter to the homeowners.

Table 9-1. State Recommendations on Jurisdiction and Real Estate

Resource - Concern	Previous Recommendation	Status	Comments
Real Estate and Jurisdiction	DNREC staff will document existing structures through photos and other cataloguing, in order to establish a baseline for existing structures. This will support conservation efforts at the lakes.	Unknown	USACE may be able to support this effort with a future CAP study.
Real Estate and Jurisdiction	The State owns the subaqueous lands of the Lakes to the OHW line. The State recognizes that several property owners have asserted rights to some subaqueous lands. These issues will likely be resolved on a case-by-case basis as needed. In other words, unless the state or the property owner have plans that could impact those rights, we do not intend to undertake any further research at this time on any of these claims.	Recommendation	USACE may be able to support this effort with a future CAP study.
Real Estate and Jurisdiction	Should any property owners come forward with plans that could affect subaqueous lands, the State is happy to discuss with the owners. Similarly, we will reach out to any property owners in locations around the Lakes should the State initiate plans that could affect ownership.	Recommendation	DNREC's continued involvement in working with the jurisdictions to continue to develop and improve the Lakes Management Plan will help the state communicate with property owners so that the entirety of the lake, including its subaqueous lands and margins can be maintained to maximize aesthetic and natural qualities of the lake.

9.2.2 Sussex County

Recommendations on Real Estate and Jurisdiction from the 2019 Sussex County Comprehensive Plan are listed in Table 9.2.

Table 9-2 Recommendations for Jurisdiction and Real Estate, Sussex County Comprehensive Plan, March 2019

Resource – Concern	Previous Recommendation	Status	Comments
Real Estate and Jurisdiction	2019 Land use Plan recommends protecting critical natural resources, such as the inland bays by guarding against over-development and permanently preserving selected lands.	Recommendation	Establishment and continued development of the Lakes Management Plan is an important step to protect the lakes against over-development of the lake margins and providing for their permanent preservation is consistent with the Land Use Plan.

9.2.3 City of Rehoboth Beach

Recommendations on Real Estate and Jurisdiction in the 2020 Rehoboth Beach Comprehensive Development Plan are listed in Table 9.3.

Table 9-3. City of Rehoboth Beach Recommendations on Jurisdiction and Real Estate

Resource Concern	Previous Recommendation	Status	Comments
Real Estate & Multiple Jurisdictions	Silver Lake has unique problems caused by a multi-jurisdictional shoreline and lake ownership. A scientific estimate of what additional means could be taken to improve the lakes coupled with an estimate of their initial, operational, and maintenance costs and an assessment of the distributed responsibilities of the various jurisdictions involved.	The Lakes Management Plan begins scientific study, describes further study needs and creates framework for jurisdictions to deconflict Real Estate issues and pursue shared goals	USACE may be able to support this effort with a future CAP study
Real Estate & Multiple Jurisdictions	Because multiple State agencies, in addition to DNREC, may have valuable input or suggestions, or may have ongoing programs or funding sources that could be of assistance in implementing these various recommendations, a Preliminary Land Use Service (PLUS) review of [the Lakes Management Plan] should be sought through the Office of State Planning Coordination.	The Lakes Management Plan creates a framework for jurisdictions to deconflict Real Estate issues on the completion of further study.	Complete a PLUS review of the Lakes Management Plan after the completion of Real Estate study such as a USACE study. Update the Lakes Management Plan.
Real Estate & Multiple Jurisdictions	Because the ultimate success of maintaining and restoring Silver Lake [and Lake Comegys because of its communication with Silver Lake] requires coordinated efforts of the City of Rehoboth Beach, Town of Dewey Beach, Sussex County, and the State, the City of Rehoboth Beach will petition the Office of State Planning Coordination to take the lead in facilitating coordination [for lake management].		Completion of the Lakes Management Plan and ratification by all jurisdictions can also accomplish this objective.
Real Estate & Multiple Jurisdictions	Review and revise City land use codes and regulations by identifying conflicting and ambiguous provisions and provisions needing updating, especially provisions necessary to implement the visions and goals in 2020 Rehoboth Beach Comprehensive Development Plan.		USACE may be able to support this effort with a future CAP study

9.2.4 Town of Dewey Beach

Recommendations on Real Estate and Jurisdiction in the 2018 Town of Dewey Beach Comprehensive Land Use Plan are listed in Table 9.4.

Table 9-4 Recommendations for Jurisdiction and Real Estate, Comprehensive Plan, Town of Dewey Beach, 2018

Resource Concern	Previous Recommendation	Status	Comments
Real Estate and Jurisdiction	Set maximum building size, minimum corner lot setbacks, basements, and roof pitch	Recommendation	Building size, roof pitch, basement and minimum lot setbacks do not address the need to establish a riparian buffer zone or greenway around Lake Comegys to protect its natural and aesthetic qualities. Review standards to determine, what, if any changes to these standards are necessary to accommodate the establishment of a riparian buffer around the lake
Real Estate and Jurisdiction	Considerations for protection measures for the natural environment in redevelopment of the bayside area is considered	Recommendations	Consider similar protection measures to enable the establishment of a riparian buffer around Lake Comegys
Real Estate and Jurisdiction	Does not describe zoning to establish a buffer zone or preserve habitat around the lake	Recommendations	Consider special zoning protections to enable the establishment of a riparian zone around Lake Comegys
Real Estate and Jurisdiction	The Town should consider examining the Zoning and related Municipal Code regarding open spaces, planting of native plants and trees, and reduction of untreated stormwater runoff	Recommendations	Also consider examining the Zoning and related Municipal Code regarding the establishment of open spaces or greenbelts around Lake Comegys

9.3 Evaluation

Sussex County, the Town of Dewey Beach and the City of Rehoboth Beach have different building requirements for properties and structures around the lake margins. One of the purposes of this Lakes Management Plan is to establish consistent conservation efforts across all lake margins and all three jurisdictions. Every subaqueous permit application must include a copy of the deed and a property survey to establish ownership extent

Achieving buy-in for the implementation of uniform measures to protect the lakes may be easier if the conservation easements are established along with trails, open spaces and greenbelts around the lakes. Establishing dual use areas may make it easier for the communities and county residents to accept conservation easements or other measures to protect the lake margins. Success with dual or multiple use areas enabling lake conservation has been successful at Lake Gerar where DuPont successfully partnered with the City of Rehoboth Beach for economic development and protection of the lake through the establishment of a park and green spaces around it.

9.4 Recommendations/Goals Related to Real Estate

The following short-term actions are recommended to address real estate concerns surrounding Silver Lake and Lake Comegys.

Short Term (< 5 years)

- Communicate with the owners of all parcels adjacent to the lakes about the benefits of riparian buffer conservation, best management practices for lawn maintenance, and techniques to make docks and gazebos more environmentally friendly.

10 Recreation

10.1 Existing Conditions

The City of Rehoboth Beach and the Town of Dewey Beach are recreation destinations. Tourism is a major driver of the economies of both municipalities and Sussex County. Businesses along the beach boardwalk and waterfront offer diverse watersports and recreational fishing opportunities. Both the City of Rehoboth Beach and the Town of Dewey Beach also offer restaurant and night-life activities. In addition, there are multiple golf, hiking, biking, and sight-seeing opportunities in the area. Silver Lake and Lake Comegys are situated close to Rehoboth Beach and the Town of Dewey Beach, and they also provide boating, fishing, and hiking opportunities for residents and tourists. However, the most important attribute of the lakes is that they contribute significantly to the aesthetic quality of both municipalities. Maintaining the natural quality of the lakes and of the lake margins is an important component of maintaining the beauty and appeal of both municipalities and enhancing their appeal as tourist destinations.

Maintaining the lakes for their continued use for recreation is also important. Recreation on Silver Lake primarily consists of paddling sports, such as canoeing and kayaking, fishing, and wildlife viewing. Silver Lake is an important bird watching location. It was established as a State Bird Refuge in 1933. There are also public amenities such as hiking trails and parks associated with the lakes. The City of Rehoboth Beach also maintains a public dock at Tear Drop Park.

10.2 Previous Recommendations Related to Recreation

10.2.1 State

State recommendations for recreation are listed in Table 10.1. The recommendations were taken from the 2019 Sussex County Comprehensive Plan and the 2018 – 2023 State Comprehensive Outdoor Recreation Plan (SCORP) (DNREC 2023).

Table 10-1 State Recommendations for Recreation

Resource Concern	Previous Recommendation	Status	Comments
Greenways	Establish greenways- natural areas of unbroken vegetation where recreation and conservation are the primary values. Greenways can include biking and hiking trails, and paths of grass and trees threading their way through cities and countryside like ribbons of green	Not implemented	DNREC contributes to the development, revision and implementation of the Silver Lake and Lake Comegys Lakes Management Plan to enable the establishment and maintenance of greenways around the lakes
Parks	Conduct park and recreation economic studies to assess the benefits of parks, wildlife, conservation areas, and Delaware's outdoor recreation economy.	Unknown	An economic study would assist in determining the value of an investment in Silver Lake and Lake Comegys and adjacent parks.

Conservation	Identify conservation opportunity areas for inclusion in the natural resource element of local comprehensive land use plans	Ongoing	Recreational and conservation elements are considered in local comprehensive plans and have been incorporated into this plan where appropriate.
Rare and sensitive habitat	Protect rare landscape elements, cultural resources, sensitive areas, and associated species.	Ongoing	All levels of government have focused efforts to protect these resources.

10.2.2 Sussex County

Recreation recommendations from the 2019 Sussex County Comprehensive Plan are listed in Table 10.2

Table 10-2 Recommendations on Recreation, 2019 Sussex County Comprehensive Plan, March 2019

Resource Concern	Previous Recommendation	Status	Comments
Recreation	Objective 6.1.1 Continue the County's role in parks, recreation, and open space planning in Sussex County	Not implemented	Contribute to the development, revision and implementation of the Silver Lake and Lake Comegys Lakes Management Plan
Recreation	Objective 6.1.2 Continue support of and increase coordination with the State and other entities to identify opportunities to increase public recreation lands and facilities in Sussex County	Not implemented	Coordinate with the municipalities to create a uniform greenway with hiking and or biking trails around the Sussex County portion of the lake Establish greenways around and between Lake Comegys and Silver Lakes. Connect them to existing greenways in the county.
Recreation	Objective 6.1.3 Increase the network of greenways and trails in the County. Strategy 6.1.3.1 Continue to support the State, local municipalities, and private non-profit organizations on their greenway and trail goals.	Not implemented	Coordinate with the municipalities to create a uniform greenway with hiking and or biking trails around the Sussex County portion of the lake Establish greenways around and between Lake Comegys and Silver Lakes. Connect them to existing greenways in the county.

10.2.3 City of Rehoboth Beach

Recreation recommendations in the 2020 Rehoboth Beach Comprehensive Development Plan are listed in Table 10.3.

Table 10-3 Recommendations for Recreation, 2020 Rehoboth Beach Comprehensive Development Plan, 2020

Resource Concern	Previous Recommendation	Status	Comments
Recreation	"Rehoboth Beach is virtually unique among all the beach resorts on the East Coast because of its abundance of trees. The northern portion of the City is naturally forested as is the area between King Charles and Bayard south of Philadelphia Avenue. The remainder of the City is irregularly tree-covered as the result of various public and private plantings.	On-going	The lakes are an important recreational resource and supporting amenities. A uniform plan for maintaining Lake Comegys and Silver Lake should be included as part of planning to maintain the quality of life/recreation assets Maintaining Riparian Habitat should be integrated into City's tree protection initiatives. Consider Establishing a City Parks

			and Shade Tree Commission to provide comprehensive tree regulations
Aesthetic Quality of the Lakes & Recreation	Continue to maintain all parks and open space areas while promoting sustainable environmental practices.	Not implemented	Maintain the riparian buffers around the lake like protected park areas
Recreation	Recommends managing paddle-boarding/canoeing and kayaking in accordance with SCORP moderate priority objectives	Not implemented	Ensure that this plan also covers these recreational opportunities on the lakes
Recreation	Recommends managing birdwatching and nature programs in accordance with SCORP moderate priority objectives	Not implemented	Ensure that this plan also covers these recreational opportunities on the lakes
Aesthetic Quality of the Lakes & Recreation	At Lake Gerar, the playground acts as a buffer to protect the lake	Not implemented	Consider the use of dual use areas such as playgrounds or trails or other recreational uses that can increase that can also serve as riparian buffer zones around the lakes
Recreation	Citywide Park Master Planning includes maintaining plants on recreational trails	Not implemented	Extend this to cover the riparian buffer zone around the lakes by expanding 10- minute walk program or other walking trails around the lakes
Recreation	Prepare a long-range development, renovation, and maintenance plan for the City's parks and recreation spaces for consideration during the annual budget cycle.	Not implemented	Include maintenance of riparian buffers around the lakes as part of the maintenance plan for the City's parks
Recreation	Continue to effectively promote and publicize the City's recognized and permitted recreational events.	On-going	Promote aesthetic and natural habitat qualities of Silver Lake in recreational events that include Silver Lake
Recreation	Increase educational opportunities throughout the City owned parks and recreation properties with community partners for events and informational placards.	On-going	Silver lake can be included in this effort

10.2.4 Town of Dewey Beach

Recreation recommendations in the 2018 Town of Dewey Beach Comprehensive Land Use Plan are listed in Table 10.4.

Table 10-4 Recommendations for Recreation, Comprehensive Plan, Town of Dewey Beach, 2018

Resource Concern	Previous Recommendation	Status	Comments
Recreation	The Town should maintain current open space, recreational resources, including marinas and other bayside amenities.	Not Started	The lakes are also an important recreational resource and supporting amenities. A uniform plan for maintaining Lake Comegys and Silver Lake should be included as part of planning to maintain the quality of life and recreation assets

Table 10-5 Recommendations on riparian habitats and buffers made in 2018 2018 Town of Dewey Beach 2018 Town of Dewey Beach Comprehensive Land Use Plan

Resource Concern	Previous Recommendation	Status	Comments
Recreation & Urban Forestry	Continue to advance existing urban forestry planning and implementation effort	Not Started	Urban forestry planning should be extended to include the areas around the lake margins including any recreational areas associated with the lakes

10.3 Evaluation

Results of recreation surveys conducted by state between 2002 through 2016 indicate that the following activities are in the top ten recreational activities in Delaware.

- Fishing
- Hiking
- Picnicking
- Gardening
- Walking
- Jogging
- Using playgrounds

Additionally, canoeing, kayaking, and bird/wildlife viewing are in the top 15 activities. These activities can be pursued along the shores of Silver Lake and of Lake Comegys. These results highlight the importance of Silver Lake and Lake Comegys to the City of Rehoboth, Town of Dewey Beach, and Sussex County, Delaware. All partners recognize the importance of these features in their planning documents, with goals and recommendations for preserving open space, maintaining tree-lined green belts and urban forests and establishing greenways and areas of unbroken vegetation set aside primarily for conservation and recreational use. Investing in recreational opportunities at Silver Lake and Lake Comegys will improve the quality of life for residents and experience of tourists.

10.4 Recommendations/Goals Related to Recreation

The partners should continue to manage recreation at Silver Lake and Lake Comegys in accordance with the goals and priorities of the SCORP as appropriate (DNREC 2018). Additionally, the following short-term and long-term actions are recommended.

Short Term (< 5 years)

- Inventory existing recreation uses and extent of use of both lakes
- Survey the public to identify public perception of recreational uses of the lakes
- Explore the funding opportunities referenced the 2018-2023 SCORP for recreational resources. These include:
    - Federal Land and Water Conservation Fund Program https://www.doi.gov/lwcf
    - Outdoor Recreation, Parks, and Trails Program https://dnrec.alpha.delaware.gov/parks/planning/recreation-parks-trails/

- Recreational Trails Program https://recreationaltrailsinfo.org/about/

Long-term (> 5 years)

- Integrate planning for maintenance of the aesthetic quality and recreational benefits of the lakes into planning for municipal economic development plans
- Continue to develop the Lakes Management Plan to pursue ways to overcome constraints that inhibit cooperation among the jurisdictions to develop recreational and greenway areas around the lakes.
- Continue to develop the Lakes Management Plan to pursue ways to overcome constraints that State, County, and municipal regulations, or policies may impose on the development of recreation and or habitat protection areas around the lakes.

11 Summary of Short-Term and Long-term Goals

This Lakes Management Plan provides recommendations for the short- and long-term goals for the partners, in order to achieve the plan's objectives (summarized below). Partners and stakeholders should add to, revise, and refine the goals over time as necessary to achieve the plans objectives as progress is made or as priorities shift over time. The ultimate objectives of the plan include the following:

1. Investigate the hydrology of the watershed and the hydrological connection between the two lakes, to support the water level management plan.
2. Address lake level management, to include flooding into the basements on the south and east end and too little water in northwest reach, which results in lake becoming a mud flat and an impediment to recreation.
3. Address shoreline management including for the riparian buffer. Additionally, develop invasive species management recommendations for Silver Lake and Lake Comegys. This will allow stakeholders to work with DNREC to address problems with phragmites, bamboo and other invasive species in order to create a more uniform, natural riparian buffer around both lakes.
4. Establish ownership and jurisdiction of the shoreline around Silver Lake and Lake Comegys using publicly available information in order to facilitate communication between property owners with the various jurisdictions and communicate the various regulations and requirements that govern development surrounding the lake.

11.1 Regulatory Review

Short Term (< 5 years)

The State, County, City of Rehoboth Beach, and Town of Dewey Beach should consider the following recommendations to standardize and unify regulatory requirements. These would be goals for the next 5 years.

- Standardize the definition of OHW with the State definition of OHW (which is similar to the Federal definition of OHW).
    - As the owner of the lakes, the State should conduct a survey to confirm the OHW elevation for both lakes.
    - Revise county and local regulations according to the State survey of OHW.
    - Use OHW to establish the desired ocean outfall-driven water level.

- Clearly identify “water dependent facilities” for consistency across jurisdictions.

Long-term (> 5 years)

The State, County, City of Rehoboth Beach, and Town of Dewey Beach should consider the following recommendations to standardize and unify regulatory requirements. These would be goals for the next 5 to 10 years.

- Project partners should develop means to coordinate permitting where jurisdictions overlap.

11.2 Riparian Habitat/Buffer and Species

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to protect or improve riparian habitat.

- Start removing invasive species around the lakes
- Develop a vegetation map of the existing riparian habitats based on aerial photointerpretation. This would be a baseline effort to identify those riparian areas that need immediate attention, provide a guide for future actions and the development for developing a more detailed map and plan (see long-term goals).
- Educate homeowners on living shoreline techniques, native plantings, and other natural methods and best practices for shoreline stabilization, development, and landscaping surrounding the lakes. The following provide educational materials, tools, and training on these topics:
    - Living shorelines
        - Delaware living shorelines - https://www.delawarelivingshorelines.org/
        - DNREC Living shorelines - https://dnrec.alpha.delaware.gov/ watershed-stewardship/ wetlands/living-shorelines/
    - Native plantings
        - University of Delaware’s Cooperative Extension Unit, Native Plants for Delaware Landscapes - https://www.udel.edu/academics/colleges/ canr/cooperative-extension/fact-sheets/native-plants-for-delaware-landscapes/
        - University of Delaware’s Cooperative Extension Unit, Liveable Ecosystems - https://www.udel.edu/academics/colleges/canr/ cooperative-extension/fact-sheets/liveable-ecosytems-model-for-suburbia/
        - Delaware Native Plant Society - https://delawarenativeplants.org/
- Explore funding opportunities such as the USFWS Partners for Fish & Wildlife, and Delaware’s Urban and Community Forestry, and DNREC’s Nonpoint Source Section 319 programs and educate homeowners about these programs, as appropriate.
    - The USFWS Partners for Fish &Wildlife Program works with private landowners to improve fish and wildlife habitat on their lands. The program provides technical and financial assistance to private landowners to assist with

projects that conserve or restore native vegetation, hydrology, and soils to provide an important habitat for rare, declining, or protected species.
    - Delaware's Urban and Community Forestry Program is dedicated to preserving and enhancing Delaware's community forests, which play a critical role in quality of life.
    - The DNREC Nonpoint Source Program administers a competitive grant program made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source pollution in Delaware.

Long-term (> 5 years)

Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect and restore riparian habitat.

- Ground-truth and update the vegetation map previously created with aerial photointerpretation.
- Use the ground-truthed vegetation map to develop uniform shoreline and riparian management recommendations across the jurisdictions.
- Use the ground-truthed vegetation map to develop location/site specific invasive species management recommendations.

11.3 Aquatic Habitat and Species

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to protect or improve aquatic habitat and species.

- Develop short-term (identify baseline conditions on site) and long-term monitoring plans.
    - A line intercept macrophyte survey, with established transects as described in Madsen (1999) or similar (see Section 5.3)
    - Fisheries population survey (Table 5.4)
- Conduct short-term monitoring of aquatic vegetation and the fishery to establish baseline conditions.
- Identify funding to conduct long-term monitoring, e.g., the SWG.
- Work with SOLA3 and the University of Delaware to develop a plan and identify funding to expand the citizen science monitoring program.
- Work with stakeholders to develop a website to publish the monitoring results.
- Provide homeowners with recommendations to reduce the environmental impacts of docks and gazebos such as the following recommendations from Kelty and Bliven (2003):
    - Reduce shading by using decking materials such as grating or adding light tunnels or reflective materials on the deck bottoms. Where possible reduce the width of the decking or increase the height above the water.
    - "Consider alternatives to *[chromated copper arsenate]* CCA-treated lumber."

Long-term (> 5 years)

Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect or improve aquatic habitat and species.

- Conduct long-term monitoring to assess long-term trends in aquatic vegetation and the fisheries populations, so that problems can be identified.
- Expand the citizen science monitoring program.

11.4 Water Quality

Short Term (< 5 years)

Over the next 5 years, the sponsors should consider working towards the following recommended goals to understand baseline conditions.

- Create a joint public-private "task force" to guide the implementation of this plan.
- Develop short-term (identify baseline conditions on site) and long-term water quality monitoring plans. Further develop the water quality sampling plan initiated by the City of Rehoboth Beach in 2022.
- Conduct short-term monitoring -establish baseline water quality conditions. It is recommended that monitoring should occur in the late spring and early fall to include the parameters provided in Table 6.7
- Explore funding to conduct long-term monitoring, e.g., the SWG.
- Work with SOLA3 and the University of Delaware to develop a plan and identify funding to expand citizen science monitoring program.

Long-term (> 5 years)

- Over the next 5 to 10 years, the sponsors should consider working towards the following recommended goals to protect and improve water quality. Conduct long-term water quality monitoring and analyze trends
- Expand citizen science monitoring program
- Develop a plan to identify and address the areas of water quality concerns

11.5 Stormwater Management

Short-Term (< 5 years)

The following short-term goals will be aimed at completing data gaps.

- Compile single comprehensive database for detailed GIS/mapping information on stormwater system and outfalls for all jurisdictions to allow full understanding of inputs to both lakes.
- Identify outfalls that are potential largest contributors of nutrients/sediment/flow.
- Identify representative vegetation/residential drainage areas to reduce to manageable number for sampling/monitoring).
- Develop/update stormwater sampling plan to establish existing conditions including lab samples/nutrients, sediment, flow rates, frequency.

- Investigate combined jurisdictional stormwater infrastructure maintenance plans.
- Investigate combined jurisdictional stormwater management fee structure

Long-term (> 5 years)

The following long- term goals are aimed at continued management of the lakes.

- Revisit previous stormwater monitoring efforts, including further monitoring of stormwater conditions across several storm events to compile observed data to determine efficiency of improvement projects, and for calibration of hydrologic/nutrient modeling efforts in later phases
- Complete/update hydrologic and nutrient load modeling
- Prioritize/re-prioritize outfalls for potential stormwater treatment efforts following completed projects since 2020 Rehoboth Beach Comprehensive Development Plan adoption
- Develop annual/seasonal stormwater monitoring plan, including lab samples/nutrients, sediment, flow rates, frequency.
- Re-assess priority outfalls for potential stormwater treatment efforts, as necessary, as projects are completed.
- Continue to develop public education/outreach for combined community, including consistent educational materials across jurisdictions.
- Ensure sea-level change analysis is required for all proposed stormwater infrastructure projects, potentially through regulation updates.

11.6 Lake Water Levels

Short Term (< 5 years)

The following goals are meant to compile data necessary to establish baseline data, inform future modeling efforts, and further understanding of water level management options.

- Collect continuous water level data via water level gages at Silver Lake, Lake Comegys, and the Ocean outfall to establish current range of water levels and inform future modeling efforts. Recommend continuous data loggers (e.g., Solinst Levelogger series, or equivalent) to capture sub hourly fluctuations.

- Complete bathymetric survey for entire lake system (Silver and Comegys) to establish baseline data for future modeling efforts. Recommend bathymetry collected and processed using dual frequency sounder to allow differentiation between water depth and top/bottom of unconsolidated sediment. Bathymetric survey should also be tied to NAVD88 vertical datum.

- Complete survey/assessment of existing outfall structure tied to NAVD88 vertical datum, including sedimentation within ocean outfall pipe
- Compile basement identification/homeowner outreach survey (type of basement, e.g., full vs. crawl space, etc.), followed by basement elevation surveys, or assumptions based on LIDAR data for all structures within identified range of water levels

Long-term (> 5 years)

The following goals are meant to build on data collection efforts to complete further analysis toward informing lake level management.

- Develop hydrologic modeling, water budget, and sediment budget to support water level management analysis
- Investigate options to manage lake level (e.g., changes to outlet structure, dredging, individual basement changes, etc.) with the goal of balancing competing interests.
- Develop recommendations for repeat bathymetric surveys to determine changes in deposition, dredging efficacy and inform dredging frequency recommendations
- Develop comprehensive Water Level Management Plan, including concepts for outlet structure modifications (if recommended).

11.7 Real Estate and Jurisdiction

The following short-term actions are recommended to address real estate concerns surrounding Silver Lake and Lake Comegys.

Short Term (< 5 years)

- Communicate with the owners of all parcels adjacent to the lakes about the benefits of riparian buffer conservation, best management practices for lawn maintenance, and techniques to make docks and gazebos more environmentally friendly.

11.8 Recreation

Short Term (< 5 years)

- Inventory existing recreation uses and extent of use of both lakes
- Survey the public to identify public perception of recreational uses of the lakes
- Explore the funding opportunities referenced the 2018-2023 SCORP for recreational resources. These include:
    - Federal Land and Water Conservation Fund Program https://www.doi.gov/lwcf
    - Outdoor Recreation, Parks, and Trails Program https://dnrec.alpha.delaware.gov/parks/planning/recreation-parks-trails/
    - Recreational Trails Program https://recreationaltrailsinfo.org/about/

Long-term (> 5 years)

- Integrate planning for maintenance of the aesthetic quality and recreational benefits of the lakes into planning for municipal economic development plans

- Continue to develop the Lakes Management Plan to pursue ways to overcome constraints that inhibit cooperation among the jurisdictions to develop recreational and greenway areas around the lakes.
- Continue to develop the Lakes Management Plan to pursue ways to overcome constraints that State, County, and municipal regulations, or policies may impose on the development of recreation and or habitat protection areas around the lakes.

12 Stakeholder Coordination

[This section will be completed following the Public Meeting to be held June 28, 2023.]

13 References

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Appendix A:

Ocean Outfall Agreement between New Jersey Department of Transportation and DNREC

DNREC Ocean Outfall Agreement.pdf

Appendix B:
Stormwater and Erosion Control Regulations by Jurisdiction

Sussex County, DE / Part II, General Legislation Chapter 90, Sediment Control and Stormwater Management

Sussex County_Sediment Cor

City of Rehoboth Beach, DE/ The Code / Part II: General Legislation / Building Construction

Rehoboth Stormwater Managen

Town of Dewey Beach, DE / The Code / Part III: Land Use and Zoning / Zoning

Town of Dewey Stormwater managen

Appendix C:
Previous Stakeholder Recommendations

SOLA3

- Develop a comprehensive stormwater management plan (unfinished from CDP 2010 and CDP 2015). A comprehensive plan will allow better prioritization of City fiscal resources toward its most significant issues. Many components of a plan have been, or are being completed, but a comprehensive plan would tie them all together and fill in the voids. Such a plan must include:
  a) the installation of appropriate filters, stormceptors, sediment and trash traps in existing and new storm drainpipes, and perforated pipes for new storm drainpipes to allow stormwater to infiltrate back into the ground. Funding can be sought through State and Federal grants [GHD Report, May 2016]
  b) remediation of the stormwater infrastructure in the many areas of the City where it is inadequate to handle severe rain events, leading to large pools of standing water and some basement flooding. Also, Bayard Ave. is an undersized basin; a preliminary engineering report prepared by a consultant to the City indicated potential upgrades to that system.
- Continue the stormwater system cleaning and assessment program until the entire system has been inspected, repairs prioritized, and the system rehabilitated and integrated into the comprehensive stormwater management plan.
- Consider creating a stormwater utility, with 1) a dedicated funding stream and 2) a dedicated staff to oversee stormwater issues.
- Determine the source of the high bacteria flowing into the lakes and ocean from stormwater and adopt appropriate ordinances and policies to provide the resources to minimize and/or eliminate higher than acceptable (by DNREC standards) levels of the bacteria that cause beach advisories to be issued.
- The City of Rehoboth Beach shall adopt an amendment to Chapter 102 of Building Code to require timed inspections and monitoring BMPs at constructions sites for sediment and erosion control, issue a stop order when not in compliance and allow 5 days for repairs for those not in compliance, and impose a daily fine for those who do not make repairs after 5 days. Staff time to oversee this should be funded through added cost for a building permit.
- The City of Rehoboth Beach shall adopt an amendment to Section 105.8 of the City code to implement practices to reduce stormwater runoff caused by transporting construction and demolition site wastes from construction sites that may contaminate surface or ground water; and in the event of a spill, control the source of the spill, remediate and properly dispose of hazardous substances. It shall require that the site will be monitored by City and if found to be not in compliance, the City will issue a stop order and the contractor will have 5 days to be in compliance. After 5 days, the City will impose a daily fine while not in compliance. Staff time to oversee this can be paid for by funded through added cost for a building permit.

- Adopt an ordinance that amends the Building Code to require that rainwater and water from lawn watering systems, which carry contaminants and silt into stormwater drains, be retained on all properties. [Recommended in the City's Lakes Report.]
- Relative to applications for permits to develop lots that are over 5,000 square feet, conduct a review of Delaware Sediment and Stormwater regulations to determine if they provide adequate protections for the natural environment and public and private properties.
    - SOLA3 has observed that the Conservation District has grandfathered prior approved sediment and stormwater plans for a new construction site within the City of Rehoboth Beach that is over 5,000 square feet that are less restrictive than the new regulations. Conservation District staff has verified that municipalities have the authority to provide their own, more effective sediment and stormwater regulations. So, if it is found that the state regulations are inadequate, the City shall adopt its own regulations to provide the necessary protections. Funding for this review could be done through increasing building permit fees.
- Undertake a vigorous campaign to educate business owners and citizens on the harmful effects of single-use plastics on the environment.
- Undertake a vigorous campaign to educate business owners on the harmful effects of not properly storing their solid waste and of improperly cleaning their equipment so that the resulting effluent flows into storm sewers, contributing to the high bacteria count in the Rehoboth Avenue storm sewer, which eventually finds its way into the lakes and ocean.
- Secure federal and state grants, supplemented with an approved capital improvement budget in FY 2021-22 budget, to provide professional assistance to design and install a citywide green infrastructure. DNREC and the EPA recommendations describe "natural systems or green infrastructure" to protect property, the natural environment, the health of water bodies, and the public from flooding as:
    - Green streets, alleys, and parking lots: integrating various green infrastructure elements—such as Permeable Pavement, Bioswales, Planter Boxes, and Trees—so as to store, infiltrate, and evapotranspire stormwater.
    - Downspout Disconnection: rerouting rooftop drainage into rain barrels, cisterns, or permeable areas. Used to store stormwater or allow stormwater to infiltrate the soil.
    - Rainwater Harvesting: collecting and storing rainfall for later use, effectively slowing and reducing runoff.
- Strengthen the regulations regarding the planting and replacement of trees removed during development.
- Partnering with SOLA3, provide a citizen education campaign for residents, visitors and businesses on how their activities impact the water quality and aesthetics of our lakes and the environment [from 2015 CDP and GHD report May 2016].
- Assess a stormwater or environmental impact fee for property owners to fund stormwater and infrastructure improvements, as other municipalities have done, such as Lewes and Newark.
- Provide an incentive to property owners, such as a tax credit, to install such green remedies as downspout disconnection, rain barrels, rainwater harvesting, rain gardens,

permeable surfaces, and riparian buffers. These improvements are also eligible for SOLA3's Lakes Improvement Matching Grant.

Appendix D:
05 August 2022 Rehoboth Water Quality Sampling Results

TheCityofRehobothBeach-SilverLake-Wate

Appendix E:

Property and Owner Information for Parcels within 300 feet of Silver Lake and Lake Comegys

Silver Lake Lake Comegys Properties_\