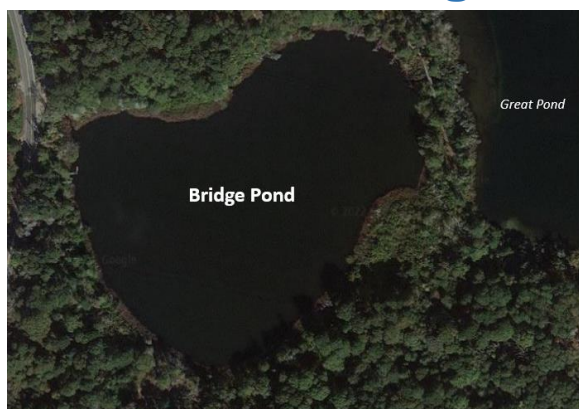


Bridge Pond, Eastham MA



Setting

Pond Size: 6.7 acres; Maximum Depth: 20 ft.

Watershed Size: 7.9 acres

Public Access: Herring Brook Road to walking trails in conservation area and Wiley Park.

Uses: Wildlife viewing; herring run; fishing. No boat launches or developed beaches.

Fish community: warm water

Data: PALS, Eichner (2009), EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Stable water quality conditions, 2009-2021
- Hydrologically connected to Great Pond (inflow) and Herring Brook (outflow)

- Pond bordered by park/conservation lands, Herring Brook Road only development. No residences within 100 m of pond
- Increasing trend in dissolved oxygen
- Possible sediment release of phosphorus
- Potential external phosphorus sources: birds, precipitation, roads, Great Pond

Outlook for Future

- Watershed likely to remain undeveloped

Recommended Actions

Watershed Best Management Practices

- Manage Great Pond phosphorus concentrations
- Maintain vegetated shoreline
- Discourage large flocks of birds
- Control road runoff



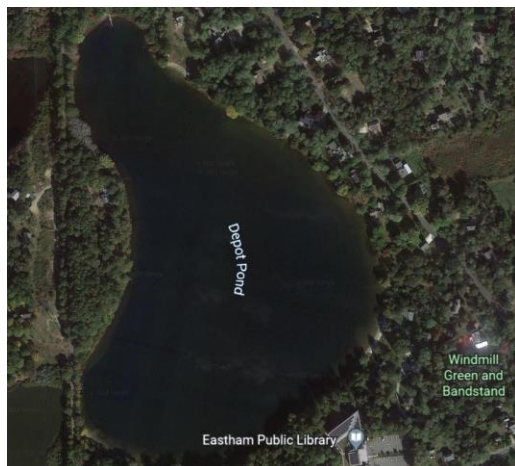
Bridge Pond Water Quality Summary

Water Column	Parameter	Result ¹	“Healthy” Ponds Thresholds ²
Upper Waters	Total Phosphorus	21.6 µg/L	≤10 µg/L
	Chlorophyll-a	15.1 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	2.73 m	Not calculated
Lower Waters	Total Phosphorus	42 µg/L	--
	Dissolved Oxygen	4 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Depot Pond, Eastham MA



Setting

Pond Size: 27.9 acres; Maximum Depth: 33 ft

Watershed Size: 64.9 acres

Public Access: Unmarked fire road

Uses: Swimming, fishing, non-motorized boating

Fish community: cold water

Data: PALS, Eichner (2009), EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Seasonal oxygen depletion in deep waters
- Emerging trends: Increasing chlorophyll-a, decreasing total phosphorus

- Major phosphorus sources: Septic (0-44%), birds (31-38%), roads (7-25%), roofs (7-25%)
- 6 residences within 300 ft. upgradient

Outlook for Future

- Septic system contribution may increase as affected groundwater reaches the pond
- Internal sediment phosphorus loading likely to increase

Recommended Actions

In-pond measures:

- Alum treatment program
- Aeration

Watershed Best Management Practices (BMPs):

- Septic system maintenance



Depot Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	18 µg/L	≤10 µg/L
	Chlorophyll-a	13 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	3.1 m	Not calculated
Lower Waters	Total Phosphorus	28 µg/L	--
	Dissolved Oxygen	3 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Great Pond, Eastham MA



- 22 properties within 300 ft. upgradient
- Discharges to Bridge Pond; herring run from Herring Brook through Bridge Pond.

Outlook for Future

- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)
- Alum treatment continue to mitigate sediment phosphorus release

Recommended Actions

In-pond measure:

- Continue to monitor effectiveness of 2013 alum treatment program, evaluate future treatment

Watershed Best Management Practices:

- Septic system maintenance/upgrades
- Replace septic systems with sewers
- Maintain shoreline vegetative buffers

Setting

Pond Size: 109.7 acres; Maximum Depth: 36 ft.

Watershed Size: 226 acres

Public Access: Town Beach, Wiley Park, and Nickerson Conservation Area

Uses: Swimming, fishing, non-motorized boating (motorized boating by permit)

Fish community: cold water

Data: PALS, Eichner (2009), EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Positive response to 2013 alum treatment program
- Slight increasing trend in phosphorus concentrations



Great Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	19.7 µg/L	≤10 µg/L
	Chlorophyll-a	9.3 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	2.8 m	Not calculated
Lower Waters	Total Phosphorus	27.4 µg/L	--
	Dissolved Oxygen	2.1 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency and dissolved oxygen, 2014-2021 (post alum treatment)

²Cape Cod Commission 2003, Table 5.

Herring Pond, Eastham MA



Setting

Pond Size: 44.2 acres; Maximum Depth: 35 ft.

Watershed Size: 79.8 acres

Public Access: Town Beach

Uses: Swimming, fishing, boating

Fish community: cold water

Data: PALS, Eichner (2009), EcoLogic 2011,
Provincetown Center for Coastal Studies

Current Conditions

- Positive response to 2012 alum treatment, large increase in Secchi disk transparency readings
- Dissolved oxygen concentrations increasing in deep waters

- 20 leach fields within 300 ft. (upgradient)

Outlook for Future

- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

Recommended Actions

In-pond treatment:

- Continue to track effectiveness of 2012 alum treatment program, consider repeating treatment

Watershed Best Management Practices (BMPs):

- Septic system maintenance
- Residential and lawn practices



Herring Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	16.8 µg/L	≤10 µg/L
	Chlorophyll-a	9.6 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	4.2 m	Not calculated
Lower Waters	Total Phosphorus	28.6 µg/L	--
	Dissolved Oxygen	6.7 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2013-2021 (post alum treatment)

²Cape Cod Commission 2003, Table 5.

Jemima Pond, Eastham MA



Setting

Pond Size: 6.4 acres; Maximum Depth: 15 ft.

Watershed Size: 17.9 acres

Public Access: Samoset Road bathing beach

Uses: Swimming, fishing, non-motorized boating

Fish community: warm water

Data: PALS, Eichner (2009), EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Stable water quality conditions, 2003-2021
- Well-mixed water column, no evidence of dissolved oxygen depletion
- Six residences within 300 ft. upgradient
- Possible phosphorus sources: birds, septic, precipitation, road runoff

Outlook for Future

- Phosphorus concentrations in pond may increase as discharges from septic systems reach the pond (time of travel in groundwater estimated 35-81 years)
- Phosphorus concentrations in pond may increase if road runoff is not controlled.

Recommended Actions

Watershed Best Management Practices (BMPs):

- Maintain or upgrade septic systems
- Maintain vegetated shoreline
- Discourage large flocks of birds
- Control road runoff



Jemima Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	23.7 µg/L	≤10 µg/L
	Chlorophyll-a	10.6 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	2.7 m	Not calculated

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, and Secchi disk transparency, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Little Depot Pond, Eastham MA



Setting

Pond Size: 2.3 acres; Maximum Depth: 10 ft.

Watershed Size: 2.3 acres

Public Access: Samoset Road or Rail Trail.

Uses: Wildlife observation, aesthetics, swimming, fishing, non-motorized boating

Fish community: warm water

Data sources: PALS, EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Impacted by human activities
- Water column well-mixed
- Possible phosphorus sources: birds, septic, precipitation, road runoff (Samoset)

Outlook for Future

- Phosphorus concentrations in pond may increase as discharges from septic systems slowly reach the pond (time of travel in groundwater estimated 35-81 years)
- Phosphorus concentrations in pond may increase if road runoff is not controlled.

Recommended Actions

Watershed Best Management Practices:

- Maintain/upgrade septic systems
- Retain vegetated shoreline
- Discourage large flocks of birds
- Reduce road runoff



Little Depot Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	50 µg/L	≤10 µg/L
	Chlorophyll-a	28.6 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	1.3 m	Not calculated
Lower Waters	Total Phosphorus	92 µg/L	--
	Dissolved Oxygen	1.7 mg/L	--

¹Annual average results (PALS) - total phosphorus, Secchi disk transparency, dissolved oxygen, and chlorophyll-a, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Minister Pond, Eastham MA



Setting

Pond Size: 16.8 acres; Maximum Depth: 13 ft.

Watershed Size: 151 acres

Public Access: “Fisherman’s Launch” at Schoolhouse Pond

Uses: Swimming, fishing, non-motorized boating

Fish community: warm water

Data: PALS, Eichner 2009, EcoLogic 2011, SOLitude, Provincetown Center for Coastal Studies

Current Conditions

- Town implementing in-lake remedial measures (aeration, hydroraking) and watershed protective measures (green infrastructure) with SOLitude and Horsley-Whitten group.
- Dissolved oxygen increased in lower waters

- Major phosphorus sources: Roads (29-60%), septic (0-45%); sediment not quantified
- Hydrologically connected to Schoolhouse (pictured to the left)

Outlook for Future

- Internal (sediment) phosphorus loading will continue to adversely affect water quality unless addressed
- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

Recommended Actions

In-Lake Measures

- Aeration or alum treatment

Watershed Best Management Practices (BMPs):

- Septic system maintenance
- Maintain vegetated shoreline
- Mitigate roadway runoff



Minister Pond Water Quality Summary

Water Column	Parameter	Result ¹	“Healthy” Ponds Thresholds ²
Upper Waters	Total Phosphorus	30.2 µg/L	≤10 µg/L
	Chlorophyll-a	17.4 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	1.76 m	Not calculated
Lower Waters	Total Phosphorus	51.4 µg/L	--
	Dissolved Oxygen	3.13 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency and dissolved oxygen, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Schoolhouse Pond, Eastham MA



Setting

Pond Size: 6.8 acres; Maximum Depth: 13 ft.

Watershed Size: 5.7 acres

Public Access: Launch off Schoolhouse Road

Hydrology: Connected to Minister Pond

Uses: Swimming, fishing non-motorized boating

Fish community: warm water

Data: PALS, Eichner 2009, EcoLogic 2011, SOLitude, Provincetown Center for Coastal Studies

Current Conditions

- Contractors to the Town are implementing in-lake remedial measures (aeration, hydroraking) and watershed protection

- Water quality conditions are stable
- Primary phosphorus sources: Birds (26-46%), roads (18-26%), precipitation (14-21%); flow from Minister Pond

Outlook for Future

- Need to continue aeration and hydroraking to maintain recreational and aesthetic use

Recommended Actions

In-lake Measures

- Aeration, hydroraking
- Feasibility analysis of alum treatment

Watershed Best Management Practices (BMPs):

- Septic system maintenance
- Green infrastructure



Schoolhouse Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	29.7 µg/L	≤10 µg/L
	Chlorophyll-a	18.4 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	1.4 m	Not calculated
Lower Waters	Total Phosphorus	56.8 µg/L	--
	Dissolved Oxygen	2.6 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Moll Pond, Eastham MA



Setting

Pond Size: 3.4 acres; Maximum Depth: 12 ft.

Watershed Size: 8.1 acres

Public Access: None

Uses: Swimming, fishing, non-motorized boating

Fish community: warm water

Data: PALS, Eichner 2009, EcoLogic, Provincetown Center for Coastal Studies

Current Conditions

- Occasional occurrence of low oxygen conditions in deeper waters
- Possible phosphorus sources: birds, septic, precipitation, road runoff

- The 2018-2020 Priority Waterbodies List cites as impaired by cyanobacteria (HABs)

Outlook for Future

- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

Recommended Actions

Watershed Best Management Practices (BMPs):

- Maintain or upgrade septic systems
- Maintain vegetated shoreline
- Discourage large flocks of birds
- Control road runoff



Moll Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	30.5 µg/L	≤10 µg/L
	Chlorophyll-a	18.4 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	2.2 m	Not calculated
Lower Waters	Total Phosphorus	41.6 µg/L	--
	Dissolved Oxygen	5.9 mg/L	--

¹Annual average results (PALS) - total phosphorus, Secchi disk transparency, dissolved oxygen, and chlorophyll-a, 2012-2021.

²Cape Cod Commission 2003, Table 5.

Muddy Pond, Eastham MA



Setting

Pond Size: 10.5 acres; Maximum Depth: 5 ft.

Watershed Size: 39.9 acres

Public Access: None; private beach

Uses: Swimming, fishing, non-motorized boating

Fish community: warm water

Data: PALS (through 2015), Eichner 2009, EcoLogic 2011

Current Conditions

- Impacted by human activities
- Dense aquatic plant growth

- Primary phosphorus sources: Roads (21-45%), septic (0-38%), birds (17-21%), precipitation (10-21%)
- 5 residences within 300 ft. upgradient

Outlook for Future

- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

Recommended Actions

In-pond measures:

- Aquatic plant management
- Resume sampling and monitoring

Watershed Best Management Practices (BMPs):

- Septic system maintenance
- Shoreline protective measures



Muddy Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	43.9 µg/L	≤10 µg/L
	Chlorophyll-a	24.6 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	1.1 m	Not calculated

¹Annual average results-PALS- Total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2012-2015.

²Cape Cod Commission 2003.

Widow Harding Pond, Eastham MA



Setting

Pond Size: 8.7 acres; Maximum Depth: 13 ft.

Watershed Size: 25.9 acres

Public Access: Walking trails in conservation area and Wiley Park

Uses: Wildlife viewing, swimming, fishing, non-motorized boating

Fish community: warm water

Data: PALS (through 2017), Eichner 2009, EcoLogic 2011, Provincetown Center for Coastal Studies

Current Conditions

- Impacted by human activities
- Transient stratification and low dissolved oxygen

- Possible phosphorus sources: birds, septic, precipitation, and road runoff.

Outlook for Future

- Septic system contribution will increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

Recommended Actions

Watershed Best Management Practices (BMPs):

- Resume sampling and monitoring
- Maintain or upgrade septic systems
- Maintain vegetated shoreline, minimize open lawn areas leading to water's edge
- Discourage large flocks of birds
- Control road runoff



Widow Harding Pond Water Quality Summary

Water Column	Parameter	Result ¹	"Healthy" Ponds Thresholds ²
Upper Waters	Total Phosphorus	32.68 µg/L	≤10 µg/L
	Chlorophyll-a	18.08 µg/L	≤1.7 µg/L
	Secchi Disk Transparency	1.89 m	Not calculated
Lower Waters	Total Phosphorus	28.69 µg/L	--
	Dissolved Oxygen	5.08 mg/L	--

¹Annual average results (PALS) - total phosphorus, chlorophyll-a, Secchi disk transparency, and dissolved oxygen, 2012-2017.

²Cape Cod Commission 2003, Table 5.