MEMORANDUM

Date:	June 28, 2022
To:	Ray Moritz – Windy Waters Conservancy
From:	Aimee N. Rutledge - DuBois & King, Inc.
Subject:	Jenness Cove – Cove Sedimentation Evaluation Preliminary Findings and Recommendations
Project No.:	127919

The following preliminary findings and recommendations have been developed to evaluate sedimentation in Jenness Cove of Lake Waukewan, town of Meredith, New Hampshire (see Attachment A, Location Map).

STUDY AREA DESCRIPTION

Jenness Cove is located in the northeastern portion of Lake Waukewan, north of Bonney Shores Road and west of Sawmill Shores Road. The project study area includes areas of Jenness Cove demonstrating significant sedimentation and submergent and emergent plant growth in the area immediately adjacent to the cove. The project study area is shown on the USGS Location Map, Figure 1.

EXISTING CONDITIONS EVALUATION

Desktop Review

Prior to the field review, GIS data, and various available mapping resources, including New Hampshire Department of Environmental Services (NHDES) OneStop Data Mapper were reviewed. Available data reviewed included, but was not limited to the following: National Wetlands Inventory (NWI); Geology; Conservation Lands; Potentially Contaminated Sites; Wildlife Habitat; Impaired Waters; ; Watersheds; Streams; Shoreland Buffer Zones; Landcover; Outstanding Water Resources; NH Natural Heritage Bureau (NHNHB) DataCheck Tool; Rare, Threatened, Endangered Species and Significant Communities; Natural Resources Conservation Service (NRCS) soils; contours (2ft), town of Meredith zoning, aerial imagery, and USGS topographic maps.

Available USGS topographic maps reviewed include the following years: 1925, 1927, 1949, 1956, 1963, 1986, 1987, 2012, 2015, 2018, and 2021. Aerial imagery review included the following years: 1992/98, 2003, 2008, 2009, 2011, 2012, 2014, 2016, 2018, and 2022. In addition, D&K utilized in-house GIS capabilities to import and analyze available data. According to the historic USGS maps reviewed, Pike Island Road (causeway south of Bonney Shores Road) was built before 1956. Bonney Shores and Sawmill Shores Roads were built before 1987. Construction of these roads cut off surface water circulation around the shore and islands. Additionally, according to neighboring landowners, both Bonney Shores and Sawmill Shores Roads were widened, in the vicinity of the study area, by the town in the 1990s. The development of Bonney Shores Road and Sawmill Shores Road are illustrated on the attached Historic Topographic Maps, Figure 2.

Lake Waukewan is classified as an oligotrophic lake, meaning it is nutrient-poor and generally free of weeds and/or algal blooms, and high in dissolved oxygen. However, according to the NHDES Surface Water Quality Assessments for 2020/2022, the lake is classified as impaired for cyanobacteria hepatotoxic microcystins, dissolved oxygen saturation, and dissolved oxygen (mg/L), which means it is not meeting the state standards or thresholds.

D&K reviewed the 2021 data summaries for the NHDES Volunteer Lake Assessment Program Individual Lake Reports, Lake Waukewan, Mayo and Winona Stations. The Mayo Station is located on the north end of the lake, approximately 0.65 nautical miles from Jenness Cove and the Winona Station is located on the south end of the lake, approximately 1.0 nautical mile from the cove. The 2021 data summary for the Mayo Station states, Lake quality remained representative of oligotrophic, or high quality conditions. However, phosphorus levels in the upper water layer have increased steadily since 2018. Nutrient levels were generally elevated in June following spring snowmelt and runoff, which is typical for most lake watersheds.

Additional resources were reviewed during the development of this report including the Lake Waukewan and Lake Winona Watershed Restoration Plan and New Hampshire, Nonpoint Source Management Program Plan, 2020-2024. It should be noted that according to the New Hampshire, Nonpoint Source Management Program Plan, Lake Waukewan ranked high as a priority for restoration activities. References reviewed and cited throughout this memorandum are listed in Attachment F.

Field Review

A site visit was conducted on April 15, 2022 to document potential sources of sedimentation contributing to Jenness Cove, existing stormwater management infrastructure, stormwater overland flow patterns, impervious surfaces, abutting residential properties, surrounding land use, and any other potential upgradient sources of nutrient loading or sedimentation. Abutting residential properties accessed during the site visit included 8 Sawmill Shores Rd, 14 Sawmill Shores Rd, 15 Sawmill Shores Rd, and 77 Bonney Shores Rd. In addition, natural resources, such as wetlands, surface waters, and protected species and their habitat, on and in the immediate vicinity of the project study area were reviewed. The project study area is mostly focused on Jenness Cove, abutting properties, and Sawmill Shores Road. However, the field review included areas accessible within the watershed contributing to the cove, including abutting properties, roadways, the town snow dump, and the Meredith Community Forest. Photographs taken during the field review are provided in Attachment B.

Observations were made from land and not on the water. Lake water levels are controlled by a dam which releases water to Meredith Bay in Lake Winnipesaukee. Drawdown of the lake begins on Columbus Day each year and reaches its summer level by mid-May. At the time of the field review, the water level was typical for springtime levels according to neighboring landowners. According to the landowners, excessive aquatic plant growth in the cove was not as visible due to the time of year and water level.

Overall, the combined 220 acre project study area and cove watershed consists largely of undeveloped forest, interspersed with wet meadow/shrub wetlands and grasslands. Residential areas are concentrated in the northern and southwestern portions of the cove watershed. A majority of the cove watershed consists of the Meredith Community Forest/conservation land, which totals approximately 186 acres, and provides multiple recreational trails throughout. The town snow dump is located on the northern portion of the Meredith Community Forest along Jenness Hill Road. The southeastern portion of the town snow

dump area appeared to have filling/end dumping activity with no downgradient erosion and sediment controls.

The study area generally slopes from the north to southwest toward Jenness Cove. A 24-inch HDPE culvert under Sawmill Shores Road directs surface water and groundwater to Jenness Cove. There was no evidence of culverts under Bonney Shores Road or Pike Island Road to the south.

Bonney Shores Road and Sawmill Shores Road are gravel roads with a heavy sand content. According to the neighboring landowners, the town adds sand/gravel to the roads. In addition, the town routinely removes debris from the culvert with an old telephone pole. Debris is also removed from the vicinity of the culvert inlet and outlet by excavator and dumped on the bank. Vegetation along the roadways were recently brush hogged. Erosion along the road shoulder and sediment runoff into the wetlands and surface water in the vicinity of the Sawmill Shores Road culvert were observed. The road shoulder is narrow and contains little if any vegetation in the vicinity of the culvert. Both Bonney and Sawmill Shores Roads have grass drainage swales along portions of the road that direct stormwater runoff to the wetland complex on the east side of Sawmill Shores Road. Evidence of sediment buildup from roadway runoff was observed in the swales. Photographs of these conditions are in Attachment x. See Figure 3, Existing Conditions, for culvert and swale locations.

Banks along the wetland complex and lake shore within the study area appear to be stable. However, sandy unvegetated lake shore areas on properties on the eastern shore of the cove may contribute minor amounts of sediment runoff to the lake.

Natural Resource Identification

The site visit, conducted on April 15, 2022, included the identification of natural resources. Based on available mapping and field review, wet meadow/shrub wetlands are located immediately adjacent to Sawmill Shores Road and Bonney Shores Road in the vicinity of the intersection and extend to the east. These wetlands are part of a larger wetland complex that extends to the north throughout the Meredith Community Forest. A perennial stream flows in a southerly direction throughout the wetland complex and discharges to the cove via the 24-inch culvert under Sawmill Shores Road. An additional stream flows into the eastern portion of the wetland complex. Mapped wetlands and streams are illustrated on Figure 4. A beaver dam is located within the wetland complex, approximately 800 feet east of the Sawmill Shores Road culvert.

Lake shore characteristics within the study area consist of mostly vegetated shorelines with a mixture of meadow and forested land with the exception of a few unvegetated sandy areas associated with residential access to the lake.

According to the NH Wildlife Action Plan, the project study area and cove watershed consists largely of undeveloped hemlock-hardwood-pine forest, interspersed with Appalachian oak-pine forest and wet meadow/shrub wetlands (see Figure 5). The study area also consists of highest ranked wildlife habitat and supporting landscape (see Figure 6).

The NHNHB did not indicate the presence of Rare, Threatened, or Endangered species on or within the immediate vicinity of the site. The U.S. Fish & Wildlife Service's (USFWS) IPaC tool indicates two threatened species, northern long-eared bat and small whorled pogonia, may be present in or within the vicinity of the study area. In addition, the USFWS IPaC indicated the monarch butterfly, a candidate

species, may be present in or within the vicinity of the study area. The USFWS IPaC resource list is included as Attachment C. Detailed studies for these species were not conducted.

Hydrologic Modeling

Hydrologic modeling of the 24-inch culvert on Sawmill Shores Road was conducted utilizing HydroCAD software (2021). Results of the modeling for the existing culvert determined that the culvert is undersized for all storm events analyzed, 1-year through 100-year. A 1-year rainfall event consists of 2.37 inches of precipitation over a 24-hour period. Conversely, a 100-year rainfall event amounts to 6.50 inches over a 24-hour period. HydroCAD was utilized to determine the appropriate culvert size to handle the 100-year rain event. The modeling indicated a 60-inch x 30-inch concrete box culvert would accommodate the 100-year rain event for the approximate 200-acre sub-watershed.

STEPL Model

The United States Environmental Protection Agency (USEPA) STEPL model was used to evaluate pollutant loading to Jenness Cove. More specifically STEPL is used to compute sub-watershed surface runoff; nutrient loads, including nitrogen, phosphorus, and 5-day biological oxygen demand (BOD5); and sediment delivery based on various land uses and management practices. Best management practices were not applicable to this sub-watershed and therefore were not incorporated into the STEPL model. A summary of total pollutant loads by land use applicable to the cove sub-watershed is shown in Table 1 below.

Table 1. Total Load by Land Uses

Sources	N Load (lb/yr)	P Load (lb/yr)	BOD Load (lb/yr)	Sediment Load (t/yr)	E. coli Load (Billion MPN/yr)
Urban	445.79	76.88	1900.29	10.43	0.00
Forest	39.07	17.99	90.96	4.19	0.00
Total	484.86	94.87	1991.26	14.62	0.00

The phosphorus load, of 94.87 lbs/year, for Jenness Cove is approximately 14% of the total load for Lake Waukewan, 676 lbs/year, according to the Watershed Restoration Plan for Lake Waukewan and Lake Winona (2016).

STEPL input and the summary of annual nutrient and sediment load for the Jenness Cove sub-watershed are provided in Attachment D.

Sediment Sampling

D&K performed sediment sampling upstream and downstream of the Sawmill Shores Road culvert to determine total phosphorus (TP) amounts in the cove and stream sediment and whether it is a contributing factor to sedimentation and plant growth in the cove. A total of four sediment samples, two upstream and two downstream, of the culvert on May 18, 2022. Two sediment samples were collected within the upper detritus layer of the cove (downstream) and stream (upstream) and two were collected

within the underlying sediment layer of the cove and stream. Both upstream and downstream samples were collected approximately 50 feet from the culvert. The sediment samples were analyzed for total phosphorus. Sampling results are shown below and in Attachment E.

Table 2. Phosphorus Sampling Results

Sample Location	Upstream	Downstream
Detritus	580 mg/kg	270 mg/kg
Sediment	530 mg/kg	680 mg/kg

Based on the sampling results, there is not a significant difference between the upstream and downstream TP amounts and therefore, conclusions, and furthermore recommendations, regarding TP in lake and stream sediment cannot be drawn from the sampling results. There is limited available information regarding TP in Lake Waukewan sediments. However, based on research in other states, the TP levels could be considered moderate for benthic sediments. TP can be released from sediment when disturbed and cause an increase in sediment-bound phosphorus into the water column. This increase in phosphorus can provide more food for plant and algal growth.

In addition to sediment sampling, a sample of water was taken at the upstream side of the 24-inch culvert during the April 15, 2022 site visit. The water appeared to be clear with no visible evidence of silt/sediment. A laboratory analysis of suspended or dissolved sediments was not conducted.

FEASIBILITY ANALYSIS

D&K analyzed the results of the site visit, desktop review, STEPL modeling, hydrologic modeling, and other available information to determine options for improvements to the cove and potential permitting requirements.

Recommendations

Recommendations are listed in the order of priority and net benefit to the cove water quality, in our opinion. Overall, these recommendations would reduce the pollutant load and improve and protect the water quality of Lake Waukewan.

A. Sawmill Shores Road Culvert

D&K determined that a major cause of sedimentation of the cove over the years is due to the construction of Bonney Shores Road and Pike Island Road causeways to what once were islands in Lake Waukewan and the construction of Sawmill Shores Road as shown on Figure 2. Construction of these roads and the undersized Sawmill Shores Road culvert have likely prevented the contributing waters to the cove, including stormwater runoff, surface water and groundwater, from being dispersed across a larger area and between the former islands. Currently, contributing waters are confined to Jenness Cove between Bonney Shores and Sawmill Shores Roads.

D&K recommends the installation of a 60-inch x 30-inch concrete box culvert to improve drainage and increase water circulation to the cove and accommodate the 100-year rain event.

Opportunities for additional modifications, including the installation of culverts under Bonney Shores Road and Pikes Island Road in the vicinity of Jenness Cove, were reviewed. These were determined to not be feasible based on the amount of dredging required within wetland areas to establish an appropriate hydrologic connection. In addition, the historic flows could not be completely restored. The existing flow pattern to the cove would remain the least path of resistance due to a greater distance/flow path for discharges to coves to the west and south from the existing Sawmill Shores Road culvert.

B. Roadway Assessment

Existing road shoulder erosion and sediment runoff are a contributing factor to pollutant loading in Jenness Cove. D&K recommends regrading the road and resurfacing the road with new material. Regrading of the road would include narrowing the road to provide wider vegetated road shoulders to slow runoff and prevent erosion. Vegetation between the road and wetlands and lake provides bank stability and filtration, protecting the integrity of both the lake and road.

Sediment buildup and erosion was observed in the existing road ditches/drainage swales. Reshaping, revegetating, and installing stone check dams in the road drainage swales is recommended to slow stormwater runoff and prevent sediment runoff into the wetland and ultimately the cove. Vegetated swales are cost effective and if planted with dense vegetation can provide wildlife habitat and be aesthetically pleasing.

C. Shoreline Management

It is recommended that unvegetated lake shore areas on properties on the shore of the cove be restored with vegetation to stabilize the shoreline and prevent sediment runoff. Vegetated shorelines naturally stabilize the shore, filter and clean polluted runoff, maintains greater privacy for residents, increases property value, prevents erosion and allows for healthy habitat for fish, birds, and other important species.

D. Other Recommendations

- Aquatic vegetation control could be implemented to improve access to navigable frontage. Based on the amount of existing aquatic vegetation, this would need to be a routine effort to to maintain and improve access. Based on prior project experience, removal and/or dredging of underlying substrate was not allowed by the NHDES in Lake Waukewan.

- There was no evidence of sediment runoff from the snow dump filling activity to the contributing waters of the cove. However, erosion controls are recommended along the toe of slope and stabilization of the bank and exposed fill material with vegetation and/or stone is recommended to prevent potential future sediment runoff to the cove.

- There is no knowledge or evidence of failing septic systems in the vicinity of the cove that could potentially contribute to pollutant loads. However, most lots around the cove are less than 250 feet deep and therefore, septic systems should be regularly maintained and upgraded if necessary to help reduce nutrient loading to the lake.

- It is D&K's opinion that current beaver activity at the culvert is not the leading cause of sedimentation and pollutant load to the cove. However, sediment and beaver dam material removed from the

culvert should be disposed of in an upland location to prevent the discharge of sediment and potential pollutants into the cove.

Permitting

A. Local

The study area and recommended projects are located within the town's Watershed Overlay District, Water Resources Conservation Overlay District, and wetlands 100' buffer. Therefore, impacts to wetlands and surface waters would require an application for special exception.

B. State

A NHDES Shoreland Permit would be required for projects involving excavation, fill, or construction activities within 250 feet of the lake shore.

A NHDES Standard Dredge and Fill Wetlands Permit would be required for impacts to jurisdictional wetlands, wetland buffers within the study area, and aquatic vegetation control and dredging in the lake.

Based on the recommendations, it is assumed a NHDES Alteration of Terrain permit would not be required unless the construction activity were to disturb greater than 50,000 square feet within the 250 foot protected shoreland.

C. Federal

A United States Army Corps of Engineers General Permit would be required for the discharge of dredged or fill material into waters of the United States, which includes the wetlands and surface waters surrounding the Sawmill Shores Road culvert.

ANR, cjr

ATTACHMENTS

A. Figures
    1. USGS Location Map
    2. USGS Topographic Maps
    3. Existing Conditions
    4. Mapped Water Resources
    5. Wildlife Habitat Land Cover
    6. Wildlife Habitat Ranking
B. Photolog
C. USFWS IPaC Resource List
D. STEPL Results
E. Sediment Sampling Analysis Results
F. References

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ATTACHMENT A

FIGURES

Jenness Cove
Lake Waukewan
Meredith, NH

USGS Location Map

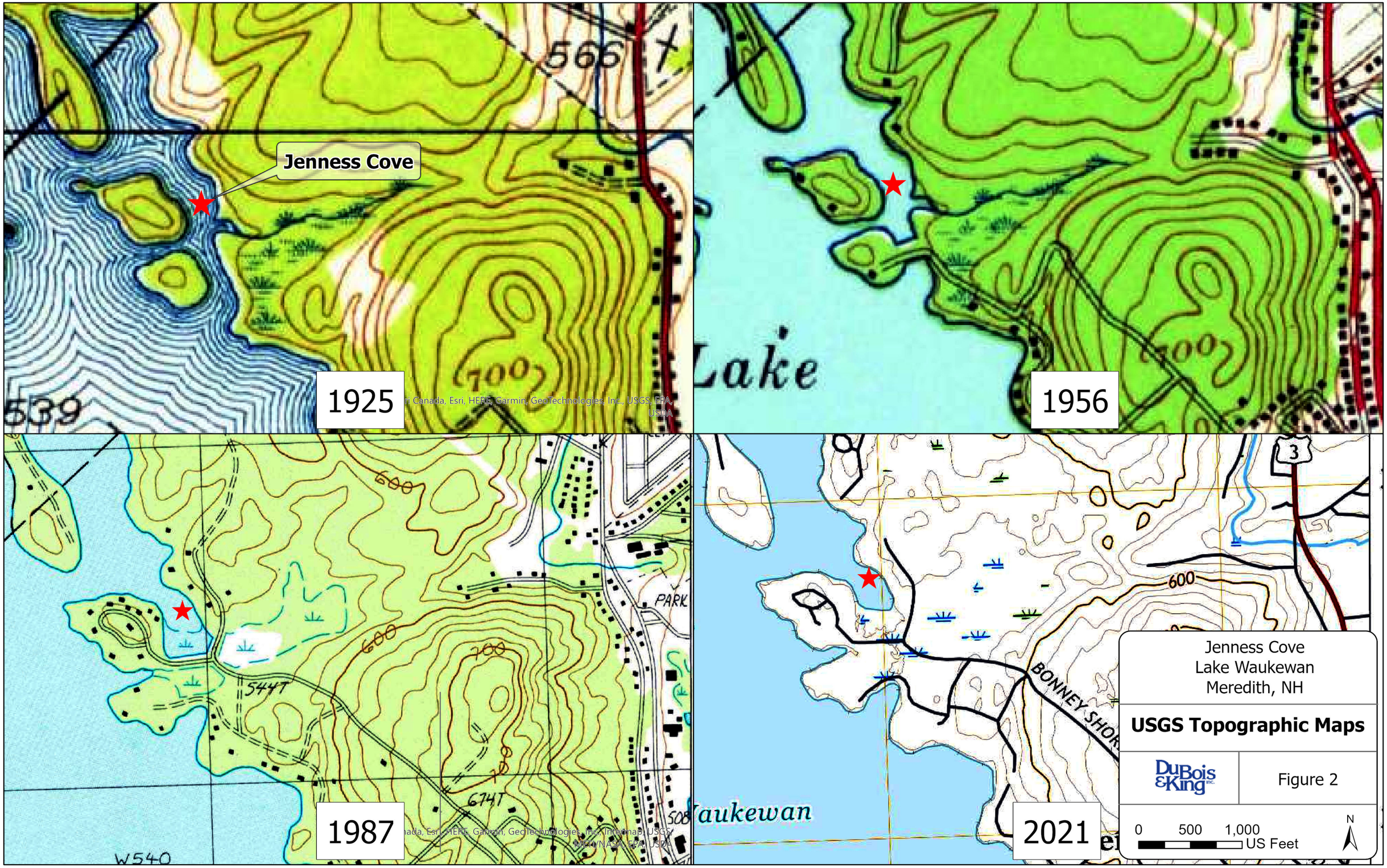
N

Scale: 1:24,000

0 1,000 2,000 3,000 4,000 US Feet

DuBois & King inc.

Figure 1


Jenness Cove
1925
1956
1987
2021
Lake
Waukewan
PARK
BONNEY SHOR
600
700
5447
6747
W540
3
Jenness Cove
Lake Waukewan
Meredith, NH
USGS Topographic Maps
DuBois & King
Figure 2
0
500
1,000
US Feet
N

Legend

- Bathymetry
- Parcel Boundary

Contours (2 FT)

- Minor
- Major

Jenness Cove
Lake Waukewan
Meredith, NH

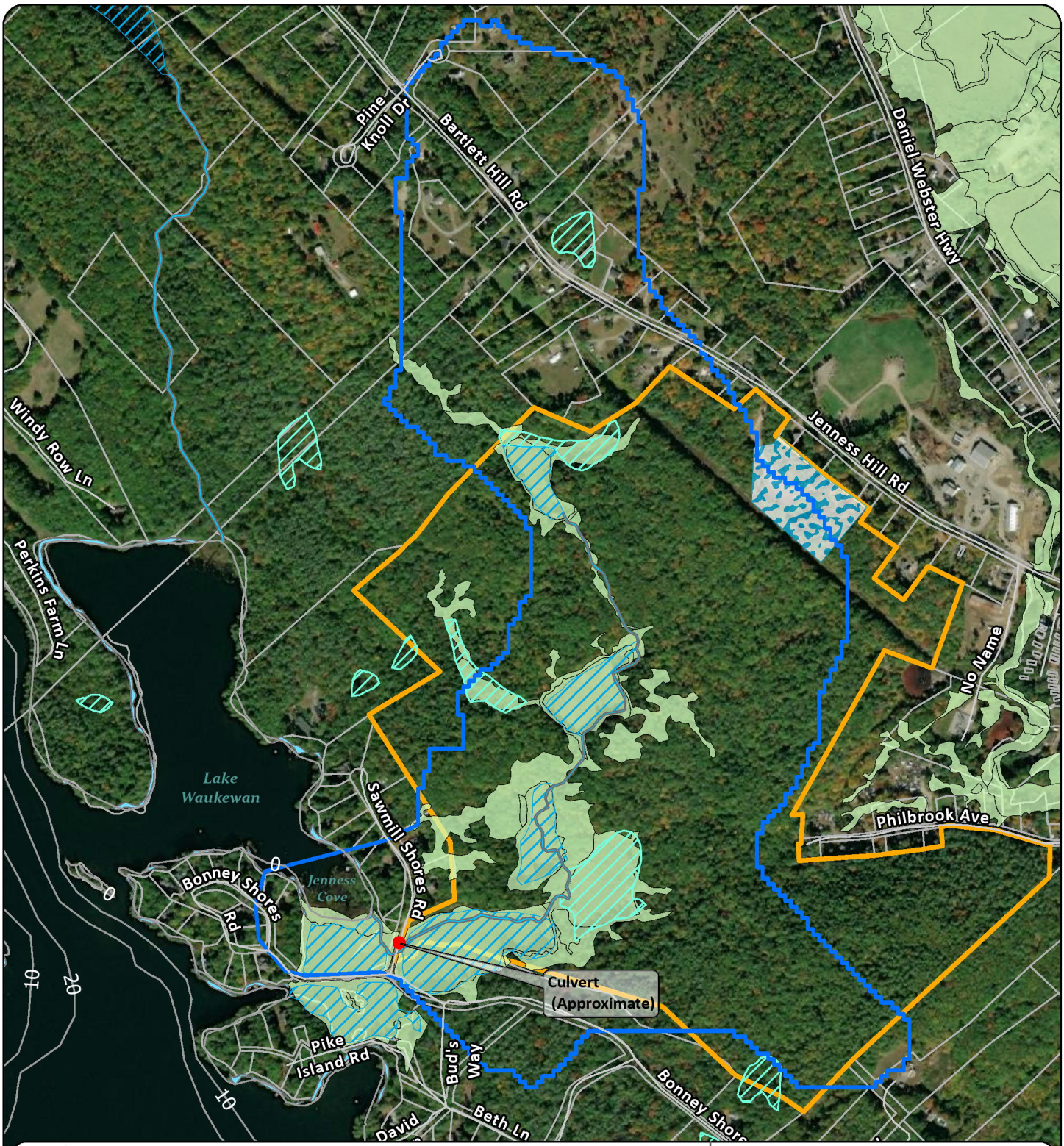
Existing Conditions

Sources: Bathymetry and Contours - Provided by Windy Waters Conservancy; Aerial Imagery Maxar

Scale: 1:3,600

0 500 US Feet

Figure 3



Legend

- Bathymetry
- Cove Watershed Boundary (Approximate)
- Meredith Town Forest/Conservation Land
- Town Designated Wetlands
- NWI Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Lake
- Riverine
- Snow Dump
- Parcel Boundary

Sources: Town Designated Wetlands - Natural Resource Inventory, Van de Poll, 2011; NWI Wetlands - USFWS National Wetlands Inventory; Snow Dump - Town of Meredith; Watershed - USGS StreamStats, revised by D&K; Aerial Imagery Maxar

N

Scale: 1:9,000

0 500 1,000 1,500 US Feet

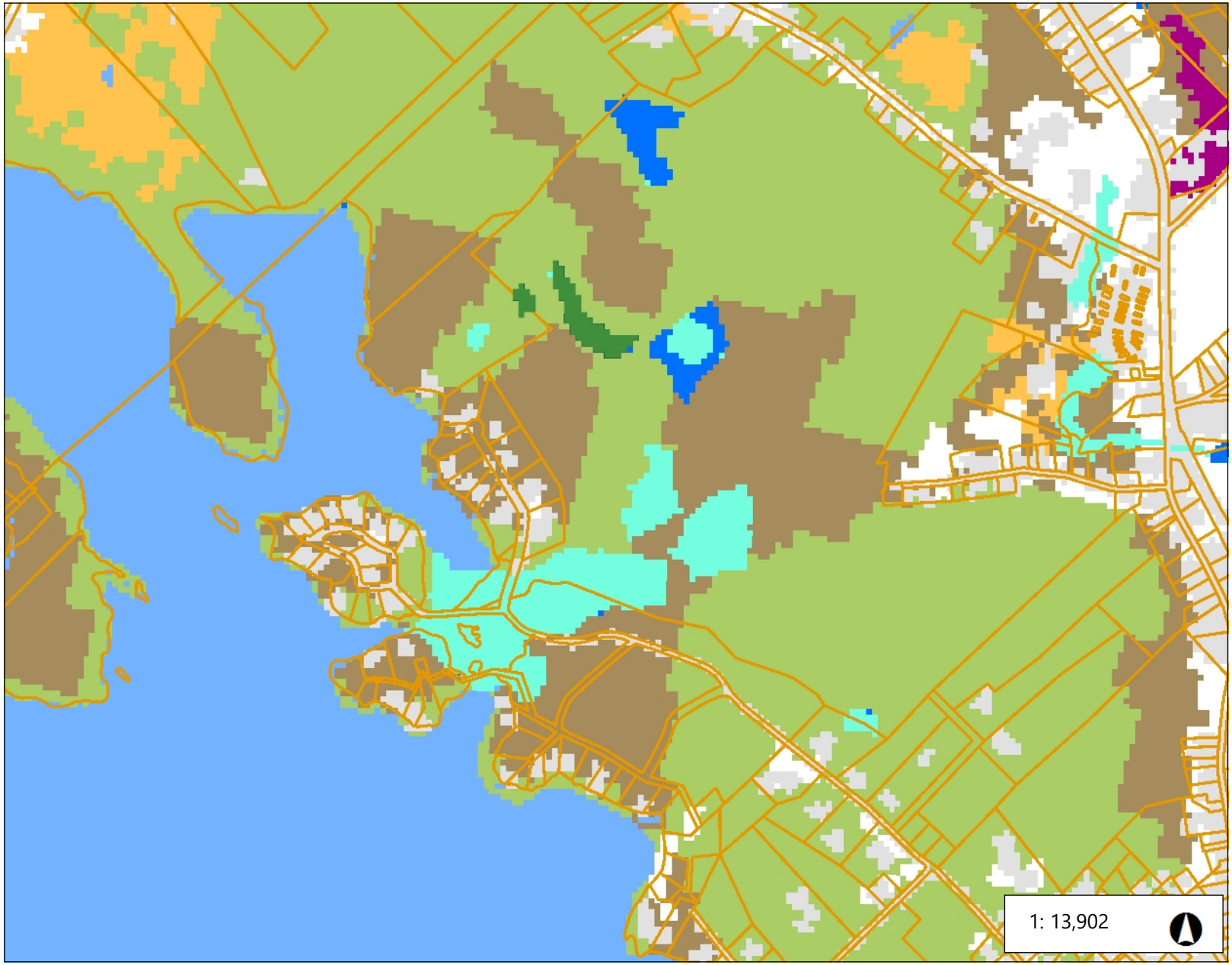
Jenness Cove
Lake Waukewan
Meredith, NH

Mapped Water Resources

DuBois & King INC.

Figure 4

Your Organization | Jeffress Cove
Wildlife Habitat Land Cover



Legend

- Wetland_Permits_points
- Parcel Polygons
  - Parcel Polygons
  - Attributes for Additional Lines
- Parcel Lines
- Wildlife Habitat Land Cover
  - Alpine
  - Appalachian oak-pine
  - Cliff and Talus slope
  - Coastal island and Rocky coast
  - Developed Impervious
  - Developed or Barren land
  - Dune
  - Floodplain forest
  - Grassland
  - Hemlock-hardwood-pine
  - High-elevation spruce-fir
  - Lowland spruce-fir
  - Northern hardwood-conifer
  - Northern swamp
  - Open water
  - Peatland
  - Pine barren
  - Rocky ridge
  - Salt marsh
  - Sand/Gravel

0.4 0 0.22 0.4 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

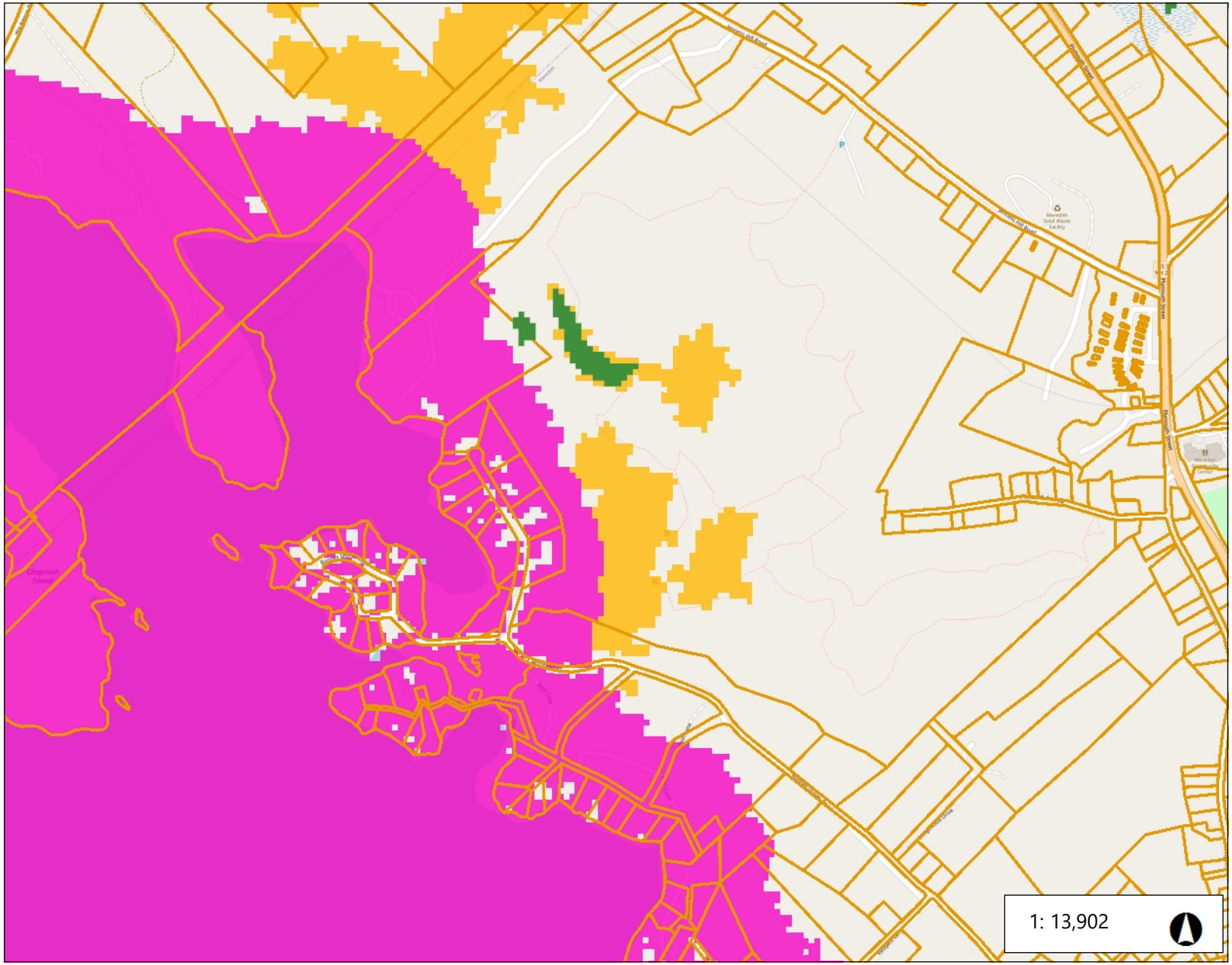
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Figure 5
Wildlife Habitat Land Cover

Your Organization | Jenness Cove
Wildlife Habitat Ranking



Legend

- Wetland_Permits_points
- Parcel Polygons
  - Parcel Polygons
  - Attributes for Additional Lines
- Parcel Lines
- Highest Ranked Wildlife Habita
  - 0
  - 1 Highest Ranked Habitat in NH
  - 2 Highest Ranked Habitat in Regior
  - 3 Supporting Landscape
- Flood Plain Wetlands Adjacent
- Prime Wetlands with 100 ft Buf
- Prime Wetlands
- Sand Dunes
  - backdune
  - foredune
  - interdune
  - other
- Tidal Waters / Tidal Wetlands
  - Tidal wetland
  - Transitional salt marsh
  - Salt marsh
  - Mud flat
  - Tidal water

0.4 0 0.22 0.4 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Figure 6
Wildlife Habitat Ranking

ATTACHMENT B

PHOTOLOG

Photograph 1: Jenness Cove, view looking northwest. Photo taken from 14 Sawmill Shores Road property.

Photograph 2: Jenness Cove, view looking south. Photo taken from 14 Sawmill Shores Road property.

Photograph 3: Jenness Cove, view looking southeast. Photo taken from 77 Bonney Shores Road property.

Photograph 4: Jenness Cove, view looking northwest. Photo taken from 8 Sawmill Shores Road property.

Photograph 4: Jenness Cove, view looking southwest. Photo taken from 8 Sawmill Shores Road property.

Photograph 5: Jenness Cove, view looking south toward Sawmill Shores Road. Photo taken from 14 Sawmill Shores Road property.

Photograph 6: Southern terminus of Jenness Cove, view looking north from Sawmill Shores Road.

Photograph 7: Wetland complex on east side of Sawmill Shores Road and Jenness Cove, view looking east from Sawmill Shores Road.

Photograph 14: View of wetland complex on east side of Sawmill Shores Road and Jenness Cove, view looking south. Photo taken from 15 Sawmill Shores Road property.

Photograph 8: View of upstream side of Sawmill Shores Road culvert and manhole, view looking north.

Photograph 9: View of downstream side of Sawmill Shores Road culvert, view looking north.

Photograph 10: View of upstream side of Sawmill Shores Road culvert.

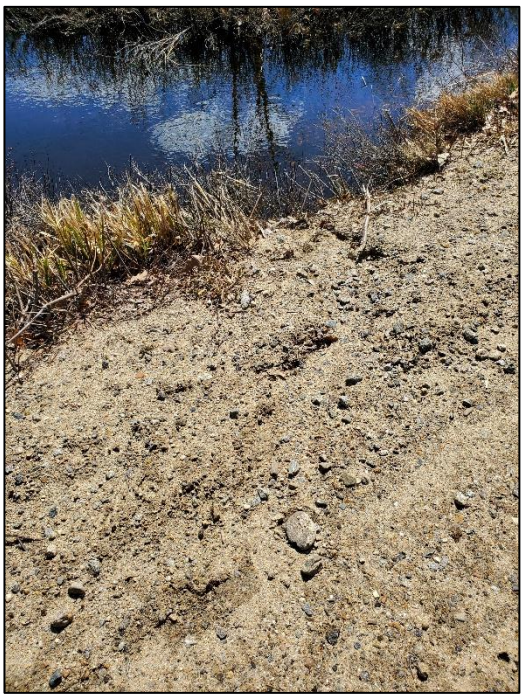
Photograph 11: View of material removed from culvert and deposited on downstream side of culvert per landowner.

Photograph 12: View of road bank erosion on the east side of Sawmill Shores Road near the culvert, view looking north.

Photograph 13: View of downstream side of Sawmill Shores Road culvert, view looking north.

Photograph 14: View of upstream side of Sawmill Shores Road culvert.

Photograph 13: View of downstream side of Sawmill Shores Road culvert, view looking north.



Photograph 14: View of upstream side of Sawmill Shores Road culvert.

Photograph 13: View of downstream side of Sawmill Shores Road culvert, view looking north.

Photograph 14: View of upstream side of Sawmill Shores Road culvert.

Photograph 13: View of downstream side of Sawmill Shores Road culvert, view looking north.

Photograph 14: View of upstream side of Sawmill Shores Road culvert.

ATTACHMENT C

USFWS IPaC RESOURCE LIST

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Project information

NAME

Jenness Cove Sedimentation Evaluation

LOCATION

Belknap County, New Hampshire

DESCRIPTION

Some(Evaluate sedimentation of Jenness Cove and stormwater and culvert infrastructure.)

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Small Whorled Pogonia Isotria medeoloides No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Cape May Warbler *Setophaga tigrina* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Jun 1 to Jul 31

Evening Grosbeak Coccothraustes vespertinus — Breeds May 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events

and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

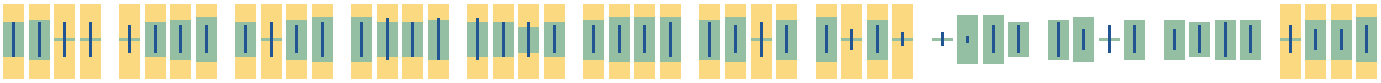
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

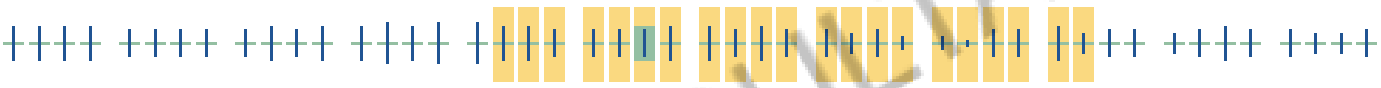
■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

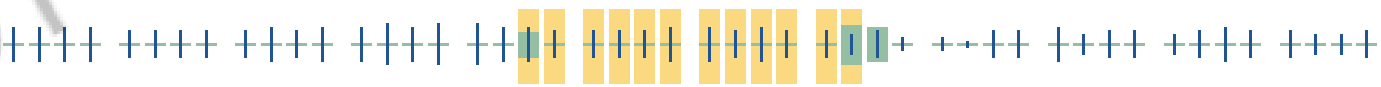
Bald Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



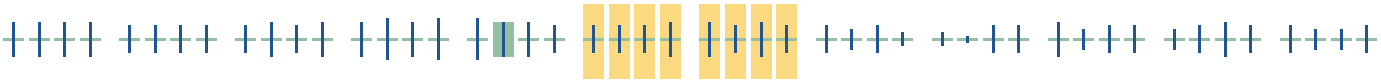
Black-billed Cuckoo BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



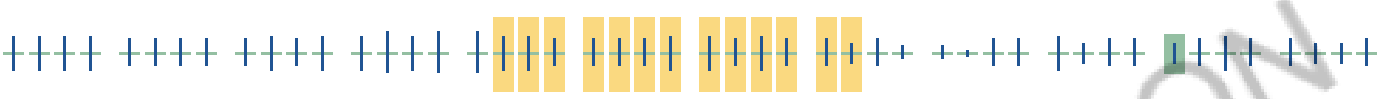
Canada Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



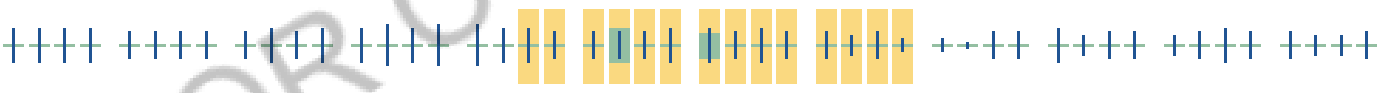
Cape May Warbler BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



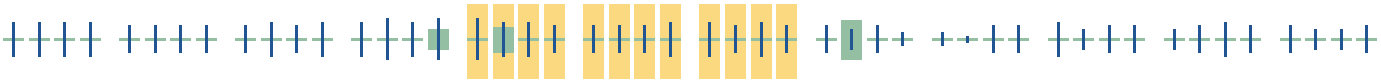
Evening Grosbeak BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



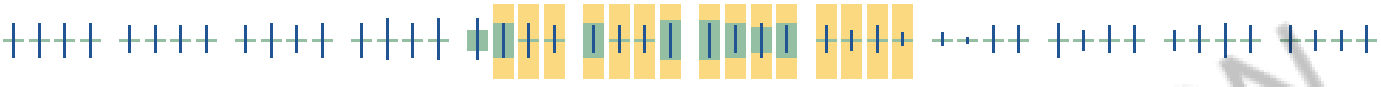
Olive-sided Flycatcher BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as

warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

THERE ARE NO KNOWN COASTAL BARRIERS AT THIS LOCATION.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- Palustrine

LAKE

- Lacustrine

RIVERINE

- Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and

geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

ATTACHMENT D

STEPL RESULTS

State	County	Weather Station
New Hampshire	Belknap	LAKEPORT 2

Calculate Manure Application Months: Manure Application

1. Input watershed land use area (ac) and precipitation (in)

Watershed	Urban	Cropland	Pastureland	Forest	User Defined	Feedlots	Feedlot Percent Paved	Total	Annual Rainfall (Rain correction factors 0.863)	Rain Days (0.435)	Avg. Rain/Event
Jenness Cove (W1)	**85.3**	**0**	**0**	**113.1**	**0**	**0**	75-100%	198.4	40	131	0.602
W2	0	0	0	0	0	0	0-24%	0	40	131	0.602
W3	0	0	0	0	0	0	0-24%	0	40	131	0.602
W4	0	0	0	0	0	0	0-24%	0	40	131	0.602
W5	0	0	0	0	0	0	0-24%	0	40	131	0.602
W6	0	0	0	0	0	0	0-24%	0	40	131	0.602
W7	0	0	0	0	0	0	0-24%	0	40	131	0.602
W8	0	0	0	0	0	0	0-24%	0	40	131	0.602
W9	0	0	0	0	0	0	0-24%	0	40	131	0.602
W10	0	0	0	0	0	0	0-24%	0	40	131	0.602

Optional Data Input:

5. Select average soil hydrologic group (SHG). SHG A = highest infiltration and SHG D = lowest infiltration

Watershed	SHG A	SHG B	SHG C	SHG D	SHG Selected	Soil N conc.%	Soil P conc.%	Soil BOD conc.%	Soil E. coli conc. (#/100mg)
Jenness Cove (W1)	○	○	●	○	**C**	0.080	0.031	0.160	0.000
W2	○	●	○	○	B	0.080	0.031	0.160	0.000
W3	○	●	○	○	B	0.080	0.031	0.160	0.000
W4	○	●	○	○	B	0.080	0.031	0.160	0.000
W5	○	●	○	○	B	0.080	0.031	0.160	0.000
W6	○	●	○	○	B	0.080	0.031	0.160	0.000
W7	○	●	○	○	B	0.080	0.031	0.160	0.000
W8	○	●	○	○	B	0.080	0.031	0.160	0.000
W9	○	●	○	○	B	0.080	0.031	0.160	0.000
W10	○	●	○	○	B	0.080	0.031	0.160	0.000

6. Reference runoff curve number (may be modified)

SHG	A	B	C	D
Urban	**89**	**92**	**90**	**95**
Cropland	67	78	85	89
Pastureland	49	69	79	84
Forest	**39**	**61**	**74**	**80**
User Defined	**50**	**70**	**80**	**85**

6a. Detailed urban reference runoff curve number (may be modified)

Urban\SHG	A	B	C	D
Commercial	89	92	94	95
Industrial	81	88	91	93
Institutional	81	88	91	93
Transportation	98	98	98	98
Multi-Family	77	85	90	92
Single-Family	**77**	**85**	**90**	**92**
Urban-Cultivated	67	78	85	89
Vacant-Developed	**77**	**85**	**90**	**92**
Open Space	**50**	**70**	**80**	**85**

7. Nutrient concentration in runoff (mg/l) and E. coli (MPN/100ml)

Land use	N	P	BOD	E. coli
1. L-Cropland	**1.9**	**0.3**	**4**	0
1a. w/ manure	8.1	2	12.3	0
2. M-Cropland	**2.9**	**0.4**	**6.1**	0
2a. w/ manure	12.2	3	18.5	0
3. H-Cropland	**4.4**	**0.5**	**9.2**	0
3a. w/ manure	18.3	4	24.6	0
4. Pastureland (see Table 10 for default values with manure)				
5. Forest	**0.2**	**0.1**	**0.5**	0
6. User Defined	**0**	**0**	**0**	0

7a. Nutrient concentration in shallow groundwater (mg/l) and E. coli (MPN/100ml)(may be modified)

Landuse	N	P	BOD	E. coli
Urban	1.5	0.063	0	0
Cropland	1.44	0.063	0	0
Pastureland	1.44	0.063	0	0
Forest	0.11	0.009	0	0
Feedlot	6	0.07	0	0
User-Defined	0	0	0	0

8. Input or modify urban land use distribution

Watershed	Urban Area (ac.)	Commercial %	Industrial %	Institutional %	Transportation %	Multi-Family %	Single-Family %	Urban-Cultivated	Vacant (developed	Open Space %	Total % Area
Jenness Cove (W1)	**85.3**	**0**	**0**	**0**	**0**	**0**	**75**	**5**	**5**	**15**	**100**
W2	0	15	10	10	10	10	30	5	5	5	100
W3	0	15	10	10	10	10	30	5	5	5	100
W4	0	15	10	10	10	10	30	5	5	5	100
W5	0	15	10	10	10	10	30	5	5	5	100
W6	0	15	10	10	10	10	30	5	5	5	100
W7	0	15	10	10	10	10	30	5	5	5	100
W8	0	15	10	10	10	10	30	5	5	5	100
W9	0	15	10	10	10	10	30	5	5	5	100
W10	0	15	10	10	10	10	30	5	5	5	100

(STEPL RESULTS, OUTPUT)

Total Load This is the summary of annual nutrient and sediment load for each subwatershed. This sheet is initially protected.

1. Total load by subwatershed(s)

Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	E. coli Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	E. coli Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	E. coli Load (with BMP)	%N Reduction	%P Reduction	%BOD Reduction	%Sed Reduction	%E. coli Reduction
	lb/year	lb/year	lb/year	t/year	Billion MPN/y	lb/year	lb/year	lb/year	t/year	Billion MPN/y	lb/year	lb/year	lb/year	t/year	Billion MPN/y	%	%	%	%	%
Jenness Cove (W1)	484.9	94.9	1991.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0	484.9	94.9	1991.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0
W2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	484.9	94.9	1991.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0	484.9	94.9	1991.3	14.6	0.0	0.0	0.0	0.0	0.0	0.0

ATTACHMENT E

SEDIMENT SAMPLING ANALYSIS RESULTS

Eastern Analytical, Inc.

professional laboratory and drilling services

Aimee Rutledge
DuBois & King, Inc. (Williston)
34 Blair Park Road, Suite 10
Williston , VT 05495

Laboratory Report for:

Eastern Analytical, Inc. ID: 243209
Client Identification: Jenness Cove
Date Received: 5/18/2022

Enclosed are the analytical results per the Chain of Custody for sample(s) in the referenced project. All analyses were performed in accordance with our QA/QC Program, NELAP and other applicable state requirements. All quality control criteria was within acceptance criteria unless noted on the report pages. Results are for the exclusive use of the client named on this report and will not be released to a third party without consent.

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the written approval of the laboratory.

The following standard abbreviations and conventions apply to all EAI reports:

< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Certifications:
Eastern Analytical, Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012), New York (12072), West Virginia (9910C) and Alabama (41620). Please refer to our website at www.easternanalytical.com for a copy of our certificates and accredited parameters.

References:

- EPA 600/4-79-020, 1983
- Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd edition or noted revision year.
- Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
- Hach Water Analysis Handbook, 4th edition, 1992

If you have any questions regarding the results contained within, please feel free to contact customer service. Unless otherwise requested, we will dispose of the sample(s) 6 weeks from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director

6.1.22
Date

SAMPLE CONDITIONS PAGE

EAI ID#: **243209**

Client: **DuBois & King, Inc. (Williston)**

Client Designation: **Jenness Cove**

Temperature upon receipt (°C): 20.9 **Received on ice or cold packs (Yes/No): N**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date/Time Sampled		Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
243209.01	UP-DET	5/18/22	5/18/22	12:50	soil	12.4	Adheres to Sample Acceptance Policy
243209.02	DOWN-DET	5/18/22	5/18/22	12:50	soil	45.6	Adheres to Sample Acceptance Policy
243209.03	UP-SOIL	5/18/22	5/18/22	12:30	soil	15.4	Adheres to Sample Acceptance Policy
243209.04	DOWN-SOIL	5/18/22	5/18/22	12:30	soil	11.3	Adheres to Sample Acceptance Policy

All results contained in this report relate only to the above listed samples.

Unless otherwise noted:

- *Hold times, preservation, container types, and sample conditions adhered to EPA Protocol.*
- *Solid samples are reported on a dry weight basis, unless otherwise noted. pH/Corrosivity, Flashpoint, Ignitability, Paint Filter, Conductivity and Specific Gravity are always reported on an "as received" basis.*
- *Analysis of pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite were performed at the laboratory outside of the recommended 15 minute hold time.*
- *Samples collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures.*

LABORATORY REPORT

EAI ID#: **243209**

Client: **DuBois & King, Inc. (Williston)**

Client Designation: **Jenness Cove**

Sample ID:	UP-DET	DOWN-DET	UP-SOIL	DOWN-SOIL					
Lab Sample ID:	243209.01	243209.02	243209.03	243209.04					
Matrix:	soil	soil	soil	soil					
Date Sampled:	5/18/22	5/18/22	5/18/22	5/18/22	**Analytical Matrix**	**Units**	**Date of Analysis**	**Method**	**Analyst**
Date Received:	5/18/22	5/18/22	5/18/22	5/18/22					
Phosphorus	**580**	**270**	**530**	**680**	SolTotDry	mg/kg	5/19/22	6020A	DS

Page _____ of _____

Chain-of-Custody Record

Bold Fields Required. Please Circle Requested Analysis.

243209

Sample I.D.	Sampling Date/Time *If Composite, Indicate Both Start & Finish Date/Time	Matrix (see below)	Grab/*Composite	VOC: 524.2 524.2 MTBE only; 8260 624 VTICs; 1, 4 Dioxane; 8021; 8015 GRO MAVPH	SVOC: 8270 625 ABN PAH EDB DBCP; TPH8100 L1 L2; 8015 DRO MAEPH; PEST 608 PCB 608 PEST 8081 PCB 8082; Oil & Grease 1664 TPH 1664	TCLP: TCLP 1311 ABN METALS VOC PEST HERB	Inorganics: BOD CBOD TS TSS TDS; Br Cl F SO_4 NO_2 NO_3 NO_2NO_3; TKN NH_3 TN T. PHOS. O. PHOS.; pH T. RES. CHLORINE SPEC. CON. T. ALK.; COD Phenols TOC DOC; Total Cyanide Total Sulfide; Reactive Cyanide Reactive Sulfide Flashpoint Ignitability	Micro: Total Coliform E. Coli Fecal Coliform Enterococci Heterotrophic Plate Count	Metals: Dissolved Metals (list below) Total Metals (list below)	Other	# of Containers	Notes MeOH Vial #
UP-DET	5/18/22 12:50						X					
DOWN-DET	5/18/22 12:50						X					
UP-SOIL	5/18/22 12:30						X					
DOWN-SOIL	5/18/22 12:30						X					

Matrix: A-Air; S-Soil; GW-Ground Water; SW-Surface Water; DW-Drinking Water; WW-Waste water

Preservative: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

Project Manager: Aimee Rutledge
Company: Dubois & King
Address: 6 Green Tree Drive
City: S. Burlington **State:** VT **Zip:** 05403
Phone: (401) 529-5034 **Ext.:**
E-Mail: arutledge@dubois-king.com
Site Name: Jenness Cove
Project #:
State: NH MA ME VT **Other:**
Regulatory Program: NPDES: RGP POTW Stormwater or GWP, Oil Fund, Brownfield or Other: N/A
Quote #: 1019535 **PO #:**

QA/QC Reporting
A B C
MA MCP
Temp. 20-9 °C
Ice? Yes No

Reporting Options
Prelims: Yes or No

Electronic Options
PDF Excel
Equis
Other _____

Turn Around Time
24hr* 48hr*
3-4 Days*
5 Day 7 Day
10 Day
*Pre-approval Required

Metals: 8 RCRA 13 PP Fe, Mn Pb, Cu
Other Metals: _____
Samples Field Filtered? ☐ Yes ☒ No
Notes: (ie: Special Detection Limits, Billing Info, If Different)

Sampler(s): Kyle McCammon

Relinquished By:	Date:	Time:	Received By:
[signature]	5/18/22	14:47	[signature]

Site History: _____
Suspected Contamination: _____
Field Readings: _____

ATTACHMENT F

REFERENCES

NHDES. New Hampshire Nonpoint Source Management Program Plan, 2020-2024. Prepared by the Watershed Management Bureau Watershed Assistance Section, October, 2019

Kalkhoff, S. J. Phosphorus in Sediment in the Kent Park, Lake Watershed, Johnson County, Iowa, 2014–15. U.S. Geological Survey, Prepared in cooperation with the Johnson County Conservation Board, 2016

Lake Winnipesaukee Association and FB Environmental Associates. Lake Waukewan and Lake Winona Watershed Restoration Plan. September2016

Randall, M. C. et. al. Sediment potentially controls in-lake phosphorus cycling and harmful cyanobacteria in shallow, eutrophic Utah Lake. February 14, 2019, https://doi.org/10.1371/journal.pone.0212238

Søndergaard, M., Jensen, J. P., Jeppesen, E. Role of sediment and internal loading of phosphorus in shallow lakes. National Environmental Research Institute, Department of Freshwater Ecology, Vejlsøvej 25, P.O. Box 314, DK8600 Silkeborg, Denmark. 2003

USEPA. Estimated Total Nitrogen and Total Phosphorus Loads and Yields Generated within States. https://www.epa.gov/nutrient-policy-data/estimated-total-nitrogen-and-total-phosphorus-loads-and-yields-generated, accessed June 1, 2022

University of Rhode Island, Natural Resources Facts, Phosphorus and Lake Aging. Fact Sheet No. 96-2, May 1996

Vermont Department of Environmental Conservation. Lake Wise Program. Referenced Fact Sheets, Lake Watershed Action Plans Guidance, and other available data on the website. https://dec.vermont.gov/watershed/lakes-ponds/lakeshores-lake-wise