

## Water Resources

Readfield's 32 square miles of lakes, streams, forests, and farmland provide many benefits to residents and the community as a whole – the natural beauty draws visitors to vacation here, soils grow food crops and timber, and the ecosystems provides habitat for a diversity of wildlife. Preserving Readfield's water resources is paramount in preserving the natural, rural character of the community. After all, the location and function of these resources have historically shaped the community's pattern of development, necessarily limiting growth in certain areas, while encouraging it in others. Healthy ecosystems are vital in sustaining healthy and prosperous communities – and Readfield's goals and priorities reflect this.

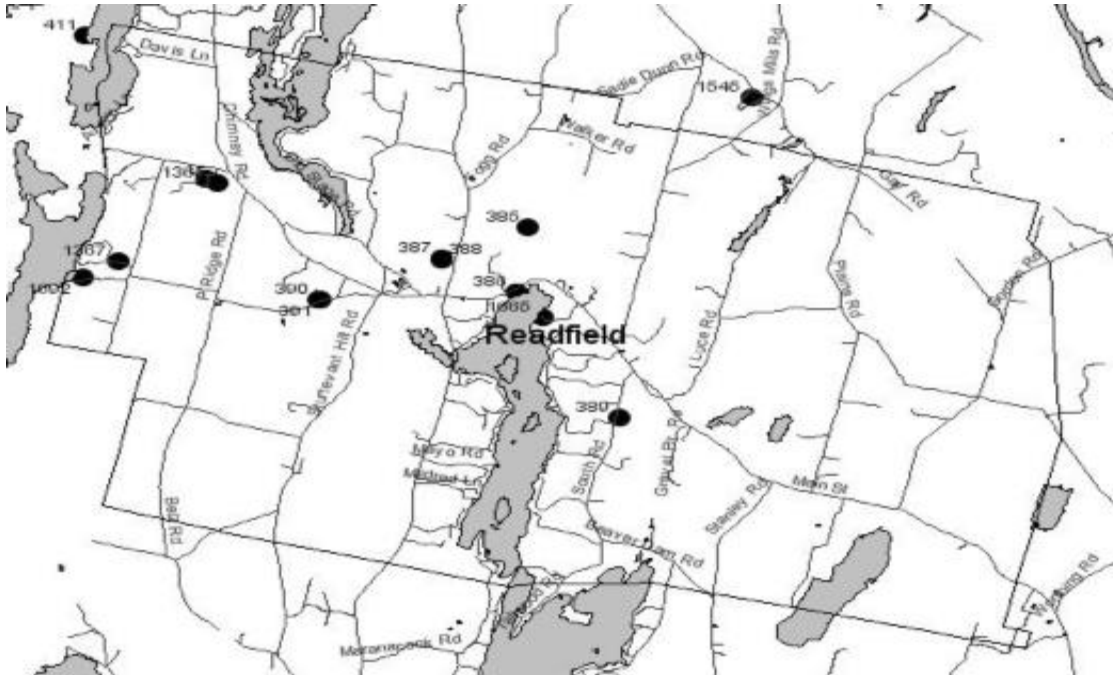
### Groundwater:

There is one significant sand and gravel aquifer in Readfield according to the Maine Geological Survey. The aquifer has an estimated yield of 10 to 50 gallons per minute and is located in the vicinity of the wetlands adjacent to the Beaver Brook outlet to Maranacook Lake. The remainder of the town has a moderate to low potential groundwater yield according to the Maine Geological Survey.

Groundwater also serves several public water supplies in Readfield. A "public water supply" is defined by state statute as one that serves 15 or more individual hookups or 25 or more persons from a single source. Public water supplies are further classified based on whether they serve the general community or individual populations. There are eight public water supplies for Readfield, as listed by the Maine Department of Human Services, Bureau of Health Drinking Water Program (DWP). They are shown on Figure 1 and detailed below.

- Kents Hill School, non-transient, non-community system. Two drilled wells, one 466' deep, one 488' deep. Each yield approximately 25 gallons per minute.
- Kirkwold Camp, non-community system, serving seasonal camp. 400' drilled well
- Menatoma Association, non-community system, serving seasonal camp. Bedrock well.
- RSU 38 Maranacook Community School, non-transient, non-community system, bedrock well.
- RSU 38 Readfield Elementary School, non-transient, non-community system. 193' bedrock well.
- Readfield Corner Water Association, Inc., two community wells, one 300' and one 401', both drilled into bedrock. 8" casing.
- Saunders Manufacturing Company, non-transient, non-community system, two wells, one 200', one 800'.
- Weathervane Restaurant, non-community system, serving restaurant. Drilled, bedrock well 208".

**FIGURE 1: READFIELD PUBLIC WATER SUPPLY WELL LOCATIONS**



Source: Provided by USDA, MEGIS, Maine DACF

The DWP promotes the establishment of wellhead protection planning for public water supplies. Plans are prepared by the well owners but should be done with the cooperation of the town. A minimum 300-foot radius of restricted land uses around a wellhead (more for larger systems) is recommended. The DWP provides source water assessments for public water supplies in Maine towns. The DWP supplied maps showing potential threats to public water sources; the *Public Water Sources Map* in the Appendix shows these.

Activities that have potential to contaminate groundwater include gravel mining, salt storage, waste disposal, underground storage tanks, industrial/commercial activities, junkyards, agriculture, and failing septic systems.

Readfield is not a newcomer to the issue of groundwater pollution. Several incidences of groundwater pollution have occurred in the last 40 years – most commonly, leaking from fuel tanks and two cases of illegal discharges from industrial businesses.

Maine’s Department of Environmental Protection administers the Underground Storage Tank (UST) program. This program is responsible for protecting public health and the environment. The rules and regulation in this program include registering, tracking, monitoring, and inspection of underground storage tanks. The requirements of the DEP’s UST program reflect the broader Environmental Protection Agency’s federal regulations for underground storage tanks.

Readfield is proactive in protecting groundwater and surface water supplies and their recharge areas through regulatory requirements. The Land Use Ordinance (LUO)

provides regulatory language and specific requirements for new and existing development. The Land Use Ordinance is reviewed and updated regularly (most recent update was Jun 2022). It incorporates and reflects the state's most updated version of the Shoreland Zoning Regulations. Readfield also has a Floodplain Management Ordinance (6/2011) and a Sludge Ordinance (6/2011).

The town also has a requirement of filing a septic inspection report with the town as well as with the state for any transfer of title within a shoreland zone. This purpose of this requirement is to provide the town with readily available documentation on the status and condition of septic systems within the shoreland zone.

There is potential for numerous natural elements to contaminate private well water, causing health concerns. Two known environmental contaminants present in Readfield are Arsenic (As) and Radon (Rn). Both are known carcinogens that can be found in almost any drinking water supply throughout Maine, with certain towns having a higher documented concentration than others. Both Arsenic and Radon are naturally occurring in the environment, although Arsenic can also be the result of human activities such as industrial and agricultural practices. The state and town can offer guidance for residents on dealing with these environmental contaminants.

Another well water contaminant that is not naturally occurring are Per- and Polyfluoroalkyl Substances (PFAS). Historically, these man-made chemicals were used in many different applications and products. Because of how slowly they breakdown and their persistence in the environment, they have earned the name "forever chemicals". PFAS have been documented in agricultural sites, drinking water supplies, landfills, wastewater, sludge and septage spreading sites, and remediation and cleanup sites. As this contaminant is a more recently emerged concern than Radon and Arsenic, the United States Environmental Protection Agency has yet to determine a Maximum Contamination Level (MCL). Standards and guidelines are still coming available to Maine residents.

Readfield encourages residents to test their well water based on the standards set forth in the Division of Environmental and Community Health's Private Well Water Safety and Testing.

### **Municipal Amenities:**

Readfield does not have municipal water or sewer facilities. Private or community wells and subsurface wastewater disposal facilities are used throughout the community, however there is a small, privately owned water system in Readfield Corner that supplies water for approximately 20 homes. Maine Department of Environmental Protection holds an agreement that regulates the size of the system; for that reason, it has limited potential for expansion. Town-wide, the long-term plan is for the continued use of private water and subsurface wastewater disposal systems.

## **Surface Waters:**

The interconnected system of surface waters begins as tiny brooks in the upper reaches of watersheds and flows through a system of streams, ponds, and wetlands ultimately reaching the sea. In the surface drainage system, runoff also collects temporarily in wetlands and on flood plains. Readfield participates in the Federal Flood Insurance Program by exercising local control over development in floodplains, but these are relatively minor.

Many land uses and other practices can impact surface water quality, as stated above. In fact, any land use, when managed improperly, can accelerate the process of eutrophication, which is foreshadowed by algae blooms in water bodies. Readfield's water bodies, their water qualities, and classifications are detailed below.

## **Streams:**

There are approximately 37 streams and brooks in Readfield. When all tributaries are taken into account, the streams represent 25 miles of moving water. In addition to enhancing the scenic landscape, moving water provides a unique habitat for a number of species and plays an essential role in the drainage of land areas during storm or snow melt events. Streams also serve as the flushing and refill conduits for the larger open water bodies to which they are connected.

The state has four classes for freshwater rivers and streams: AA, A, B, and C. All streams and brooks in Readfield are Class B. The classification system should be viewed as a hierarchy of risk, more than for use or quality assessment, the risk being the possibility of a breakdown of the ecosystem and loss of use due to either natural or human-caused events. Ecosystems that are more natural in their structure and function can be expected to be more resilient to a new stress and to show more rapid recovery.

Class B water bodies are suitable for drinking water supply, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation, navigation and an unimpaired habitat for fish and other aquatic life.

The Map of *Water Resources* (Appendix) shows Readfield's streams, lakes, ponds and wetlands. Most streams are bounded by the Stream Protection District. The Stream Protection District establishes a 75-foot building setback from the stream high water mark. Standards in Section 8.19 of the Ordinance establish further protection.

## **Lakes and Ponds:**

Lakes and ponds are an essential part of Readfield's landscape. Large, open bodies of water provide scenic views, recreational opportunities, important fish and wildlife habitats, sources of drinking water and provide prime real estate development opportunities along their shores.

The quality of water in any lake depends on many factors including the surface area and depth of the lake; the flushing rate; the size of the watershed; the extent of development along the shore and in the watershed; the extent of agricultural activity in the watershed; and the degree to which obvious sources of pollution, such as septic effluent, sewage, agricultural fertilizers and manure are kept from entering the water body.

The state designates water bodies encompassing 10 acres or more as Great Ponds. Great Ponds and their shorelands are subject to special regulations through Shoreland Zoning and Maine's Natural Resources Protection Act. The state has one standard for the classification both of Great Ponds and of natural lakes and ponds less than 10 acres in size. This classification is GPA. The water quality attainment goal for Class GPA water bodies is that they are suitable for drinking water, recreation, fishing, hydro-electric power generation and as natural habitat for fish and other aquatic life. If a water body is not meeting its attainment goal, it is described as a "nonattainment" lake.

As with the water classification system for rivers, the classification in general should be viewed as hierarchy for risk, rather than for use or quality assessment, with the risk being the possibility of a breakdown of the ecosystem and loss of use due to either natural or human-caused events.

Readfield has seven ponds and two lakes, none of which meets the state's criteria for GPA classification. The ponds and lakes are listed and detailed below in order of size.

**Mill Pond-**

Direct Drainage Area: 516 acres (100% in Readfield)

Area: 18 acres

Maximum Depth: 8 feet

Mean Depth: 4 feet

Invasive species: unknown

Number of dams: 1

Fisheries management: warmwater

**Fish species:**

|  |  |
|--|--|
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | Brown Bullhead ( <i>Ameiurus nebulosus</i> )     |
| Yellow Perch ( <i>Perca flavescens</i> )         | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Chain Pickerel ( <i>Esox niger</i> )             | Pumpkinseed ( <i>Lepomis gibbosus</i> )          |
| White Sucker ( <i>Catostomus commersoni</i> )    |  |

Source: Lakes of Maine

There was no information available on water quality, flush rate, or level of protection for this pond. Nor was information available on plant species, mussels, crayfish, or loon counts for Mill Pond.

**Brainard Pond-**

Direct Drainage: 1,121 acres (100% in Readfield)

Area: 15 acres

Maximum Depth: 13 feet

Mean Depth: 9 feet

Invasive species: unknown

Number of dams: 0

Fisheries management: warmwater

**Fish species:**

|  |  |
|--|--|
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | Brown Bullhead ( <i>Ameiurus nebulosus</i> )     |
| Chain Pickerel ( <i>Esox niger</i> )             | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Pumpkinseed ( <i>Lepomis gibbosus</i> )          | White Sucker ( <i>Catostomus commersoni</i> )    |
| Yellow Perch ( <i>Perca flavescens</i> )         |  |

Source: Lakes of Maine

There was no information available on water quality, flush rate, or level of protection for this pond. Nor was information available on plant species, mussels, crayfish, or loon counts for Brainard Pond.

### **Bog Pond-**

Direct Drainage: 1,230 acres (80.3% in Readfield)

Area: 26 acres

Maximum Depth: unknown

Mean Depth: unknown

Number of dams: 0

Invasive species: unknown

Fisheries management: unknown

There was no information available on plant species, fish species, mussels, crayfish, or loon counts for Bog Pond.

The Lakes of Maine website did not have information on water quality, however Maine DEP listed Bog Pond's water quality category as moderate-sensitive with regard to phosphorous loading; as such, its level of protection is listed as medium. The allowable per acre phosphorous allocation (lb/acre/year) is 0.032 which means it is constrained for development.

### **Shed Pond-**

Direct Drainage: 316 acres (48.2% in Readfield)

Area: 51 acres

Maximum Depth: 10 feet

Mean Depth: 5 feet

Number of dams: 0

Invasive species: unknown

Fisheries management: warmwater

| <b>Fish species:</b>                            |  |
|---|--|
| Chain Pickerel ( <i>Esox niger</i> )            | American Eel ( <i>Anguilla rostrata</i> )        |
| Blacknose Dace ( <i>Rhinichthys atratulus</i> ) | Brown Bullhead ( <i>Ameiurus nebulosus</i> )     |
| Creek Chub ( <i>Semotilus atromaculatus</i> )   | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Pumpkinseed ( <i>Lepomis gibbosus</i> )         | White Sucker ( <i>Catostomus commersoni</i> )    |
| Yellow Perch ( <i>Perca flavescens</i> )        |  |

Source: Lakes of Maine

The Lakes of Maine website did not include information on plant, mussel, crayfish, or loon counts for Shed Pond.

### **Water Quality Assessment** (overall averages unless noted with \*)-

**Transparency:** According to the Lakes of Maine website, the water quality for Shed Pond appears to be in acceptable to good condition. The transparency is at 2.4 meter\*. Factors that reduce water clarity are algal blooms, zooplankton, water color, and silt, with algae being the most abundant. In Maine, the current overall average for transparency is 5.3 meters. Shed Pond has a better than average transparency when compared to the state average.

**Chlorophyll:** Shed Pond has a chlorophyll measure of 8.7 micrograms per liter which is equivalent to 8.7 ppb. This test measures the green pigment found in plants including microscopic algae. This measure is used to estimate algal biomass: the higher the

chlorophyll content, the higher the algae in the lake. In Maine, the average is 5.7 ppb, which is lower than measured in Shed Pond.

**Phosphorous:** Phosphorous is a major nutrient plants need for growth and is often a limiting factor; however, high phosphorous levels are often a sign of pollutants entering the waterbody. As levels of phosphorous increase, the amount of algae increases, resulting in reduced water quality. Shed Pond has a phosphorous level of 19 ppb\*; the average in Maine is 11.2 ppb.

**Color:** This measure refers to the amount of dissolved organic acids such as tannins and lignin, resulting in tea colored water. The unit of measure for color is Standard Platinum Units or SPU. Color reduces the lake's transparency and increases phosphorus readings. The average color reading in Maine is 20.1 SPU; Shed Pond has a reading of 41 SPU, higher than the average for the state.

**Alkalinity:** This is the measure of the capacity of the water to neutralize acids (buffering). A lake's ability to buffer acids is affected by the natural geology of the surrounding area, and the presence of naturally available bicarbonate, carbonate, and hydroxide ions. It is measured in mg/L. The average alkalinity is 11.1 mg/L in Maine; Shed Pond's measure of alkalinity is 15.7 mg/L.

**pH:** Similar to alkalinity, pH is the measure of acidity of the water. How acidic or basic the water is will determine which plant and animal life will be present. The measure of acidity is on a scale of 1-14 with 7 indicating neutral acidity. A one unit change in pH represents a 10-fold change in the concentration of hydrogen ions (H<sup>+</sup>), which determines the acidity of the water. The average pH in Maine is 7.23; Shed Pond has a pH of 7.07.

**Conductivity:** Specific conductivity measure the ability of the water to carry an electrical current and is directly related to the dissolved ions (charged particles) in the water. Conductivity is measured in microSiemens per centimeter. This quality is used to calculate fish yield estimates. Specific conductivity will increase if there is an increase in pollutants entering the waterbody, usually in the form of runoff from urban or residential areas and roadways. Maine's average specific conductivity is usually below 95.3 microSiemens per centimeter; Shed Pond's specific conductivity is 54 microSiemens per centimeter.

**Dissolved Oxygen:** Adequate levels of dissolved oxygen (DO) in waterbodies is essential to most life in the lake. DO is an important indicator of water quality and it influences water chemistry. DO levels are strongly affected by water temperature: warmer water is less dense and its ability to hold oxygen is reduced. Shed Pond appears to have reduced DO levels during warmer months, as expected, but the levels of DO increase in colder months.

All of the above information indicates that Shed Pond has slightly higher than average levels of phosphorous, color, chlorophyll, and alkalinity. This is an indicator that Shed Pond is danger of algal blooms.



Shed Pond is a small pond owned by Kennebec Land Trust located on Readfield's border with Manchester. The 300-acre watershed is somewhat isolated with only Gorden Road running through it. Water quality is listed as moderate-sensitive, and its level of protection is medium. Acceptable phosphorus allocation is only 0.031 (ppa), which means that it is constrained for development.

**Carlton Pond-**

Direct Drainage: 1,383 acres (92.7% in Readfield)

Area: 223 acres

Maximum Depth: 57 feet

Mean Depth: 24 feet

Invasive species: unknown

Number of dams: 1

Fisheries management: no fishery

| <b>Fish species:</b>                            |   |
|---|---|
| Banded Killifish ( <i>Fundulus diaphanous</i> ) | Brown Bullhead ( <i>Ameiurus nebulosus</i> )    |
| Chain Pickerel ( <i>Esox niger</i> )            | Rainbow Smelt ( <i>Osmerus mordax</i> )         |
| Redbreasted Sunfish ( <i>Lepomis auratus</i> )  | Smallmouth Bass ( <i>Micropterus dolomieu</i> ) |
| White Perch ( <i>Morone americana</i> )         |   |

Source: Lakes of Maine

The Lakes of Maine website did not have any information available on mussel species, crayfish species, plant species or loon counts found on Carlton Pond.

**Water Quality Assessment** (overall averages unless otherwise noted with \*)-

**Transparency:** Maine's average: 5.3m, Carlton Pond's transparency measure: 6.1m\*

**Chlorophyll:** Maine's average: 5.7 ppb, Carlton Pond's chlorophyll measure: 4.5 ppb

**Phosphorous:** Maine's average: 11.2 ppb, Carlton Pond's phosphorous measure: 11 ppb\*

**Color:** Maine's average: 20.1 SPU, Carlton Pond's color measure: 13 SPU

**Alkalinity:** Maine's average: 11.1 mg/L, Carlton Pond's alkalinity measure: 13.6 mg/L

**pH:** Maine's average: 7.23, Carlton Pond's pH measure: 6.96

**Conductivity:** Maine's average: 52.6 uS/cm, Carlton Pond's conductivity: 48 uS/cm

**Dissolved Oxygen:** Carlton Pond appears to have reduced DO levels during warmer months, as expected, but the levels of DO increase in colder months.

All of the above information indicates that Carlton Pond has slightly above average water quality when compared to state averages.

Carlton Pond, located in Readfield and Winthrop, is currently the backup water supply for the Augusta Water District, which serves up to 40,000 people per day. It discharges into Upper Narrows Pond, the primary water supply for the town of Winthrop.

Of the 10 lakes and ponds located wholly or partially in Readfield, only Carlton Pond is presently being used as a source of public drinking water. The Augusta Water District pumps approximately 2.2 million gallons of water from several sources each day. Though Carlton Pond water was formerly the primary source, Cobbosseecontee Lake is used as well as several deep wells. The district has a filtration plant to treat all water.

The watershed of the pond is well protected. Between 1905 and 1908 the district purchased approximately 600 acres of land in Readfield and 50 acres in Winthrop and since that time has owned the entire perimeter of the pond. Today the District owns 710 acres surrounding Carlton Pond. According to Brian Tarbuck of the District, there are no current plans to sell or develop any of the district's ownership. It is currently listed as Tree Growth and managed for timber production. Portions of the watershed are also a state game preserve and public access to the pond is highly restricted. The district also owns and operates the dam controlling the pond's water level, which is located at the outlet in Winthrop.

Carlton Pond is on the DEP's Non-Point Source Priority Watershed Listing as a Threatened Lake because it is licensed by the Maine CDC Drinking Water Program as a public water system with a lake or pond as the surface water source. The DEP lists the pond as moderate-sensitive with a high level of protection for phosphorous loading. Its allowable phosphorous allocation is 0.052 pounds per year per acre. Carlton Pond is also on DEP's list of "Lakes Most at Risk from New Development" which requires projects in the watershed to meet additional standards (Chapter 502, *Stormwater Management Rule*).

The undeveloped nature of the watershed, including a virtually undeveloped shoreline, forces a consideration of major development impacts in the future. The Augusta Water District owns substantial amounts of land in the watershed, which is also valuable as open space. The Land Use Ordinance also establishes a 1,000-foot Resource Protection Zone surrounding the pond.

Carlton Pond is a Waterfowl Production Area as it is one of the few areas in the state that provides nesting habitat for black terns (*Chlidonias niger*), a state listed endangered species. Black tern populations have been monitored by the state since 1990, and MDIF&W manages their habitats by maintaining stable water levels in impoundments, taking efforts to deter predators, and using floating nest platforms.

**Lovejoy Pond-**

Direct Drainage: 1,158 acres (39% in Readfield)

Area: 379 acres

Maximum Depth: 22 feet

Mean Depth: 16 feet

Invasive species: unknown

Number of dams: 1

Fisheries management: warmwater

| Fish species:                                    |   |
|--|---|
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | American Eel ( <i>Anguilla rostrata</i> )     |
| White Perch ( <i>Morone Americana</i> )          | Brown Bullhead ( <i>Ameiurus nebulosus</i> )  |
| Chain Pickerel ( <i>Esox niger</i> )             | Fallfish ( <i>Semotilus corporalis</i> )      |
| Smallmouth Bass ( <i>Micropterus dolomieu</i> )  | Minnnow species ( <i>Cyprinidae</i> family)   |
| Pumpkinseed ( <i>Lepomis gibbosus</i> )          | Rainbow Smelt ( <i>Osmerus mordax</i> )       |
| Sunfish species ( <i>Lepomis</i> family)         | White Sucker ( <i>Catostomus commersoni</i> ) |
| Yellow Perch ( <i>Perca flavescens</i> )         |   |

Source: Lakes of Maine

**Plant species:** Arrowhead, bladderwort, cattail, pickerel weed, pondweed, water lily and many more.

**Mussels & Crayfish:** No information available.

Loon Counts have taken place on Lovejoy Pond sporadically since 1983. The loon population has varied over the years, but the current population seems to be increasing slightly.

| Year | # Adults | # Chicks | Year | # Adults | # Chicks |
|------|----------|----------|------|----------|----------|
| 1983 | 6        | 1        | 1991 | 2        | 1        |
| 1985 | 5        | 2        | 1993 | 4        | 1        |
| 1986 | 0        | 0        | 2002 | 8        | 0        |
| 1987 | 2        | 2        | 2019 | 4        | 0        |
| 1989 | 1        | 0        | 2021 | 6        | 0        |
| 1990 | 0        | 0        |      |          |          |

Source: Lakes of Maine

**Water Quality Assessment** (overall averages unless otherwise noted with \*)-

**Transparency:** Maine’s average: 5.3m, Lovejoy Pond’s transparency measure\*: 5.4m

**Chlorophyll:** Maine’s average: 5.7 ppb, Lovejoy Pond’s chlorophyll measure: 3.0 ppb

**Phosphorous:** Maine’s average: 11.2 ppb, Lovejoy Pond’s phosphorous measure\*: 15 ppb

**Color:** Maine’s average: 20.1 SPU, Lovejoy Pond’s color measure: 11 SPU

**Alkalinity:** Maine’s average: 11.1 mg/L, Lovejoy Pond’s alkalinity measure: 13.5 mg/L

**pH:** Maine’s average: 7.23, Lovejoy Pond’s pH measure: 6.86

**Conductivity:** Maine’s average: 52.6 uS/cm, Lovejoy Pond’s conductivity: 51 uS/cm

**Dissolved Oxygen:** there does not appear to be a great reduction of dissolved oxygen at the lower depths of Lovejoy Pond.

Overall, the information provided indicates that the water quality in Lovejoy Pond is about average compared with other ponds and lakes in the state of Maine. Most notable, the phosphorous level in Lovejoy Pond is higher than average for the state.

Lovejoy Pond is listed under the Threatened Lake Priority List by the DEP as Sensitive due to sediment chemistry. This means the sediment chemistry has been analyzed to determine susceptibility to internal phosphorous release. Studies have shown that lakes with ratios of aluminum to iron less than three to one and aluminum to phosphorous less than 25 to one are more vulnerable to the release of sediment-bound phosphorous, which can lead to phosphorous loading. Lakes with these qualities are listed as sensitive due to sediment chemistry.

Water quality in Lovejoy Pond, located in Fayette, Readfield and Wayne, is considered moderate-sensitive with a high level of protection. Allowable phosphorous loading is 0.055 pounds/acre/year.

**Torsey (Greeley) Pond-**

Direct Drainage: 1,094 acres (33.6% in Readfield)

Area: 679 acres

Maximum Depth: 45 feet

Mean Depth: 15 feet

Invasive species: unknown

Number of dams: 1

Fisheries management: warmwater

| <b>Fish species:</b>                             |  |
|--|--|
| Brown Trout ( <i>Salmo trutta</i> )              | American Eel ( <i>Anguilla rostrata</i> )        |
| Brook Trout ( <i>Salvelinus fontinalis</i> )     | Brown Bullhead ( <i>Ameiurus nebulosus</i> )     |
| Smallmouth Bass ( <i>Micropterus dolomieu</i> )  | Northern Pike ( <i>Esox 12ucius</i> )            |
| Chain Pickerel ( <i>Esox niger</i> )             | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | Pumpkinseed ( <i>Lepomis gibbosus</i> )          |
| Rainbow Smelt ( <i>Osmerus mordax</i> )          | Redbreasted Sunfish ( <i>Lepomis auratus</i> )   |
| White Perch ( <i>Morone americana</i> )          | White Sucker ( <i>Catostomus commersoni</i> )    |
| Yellow Perch ( <i>Perca flavescens</i> )         |  |

Source: Lakes of Maine

**Plant species:** Aquatic moss, arrowhead, bladderwort, bulrush, pickerel weed, pondweed, horsetail, coontail, waterlily, and many more.

**Mussels & Crayfish:** No information available.

Loon counts have taken place at Torsey Pond regularly since 1983. The loon population appears to have stayed relatively stable since this time.

| Year | # Adults | # Chicks | Year | # Adults | # Chicks | Year | # Adults | # Chicks |
|------|----------|----------|------|----------|----------|------|----------|----------|
| 1983 | 8        | 1        | 1996 | 10       | 3        | 2009 | 10       | 0        |
| 1984 | 7        | 0        | 1997 | 15       | 1        | 2010 | 10       | 1        |
| 1985 | 5        | 0        | 1998 | 11       | 4        | 2011 | 10       | 2        |
| 1986 | 8        | 0        | 1999 | 4        | 4        | 2012 | 11       | 2        |
| 1987 | 4        | 0        | 2000 | 6        | 3        | 2013 | 9        | 0        |
| 1988 | 15       | 4        | 2001 | 16       | 1        | 2014 | 12       | 1        |
| 1989 | 14       | 2        | 2002 | 7        | 3        | 2015 | 14       | 2        |
| 1990 | 13       | 4        | 2003 | 13       | 0        | 2016 | 16       | 3        |
| 1991 | 10       | 1        | 2004 | 10       | 2        | 2017 | 18       | 2        |
| 1992 | 7        | 2        | 2005 | 7        | 3        | 2018 | 7        | 1        |
| 1993 | 14       | 4        | 2006 | 18       | 2        | 2019 | 13       | 1        |
| 1994 | 15       | 3        | 2007 | 8        | 1        | 2020 | 10       | 3        |
| 1995 | 12       | 4        | 2008 | 12       | 0        | 2021 | 15       | 3        |

Source: Lakes of Maine

**Water Quality Assessment** (overall averages unless otherwise noted with \*)-

**Transparency:** Maine’s average: 5.3m, Torsey Pond’s transparency measure\*: 4.3m

**Chlorophyll:** Maine’s average: 5.7 ppb, Torsey Pond’s chlorophyll measure: 4.0 ppb

**Phosphorous:** Maine’s average: 11.2 ppb, Torsey Pond’s phosphorous measure\*: 10 ppb

**Color:** Maine’s average: 20.1 SPU, Torsey Pond’s color measure: 15 SPU

**Alkalinity:** Maine’s average: 11.1 mg/L, Torsey Pond’s alkalinity measure: 14 mg/L

**pH:** Maine’s average: 7.23, Torsey Pond’s pH measure: 6.96

**Conductivity:** Maine’s average: 52.6 uS/cm, Torsey Pond’s conductivity measure: 43 uS/cm

**Dissolved Oxygen:** data shows that dissolved oxygen is reduced at around 26 feet deep and continues to decline until it reaches zero at approximately 36 feet deep. These circumstances are not unusual for a lake of this depth. Typically, the dissolved oxygen content is higher in the upper levels of lakes large enough to stratify, while they are reduced at depths.

Statistically, the water quality in Torsey Pond is above average for the state of Maine, based on these water quality values detailed above.

Torsey Pond is the headwater of the Cobbossee Watershed. The upper, deep basin in Mount Vernon narrows to a shallower southern basin in Readfield and discharges to Maranacook Lake. Rooted aquatic plants are prevalent in the southern basin of Torsey Pond. Data indicate stable or slightly improving water quality. Algal blooms have not been observed in the pond. The DEP ranks Torsey Pond as moderate-sensitive, with a level of protection as high.

Approximately 1/3 of the Torsey Pond watershed is in Readfield comprising about 1,100 acres. This includes Kents Hill and significant lakefront development. The major land use in the watershed is forest with agriculture and development as the largest phosphorus sources. Ongoing lake protection through stormwater management and other phosphorus controls will be needed to maintain the pond's good water quality and protect Maranacook Lake downstream.

Torsey Pond is on DEP's list of "Lakes Most at Risk from New Development" which requires projects in the watershed of waterbodies on this list to meet additional standards (Chapter 502, *Stormwater Management Rule*).

Torsey Pond is listed under the Threatened Lake Priority List by the DEP as Sensitive due to sediment chemistry. This means the sediment chemistry has been analyzed to determine susceptibility to internal phosphorous release. Studies have shown that lakes with ratios of aluminum to iron less than three to one and aluminum to phosphorous less than 25 to one are more vulnerable to the release of sediment-bound phosphorous, which can lead to phosphorous loading. Lakes with these qualities are listed as sensitive due to sediment chemistry.

**Maranacook Lake** (northern and southern basins)-

Direct Drainage: southern: 2,907 acres (50.8% in Readfield), northern: 6,604 acres (82% in Readfield)

Area: 1844 acres

Maximum Depth: 128 feet

Mean Depth: 30 feet

Invasive species: unknown

Number of dams: 1

Fisheries management: warm & cold water

| <b>Fish Species:</b>                             |  |
|--|--|
| Brown Trout ( <i>Salmo trutta</i> )              | Banded Killifish ( <i>Fundulus diaphanous</i> )  |
| American Eel ( <i>Anguilla rostrata</i> )        | Black Crappie ( <i>Pomoxis nigromaculatus</i> )  |
| Brook Trout ( <i>Salvelinus fontinalis</i> )     | Fallfish ( <i>Semotilus corporalis</i> )         |
| Brown Bullhead ( <i>Ameiurus nebulosus</i> )     | Lake Trout ( <i>Salvelinus namaycush</i> )       |
| Chain Pickerel ( <i>Esox niger</i> )             | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | Pumpkinseed ( <i>Lepomis gibbosus</i> )          |
| Landlocked Salmon ( <i>Salmo salar</i> )         | Rainbow smelt ( <i>Osmerus mordax</i> )          |
| Redbreasted Sunfish ( <i>Lepomis auratus</i> )   | Slimy Sculpin ( <i>Cottus cognatus</i> )         |
| Smallmouth Bass ( <i>Micropterus dolomieu</i> )  | White Perch ( <i>Morone americana</i> )          |
| White Sucker ( <i>Catostomus commersoni</i> )    | Yellow Perch ( <i>Perca flavescens</i> )         |

Source: *Lakes of Maine*

**Plant Species:** Bladderwort, bryozoan, bur-reed, coontail, pickerel weed, pipewort, pondweed, waterweed, wild celery and many more.

**Mussels & Crayfish:** Eastern elliptio and Eastern floater; no crayfish have been reported but may be present.

Loon counts have been done regularly since 1983. Since that time the loon population has stayed relatively stable.

| Year | # Adults | # Chicks | Year | # Adults | # Chicks | Year | # Adults | # Chicks |
|------|----------|----------|------|----------|----------|------|----------|----------|
| 1983 | 4        | 0        | 1996 | 18       | 0        | 2009 | 29       | 1        |
| 1984 | 6        | 0        | 1997 | 16       | 0        | 2010 | 27       | 2        |
| 1985 | n/a      |          | 1998 | 14       | 0        | 2011 | 31       | 2        |
| 1986 | n/a      |          | 1999 | 20       | 2        | 2012 | 23       | 1        |
| 1987 | 6        | 0        | 2000 | 25       | 2        | 2013 | 28       | 2        |
| 1988 | n/a      |          | 2001 | 24       | 2        | 2014 | 29       | 1        |
| 1989 | 13       | 1        | 2002 | 21       | 3        | 2015 | 33       | 1        |
| 1990 | 15       | 2        | 2003 | 30       | 1        | 2016 | 25       | 4        |
| 1991 | 18       | 1        | 2004 | 21       | 0        | 2017 | 23       | 1        |
| 1992 | 18       | 2        | 2005 | 36       | 1        | 2018 | 9        | 3        |
| 1993 | 15       | 1        | 2006 | 23       | 0        | 2019 | 24       | 2        |
| 1994 | 15       | 2        | 2007 | 27       | 1        | 2020 | 43       | 0        |
| 1995 | 29       | 0        | 2008 | 23       | 2        | 2021 | 27       | 2        |

Source: *Lakes of Maine*

**Water Quality Assessment** (overall averages unless otherwise noted with \*)-

**Transparency:** Maine’s average: 5.3m, Maranacook Lake’s transparency measure\*: 5.5m

**Chlorophyll:** Maine’s average: 5.7 ppb, Maranacook Lake’s chlorophyll measure: 3.9 ppb

**Phosphorous:** Maine’s average: 11.2 ppb, Maranacook Lake’s phosphorous measure\*: 10 ppb

**Color:** Maine’s average: 20.1 SPU, Maranacook Lake’s color measure: 11 SPU

**Alkalinity:** Maine’s average: 11.1 mg/L, Maranacook Lake’s alkalinity measure: 16 mg/L

**pH:** Maine’s average: 7.23, Maranacook Lake’s pH measure: 7

**Conductivity:** Maine’s average: 52.6 uS/cm, Maranacook Lake’s conductivity measure: 60 uS/cm

**Dissolved Oxygen:** data shows that dissolved oxygen is reduced sharply at around 36 feet, coinciding with a temperature drop. The dissolved oxygen rebounds and increases at around 52 feet; the temperature stays relatively consistent at this depth as well.

Overall, Maranacook Lake’s water quality is lower than average for the state.

Maranacook Lake is composed of two distinct basins. The northern basin located in Readfield, is smaller and shallower and exhibits water quality that is slightly below average for Maine lakes. The possibility of excessive watershed phosphorus loading and the potential for internal phosphorus recycling are real concerns for future water quality of this basin.

The southern basin of Maranacook Lake is located partially in Readfield and primarily in Winthrop, directly downstream of the northern basin. Maranacook Lake is a secondary water supply for Winthrop and is used as a source of drinking water by some lakefront owners. It is a large, deep lake. During stratification it remains well oxygenated to the bottom depths, providing a large volume of water to support a cold-water fishery.

Together the basins of Maranacook Lake and their watersheds pose the greatest challenge to water quality management in Readfield. The lake is rated “moderate-sensitive” and is classified as a “Lake Most at Risk from Development” by the DEP. The watershed in Readfield consists of over 9,500 acres (almost half of Readfield’s land area) and includes both Readfield Village and the Depot. There are extensive areas of recent development within the watershed. Concerns expressed by the Cobbossee Watershed District range from erosion along camp roads to runoff from the school parking lots.

Maranacook Lake is listed under the Threatened Lake Priority List by the DEP as ‘Sensitive’ due to sediment chemistry, the lake’s hydrology and threats in the watershed. This listing is based on predictions for the lake’s phosphorous concentration increasing due to watershed growth projections and watershed threats. The DEP listed the water quality category as moderate-sensitive in regard to phosphorous loading and the level of protection as high. The south basin has an allowable limit of 0.052 pounds phosphorous per year, per acre, while the north basin has an allowable limit of 0.032 pounds per year, per acre.



**Echo Lake (Crotched Pond)-**

Direct Drainage: 311 acres (5.8% in Readfield)

Area: 1,109 acres

Maximum Depth: 117 feet

Mean Depth: 21 feet

Invasive species: unknown

Number of dams: 3

Fisheries management: warm & cold water

| Fish Species:                                    |  |
|--|--|
| American Eel ( <i>Anguilla rostrata</i> )        | Brook Trout ( <i>Salvelinus fontinalis</i> )     |
| Brown Bullhead ( <i>Ameiurus nebulosus</i> )     | Burbot (cusk) ( <i>Lota lota</i> )               |
| Chain Pickerel ( <i>Esox niger</i> )             | Common Shiner ( <i>Luxilus cornutus</i> )        |
| Fallfish ( <i>Semotilus corporalis</i> )         | Golden Shiner ( <i>Notemigonus crysoleucas</i> ) |
| Lake Trout ( <i>Salvelinus namaycush</i> )       | Landlocked Salmon ( <i>Salmo salar</i> )         |
| Largemouth Bass ( <i>Micropterus salmoides</i> ) | Pumpkinseed ( <i>Lepomis gibbosus</i> )          |
| Rainbow smelt ( <i>Osmerus mordax</i> )          | Redbreasted Sunfish ( <i>Lepomis auratus</i> )   |
| Slimy Sculpin ( <i>Cottus cognatus</i> )         | Smallmouth Bass ( <i>Micropterus dolomieu</i> )  |
| Splake ( <i>Salvelinus hybrid</i> )              | White Perch ( <i>Morone americana</i> )          |
| White Sucker ( <i>Catostomus commersoni</i> )    | Yellow Perch ( <i>Perca flavescens</i> )         |

Source: Lakes of Maine

**Plant Species:** Aquatic moss, arrowhead, bladderwort, blueflag, bulrush, cattail, coontail, pickerel weed, pipewort, pondweed, rush, sedge, and many more.

**Mussels & Crayfish:** Eastern floater and Eastern lamp mussel; no crayfish have been reported but may be present.

Loon counts have been done regularly since 1983. Since that time the loon population has stayed relatively stable.

| Year  | # Adults | # Chicks | Year | # Adults | # Chicks | Year | # Adults | # Chicks |
|-------|----------|----------|------|----------|----------|------|----------|----------|
| 1983  | 17       | 1        | 1996 | 15       | 3        | 2009 | 20       | 0        |
| 1984  | 6        | 0        | 1997 | 13       | 1        | 2010 | 26       | 2        |
| 21985 | 12       | 1        | 1998 | 18       | 1        | 2011 | 16       | 1        |
| 1986  | 9        | 0        | 1999 | 18       | 0        | 2012 | 15       | 0        |
| 1987  | 14       | 0        | 2000 | 19       | 1        | 2013 | 11       | 4        |
| 1988  | n/a      |          | 2001 | 12       | 0        | 2014 | 22       | 0        |
| 1989  | 17       | 1        | 2002 | 15       | 2        | 2015 | 14       | 1        |
| 1990  | 15       | 2        | 2003 | 21       | 2        | 2016 | 21       | 0        |
| 1991  | 19       | 2        | 2004 | 12       | 1        | 2017 | 15       | 1        |
| 1992  | 19       | 0        | 2005 | 16       | 2        | 2018 | 16       | 3        |
| 1993  | 16       | 2        | 2006 | 23       | 0        | 2019 | 17       | 2        |
| 1994  | 17       | 3        | 2007 | 17       | 0        | 2020 | 18       | 0        |
| 1995  | 12       | 6        | 2008 | 12       | 0        | 2021 | 16       | 0        |

Source: Lakes of Maine Website

**Water Quality Assessment** (overall averages unless otherwise noted with \*)-

**Transparency:** Maine's average: 5.3m, Echo Lake's transparency measure\*: 6.5m

**Chlorophyll:** Maine's average: 5.7 ppb, Echo Lake's chlorophyll measure: 2.5 ppb

**Phosphorous:** Maine's average: 11.2 ppb, Echo Lake's phosphorous measure\*: 6 ppb

**Color:** Maine's average: 20.1 SPU, Echo Lake's color measure: 13 SPU

**Alkalinity:** Maine's average: 11.1 mg/L, Echo Lake's alkalinity measure: 12.2 mg/L

**pH:** Maine's average: 7.23, Echo Lake's pH measure: 6.79

**Conductivity:** Maine's average: 52.6 uS/cm, Echo Lake's conductivity measure: 47 uS/cm

**Dissolved Oxygen:** data shows that dissolved oxygen is reduced at around 32 feet, coinciding with a decrease in temperature. The dissolved oxygen rebounds slightly and increases to about 7ppm at around 39 feet. Both the temperature and the dissolved oxygen stay relatively stable through the deeper water after the initial plume.

The water quality in Echo Lake is above average compared with other waterbodies in the state of Maine. This lake is located in Readfield, Mount Vernon and Fayette. It supports wild populations of lake trout and salmon; brook trout are occasionally stocked by MDIF&W. In 2022, 500 nine-inch brook trout and 500 eight-inch Salmon were stocked in Fayette in Echo Lake.

Water quality is listed as "good," which is unusual for this area. The lake bottom remains well oxygenated throughout the summer. The portion of the watershed in Readfield is relatively small (311 acres) though there is some lakefront development. The portions of the watershed in Fayette and Mount Vernon are much more extensively developed.

Echo Lake is listed under the Threatened Lake Priority List by the DEP as 'Sensitive' due to sediment chemistry. This means the sediment chemistry has been analyzed to determine susceptibility to internal phosphorous release. Studies have shown that lakes with ratios of aluminum to iron less than three to one and aluminum to phosphorous less than 25 to one are more vulnerable to the release of sediment-bound phosphorous, which can lead to phosphorous loading. Lakes with these qualities are listed as sensitive due to sediment chemistry. DEP lists the lake as moderate-sensitive in regard to phosphorous loading. It has a high level of protection and an allowable pounds phosphorous per acre per year of 0.036.

### **Watersheds:**

A watershed is a natural drainage basin that collects precipitation and sends it to a body of water through an interconnected system of streams, brooks, and other such wetlands. Many human activities in any part of a watershed can have negative impacts on the water quality into which the watershed drains.

Several of Readfield's lakes are within the Cobbossee Lakes system and thus within the jurisdiction of the Cobbossee Watershed District (CWD) of which Readfield is a member. The CWD provides technical assistance and review of development applications as well as volunteer lake quality monitoring and management of lake water levels. Even though

these lakes may not be wholly or even partially in Readfield, their watershed lies within Readfield's town boundaries, so they are included in this chapter.

### **A. Berry Pond**

Berry Pond, located in Wayne and Winthrop, has approximately 1,300 acres of drainage area in Readfield. It shows dissolved oxygen depletion in the bottom waters to levels, which are considered to be high risk and has developed or will develop, a significant phosphorus internal recycling problem. Water quality in Berry Pond is considered moderate-sensitive, and it has a level of protection of medium. The phosphorous allocation is 0.029 pounds per acre (ppa), which means very strict measures should be in place to minimize phosphorus export.

### **B. Little Cobbosseecontee**

Little Cobbosseecontee (Cobbossee) Lake, located in Winthrop, shows dissolved oxygen depletion in the bottom waters to levels which are considered to be high risk and has developed, or will develop, a significant phosphorus internal recycling problem. Water quality in the Little Cobbosseecontee is classified as poor-restorable the only lake with a watershed in Readfield so-designated. Its level of protection, as listed by the DEP regarding phosphorous loading is medium and it has an allowable limit of phosphorous per acre per year of 0.021, making it very constrained for development. There are over 500 acres of Little Cobbosseecontee watershed in Readfield, but it is relatively undeveloped, much of it used for agriculture. It, too, is on the DEP's list of "Lakes Most at Risk from Development."

### **C. Messalonskee Lake**

Messalonskee Lake, located in Belgrade, Oakland and Sidney, shows dissolved oxygen depletion in the bottom waters to levels considered to have a moderate reduction in cold water fish habitat, but pose no immediate risk for the development of a significant phosphorus internal recycling problem. Messalonskee is also having problems with invasive aquatic plants, most notably variable leaf milfoil (*Myriophyllum heterophyllum*). The watershed of Messalonskee is almost 3,000 acres in Readfield's northeastern corner where there has been some development activity, but the lake has a relatively high phosphorus allocation of 0.058. The DEP lists it as moderate-sensitive for phosphorus loading and its level of protection as high.

Messalonskee Lake is also on DEP's list of "Lakes Most at Risk from New Development" which requires projects in the watershed to meet additional standards (Chapter 502, *Stormwater Management Rule*).

A more recent planning concern for all water bodies is the threat of invasive water plants. Maine, for years isolated from the plague of milfoil, is now seeing more and more frequent occurrences. Eurasian Milfoil (*Myriophyllum spicatum*), the most aggressive species, has been identified in Cobbossee Lake as of July 2018. Other species of milfoil have been

identified in waterbodies surrounding Readfield, such as Belgrade Stream, Messalonskee Lake and Androscoggin Lake.

The state has initiated several measures aimed at preventing the spread of aquatic invasive plants, including signs and monitors at most public boat landings. The CWD received a grant and utilized it to develop the Maranacook Lake Watershed Management Plan, published in 2008, which included strategies to control invasive species and improve water quality.

### **Wetlands:**

Wetlands serve many important functions such as stormwater storage areas, surface water filtration systems, and critical habitat for certain species of birds, fish, aquatic mammals, and aquatic vegetation. They also serve as important breeding grounds for many species as well as important travel corridors. Wetlands also provide open space for some forms of recreational enjoyment or aesthetic appreciation.

Maps provided by the Maine Natural Areas Program, the National Wetlands Inventory and Maine Inland Fisheries and Wildlife (IFW) show wetlands information for Readfield. Wetlands are shown on several maps in the Appendix to this plan.

Maine Natural Areas Program (MNAP) defines wetlands based on their environmental benefit and the functions they serve for communities. Functional values include sediment retention, flood flow alterations, finfish habitat, flora/fauna habitat, and educational and cultural values. MNAP assigns one point per each function achieved by a wetland. The greater the benefit provided by the wetland to the community, the more points awarded. Besides the MNAP ranking, non-forested wetlands greater than ten acres in size are protected under state wetlands ordinances, which sets conditions for alterations, mitigation, and development within the wetland.

In Readfield there are several areas of extensive wetlands including: the stream and wet areas between Torsey Pond and Maranacook; the bog between North Road and Plains Road; and Beaver Brook, which empties into the southern basin of Maranacook Lake. Four wetlands are positively identified by the state as having a high value as waterfowl and wading bird habitat. They are found in the vicinity of the following water bodies: Brainard Pond, Beaver Brook, Dead Stream and Gardiner Brook.

Among other standards, the Readfield Land Use Ordinance provides protection of wetlands through a minimum structure setback of 25 feet from wetlands over two acres in size and 75 feet from wetlands over 10 acres or over two acres when associated with an open water body.

### **Vernal Pools:**

A vernal pool is defined as a naturally occurring, temporary to permanent inland body of water that forms in a shallow depression and typically fills during the spring or fall and

may dry during the summer. The vernal pool contains no viable populations of predatory fish, and it provides the primary breeding habitat for wood frogs, spotted salamanders, blue spotted salamanders, and fairy shrimp. The presence of any one or more of these species is usually conclusive evidence of a vernal pool.

Vernal pools do not fall under the protection provided to wetlands by MNAP, but as of September 2007, significant vernal pool habitats are protected under the Natural Resources Protection Act (NRPA). A vernal pool is considered 'significant' if it has a high habitat value, either because 1) a state-listed threatened or endangered species uses it to complete a critical part of its life history, or 2) there is a notable abundance of specific wildlife. This new regulation protects areas within a 250-foot radius of the spring or fall high water mark of a significant vernal pool, which is considered critical terrestrial habitat. Any activity on, in, or over these areas must be approved by the Maine DEP and required either a Permit by Rule or individual NRPA approval.

The Conservation Commission, in collaboration with an environmental consulting firm, has been working on an ongoing project to document and map potentially significant vernal pools that undoubtedly exist in Readfield. The project is nearly complete, with only the task of selecting the significant vernal pools from the data already collected and map them, a task which is expected to be completed in 2023.

With new attention to their importance in the ecosystem, the town should incorporate some protection of vernal pools into its development standards. Extra protection through Shoreland Zoning is a consideration for these sites, as well.

### **Threats to Readfield's Water Resources:**

Threats to water resources are many and include, but are not limited to, development and increased impervious surfaces related to development. Increased impervious surfaces cause run off and result in erosion during precipitation events if not properly managed. When the water runs off impervious surfaces, it collects pollutants which end up in stormwater drains and eventually find their way into waterbodies.

Another threat to Readfield's water resources is development in rural areas and along the shores of the many water bodies.

Both threats detailed above can be mitigated through proper stormwater management.

Work on public infrastructure near and in the water is carefully managed to avoid erosion and sedimentation. Careful consideration is also given to the miles of ditching that are town maintained and hundreds of road culverts that need periodic replacement. Public supplies of salted sand are stored in a Maine DEP approved building and erodible materials are stored away from drainage areas and water bodies. Best management practices are pulled from many sources but primarily from Maine DOT.

## **Point and Nonpoint Source Pollution:**

Point Source Pollution can be linked back to one location, or point, such as a leaking oil tank. Point sources come from a direct source and are easily identified and managed. No point sources of pollution have been identified in Readfield.

Nonpoint Source Pollution cannot be traced to one single source. It includes stormwater runoff. Stormwater can come from anywhere, especially impervious surfaces. Stormwater is water that does not soak into the ground during a precipitation event, but flows on top of the ground instead, to a body of water. As this water travels across the surface of the ground, it collects pollutants such as petroleum product, heavy metals, fertilizers, manure, which originate from gas stations, farm fields, residential lawns and more.

Readfield has language in their Land Use Ordinance that sets standards that require the management of stormwater, based on state requirements. Surface and subsurface drainage systems are one options for minimizing stormwater runoff, as is minimal bare soil within a shoreland zone. The Town partners with local watershed districts to address gravel road issues. This is done through education and volunteer erosion control efforts.

## **Regulatory Protection:**

In addition to state and federal standards to protect water quality, Readfield's Land Use Ordinance includes language to provide further protection of water resources (see Existing Land Use for more information).

The Land Use Ordinance designates three zones for the purpose of protecting water resources:

*Shoreland Residential District (SR):* includes all shoreland areas within 250 feet, horizontal distance, of the normal high-water mark of a great pond or the upland edge of a wetland consisting of ten (10) or more contiguous acres or as otherwise defined, other than those areas included in the Resource Protection District or the Stream Protection District. It includes areas that are appropriate for residential, recreational, and other non-intensive development activities.

*Resource Protection District (RP):* includes areas having current moderate or high habitat value and in which development would adversely affect water quality, productive fish or wildlife habitat, biotic systems, or scenic and natural values. However, areas which are currently developed, and which would meet the criteria of this district shall be placed in another suitable land use district. This district shall include:

- Wetlands and the areas 250 feet horizontally of the upland edge of the following wetlands: a wetland that is 10 acres or greater; wetlands associated with great ponds; and wetlands which are rated "moderate" or "high" value by the Maine Department of Inland Fisheries and Wildlife.
- Wetlands and the areas within 25 feet horizontally of the upland edge of wetlands that are greater than 2 acres and less than 10 acres.

- Areas within 1,000 feet horizontally of the normal high-water line of Carlton Pond.
- Areas within 1,000 feet horizontally of the normal high-water line of Mill Pond, Shedd Pond and Brainard Pond.
- Areas of 1 or more contiguous acres with sustained slopes of 20% or greater.
- The following areas when they are located within 250 feet horizontally from the normal high-water line of a great pond; within 250 feet of the upland edge of a wetland; and within 75 feet horizontally of a stream:
  1. Important wildlife habitat
  2. Natural sites of significant scenic or aesthetic value.
  3. Areas designated by federal, state and local government as natural areas of significance to be protected from development.
  4. Existing areas of public access and certain significant archeological and historic sites.

*Stream Protection District (SP):* includes all land area within 75 feet, horizontal distance, of the normal high-water line of a stream as defined in Article 11 and other streams of local significance designated on the Official Land Use Map, exclusive of those areas within 250 feet, horizontal distance, of the normal high-water line of a great pond, or within 250 feet, horizontal distance of the upland edge of a freshwater wetland. Where a stream and its 75-foot shoreland area is located within the 250-foot shoreland area of a great pond or a freshwater wetland, that land area shall be regulated under the terms of the district in which the great pond or wetland are located.

Additionally, the town adopted the following ordinances that provide resource protection:

- Floodplain Management Ordinance
- Sludge Ordinance
- Junkyard Permit Application
- Solid Waste Disposal and Recycling Ordinance

**Local and Regional Coordination:**

Local Partners:

Readfield’s Conservation Commission, a voluntary board of nine members, is active and engaged in protecting the town’s natural and water resources. The Readfield Conservation Commission is active in managing critical resource lands on town property.

Regional Partners:

Kennebec Land Trust (KLT) is a non-profit organization that works with landowner and communities to protect the Kennebec Valley’s natural features, working landscapes, and fragile ecosystems. The properties entrusted to the KLT are usually open to the public, such as Torsey Pond Nature Preserve and Macdonald Conservation Area for example. The KLT works to preserve natural resources through land protection, stewardship, education, advocacy, and cooperation. KLT is active in Readfield offering landowner assistance with conservation easements and accepting donations of property.

Readfield is a member of the Cobbossee Watershed District (CWD) as a large portion of this watershed lies within town boundaries. The CWD provides technical assistance and review of development applications as well as volunteer lake quality monitoring and management of lake water levels.

Many land holdings are public, including the Carlton Pond watershed and town land.

### **Analysis:**

Readfield has historically taken active measures to preserve the water quality of the many water bodies within its boundaries. Through collaboration with various local and regional partners, Readfield has thoughtfully protected significant landholdings surrounding waterbodies, wetlands and other areas throughout town to ensure their continued protection. The town's many conserved and preserved properties and open space all offer protection to natural resources for the betterment of the community.

The Readfield Conservation Commission is active in the community and works with town officials and other stakeholders in maintaining currently conserved properties.

The Land Use Ordinance includes Shoreland Zoning regulations and is updated regularly. This ordinance is imperative for the continued protection of water quality. The language in the Land Use Ordinance sets standards for properties in shoreland zones, but also stormwater management, phosphorous control, new development and more.

In short, Readfield should continue its forward-thinking approach to safeguarding water quality through preservation and conservation of sensitive lands and well-written ordinances that offer the utmost protection.

### **Future Considerations:**

- ❖ Are there specific point and nonpoint sources of pollution that Readfield could take additional steps to eliminate or limit?
- ❖ Are public works crews using best management practices to protect water resources in their daily operations?