

GEI Consultants of Michigan, P.C. (GEI) was contracted by Mr. Scott Troia, Staff Attorney for the Great Lakes Environmental Law Center (GLELC) to provide expert testimony in the matter of:

Grand Traverse Band of Ottawa and Chippewa Indians, Grand Traverse Bay Watershed Initiative, Inc., and Elk-Skegemog Lakes Association v. Burnette Foods, Incorporated

Case No. 23-cv-00586

Prepared by:

Stuart Kogge, Professional Wetland Scientist (PWS), Sr. Wetland/Aquatic Biologist, VP
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Qualifications:

Mr. Kogge received a B.S. and M.S. degree from Michigan State University in Fisheries and Wildlife Management and Limnology/Aquatic Biology, in 1983 and 1985, respectively. After graduation he worked for the United States Fish and Wildlife Service, Michigan Department of Natural Resources, and Michigan Department of Environmental Quality. After serving as Michigan's Statewide Wetland Biologist, where part of his duties was providing training for wetland staff, he left state service in 1999 to form a profit and non-profit organization. From 1999 to present day Mr. Kogge has been working with private consulting firms serving as their senior wetland/aquatic biologist and botanist. Attached as Appendix A is Mr. Kogge's resume with additional information, project experiences, presentations, classes taught, and publications.

Publications and Prior Expert Testimony:

Mr. Kogge has authored several publications; however they were all prepared and published more than ten (10) years ago. A list of books, articles, publications, and bulletins Mr. Kogge has authored or co-authored are provided at the end of Appendix A.

Mr. Kogge has testified in seven district court cases and a circuit case, however all of those are more than 20 years ago when Mr. Kogge's responsibilities focused on enforcing environmental statutes administered by MDEQ Water Resource Division.

Within the past four (4) years, in 2023, Mr. Kogge testified in an EGLE Contested Case that was conducted by an Administrative Law Judge. His testimony focused on the extent and quality of habitat present for aquatic biota (e.g., fish, macroinvertebrates, freshwater mussels, and aquatic plants) within a marina basin, in Lake Macatawa, Ottawa County, Michigan.

Compensation:

Mr. Kogge is being paid on an hourly basis for his testimony at a rate of \$283/hour.

Introduction

Based on discussions with Mr. Troia and a preliminary review of documents from the Department of Environment, Great Lakes and Energy (EGLE), it became apparent that Burnette Foods Inc. (BFI) has had numerous instances over the past few years of non-compliance with their EGLE Ground Water Discharge Permit and causing concern for downstream water quality issues. I was asked to review the wetland delineations provided by Burnette Foods and assess their accuracy, as well as to opine on the connection between the wetlands and adjacent lands and waters. GEI was also requested to review the data and current and past site conditions to assess the potential for Burnette Foods's wastewater to transport contaminants through the wetlands and impact the adjacent wetlands, groundwater, Spencer Creek, Elk Lake, and their associated biota. This included conducting a field assessment of the land and water features depicted within Figure 1 (inset right). Areas outside of this originally estimated red polygon shown in Figure 1 were also assessed.



I. Methods

Desktop Review of Existing Data

GEI reviewed agency resource reference maps of the project area from the following federal and state websites/databases to assist in identifying/confirming the presence/absence of defined watercourses, wetlands, direction of overland runoff, soils present and their potential to uptake compounds and elements:

- U.S. Geologic Survey (USGS) Topographic Map Series
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI)

- U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Soil Survey.
- EGLE Wetland Map Viewer

GEI's desktop review also focused on EGLE's notice of violation letters, BFI's responses, BFI's consultants' reports, field and monitoring data collected by the GTBWC, ELSA, BFI, and EGLE, and aerial imagery (courtesy of Google Earth and Bing). Desktop reviews of aerial imagery, documents, and data provided to GEI extended beyond the area shown in Figure 1, including but not limited to, BFI's processing plant further to the north.

II. Results

Desktop Review of Existing Data

A brief summary of information GEI found beneficial in formulating professional opinions and recommendations, relative to our requested tasks and the alleged discharges, violations, and impacts to the State's natural resources, are provided by natural resource categories below:

Wetlands

Lakeshore Environmental Inc. (LEI) conducted three separate wetland delineations for the BFI property. The first was on November 18, 2020, where they focused their assessment on the northern end of Field 36 (southern end of the site). (BFI#00004023). This report showed the presence of wetlands on the backside (northside) of the historically constructed berm around the perimeter of Field 36 (aerial imagery appears to indicate prior to June 2006). It also mapped wetlands south of that berm and within a more recently constructed retention area by the creation of another berm in 2008 (as reported by LEI in their report). The LEI report identifies two wetlands, Wetland A and Wetland B, with Wetland A being the apparent recently constructed retention basin and Wetland B the prior existing wetland to the north of the berm. However, their figure shows division of upland between them, to which GEI opines that the berm that separates the two called out wetlands had also developed into wetland. GEI's 2024 field review, covered later in this tech memo, confirmed this. LEI concluded these wetlands are regulated pursuant to Part 303, Wetland Protection, of the Natural Resources and Environmental Protection Act (NREPA), P.A. 451 of 1994, as amended, and to which GEI concurs.

This November 2020 report provides documentation, from BFI's consultant, that there is a continuum between Field 36 and the southern end of the wetland complex that eventually flows into Elk Lake. The lack of an upland berm, or a berm of significant height to prevent its establishment into wetland, provides a strong indication that not only does

water subsurface move through this berm, but that also likely surface water flows over top of it – which leads to its identification and mapping as being wetland and not upland. GEI concurs that even if there is a berm at this location its identification and mapping as wetland is a strong indication that subsurface and/or surface water flows over it on some level of frequency.

LEI's second wetland delineation report dated May 2021, focused on the wetlands that were bisected by the east-west farm road that provides access between Fields 38 and 39. (BFI#00003973). LEI concluded and GEI's 2024 field review, covered later in this tech memo, concurs with LEI that these wetlands are regulated pursuant to Part 303 of NREPA.

LEI's third wetland delineation on September 28, 2022, focused on the wetlands north of Field 39. (BFI#00003997). LEI concluded and GEI's 2024 field review, covered later in this tech memo, concurs with LEI that these wetlands are regulated pursuant to Part 303 of NREPA.

GEI's general concurrence with LEI's findings that the mapped wetlands on the property, including the wetlands bisected by the roadway are regulated, pursuant to Part 303, is based on the definition of wetlands, its history and regulatory criteria. A brief summary of these is provided in Appendix B.

Included in the LEI reports is information from the USDA NRCS Soil Survey and USFWS NWI which support the historical and presence of wetlands within the areas mapped by LEI and to which GEI also concurs. Copies of these maps from those agencies are not included in this tech memo.

Through the use of a combination of aerial imagery (courtesy of Google Earth and Bing), USDA NRCS Soil Survey data, USGS Topography maps, EGLE's Wetland Map Viewer and USFWS NWI maps, GEI was able to get a fair understanding of the historical state of the wetlands on the BFI property. Aerial imagery for the subject area from 2005 to 2024 is provided within Appendix C.

Aerial imagery appears to indicate that over the years the interior portions of the wetland complex within the central portions of the property has consisted primarily of emergent wetland vegetation (specifically cattails) with the outer margins of the wetland complex being scrub-shrub and then forested wetland at the outer most margins. The percentage of these wetland types to one another does not appear to have changed over the years evaluated (2005 to 2022). Field reviews, discussed in another section of this memo, indicate that three species of cattails are present in this wetland complex - broadleaf (*Typha latifolia*), narrowleaf (*T. angustifolia*), and hybrid cattail (*T. glauca*). The latter two species of cattails are non-native species and have shown a high tolerance to

periodic fluctuations in water levels – able to survive short periods of high and low water elevations.

Visual evidence of the potential impact of the spray fields on the adjacent wetlands can be seen in closer examination of the aerial photography from October 5, 2019, April 30, 2020, and October 10, 2020. These aerials show an apparent increase in water being stored within the wetland as compared to prior years. These aerials show an apparent excess amount of water within the wetlands and the October 5, 2019, and October 10, 2020, aerials show a reddish cast/coloration within areas of apparent excess or ponding water. These aerials, coupled with LEI's 2020 report, show a continuum between Field 36 and the southern end of the wetland complex despite the construction of a berm in 2008, and further supports a connection via groundwater and/or surface water into the wetlands with the spray discharge fields. Mr. Kogge of GEI has been doing aerial interpretation of aerial photographs for evaluating wetlands for over 38 years (commencing in 1986 with MDNR Land and Water Management Division) and EGLE records show repeated violations for exceeding flows and application rates, elevated element and compounds going into the groundwater and wetland, and ponding in numerous years, in part to these permit exceedances/violations, which supports these interpretations of the imagery. These will be presented and discussed in a proceeding section of this technical memo.

Watercourses

Maps created by EGLE and by USGS show the presence of a defined stream/watercourse emanating from the wetland complex on BFI property, flowing north and under County Highway 605 (aka Elk Lake Road) then into Elk Lake (Figure 2 courtesy of USGS, inset right). Google and Microsoft maps also show the presence of a creek similar to that of EGLE and USGS.

Photographs taken by ESLA and GTBWC over the past several years show the presence of a defined stream upstream a very short distance from Elk Lake Road and then another reach downstream of this culvert under the road to the next culvert which then transports water directly into Elk Lake. Some reports reviewed refer to Spencer Creel as Gretels Creek, which coincides with the name of an apparent commercial cottage rental at/near this same location (Gretel's Cottage, 10443 S Elk Lake Road). Physical description of this stream will be



provided within GEI's field site assessment section of this memo.

Water Quality Monitoring Data

EGLE and BFI Data

In 2019, EGLE WRD evaluated BFI's July 2018 to July 2019 monitoring data for the site and reported (in table format within their August 21, 2019 letter) 29 events where either the flow, Sodium, pH, Chloride, Total Phosphorous, and/or Total Inorganic Nitrogen levels exceeded the limits of BFI's Groundwater Discharge Permit Number GW1810211 (issued pursuant to Part 22, Ground Water Quality, of NREPA). On July 15, 2019, there was a non-reporting issue for dissolved oxygen. EGLE also found 78 events where application rates exceeded daily and/or weekly limits for discharge. These exceedances represented violations of that permit, and EGLE WRD responded with a Notice of Violation letter dated August 21, 2019, summarizing their findings and requirements for seeking compliance. (BFI#00006044).

In 2020, EGLE WRD evaluated BFI's August 2019 to September 2020 monitoring data for the site and determined there were 33 events where either the flow, Sodium, pH, Chloride, Total Phosphorous, and/or Total Inorganic Nitrogen levels exceeded the limits of BFI's Groundwater Discharge Permit Number GW1810211. Between June 1, 2020, and September 9, 2024, there were 25 non-reporting issues for Nitrate Nitrogen, pH, BOD5, Ammonia Nitrogen, and/or Dissolved Oxygen. EGLE also found 113 events where application rates exceeded daily and/or weekly limits for discharge. On August 4, 2020, EGLE observed ponded wastewater effluent from the spray irrigation system and saturated soils along northern edge of spray field 36 along with brown effluent. All these exceedances and observations represent additional violations of that permit, and EGLE WRD responded with a Second Notice of Violation letter dated November 6, 2020, summarizing their findings and requirements for seeking compliance. (BFI#00006776).

In 2021, EGLE WRD evaluated BFI's October 2020 to October 2021 monitoring data for the site and determined there were 25 events where either the flow, Sodium and/or Chloride levels exceeded the limits of BFI's Groundwater Discharge Permit Number GW1810211. EGLE also found 31 events where application rates exceeded daily and/or weekly limits for discharge (EGLE cites 23 times in the month of July). On July 27, 2021, EGLE observed wastewater effluent from the spray irrigation system running along surface of the ground and ponding along northern edge of spray field 36. Sampling of the adjacent wetland showed "an unnaturally high" BOD concentration of 1,910 mg/l. During this time period there were also concerns about *E.coli* in Spencer Creek which prompted additional sampling by EGLE and BFI on July 27, 2021. EGLE's data showed the presence of *E.coli* at BFI's discharge point from the processing plant (EQ-1). Sampling done by GTBWC and ELSA within Spencer Creek also showed the presence of this infectious bacteria. All these observations and exceedances represented

additional violations of that permit, and EGLE WRD responded with a Third Notice of Violation letter dated November 15, 2021, summarizing their findings and requirements for seeking compliance. EGLE also cited additional violations of Part 22 Groundwater Rule from very high concentrations of Arsenic being reported within interior wetlands on the site and extremely high iron and manganese levels within both inner and outer wetlands of the site. (BFI#00004617).

Snapshots of drone survey of the shoreline of Elk Lake on July 30, 2021, show the apparent discharge of reddish-brown water from Spencer Creek, a defined stream channel and series of culverts that convey water from the wetlands on BFI property, under Elk Lake Trail, and eventually into Elk Lake (Appendix D). As noted earlier in this memo, EGLE observed on August 4, 2020, wastewater effluent from the spray irrigation system ponding and saturating the soils along the northern edge of spray field 36 with the color of this effluent being brown. Then again on July 27, 2021, EGLE observed wastewater effluent from the spray irrigation system not just ponding but flowing across the ground surface towards the wetlands north of spray field 36.

Leading up to both EGLE's site review on July 27, 2021, and the discharge of reddish-brown water into Elk Lake on July 30, 2021, there were 16 days in July where daily or weekly application rates within BFI's EGLE permit were exceeded. Flow on July 24, 2021, from EQ-1 was exceeded. These continued exceedances over a period of weeks appear to be strongly correlated with the reddish discharge that was documented to flow out of the culvert (that conveys what from BFI's wetlands) into Elk Lake on July 30, 2021.

In 2023, EGLE WRD evaluated BFI's October 2021 to May 2023 monitoring data for the site and determined there were 20 events where either the flow, Sodium, and/or Chloride levels exceeded the limits of BFI's Groundwater Discharge Permit Number GW1810211. EGLE also found 4 events where application rates exceeded daily and/or weekly limits for discharge. In response to continuing concerns about *E.coli* coming from BFI, EGLE and BFI sampled EQ-1 and EQ-2 (upstream of culvert at Elk Lake Road) on May 16, 2023. *E.coli* was again found by EGLE's sampling to be present in high concentration at EQ-1 but not at EQ-2. These exceedances represent additional violations of BFI's Groundwater permit. EGLE WRD responded with a fourth Notice of Violation letter dated August 2, 2023, summarizing their findings and requirements for seeking compliance. EGLE again also cited additional violations of Part 22 Groundwater Rule from concentrations of arsenic, iron, and manganese exceeding Part 22 criteria levels. (BFI#4549).

GTBWC and ELSA Data

GTBWC and ELSA also collected water chemistry data downgradient (north) of BFI coupled with conducting surveys of aquatic biota within Spencer Creek (commencing

upstream of culvert under Elk Lake Road). Their water chemistry data was fairly consistent with that of EGLE's, showing similar time periods of spikes in concentration of various elements and compounds such as Sodium, Chlorides, Ammonia, and BOD.

Monitoring of the upstream and downstream ends of the culvert under Elk Lake Road (C9 and C8 respectively) between 2019 and 2022 show the presence of *E. coli* with the highest concentrations being in June and/or July. As an example, in 2022, *E. coli* was present throughout the summer, increasing significantly by June 20, 2022 to 345 *E. coli* per 100ml, between August 1 and August 8, 2022 and spiking to more than 2,410 to a maximum of 5,172 *E. coli*/100ml, and eventually in October 2022 numbers of this bacteria getting down to 20/100ml. These time periods of not just elevated but extremely high levels of *E. coli* coincide with the same months in which BFI is at its peak season for operating its facility, discharging wastewater on its fields, and having exceedances each year with respect to various parameters in their permits and with application rates. (PLFS#00000200)

It is also important to note that coupled with this high spike of *E. coli* in the summer months was a time period of extremely high biological oxygen demand (BOD), specifically a sample taken on July 25, 2022, with a value of 9 mg/l. Although the following is already noted within the ELSA 2022 Spencer Creek-Elk Lake Sampling Report (PLFS#00000101), it bears repeating, in reference to the BOD levels found at C9 and C8 and at various BFI monitoring locations:

“A BOD of this magnitude is typically seen in a significantly degraded water system...Unpolluted rivers typically have a BOD below 1 mg/L. Moderately polluted rivers vary between 2 to 8 mg/L. While efficiently treated municipal sewage would be 20 mg/L or less. Burnette Foods generates high strength organic waste with BOD levels in the thousands (see DMRs on MiEnviroPortal).”

Visual signs of pollutants and nutrients downstream of Elk Lake Road are documented in their annual field reports (e.g., discolored foams and scums collecting below the culvert and along the shoreline) (PLFS##000006, 000028, 000049, 000101, 000152). GTBWC monitoring also shows the presence and dominance of pollution tolerant macroinvertebrates such as isopods (sow bugs), amphipods (scuds), and dragonflies indicating there may be some level of degradation within the water chemistry of the surface waters or groundwater as they are not typical of most natural wetland seeps and headwaters of streams GEI typically encounters and evaluating in northern Michigan. (PLFS## 0000136, 0000145, 0000179, 0000181).

Field Site Assessment

In the morning hours of October 9, 2024, Mr. Kevin Kalchik of BFI assisted Messrs. Stu Kogge and Zack Pitman of GEI in getting around the property to look at various areas of the site, specifically the edges of the spray fields, berms, and adjacent upland and wetland areas.

Upland Spray Fields (Fields 36, 37, 38, and 39)

The upland fields that are/were being sprayed with wastewater, were sparsely vegetated with a mixture of native and non-native herbaceous plants species. There was no evidence of a commercial crop having been planted or being grown in these fields, as the predominant plant species were a mixture of “old field” grasses and forbs, consisting of, but not limited to, smooth brome grass (*Bromus inermis*), tall fescue (*Festuca arundinacea*), orchard grass (*Dactylis glomerata*), Queen Ann’s lace/wild carrot (*Daucus carota*), yarrow (*Achillea millefolium*), Canada bluegrass (*Poa compressa*), dandelion (*Taraxacum officinale*), and Canada thistle (*Cirsium arvense*). There were patches within the fields that were only sparsely vegetated. At the time of GEI’s site review there was no evidence of any recent spraying of any of the fields or signs of any ponding water.

Forested Upland

Within the southwestern corner of the property, north of Field 36, there was a relatively wide band (greater than 200 feet) of forested upland comprised of herbaceous, shrub and tree species indicative and representative of northern Michigan. That band of forested upland tapered off to the east where it abutted a scrub-shrub wetland complex mixed with emergent wetland. Within the central and northern portions of the property west of Fields 37 and 38 the strip of forested upland was relatively narrower (approximately 100 feet or less) and it was mostly located on fairly steeply sloping embankments (with the earthen berms between the spray fields from these forested areas). In some locations in the central part of the property (Field 37) there was no fringe of forested upland west of the berms but instead a mixture of forested, scrub-shrub, and emergent wetland to the west of the berms.

Berm

As discussed in the desktop review section of this report, the berm that goes around the northern end of Field 36 does not appear to be of sufficient height to prevent groundwater and/or surface water from escaping the recently constructed retention basin at this northern end. The establishment of wetlands within the historical berm location indicates there is presence of groundwater and/or surface water at a sufficient frequency to maintain that old berm as wetland.

Within Field 36 there also appeared to be an apparent historical breaching of the berm located in the far northwest corner within the edges of the forested upland. This area had the appearance of some level of sheet flow years ago (at least more than two years ago based on the re-vegetation of the area). The distance from this breach to the nearest wetland was at least 100 feet.

Wetlands

The wetlands that are located in the northwestern corner of Field 36, to the west of Fields 37 and 38, and north and east of Field 39 are primarily comprised of a narrow fringe of forested wetland at the base of the forested uplands, followed by another narrow fringe of scrub-shrub wetland, which then blends into the major component of the overall wetland complex which is emergent wetland. The forested and scrub-shrub wetlands were typical of northern Michigan consisting primarily of northern white cedar (*Thuja occidentalis*), balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus incana*) and various willows (*Salix spp.*) and dogwoods (*Cornus spp.*).

Within Field 36 there was evidence of historical flow of water from Field 36 into the adjacent forested upland and the wetlands. There also is indication that there has and continues to be some sheet flow of water (and subsurface flow) from Field 36 to the adjacent emergent and scrub-shrub wetlands to the north. There is strong correlating evidence from LEI's 2020 wetland delineation report and aerial photographs from 2019 and 2020 (Appendix B) to indicate movement of water and suspended material (e.g., red flocculant) into these adjacent wetlands.

Within Fields 37, 38, and 39 I did not observe visual signs of recent sheet flow or channelized flows of water/substances down the upland embankments and into these wetland areas. Noting that GEI's site visit was conducted in October in a particularly dry year and after peak spraying operations had ceased, and that there could have been events in prior years where there was some level of sheet flow into these wetlands where application rates were exceeded and waters overtopped what could appear (including GEI biologists) to be berms of adequate height.

The emergent portions of the wetland complex located within the central eastern and central northern portions of the property were dominated by hybrid cattail (*Typha x glauca*). This is not a native species but a non-native highly invasive species that has been successful in out competing native cattails (broadleaf cattail [*Typha latifolia*]) over time given their ability, in part, to be more tolerant of fluctuating water levels. Additional plant species were also present in the forested, scrub-shrub, and emergent wetlands and are available upon request.

Within the edges of the scrub-shrub and emergent wetlands of the central and northern portions of the property there was visual evidence of groundwater discharge. Wetland plants species typically indicative of groundwater seeps that were found in these areas included but were not limited to jewelweed (*Impatiens capensis*), nodding beggar-ticks (*Bidens cernua*), and watercress (*Nasturtium officinale*). This was particularly evident at the northern end of the assessment area just south of the Elk Lake Road culvert where

these plants became more prominent and eventually a defined stream channel formed at the far northern end of this wetland complex. Walking through the interior of the wetland complex south of the culvert showed signs of apparent sheet flow through the wetlands but not within any defined banks or formation of a defined bed.

In summary, there are three main wetland types within the wetland complex that extend across the western side of the site, and which have a directional flow of water, primarily sheet flow and subsurface flow with eventual discharging downgradient to the north. The three wetland types are forested, scrub-shrub, and emergent wetland.

Despite the division of the overall wetland complex by an east-west farm road there are two equalization culverts that assist in conveying water from the south to the north during wetter periods of the year or following rainfalls or events that may add additional water into these wetland areas. At the time of field review, GEI noted that both culverts were completely free of any debris or obstructions which could prevent flow of water to the north. Part 303, Wetland Protection, of NREPA defines these wetlands as being all one wetland complex and regulated. Rules promulgated for Part 303 has R 281.921 Definitions, Rule 1 (b)(iv) defining “contiguous” as also meaning “Two or more areas of wetland separated only by barriers, such as dikes, roads, berms or other similar features....”. A summary of this and other meanings for contiguous relative to Part 303 are provided in Appendix B.

GEI generally concurs with the wetland boundaries LEI had delineated for the property and that all of those mapped wetlands would be regulated. There are additional wetlands on the property that are part of this overall wetland complex that were not delineated by LEI but would also be regulated.

Watercourses

Section 30101 of Part 301, Inland Lakes and Streams, of NREPA, defines a stream as having “...definite banks, a bed, and visible evidence of a continued flow or continued occurrence of water...”. Immediately upstream of the Elk Lake Road culvert there is an approximate 16-foot reach immediately upgradient of the culvert (west of Elk Lake Road) that has defined banks, bed, and an occurrence of flow. The stream width varied from 32 inches wide at its downstream end before entering the culvert to 30 inches approximately 8 feet upstream and 19 inches at upper limit of the defined bank and bed features. Maximum water depth at the downstream end was 3 inches and upper limit was devoid of standing/running water. Bottom substrates in all parts of this short reach of defined channel west of Elk Lake Road was silt and detritus. The emergent wetland complex immediately south and upgradient of the defined stream reach lacks a defined bed and formation of defined banks.

Downstream of the culvert there is an even more defined reach of this watercourse with defined banks, bed, and obvious occurrences of flow. GEI conducted the field

assessment of this water course with Mrs. Samantha Ogle of ELSA, and she confirmed that she has observed that this reach always has water in it and some level of discernible flow. At the time of GEI's inspection, the maximum water depth in the plunge pool was 8 inches. Moving down gradient (downstream), towards Elk Lake, there were more reaches of well-defined banks and bed with good visual evidence there had been channelized flow through this location. At the time of GEI's assessment, there was no water in this defined water course and to which GEI would classify this reach from below the plunge pool below the culvert to be an intermittent stream, lacking a continuous flow of water to be classified as a perennial stream. Intermittent means the flow of water is not 365 days a year but only periodic.

Moving further downstream the intermittent stream becomes less defined with the banks and bed being very difficult to differentiate from one another but still present. Areas of obvious scour and deposition in the stream bed less than 50 feet upgradient are no longer visible likely due in large part to a variety of factors, including but not limited to: blockages in the culvert inlet that conveys water from this drainageway/stream to Elk Lake from landowners disposal of leaves and debris into this apparent open pit/corridor, the apparently scouring out of this pit/corridor from apparent previous years of culvert blockage and impoundment of water causing more scour and widening of this area, which in turn reduces channelization and formation of well-defined banks and bed. During the time of GEI's inspection the culvert appeared to be obstructed, and no water was flowing out of the culvert into Elk Lake.

Based on GEI's 2024 field site assessment and information from GTBWC and ELSA indicating the continued (year-round) presence of water immediately upstream and downstream of the culvert, GEI would classify the areas around the culvert as a perennial stream and those areas downstream to Elk Lake as intermittent. Part 301 of NREPA regulates both intermittent and perennial streams as does Section 404 of the Clean Water Act (CWA) of 1972. This is important and evident in our finding of a larval dragonfly (Ashenidae family) beneath a rock in the moist but dry streambed within this nearly indiscernible intermittent stream reach between Elk Lake Road and Elk Lake. Dragonfly larvae would not be able to inhabit this area if it did not regularly fill with water for extended periods of time or relied on just rainfall to provide water to the stream. Streams which form and are only sustained by rainfall (rain-dependent) are classified as ephemeral.

Within the perennial portion of the stream immediately below the culvert east of Elk Lake Road, aquatic macroinvertebrate taxa from the following taxa were found: Amphipoda (water scuds), Isopoda (sow bugs), Physidae (pond snail), and Aeshnidae (dragonfly). Water scuds were found in greatest abundance followed by sow bugs. This one-time end of year sampling was indicative of prior results found by GTBWC in previous years and time periods for sampling. Noting that greater numbers and diversity of taxa would be

found earlier in the year during the summer months as compared to our late fall sampling in October 2024.

III. Summary/Professional Opinions

GEI generally concurs in LEI's mapping, descriptions, or finding of regulatory status of the wetlands on BFI's property, though GEI observed additional unmapped areas that are likely regulated wetlands, as discussed above. We concur that the mapped wetlands on the property, together with unmapped wetlands that are connected to these wetlands, meet the definition of wetlands and would be regulated by EGLE pursuant to Part 303 of NREPA, for any proposed dredging, filling, draining, or maintained use of these wetlands. The EGLE documents reviewed made no reference to BFI requiring a permit pursuant to Part 303 of NREPA.

According to the EGLE violation notices, there are numerous violations of BFI's groundwater discharge permit and Part 22 rules which indicate that the wastewater is not being fully treated within the upland portions of the property and those wastewaters (not meeting Part 22 criteria or acceptable health levels) are apparently entering the adjacent wetlands. These wetlands are directly connected to the wetlands which extend north onto other properties and areas where the wetland turns into a defined watercourse (Spencer Creek) and eventually flows easterly into Elk Lake.

There is an abundance of monitoring data that shows elevated levels of various elements, compounds, and parameters above EGLE permit and safety thresholds to the public for several years leading up to 2024. Primary dates and time periods for these exceedances were during the summer months during primary operating time periods for BFI. Reduced and non-detect levels, if present, were in either the early (spring) or late (fall) time periods of the year when BFI was not in peak season of processing fruit, pumping wastewater to the site, and spraying the fields.

As noted earlier in this technical memo, there is a strong correlation between the time periods that BFI was spraying their fields and exceeding their application rates and permitted levels of discharge (of various elements and compounds associated with their wastewater) with GTBWC and ESLA's monitoring data showing elevated levels of those same elements and compounds, in addition to BOD and *E.coli*. This data provides compelling support indicating that wastewater leaving the processing plant (EQ-1) and being sprayed on upland fields has been making its way into the adjacent wetlands and groundwater via surface water or groundwater and is likely causing the elevated levels of these same elements, compounds, BOD, and *E.coli* (above normal levels) downstream within the defined watercourse (Spencer Creek). Spencer Creek then flows into Elk Lake.

High BOD levels mean there is less oxygen in the water for aquatic biota (e.g., fish and macroinvertebrates) and which can lead to stress and death. Grover and Watson (2013)¹ cite that most pristine streams are likely to have BOD levels below 1 mg/L, moderately polluted streams between 2 and 8 mg/L, and severely polluted rivers in excess of 8 mg/L. Concentrations of 300 or more *E.coli* per 100 milliliters in water are hazardous to humans - considered unsafe for swimming.

GEI is providing our professional opinion based on our understanding and experiences of how wetlands uptake and filter out pollutants to provide some professional opinions. Upon completion of the desktop and field assessments some additional review of documents, on-line resources, and discussions with fellow GEI biologists were done to help answer some lingering questions and concerns. The most striking was the July 2021 video showing a discharge of a reddish-brown liquid (or material in suspension) from the outlet of Spencer Creek into Elk Lake. Due to the concentration of this discoloration at the shoreline and dispersion north and south along the shoreline of the lake.

This discoloration was not normal nor one associated with natural ecological events. It is apparent to GEI that there was some level of increased discharge into this sub watershed, prior to the video recorded discharge into Elk Lake. Since Spencer Creek is a very small intermittent stream with a small sub watershed to feed it. To GEI's knowledge there are no other farming, commercial, industrial, or residential properties or operations, other than BFI that are in this sub watershed that could be contributing this magnitude of water and substances into the surface or groundwater to have the results the data is showing us.

¹ Grover and Watson. 2013. Chapter 7 - Detection of River Water Quality. [Water Quality Monitoring and Management](https://doi.org/10.1016/B978-0-12-811330-1.00007-7) Basis, Technology and Case Studies, 2019, Pages 211-220; <https://doi.org/10.1016/B978-0-12-811330-1.00007-7>

Appendix A

Resume/CV for Mr. Stuart Kogge

Stuart N. Kogge, PWS

Sr. Wetland/Aquatic Biologist

Stuart (Stu) Kogge, PWS is a senior wetland/aquatic biologist and a Professional Wetland Scientist (PWS) with over 39 years of natural resource and wetland experience. He has Master of Science degree in Limnology/ Fisheries/Aquatic Biology from Michigan State University. He worked for the MDNR and MDEQ from 1985 to 1995 at the Cadillac District office in northern Michigan and was then recommended and took the MDEQ's State-wide coastal wetland biologist position in 1995 and then the State-wide inland wetlands biologist in 1997. He assessed and managed the State of Michigan's exemplary coastal wetlands pursuant to Part 323, Shorelands Management Act of NREPA and administered, hired and trained wetland contractors for the Wetland Assessment Program (pursuant to Part 303 of NREPA), and provided annual technical, permitting, and enforcement training for district staff for Upper and Lower Peninsula MDEQ offices.

In 1999, Stu left the State of Michigan and started Wetland and Coastal Resources, Inc. (WCR) and in 2000, The Institute for Wetland and Coastal Trainings and Research. From 1999-2008 WCR provided ecological services relating to wetlands, lakes and streams, and aquatic resources while the non-profit organization conducted wetland delineation, mitigation and assessment and botanical plant identification classes that catered to MDNR, MDEQ, MDOT, private consulting firms. During this time period he held workshops with local conservation districts on how to identify and locate properties for preservation and restoring wetlands for mitigation.

From 1999 to the present he has been a wetland/aquatic biologist for various consulting firms. Over the past 20 years he has been instrumental in identifying, locating, assessing and getting mitigation wetlands (and wetland banks) established and approved by the regulatory agencies. Stu also leads and continues to conduct wetland assessments, delineations, mitigation design, ecological restoration, endangered species surveys, and fisheries and aquatic assessments (using P51, P22, and Freshwater Mussel Protocols). He manages, conducts field assessments, and coordinates with federal and state on larger more complex wetland and aquatic resource related projects.

Stu has his SESC and Storm Water Operators certifications to assist clients addressing water runoff and erosion issues. He serves as GEI's critical dune and high-risk erosion area expert providing an array of services to clients, local realtors and legal counsel on MDEQ regulatory issues pursuant to Part 353, Sand Dune Management, Part 325, Great Lakes Submerged Lands, Part 323, Shorelands Management, and Part 91, Soil Erosion and Sedimentation Control, of P.A. 451, of 1994

WETLAND/PERMITTING PROJECT EXPERIENCE:

Confidential Gypsum Mining Client, Iosco County. 2021 to present. Project Manager, Senior Wetland/Aquatic Biologist responsible for orchestrating the GEI team in conducting all necessary wetland and threatened and endangered species (TES) field assessments, terrestrial and aquatic biota surveys, coordination with state and federal agencies on TES, installation of groundwater and surface water monitoring wells for assessing potential impacts of



EDUCATION

M.S., Fisheries/Aquatic Biology, Limnology, Michigan State University
B.S., Fisheries and Wildlife Management, Michigan State University

EXPERIENCE IN THE INDUSTRY

39 years

EXPERIENCE WITH GEI

Over 10 years (Sept 2014-present)

CERTIFICATIONS

Professional Wetland Scientist (since 2000)
Federal permit for handling and relocation of federally-listed freshwater mussels (valid 2019-2024)
Soil Erosion and Sedimentation Control Plan Review and Design; Comprehensive & Storm Water Management – Construction Site (exp 2023)
40-Hr OSHA HAZWOPER
8-Hr HAZWOPER Refresher
American Red Cross Adult CPR/AED

WETLAND and AQUATICS TRAININGS (partial listing)

2022 – Ohio Freshwater Mussel Workshop
2019 – GEI Internal freshwater mussel, macroinvertebrates, and fish identification
2018 – USFWS Freshwater Mussel Identification (5-days at National Technical Training Center, WV)
2015 – GEI Internal Wetland Training for the Arid West, US, Instructor
2014-2018 – Annual GEI Internal Wetland and Seasonal Botany Training, Instructor
2001-2008 – Twice annual classes with Wetland and Coastal Trainings and Research Institute (non-profit organization co-founded by Stu Kogge) on various classes for regulatory agencies including: Sedges, Spring Flora, Asters and Goldenrods, and Shrubs. Instructor alongside Dr. Anton Reznicek
2007-2008 - Wetland Training for Indiana Department of Environmental Management, Instructor
Prior to 2001 – Numerous USACE/MDEQ Wetland Delineation Manual Trainings and development of MDEQ field staff and wetland contractors for the MDEQ's Wetland Assessment Program

PROFESSIONAL ASSOCIATIONS

Society of Wetland Scientists, Member
American Fisheries Society, Member
Michigan Wetlands Association, Member
Michigan Association of County Drain Commissioners, DEQ Liaison Committee Member

AWARDS

Vice President, GEI, 2017
Employee of the Year, Cardno JFNew, 2010
Vice President Technical Serv., JFNew 2008
Sparkplug Award, MDEQ, 1997
Sparkplug Award, MDEQ, 1995
Land and Water Management Division Employee of the Year Award, MDEQ, 1990

constructing a new gypsum mine. Assessing lands for potential use as mitigation for mitigating anticipated direct and indirect impacts to wetlands and streams from a new mine. Coordination with federal and state regulatory agencies on a regular basis.

Great Lakes Tunnel Project, Enbridge Energy and Stantec, Threatened and Endangered Species Population Estimates, Mackinaw County, MI. Project Manager. Assisted with the development of a survey and monitoring plan for submittal to USFWS and MDNR for federally- and state-listed plant species, dwarf lake iris (*Iris lacustris*) and Houghton's goldenrod (*Solidago boughtonii*). Surveys were conducted in the spring and fall, respectively, and statistical analysis conducted to confirm sufficient quadrats sampled to provide population estimates for each species within various areas of the proposed impact and mitigation areas.

Michigan Department of Natural Resources, Fisheries Division, Thompson, Michigan. Project and technical manager responsible for obtaining USACE and EGLE permits for expanding the fish hatchery into 6 acres of regulated wetlands. Inventoried and assessed hundreds of acres of land to identify and document 120-acres of land which met sufficient statutory criteria to be used as mitigation in the form of preservation. The two communities that have been managed and preserved for the past five years are *Rich Conifer Swamp* and *Wooded Dune and Swale Complex*. GEI continues to provide maintenance, monitoring, and reporting to the agencies for the mitigation preservation site.

Confidential Mining Client, Western Upper Peninsula, Michigan. Senior Wetland/Aquatic Biologist responsible for overseeing desktop and conducting field assessments of thousands of acres of land to find areas worthy of preservation to serve as mitigation for permissible wetland impacts. Several hundred acres of property have been identified as *Rich Conifer Swamp*, *Northern Hardwood Swamp*,

Long Lake Township, Grand Traverse County, Michigan. Project Manager, Senior Wetland/Aquatic Biologist providing technical assistance in the development and rewording of local ordinances with respect to wetlands, water features, buffers, and setbacks. Provided educational presentations and guidance during public township workshops to help guide township officials. Provide technical reviews of requests to evaluate potential impacts to wetlands, buffer, setbacks, and natural features.

Grande Pointe Marina, Confidential Client, St. Clair County, MI. Client and Project Manager, Senior Wetland/Aquatic Biologist, and Agency Liaison. Conducted wetland functional assessments and delineations, threatened and endangered species assessments, prepared permit application and wetland mitigation plans for the creation, enhancement and preservation of approximately 95 acres of several natural community types. The communities that were included in the plan were *Lakeplain Wet Prairie*, *Lakeplain Wet-mesic Prairie*, *Oak Openings*, and *Wet Prairie*.

Marquette County Road Commission, Proposed County Road 595, Marquette County. Third-party reviewer of the proposed 21-mile road from the Eagle Mine to US Highway 41. Worked with both the Road Commission and Eagle Mine's consultants to assure all wetlands and regulated natural features (i.e. rare and imperiled community types, streams and threatened and endangered species) were identified and included in MDEQ permit application. Provided recommendations on sizing of stream crossings, the location of threatened and endangered species not identified by the previous consultants, and other aspects of the application to reduce wetland and listed species impacts and long-term maintenance costs.

MDOT, US-41 (Napier Avenue to I-94), Berrien County, MI. Subcontractor to Wilbur Smith & Associates. Project Manager Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, Botanist. Conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species habitat assessments. Required coordination with MDNR and USFWS for state and federally listed species (e.g. Mitchell satyr butterfly and Eastern massasauga rattlesnake). Assisted with DEIS and FEIS.

Harbor Shores Community Redevelopment, City of Benton Harbor, Berrien County, MI. Project Manager and Sr. Wetland Biologists/Botanist conducting wetland, threatened and endangered species, and environmental assessments, provided document review and guidance to the City of Benton Harbor. As Technical Sr. Wetlands Biologist, provided additional ecological support, prepared federal court documents, and acted as liaison with City of Benton Harbor. Part of a lead consultant for permitting, threatened and endangered species surveys, and stream and wetland mitigation design of an approximately 500-acre community revitalization project. The permitting phase

of the project involved interaction with City of Benton Harbor, Michigan DEQ, USACE, USEPA, USFWS, National Park Service, State Historic Preservation Office, and Michigan DNR Wildlife and Fisheries Division.

Dale Woodward Mitchell Satyr Butterfly - Project Manager, Sr. Wetlands Biologist, Ecologist. Conducted wetland and threatened and endangered species assessments (for Mitchell satyr butterfly). Coordinated with MDEQ, MDNR and USFWS for resolving wetland and both state and federally endangered species violations.

Brent Run Landfill Environmental Assessment, Genesee County, MI. Client Manager, project manager (early years), and technical lead for wetlands and aquatic resource assessments and agency coordination. Assessed the natural resources associated with approximately 300 acres of land for expansion of the existing landfill. Wetlands, floodplains and stream resources were delineated and assessed; TES surveys conducted. Project involved early and continuous coordination with USEPA, MDEQ, MDNR, and USFWS. Prepared and obtained USEPA approval and MDEQ permit for over 9 acres of wetland impacts and relocation of over 4,000 linear feet of new stream channel. Included relocation of freshwater mussels including state-listed ellipse (*Venustaconcha elipsiformis*) and slippershells (*Alismidonta viridis*) to suitable habitats upstream of the newly created creek channel. Newly established creek channel was surveyed in 2020 and state-listed slippershell and spikes (*Eurymia dilatata*) were found re-establishing in the new channel (juveniles and adults).

Three Mile Creek Restoration, Hiawatha Sportsman's Club, Engadine, MI. Task Manager. Responsible for pricing, devising an implementation plan, field oversight, and managing a "one of a kind" project. GEI was responsible for removing 200 cubic yards of sediment deposition from a 1,000-foot stretch of Three Mile Creek. This was in response to an earthen dam failure that resulted in sand and sediment depositing within the creek and adjacent wetlands. Challenges included removing the large amount of sediment using only hand tools and no excavating equipment due to the remoteness and topography of the site. In addition to sediment removal, restoration tasks included installation of native seed, native shrubs, and erosion control blanket.

Damfino Development, LLC, Botanical and Wetland Surveys, Muskegon County, MI. Conducted field site assessments, surveys, and provided regulatory assistance and guidance through the regulatory permitting process including interpretations and professional opinions of statutory mining exemptions and classifications of wetlands as whether they are classified as being interdunal, rare and imperiled, and regulated pursuant to Part 303 of NREPA.

Berrien County Drain Commission, Tanner Creek Drain, Berrien County, Michigan. Provided regulatory guidance on EGLE's position to regulate dune features within county drain easement and obtained permission from client to have GEI seed and plant alleged impacted dune areas with native vegetation (work completed 2024).

Marquette Woods, Lincoln Township, Berrien County, Michigan. Delineating and mapping of critical dunes within CDA and HREA and providing guidance to clients and activities that may or may not be permitted by the regulatory agencies pursuant to Part 323, 325, and 353 of NREPA. Providing recommendations for avoiding impacts.

Nancy Fishman, Covert Township, Van Buren County, Michigan. Delineating and mapping of dunes within CDA and HREA and providing guidance to clients and activities that may or may not be permitted by the regulatory agencies pursuant to Part 323, 325, and 353 of NREPA. Providing recommendations for avoiding impacts.

The Dunes (Cook Family Trust), West Olive, Ottawa County, Michigan. Conducted shoreline and bluff assessments to assess potential beach, shoreline, and bluff impacts associated with a new rock revetment and encroachment onto trust/association property. Provided technical assistance, alternatives and affidavits for court proceedings between property owners.

McDermott, Chikaming Township, Berrien County, Michigan. Conduct shoreline and bluff assessment to determine potential impacts from proposed rock revetment being installed by property owner to the south. Recommended installation of splash pad above existing revetment coupled with some exempted revetment repairs to minimize bluff erosion. GEI obtained EGLE and USACE permits for shoreline/dune work.

Congregational Summer Assembly, Benzie County, Michigan. Conduct shoreline and bluff assessments and provide technical assistance in minimizing impacts to the regulated dune features along their shoreline and regulated dune features.

Ezra Friedman, Covert Township, Van Buren County, Michigan. Conduct shoreline and bluff assessment and provide technical assistance in getting EGLE and USACE permits/exemptions for maintenance of work of previously permitted structures.

Joe Getto, Berrien and Ottawa County, Michigan. Assessment of shoreline erosion and development of bank stabilization plan with GEI engineers. Prepare and obtain USACE and MDEQ permits for client for New Buffalo residence. Subsequent assessment of shoreline property in Ottawa County for potential shoreline protection. Due to distance of residences from bluff and toe of erosion, steepness of bank, and costs for implementing protective measures a decision to do nothing further was decided upon.

SEMCO Energy Gas Company, Proposed Marquette Connector Pipeline Project, Marquette and Delta Counties, Michigan. 2018-present. GEI technical lead and in-house reviewer for project team assessing wetlands for MDEQ permits. Technical field lead locating and assessing wetland mitigation sites and coordinating with regulatory agencies. Led team in finding, assessing, getting MDEQ approval, design, and permit approval for forested mitigation wetlands. Mitigation wetland has been constructed, planted, and is currently being monitored by GEI staff.

Enbridge, Kalamazoo River and Talmadge Creek Restoration, Calhoun to Kalamazoo County, MI. Field Manager, Senior Wetland/Aquatic Biologist, and NRDA lead contact with the client and agency liaison. Numerous services and tasks were provided by Mr. Kogge and colleagues commencing in September 2010. Wetland tasks completed during the course of the project included botanical surveys and assessment of impacted wetlands (including some high-quality wetland areas), development of interim and final restoration plans, delineations, quantitative assessment and qualitative survey of vegetation communities, development and refinement of work plans, and coordination with various regulatory agencies.

Switch Ltd., Grand Rapids, MI. Project Manager, Senior Wetland/Aquatic Biologist responsible for orchestrating the GEI team in conducting all necessary wetland and threatened species field assessments, coordination of state and federal agency meetings, preparation of MDEQ and County permit applications, locating, design and submittal of wetland mitigation plans to USEPA and MDEQ. Obtained federal, state and local permits for 14 acres of wetland impact and 23 acres of wetland mitigation for this multi-billionaire dollar project.

Lansing Board of Water and Light, Ingham County, MI. Project Manager, Senior Wetland/Aquatic Biologist Led GEI staff with wetland and threatened species field assessments, coordination with state agencies, preparation of MDEQ permit applications, and arranging for mitigation credits to be purchased from a MDEQ approved bank. Permit issued for approximately 2 acres of wetland impact to facilitate the replacement of a coal-fired plant with a new natural gas-fired plant.

Confidential Mining Client, Upper Peninsula, Michigan. Senior Wetland/Aquatic Biologist responsible for overseeing desktop and conducting field assessments to locate land for providing over 130 acres of wetland mitigation.

Cloverland Electric Cooperative, Mackinac Environmental Technology, Inc (MET), Chippewa and Mackinac Counties, MI. 2015-2016. Refined and conducted field assessment methodologies for obtaining necessary information for the preparation of an Environmental Assessment (EA) for the U.S. Forest Service for work proposed within the Hiawatha National Forest. GEI authored portions of the EA that MET presented to the client.

Kennecott Exploration (Eagle Mine) through Golder and Associates, Inc. 2003-2005. Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, and Botanist. Provided the initial wetland delineations and assessments of wildlife, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species for more than 3,500 acres of land for the proposed multi-billionaire dollar nickel mining project in Marquette County, Michigan.

Grande Pointe Marina, Confidential Client, St. Clair County, MI. Client and Project Manager, Senior Wetland/Aquatic Biologist, and Agency Liaison. Conducted wetland functional assessments and delineations,

threatened and endangered species assessments, prepared wetland mitigation plans (for the creation, enhancement and preservation of approximately 95 acres of wetland and lake plain prairie, mesic prairie, oak savanna habitats). Obtained MDEQ permit for the project and wetland/TES mitigation areas.

Napier Avenue to I-94), Berrien County, MI. Subcontractor to Wilbur Smith & Associates - Project Manager Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, Botanist. Conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments (including Indiana bat) for various road location alternatives. Required coordination with MDNR and USFWS for state and federally-listed species (e.g. Mitchell satyr butterfly, Eastern massassauga rattlesnake). Conducted preliminary assessments of potential mitigation wetland sites and provided design alternatives. Assisted with Draft Environmental Impact Statement preparation.

US-131 (Bypass of City of Constantine), Michigan. Subcontractor to Wilbur Smith & Associates - Project Manager, Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, Botanist. Conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments (including Indiana bat and herps) for proposed bypass road location. Required coordination with MDNR and USFWS for state and federally-listed species (e.g. Indiana bat and herp species). Assisted with Draft Environmental Impact Statement.

I-69 Blue Water Bridge, Port Huron, MI. Subcontractor to Wilbur Smith & Associates. Senior Wetlands Biologist, Fisheries/Aquatic Biologist and Botanist. He conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments for proposed roadway expansion, travel plazas and approaches to the bridge. Assisted with Draft Environmental Impact Statement.

Invenergy Wind Development, Invenergy, Gratiot County, MI. Wetland and Aquatic Field Biologist. A now completed 30,000-acre wind farm project in Gratiot County, Michigan. Stu conducted wetland and stream delineations for the proposed location of wind turbines, underground collection lines, substations, and private access road corridors across the project area. Also provided guidance to staff serving as field leads on working with the various MDEQ and regulatory agency staff – given history and rapport with the various agency staff.

Parmenter Marsh -Wetland Mitigation Bank, Mr. Brian Parmenter of Al-Par Peat, Shiawassee County, MI. Conducted site and wetland delineations and assessments followed by coordination with MDEQ Mitigation Banking staff to develop and eventually establish a wetland mitigation banking agreement with MDEQ and Al-Par Peat. The bank is currently proposed at approximately 150-acres in size and is currently under construction.

Bear Swamp Drain Mitigation Bank, Allegan County Drain Commissioner, Hopkins, Michigan. WCR Sr. Wetland/Aquatic biologist and strategist conducting wetland and field assessments and providing design and documentation for the development of the first County Drain Commissioner wetland mitigation bank in the State. Seventy-five (75) acres were initially established.

I-275 Bike Path, Michigan Department of Transportation (MDOT), Wayne County, MI. Project Manager and Senior Wetland Biologist. Subcontracted by Parsons Brinkerhoff and Michigan DOT to conduct wetland assessments and delineations, threatened and endangered species assessments, and prepare final reports and figures for obtaining Michigan DEQ permits for re-construction of approximately 42 linear miles of bike path within the I-275 highway right-of-way.

Grand Landing LLC. Project Manager, Sr. Wetlands Biologist, Botanist, MDEQ Liaison - Conducted wetland and threatened and endangered species assessments and designed mitigation wetlands for multi-million dollar gateway project for the City of Grand Haven, Ottawa County, Michigan. Compiled, submitted and coordinated with agencies the issuance of both MDEQ and USACE permit applications for over an acre of coastal wetland impact and over 2 acres of coastal mitigation.

Harbor Shores Community Redevelopment, City of Benton Harbor, Berrien County, MI. Project Manager and Sr. Wetland Biologists/Botanist conducting wetland, threatened and endangered species, and environmental assessments, provided document review and guidance to the City of Benton Harbor. As Technical Sr. Wetlands Biologist, provided additional ecological support, prepared federal court documents, and acted as liaison with City of Benton Harbor. Part of a lead consultant for permitting, threatened and endangered species surveys, and stream and wetland mitigation design of an approximately 500-acre community revitalization project. The permitting phase

of the project involved interaction with City of Benton Harbor, Michigan DEQ, USACE, USEPA, USFWS, National Park Service, State Historic Preservation Office, and Michigan DNR Wildlife and Fisheries Division.

US-31 (Napier Avenue to I-94) - Project Manager Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, Botanist. Conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments (including Indiana bat) for various road location alternatives. Required coordination with MDNR and USFWS for state and federally-listed species (e.g. Mitchell satyr butterfly, Eastern massassauga rattlesnake). Conducted preliminary assessments of potential mitigation wetland sites and provided design alternatives. Assisted with DEIS preparation.

US-131 (Bypass of City of Constantine) - Project Manager, Sr. Wetlands Biologist, Fisheries/Aquatic Biologist, Botanist. Conducted wetland delineations and assessments, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments (including Indiana bat and herps) for proposed bypass road location. Required coordination with MDNR and USFWS for state and federally-listed species (e.g. Indiana bat and herp species). Assisted with DEIS preparation. Contact Doug Lavoie, Wilbur Smith Associates, Inc., Lansing, Michigan).

Dale Woodward Mitchell Satyr Butterfly - Project Manager, Sr. Wetlands Biologist, Ecologist. Conducted wetland and threatened and endangered species assessments (for Mitchell satyr butterfly). Coordinated with MDEQ, MDNR and USFWS for resolving wetland and both state and federally endangered species violations.

Knights Creek Mitigation Bank, Wisconsin Department of Transportation, WI. As Senior Wetland Biologist, conducted wetland delineations and assessments to document the development of wetlands within the WisDOT constructed wetlands. Under a master contract with Wisconsin DOT, contracted for wetland delineations on several mitigation banks totaling more than 700 acres. Conducted field surveys, compiled and analyzed wetland data, developed GIS site mapping, and completed a summary report. Sites included multiple wetland types and several atypical situations and problem areas.

Carrier Creek Drainage District. Project Manager (early years), Sr. Wetlands Biologist, Aquatic/Fisheries Biologist; Botanist, MDEQ Liaison - Conducted wetland, fisheries and aquatic (Michigan Procedure 51) and threatened and endangered species assessments for multi-million-dollar drainage district project in Eaton County. Over 5,000 acres of land were assessed for wetlands and threatened and endangered species. Designed mitigation wetlands, compiled, submitted and coordinated with agencies the issuance of MDEQ permit application. Our team also obtained 1.3 million in state grants (CMI and 319) to implement this project. Contact person: Mr. Brady Harrington (formerly Eaton County Drain Commissioners Office, now MDARD).

MDEQ Permits, Enforcement Actions, and Contested Cases, Lake Michigan, 1986-1999. Several hundred permit applications relative to coastal shorelines, dunes, and near shore resources were reviewed and permits issued, modified, and/or denied by Mr. Kogge out of the MDNR/MDEQ Cadillac district office during his tenure in Cadillac. Criminal charges were brought against several landowners/ contractors during this time period seeking restoration of resource impacts and levying of fines for monetary damages to other parties/resources of the State. Permit applications for shoreline protection (e.g. groins, jetties and undercurrent stabilizers) were sometimes denied based upon the potential adverse impact they could have on downdrift/adjacent properties.

FRESHWATER MUSSEL and AQUATIC PROJECT EXPERIENCE

NCR, Kalamazoo River Mussel Salvage, Allegan County, MI. 2024. Sr. Aquatic Biologist. Mussel salvage upstream of Trowbridge Dam within areas proposed for remediation. Prior to conducting this salvage work a work plan was prepared and approved by the federal and state agencies.

City of Grand Rapids, Plaster Creek, Kent County, MI. 2024. Sr. Aquatic Biologist. Mussel salvage within two reaches of Plaster Creek proposed to be excavated and filled for bank stability and improving in-stream habitats. Prior to conducting this salvage work a work plan was prepared and approved by state agencies.

Fishbeck - Grand River, Ann Street, Leonard Street, and RR Crossings, Kent County, MI. 2022. Sr. Aquatic Biologist/Federal Permit Holder. GEI's dive team conducted quantitative mussel surveys of the river bottom, over the course of one week at three locations along the left descending bank of the Grand River in preparation for a public walkway along the river. The survey focused on creating population estimates of all species, including the

federally-listed snuffbox, within a yet to be determined footprint of impact for the walkway. Project has required work plans and continued coordination/consultation with MDOT, MDNR and USFWS mussel biologists. Relocation of mussels is anticipated in 2023.

MDOT, Grand River, I-96, Grand Rapids, Kent County, MI. 2020-22. Sr. Aquatic Biologist/Federal Permit Holder. GEI's dive team conducted quantitative mussel surveys of the river bottom, over the course of two-weeks, focusing on creating population estimates of all species, including the federally-listed snuffbox, within a yet to be determined footprint of impact for replacement of the bridge. Project has required work plans and continued coordination/consultation with MDOT, MDNR and USFWS mussel biologists. Relocation of mussels commenced in 2021 and is continuing in 2022.

MDOT Office of Rail, Shiawassee River, South Branch Shiawassee River, and East Huron River, various counties in southeast MI. Sr. Aquatic Biologist/Federal Permit Holder. GEI's dive team conducted full relocation of mussels on the Shiawassee river and quantitative mussel surveys of the South Branch Shiawassee River and East Huron River in preparation for abutment repair work at these sites. The surveys focused on creating population estimates of all species, including the federally-listed snuffbox at the East Huron River, and other state-listed species at the other sites. Project has required work plans and continued coordination/consultation with MDOT, MDNR and USFWS mussel biologists. Relocation of mussels is anticipated in 2023 at the South Branch Shiawassee and East Huron River in 2023.

NCR, Kalamazoo River Mussel Salvage, Allegan County, MI. 2020. Sr. Aquatic Biologist. Commenced a mussel salvage operation within an approximate 1 mile reach of the Kalamazoo River, upstream of the Trowbridge Dam, in preparation for remediation of contaminated bottom sediments. Prior to conducting this salvage work a work plan was prepared and approved by the federal and state agencies to conduct both a reconnaissance survey and mussel salvage operation. In 2020, approximately 30,000 square meters of bottom substrates were cleared by GEI divers and biologist of freshwater mussels and those mussels were relocated far upstream to similar and more suitable habitats. Less than 20,000 square meters remains to salvaged in 2021.

ATC and Resolute Paper Company, Menominee River, MI and WI. 2020. Sr. Aquatic Biologist. These two mussel relocation projects were conducted during the same week for two different clients at three different sites on the river less, in Michigan and Wisconsin waters, but less than 2 miles apart. Mussels were relocated from these sites and all state-listed species were tagged for potential future post-relocation. Listed species included purple wartyback (*Cyclonaias tuberculata* – T) in Wisconsin, and black sandshell (*Ligumia recta* – E) in Michigan. Over a thousand mussels were relocated for these two projects.

Cut River Freshwater Mussel Relocations, Roscommon County Road Commission, Roscommon County, MI. 2019-2020. Project Manager and Sr. Aquatic Biologist. Conducted freshwater mussel surveys and post-relocation and post-construction monitoring of the Co Rd 300 Cut River bridge crossing. Michigan's 2019 freshwater mussel protocol was followed for all relocation and monitoring events. State-listed rainbow (*Villosa iris*; special concern) and eastern pondmussel (*Ligumia nasuta*; endangered) were tagged and relocated to suitable areas upstream of the project sites. Survey techniques included scuba diving, snorkeling, viewing buckets, grubbing.

Freshwater Mussel Surveys, Barr Engineering Co., Multiple Counties, MI. 2019. Sr. Aquatic Biologist. Conducted transect-based surveys for freshwater mussels at over 30 pipeline water crossings throughout the Upper and Lower Peninsula of Michigan. Required approval of work plan by MDNR, EGLE, and USFWS. 2019 surveys included Group 3a streams which required a federal permit. Provided quality assurance and control for over 30 mussel reports that are currently under review by agency personnel. Survey techniques included scuba diving, viewing buckets, grubbing.

Pine River and Chippewa River Freshwater Mussel Relocations, MDOT, Gratiot and Isabella Counties, MI. 2019. Sr. Aquatic Biologist. Conducted freshwater mussel surveys at MDOT bridge project locations. Michigan's 2019 freshwater mussel protocol was followed. Nearly 700 mussels, including species of special concern (e.g., Elktoe [*Alasmidonta marginata*], Flutedshell [*Lasmigona costata*]), were found and relocated to suitable areas upstream of the project sites. Survey techniques included scuba diving, viewing buckets, grubbing.

River Raisin and Otter Creek Freshwater Mussel Relocations, MDOT, Monroe County, MI. 2018. Sr. Aquatic Biologist. Conducted freshwater mussel surveys at MDOT bridge project locations. Michigan's 2018 freshwater mussel protocol was followed. Nearly 900 mussels, including species of special concern (e.g., Flutedshell [*Lasnigona costata*], Pink heelsplitter [*Potamilus alatus*]), were found and relocated to suitable areas upstream of the project sites. Survey techniques included scuba diving, viewing buckets, grubbing.

Barley Excavating Inc, Menominee River, Menominee County, MI. 2018. Assessment of over 200 linear feet of riverine shoreline prior to placement of fieldstone utilizing snorkel/mask and viewing buckets.

MDOT, Kalamazoo River, M-11 Bridge Crossing, Calhoun County, MI. 2017. Sr. Aquatic Biologist. Project required the identification and relocation of over 350 freshwater mussels to suitable habitat upstream of the proposed bridge maintenance project.

MDOT, Grand River, Fulton, Market Street, Leonard Street and I-196 Crossings, Kent County, MI. 2014. Project manager and MDOT liaison. Conducted Phase II Mussel Surveys and Relocations in accordance with West Virginia's Freshwater Mussel protocols. Federally listed snuffbox (*Epioblasma triquetra*) was found within one of these reaches and coordination with USFWS ensued. State-listed and non-listed species were relocated to suitable upstream locations. Federal mussels were relocated in 2015 by Cardno.

MDOT, Sauk River, Branch County and St. Joseph River, Berrien County, MI. 2014. Project manager and MDOT liaison. Conducted Phase II Mussel Surveys and Relocations in accordance with West Virginia's Freshwater Mussel protocols in preparation of bridge repairs at various river crossings. State-listed and non-listed species were relocated to suitable upstream locations.

MDOT, Plaster Creek, Kent County, MI. Project manager and MDOT liaison. 2014. Project manager and MDOT liaison. Conducted Phase I Mussel Surveys and Relocations in accordance with West Virginia's Freshwater Mussel protocols in preparation of bridge repairs. No federal or state-listed species were identified; all non-listed species were relocated upstream to suitable habitat.

MDOT, M-21 Grand River Mussel Survey and Relocation, MI. 2014. Project manager and MDOT liaison. Conducted mussel surveys and relocations using SCUBA search and rescue techniques within a 200 foot by 400 foot section of the river bottom in up to 15 feet of murky water, resulting in the recovery of 1,069 mussels including 30 state endangered Black sandshells (*Ligumia recta*) and 7 state threatened Purple wartybacks (*Cyclonaias tuberculata*). Mussels were collected using dive techniques and utilized the Michigan DEQ "Stranded Mussel Protocol."

Kalamazoo County Road Commission, Kalamazoo River, Kalamazoo County, MI. 2012. Project Manager. Conducted mussel relocations within the proposed footprint for the replacement of the River Street Bridge in Comstock MI. Mussels were collected using SCUBA techniques and relocated upstream of the project area in similar habitat.

MDOT, M-21 Flat River Dam Replacement/Stranded Mussel Survey, Lowell, MI. 2010. Project Manager and lead biologist. During April and July 2010 the M-21 highway bridge/dam structure impounding the Flat River was reconstructed resulting in a 2-foot drawdown of the Flat River. Mussel surveys and relocations were conducted which included relocation of over 1,600 mussels including six state threatened and endangered species.

PRESENTATIONS (updated only through 2023):

"Relocation of Brent Run Creek Re-establishing Nearly a Mile of Aquatic Habitat/Biota (featuring natural recruitment of state-listed Slippershell [*Alasmidonta viridis*]), Natural Stream Restoration Conference, Baltimore, MD. August 22, 2023.

"Stranded Aquatic Biota (Mussel and Fish) Survey and Relocations in the Upper Peninsula, Michigan," American Fisheries Society Annual Meeting, March 23, 2023.

"Wetland and TE Species Updates," Michigan Association of County Drain Commissioners, Southwest District Meeting, Kalamazoo, Michigan, May 12, 2023.

"Northern MI TE Species - Species Commonly Associated with ROWs," Michigan Association of County Drain Commissioners, Northeast District, May 27, 2022.

"Use of Wetland & Aerial Data to Document Historic & Proposed Water Levels," Michigan Association of County Drain Commissioners, Winter Conference, February 10, 2022.

"Stream Relocation Success," American Fisheries Society Annual Meeting, March 13, 2020.

- “Economical and Ecological Drain Maintenance”**, Michigan Association of County Drain Commissioners Summer Conference, July 18, 2019.
- “Northern MI Species T&E Update”**, Michigan Association of County Drain Commissioners, Northeast District, September 18, 2020.
- “Watershed Management Plan – Why Are They Important”**, Hiawatha Sportsman’s Club, Engadine, Michigan. July 21, 2018.
- “Wetlands and TE Updates”**, Michigan Association of County Drain Commissioners, Southwest District. March 12, 2017.
- “Use of Collector – An ArcGIS Based Application”**, Michigan Association of County Drain Commissioners, Southwest District. Collection of wetland, TE, and drain maintenance related activities using Collector. Co-presented with Eric Deibel, Eaton County Deputy Drain Commissioner. March 12, 2017.
- “GEI Response to a Hazmat Scene – Ecological Remediation/Restoration”**, Allegan County Hazmat Officials. Walked through early response actions from an ecological perspective coupled with lessons learned from Line 6B, Marshall, Michigan. May 3, 2017.
- “Environmental Impact within Right-of-Ways”**, International Right-of-Way Association, Michigan Chapter 7. March 8, 2017.
- “Waste Connections - Brent Run Landfill: Floodplain, Wetland, and Stream Restoration”**, Michigan Stormwater Floodplain Association. Lansing, Michigan, March 2, 2017.
- “Wetland and Stream Restoration Techniques Following Emergency Response Actions to the Line 6B Oil Leak in Marshall, Michigan.”** Sediment Management Work Group, Washington, D.C. October 2016.
- “Winter’s Coming – What should I be doing now to prepare?”** Michigan Association of County Drain Commissioners, Southwest District Fall Meeting, Pierce Creek Institute, Middleville, Michigan. Key ecological, hydrological and other issues that drain commissioners need to prepare for. October 2016.
- “Mackinac Island Geology 101 and Unique Wetlands”**. International Right-of-Way Association Annual Conference, Mackinac Island, MI. Fall 2015
- “Geology and Unique Wetlands of Mackinac Island”**. Michigan Association of County Drain Commissioners Annual Conference, Mackinac Island, MI. Summer 2015
- “Threatened and Endangered Species Commonly Associated with ROW’s and Use of Native Plant Species and Stormwater Control within Greenways”**. International Right-of-Way Association Annual Southwest Chapter Meeting. Grand Rapids, MI. May 2015.
- “Unique Wetlands and TE Species of the NLP and UP of MI”**. Michigan Association of County Drain Commissioners Northern District Spring Meeting. May 29, 2015.
- “I’m Dreaming of Threatened and Endangered Species”**. Michigan Association of County Drain Commissioners Northern District Winter Meeting. December 4, 2014.
- “Habitat and Stream Restoration”**. Michigan Stormwater Floodplain Association, Annual Conference. Battle Creek, MI. 2014.
- “Lessons Learned on Line 6B Ecological and Restoration Work”**. Presented to Chevron - Environmental Functional Team (responders to Oil Spills), California. October 2013.
- “Threatened and Endangered Species MDEQ General Permit Rules and Requirements”**. Michigan Association of County Drain Commissioners (MACDC) Fall District Meetings. Presented first at Northeast District Meeting in Saginaw, MI and then repeated for MACDC Northwest and Southwest Joint District Meeting, Ottawa County, MI, and Southeast District, Livonia, MI. October-November, 2013.
- “Native Plant Primer”**. Michigan Association of County Drain Commissioners - Annual Summer Conference. July 2013.
- “Enbridge Line 6B Restoration”**. Michigan Society of Professional Engineers, Southwest Michigan Chapter. May 2013.
- “Enbridge Line 6B Restoration”**. Michigan Stormwater Floodplain Association Annual Conference. March 2013.
- “Emergency and Ecological Restoration Response To The Line 6B Oil Spill In Marshall, Michigan.”** Michigan Association of County Drain Commissioners Southwest District Meeting. Sturgis, Michigan. May 2012.
- “Wetland and Stream Restoration Techniques Following Emergency Response Actions to the Line 6B Oil Leak in Marshall, Michigan.”** International Wetlands Conference/Society of Wetland Scientists Annual Meeting. Orlando, Florida. June 2012.

- “Wetland and Stream Restoration Techniques Following Emergency Response Actions to the Line 6B Oil Leak in Marshall, Michigan.”** Florida Energy Pipeline Association Annual Conference. Orlando, Florida. July 2012.
- “Emergency and Ecological Restoration Response To The Line 6B Oil Spill In Marshall, Michigan.”** Michigan Association of County Drain Commissioners Annual Conference. Crystal Mountain, MI. August 2012.
- “Restoration Techniques Associated with Line 6B”.** Michigan Association of Conservation Districts Annual Conference. November 2012.
- “Invasive Species: Early Identification and Control”.** Michigan Wetlands Association, Traverse City, Michigan. 2011.
- “Identifying Potential Wetland Mitigation Sites”.** Michigan Transportation and Environment Conference. Mount Pleasant, Michigan. November 2011.
- JFNew White Papers and Wetland Bulletins.** 2006-2014. Developed and distributed nearly 20 documents/bulletins that were distributed internally on various wetland, botanical and ecological issues.
- “Recent Changes to Michigan’s Wetlands Statute”.** Michigan Association of Conservation Districts. Mt. Pleasant, Michigan. 2011
- “Invasive Species: Early Identification and Control”.** Presentation to the Michigan Wetlands Association. September 2011.
- USACE Regional Supplements to the 1987 Wetland Delineation Manual”.** Michigan Association of Conservation Districts. Mt. Pleasant, Michigan. 2011
- “Hydric Soil Formation, Chemical Reactions and Redoximorphic Features”.** Stu’s part of the larger session on Regional Supplements. March 2011
- “Use of Simple Techniques and Native Plants to Control Runoff and Pollutants”.** December 2010.
- Environmental advisor on wetland and water quality issues.** Michigan State University Engineering Departments Senior Cap Stone Class. 2005-2008.
- “Michigan’s MDEQ and DNR (viewpoints from an MSU grad)”**, guest speaker for Dr. Ben Peyton's Fisheries and Wildlife - Human Dimensions class, Michigan State University. 2001.
- “Michigan’s Wetland Regulations” (viewpoints from an MSU grad)**, guest speaker for Dr. Harold Prince's Wetlands Management class, Michigan State University. 2002.
- Wetland Training Sessions, Indiana Department of Environmental Management, IN.** Presenter and Field Workshop Biologist. Led a series of workshops to enhance understanding of wetland functions and values by providing a general overview of wetlands in both classroom and field settings. This included oversight of the development of an electronic invitation, emailing more than 1,300 potential participants, coordinating the electronic registration, and coordination of the workshop team, materials and logistics. More than 150 people participated in the workshops throughout the state. He presented "Wetland Restoration Techniques and Incentives" and helped conduct field exercises as part of a workshop series funded by the Indiana Department of Environmental Management and (IDEM) and Indiana Department of Natural Resources.

CLASSES DEVELOPED/TAUGHT (updated only through 2016; many now being done through Michigan Wetland Association since leaving IWCTR and JFNew):

- “Wetland Identification in the West”.** Two day classroom and field training on wetland parameters designed specifically for GEI Denver Colorado staff. April 2016.
- “Winter Botany”.** Two one day sessions with GEI field staff covering winter plant identification with emphasis on willows, dogwoods and other woody plants. 2015 and 2016.
- “Asters and Goldenrods”.** Evening workshop developed for Kent County Conservation District. Grand Rapids, Michigan. 2011.
- “Wetland Delineation and Understanding USACE Regional Supplements”.** Developed and instructor for 3-day training class, Roscommon, Michigan. 2009 and 2010. Attendees included MDOT, MDEQ and County Conservation Staff.
- “Identifying Macroinvertebrates and How to Use Procedure 51”.** Developed and led instruction for 1-day class provided to Delhi Township staff responsible for assessing water quality in their township – Phase II Stormwater requirement.
- “Sedge Identification”.** 2004. Co-developed and instructed two-day class for the Wetland and Coastal Trainings and Research (non-profit organization) wherein Dr. Reznicek was retained to serve as lead

- instructor. Dr. Anton Reznicek is curator of the University of Michigan herbarium and world recognized “sedge and plant botanist”. Attendees included MDOT, MDEQ, MDNR and County Conservation Staff.
- “Wetland and Woodland Flora Identification”**. Co-developed and co-instructed two-day class put on by The Institute for Wetland and Coastal Trainings and Research, 2003 and 2004. Emphasis on floodplain and ephemeral species. Dr. Anton Reznicek lead instructor.
- “Asters and Goldenrods Identification”**. Co-developed and co-instructed two-day class put on by The Institute for Wetland and Coastal Trainings and Research, 2002 and 2004. Dr. Anton Reznicek lead instructor.
- “Shrub Identification”**. Co-developed and co-instructed two-day class put on by The Institute for Wetland and Coastal Trainings and Research, 2003. Dr. Anton Reznicek lead instructor.
- “Wetland Identification and Delineation”**. Developed and instructed 3-day class for guiding MDOT and private consultants through MDEQ’s Wetland Delineation Manual. R.A. MacMullen Center, Roscommon, Michigan.
- “Advanced Soils and Plant Training”**. Developed and led group of instructors conducting four (4) sessions scattered across the Lower and Upper Peninsula of Michigan for MDEQ LWMD field staff. More than 60 staff were trained on advanced identification of hydric soils, hydrologic indicators, and wetland vegetation during these 4 3-day sessions. 1998. Stu brought in additional instructors specific to the geographic regions of the state from NRCS (soils) and Ms. Ellen Weatherbee (UM botanist) to help with all sessions across the state.
- “Wetland Restoration”**. Developed and instructor for 1-day classroom and field workshop on how to identify potential wetland sites for restoration. 2000. Antrim County Soil Conservation District.
- “Wetland Assessment Training”**. Developed and instructor for 3-day class given to new MDEQ contractual staff hired to conduct wetland assessments for the Wetland Assessment Program (WAP), Yankee Springs Recreation Area, Middleville, Michigan. 1997-1999.
- “Basic Wetland Training”**. Developed and instructed new and old field and Lansing LWMD staff on the basics of identifying and delineating wetlands – including permit review criteria and defined streams. R.A. MacMullen Center, Roscommon, Michigan. 1998-1999.
- “Wetland Delineation”**. One of several instructors putting on this 5-day class sponsored by Matthaei Botanical Gardens, USDA NRCS, and MDEQ LWMD. Matthaei Botanical Gardens, Michigan. 1997

CLASSES TAKEN (updated only through 2018):

- “Wetland Identification”**. Half-day sessions for the various universities participating in Michigan’s Teachers Environmental School, R.A. MacMullen Center. Over 10-year period provided sessions for Michigan State, Michigan Technological, Central Michigan and Wayne State University. Lead classroom and field reviews of wetland identification for various university curricula. 1987-1995. Periodically covered macroinvertebrates.
- “Use of Large Woody Debris”**. Dave Rosgen taught/led this 1-day workshop prior to the start of the Michigan Aquatic Restoration Conference. Construction methods, configurations and applicable areas were covered throughout the day. October 2015. Kettunen Center, Tustin, MI
- “Michigan Aquatic Restoration Conference”**. Three-day conference of classroom presentations focusing on natural stream design. 16 hours of CEU. October 2015. Kettunen Center, Tustin, MI
- “Introduction to Lakes”**. 2015. On-line 6-weeks course provided by Michigan State University.
- “Wetland Mitigation and Monitoring”**. Three-day classroom and field exercises class conducted by members of the Michigan Wetlands Association. Lead instructors were PWS from MDEQ and MDOT. September 2014.
- “Sedge Identification”**. Two-day field class focusing on sedge species mostly within Pinckney Recreation Area, southeastern lower peninsula Michigan. Dr. Anton Reznicek led the two-day class. 2009.
- “Using the Midwest Interim Regional Supplement for Wetland Delineation”**. Illinois Soil Classifiers Association. Attended 2-day workshop inclusive of classroom and hands on workshop exercises. February 2009.
- “Sedges, Rushes and Grasses”**. A five-day classroom and field class (early morning to late night) led by Dr. Anton Reznicek for the Humboldt Research Institute, Maine. Covering these groups of plants by day and in the evening preparing herbarium specimens and working through keys. Summer of 2002, 2007, and 2016.

MUSSEL TRAININGS (updated through 2023)

- 2022 – Ohio Freshwater Mussel Certification (week-long class at Ohio State University, Columbus, OH)
- 2018 – US Department of the Interior Freshwater Mussel Identification (5 days)
- 2016 – American Fisheries Society - Freshwater Mussel Identification (2 days)
- 2015 – Michigan Natural Features Inventory - Freshwater Mussel Refresher (1/2 day)
- 2008 – American Fisheries Society - Freshwater Mussel Identification (1/2 day)

BOOKS, ARTICLES, PUBLICATIONS, AND BULLETINS AUTHORED OR CO-AUTHORED

Getsinger, K. D., L. S. Nelson, L. M. Glomski, E. Kafcas, J. Schafer, S. Kogge, M. Nurse. 2006. *Control of phragmites in a Michigan Great Lakes marsh*. Final Report to the Michigan Department of Natural Resources. Lansing, MI. 45 pp.

Kogge, S. 2018. *An Economical and Manual Alternative to Flow and Woody Debris Management*. Pipeline Magazine. Vol. 27 No. 2 Summer 2018.

Kogge, S. 2018. Japanese Knotweed: Friend or Foe? Invasive Species in County Drains. Summer Conference Recap. Pipeline Magazine. Vol 27 No. 3 Fall 2018.

Kogge, S. 1998. *Wetland Assessment Program*. Pipeline Magazine. Vol. 7 No. 2. Written by S. Kogge while acting as MDEQ state-wide wetland biologist managing the WAP.

Kogge, S. and Creal W. 1986. Water, Sediment, and Macroinvertebrate Survey of the South Branch Raisin River, and Eastside Drain, vicinity of Adrian, 1982-1985. Michigan Department of Natural Resources Surface Water Quality Division Staff Report #005380. Lansing, MI.

Kogge, S. 1986. Stream Assessment of Dowagiac Creek, Vicinity of Dowagiac POTW. Michigan Department of Natural Resources Surface Water Quality Division Staff Report MI/DNR/SWQ-91/123. Lansing, MI.

Kogge, S. N. 1985. *Feeding habits of salmonids in Michigan waters of eastern Lake Michigan and southern Lake Superior*. M. S. Thesis, Michigan State University, East Lansing. 122 pp

Kogge, S. and B. Kulhanek. 2012. Wetland and Stream Restoration Techniques Following Emergency Response Actions to Enbridge Oil Leak in Marshall, Michigan. Pipeline Magazine. Third Quarter 2012.

Lark, T. and Kogge, S. 2013. *Restoring Talmadge Creek*. Pipeline Magazine. Vol. 22 No. 2 Summer 2013.

Lyman, G.T., Staton E., Kogge, S, and Bennett, T. 2005. *Buffer Strip Basics for Golf Courses: Buffer strips on golf courses can provide wildlife habitat and reduce or prevent erosion and water pollution: Part 1*. Golf Course Management. November 73(11):81-83.

Lyman, G.T., Staton E., Kogge, S, and Bennett, T. 2005. *Buffer Strip Techniques for Golf Courses: Different criteria are used for in-play and out-of-play buffer zones on golf courses and provide superintendents some flexibility in developing buffers for existing golf courses*. Golf Course Management. December 72(12): 75-77.

Lyman, G.T., Staton E., Kogge, S, and Bennett, T. 2006. *Buffer Zone Vegetation: Part 3*. Golf Course Management. 2006. January 74(1):135-138.

MDEQ. 2008. *Michigan Rapid Assessment Method for Wetlands - MiRAM Version 2.0, User Manual*. 2008. MiRAM Development Committee member that co-authored with MDEQ.

MDEQ. 199X. *LWMD Compliance and Enforcement Manual*. S.Kogge was chair of committee that developed this guidance manual for State of Michigan DEQ Land and Water Management Division staff.

Parry, G.J. and S. Kogge. 2005. *Developing Near Wetlands in Michigan: Frequently Asked Questions & Answers*. Real Estate News. Dickinson Wright, PLLC, quarterly publication. Fall 2005.

Seng, P. and S. Kogge. 2008. *Wetlands: Deal Breakers or Profit Builders*. 2008. Building Indiana Magazine. September/October 2008 Issue.

Mr. Stu Kogge and Robert Wolfe, JFNew's two Vice Presidents of Technical Services that were PWS and focused on wetlands, authored and distributed seventeen (17) wetland bulletins to fellow JFNew biologists throughout the Great Lakes/Midwest (Indian, Illinois, Michigan, Ohio, and Wisconsin) from August 2010 through January 2011. Following is list of those JFNew Wetland Training Bulletins and their main topics:

- Training Bulletin #1 – Equipment for Wetland Field Work. August 16, 2010. Addendum
August 20, 2010.
- Training Bulletin #2 – National Wetland Plant List and plant ratings. August 23, 2010.
- Training Bulletin #3 – 5% Rule for including/excluding stratum from data forms. August 30,
2010.
- Training Bulletin #4 – Eastern Mountains & Piedmont Interim Regional Supplement. September 6, 2010.
- Training Bulletin #5 – Field indicators for species of willow (*Salix*). September 12, 2010.
- Training Bulletin #6 – Wetland Delineation Reports, Winter Delineations, and Web Sites. September 21, 2010.
- Training Bulletin #7 – Preparing for winter field work in Michigan. September 27, 2010.
- Training Bulletin #8 – Web sites with useful information (e.g., plant keys, aerials, etc.). October 4, 2010.
- Training Bulletin #9 – Final Midwest Supplement released; key items in it. October 18, 2010.
- Training Bulletin #10 – Soil Textures. October 25, 2010.
- Training Bulletin #11 – What is a landform? November 1, 2010.
- Training Bulletin #12 – What is local relief? November 10, 2010.
- Training Bulletin #13 – What is typical and normal? November 15, 2010.
- Training Bulletin #14 – PWS and WPIT certification requirements. December 6, 2010.
- Training Bulletin #15 – Winter Wetlands. December 20, 2010.
- Training Bulletin #16 – Indicator C2: Dry-Season Water Table. January 2, 2010.
- Training Bulletin #17 – Normal Circumstances. January 17, 2011.
- Training Bulletin #18 – Winter Time – Wetland Hydrology Indicators. January 17, 2011.
- Training Bulletin #19* – New Wetland Hydrology Indicators (i.e., S7, S11, and F10). March 13, 2021. *JFNew is
now Cardno JFNew.

Mr. Stu Kogge, PWS, Sr. Wetland/Aquatic Biologist for GEI authored and distributed 3 wetland bulletins between April 2015 and January 2016 to fellow GEI staff throughout GEI's United States footprint (east to west coast including Michigan staff in the Midwest). Following is list of those GEI Wetland Training Bulletins and their main topics:

- Training Bulletin #1 – Regional Supplements to the 1987 USACE Wetland Delineation Manual. April 8, 2015.
- Training Bulletin #2 – Growing Season and Client Communication. December 14, 2015.
- Training Bulletin #3 – Winter Botany: Winter Plant Identification 101. January 27, 2016. Issue
- Training Bulletin #4 – Growing Season: Field indicators. March 31, 2016, not finalized draft only.

Appendix B

Michigan Wetland Authorization and Regulatory Criteria

Michigan's regulatory authority over wetlands, with its own program to administer and enforce the provisions of Section 404 of the federal Clean Water Act was approved in 1984. In Michigan, pursuant to Part 303 of NREPA, wetlands are regulated if they are

- Connected to one of the Great Lakes or Lake St. Clair.
- Located within 1,000 feet of one of the Great Lakes or Lake St. Clair.
- Connected to an inland lake, pond, river, or stream.
- Located within 500 feet of or "contiguous" to an inland lake, pond, river or stream.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but are more than 5 acres in size.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than 5 acres in size, but EGLE has determined that these wetlands are essential to the preservation of the state's natural resources and has notified the property owner.

Wetlands are considered contiguous by Part 303 of NREPA if they meet any of the following criteria:

1. A permanent surface water connection or other direct physical contact with an inland lake or stream, a pond, a river, one of the Great Lakes, or the connecting waters of the Great Lakes;
2. A seasonal or intermittent direct surface water connection to an inland lake or stream, a pond, river, one of the Great Lakes, or the connecting waters of the Great Lakes;
3. Partially or entirely located within 500 feet of the ordinary high watermark of an inland lake or stream, a pond, or a river or is within 1,000 feet of the ordinary high watermark of one of the Great Lakes or the connecting waters of the Great Lakes, unless it is determined by EGLE that there is no surface water or groundwater connection to these waters; or
4. Two or more areas of wetland separated only by unnatural barriers, such as dikes, roads, berms, or other similar constructed features, but with any of the wetland areas contiguous under the criteria described in this definition. The connecting waters of the Great Lakes shall be considered part of the Great Lakes for purposes of this definition.
5. The wetland is not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but is more than 5 acres in size.
6. The wetland is not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than 5 acres in size, but EGLE has determined that these wetlands are essential to the preservation of the state's natural resources and has notified the property owner.

Pursuant to Part 303 of NREPA, a permit would be required from EGLE for any proposed dredging, filling, draining, or maintained use or development within a regulated wetland.

Appendix C

**Aerial Imagery
(courtesy of Google Earth and Bing)**

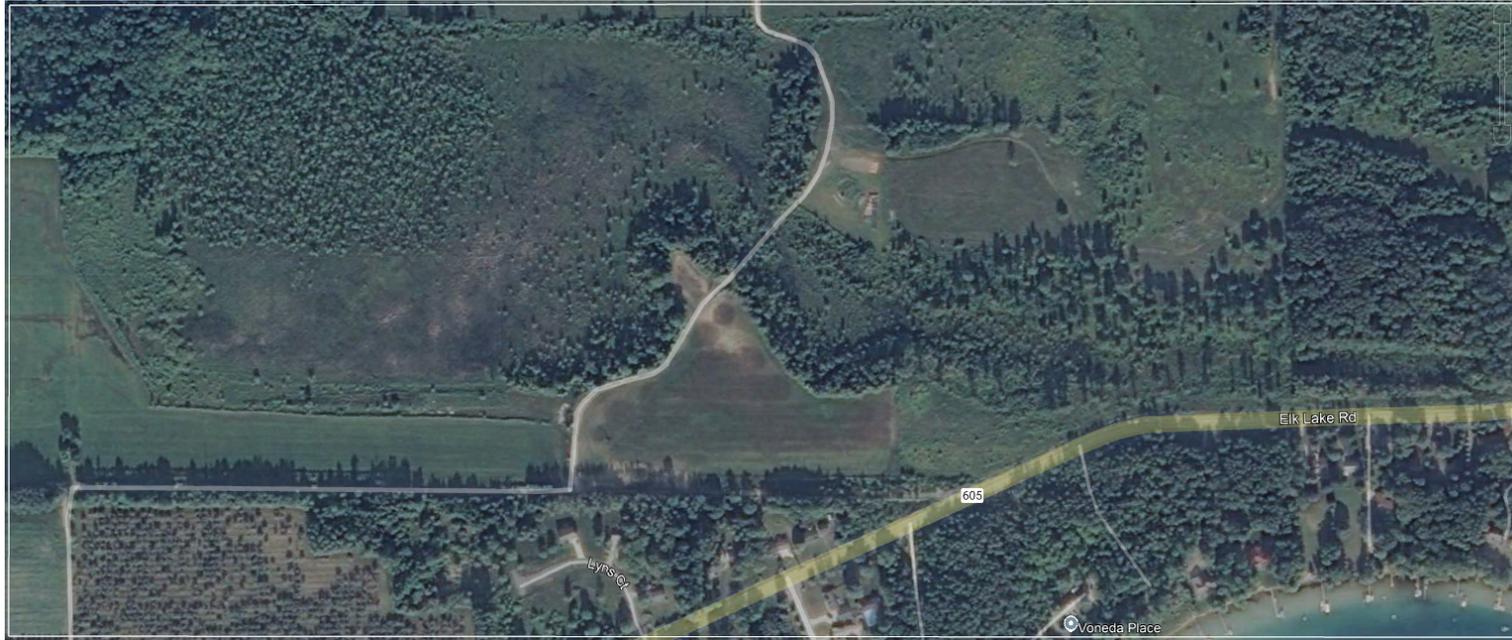
May 31, 2005



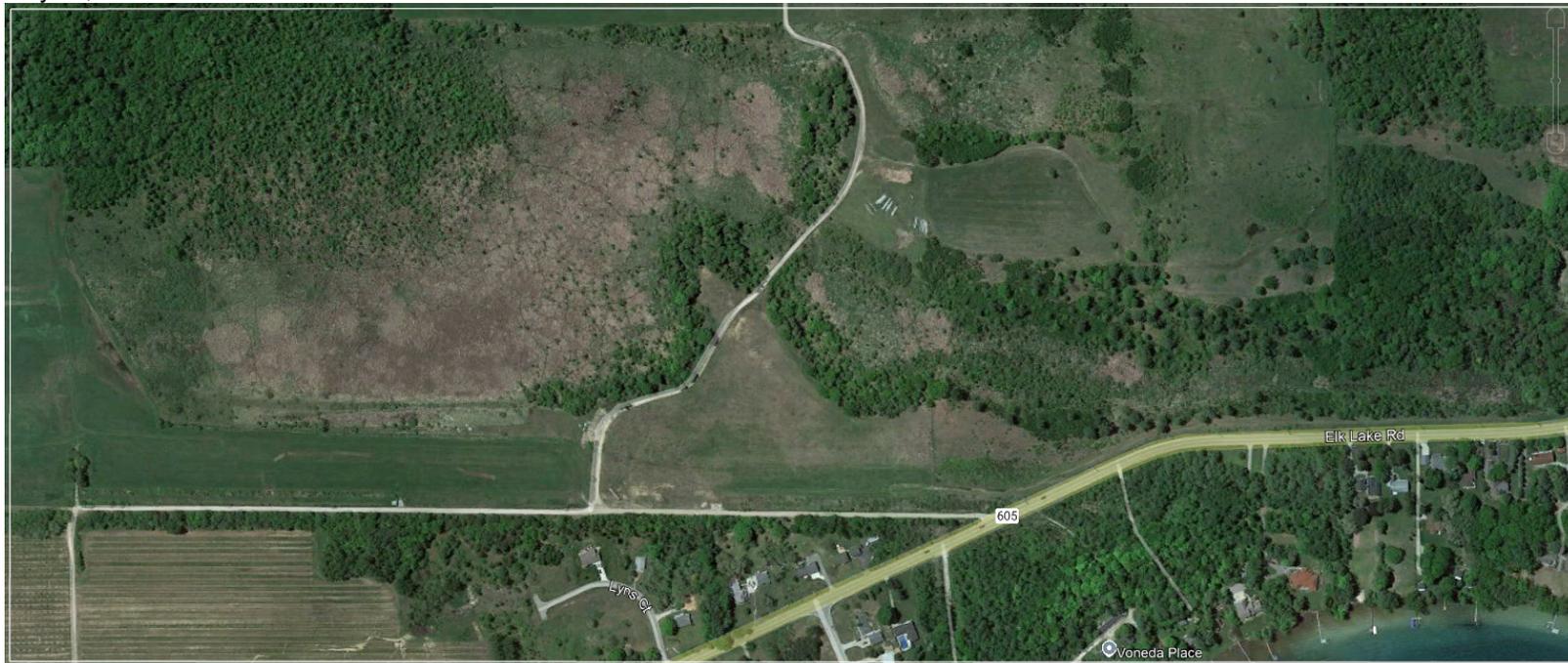
June 2, 2006



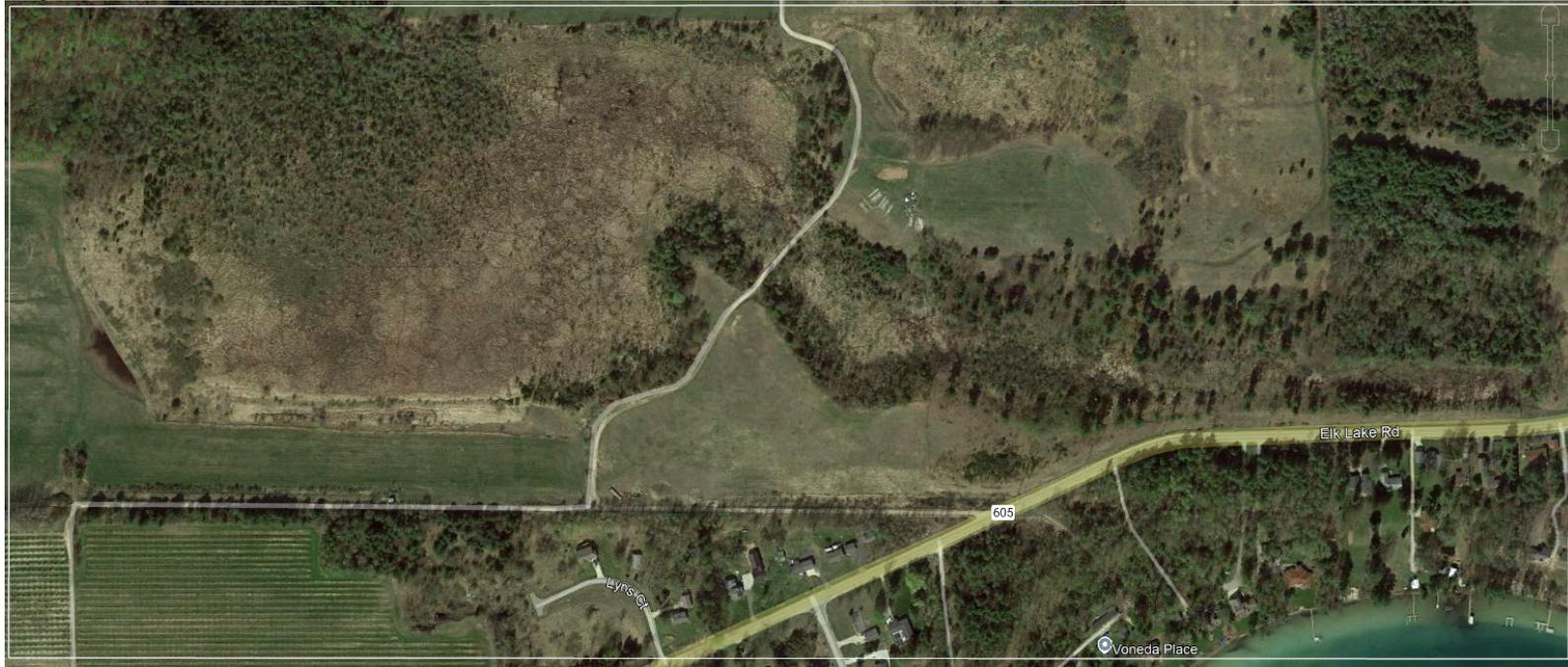
July 25, 2010



May 30, 2015



May 15, 2018



October 5, 2019



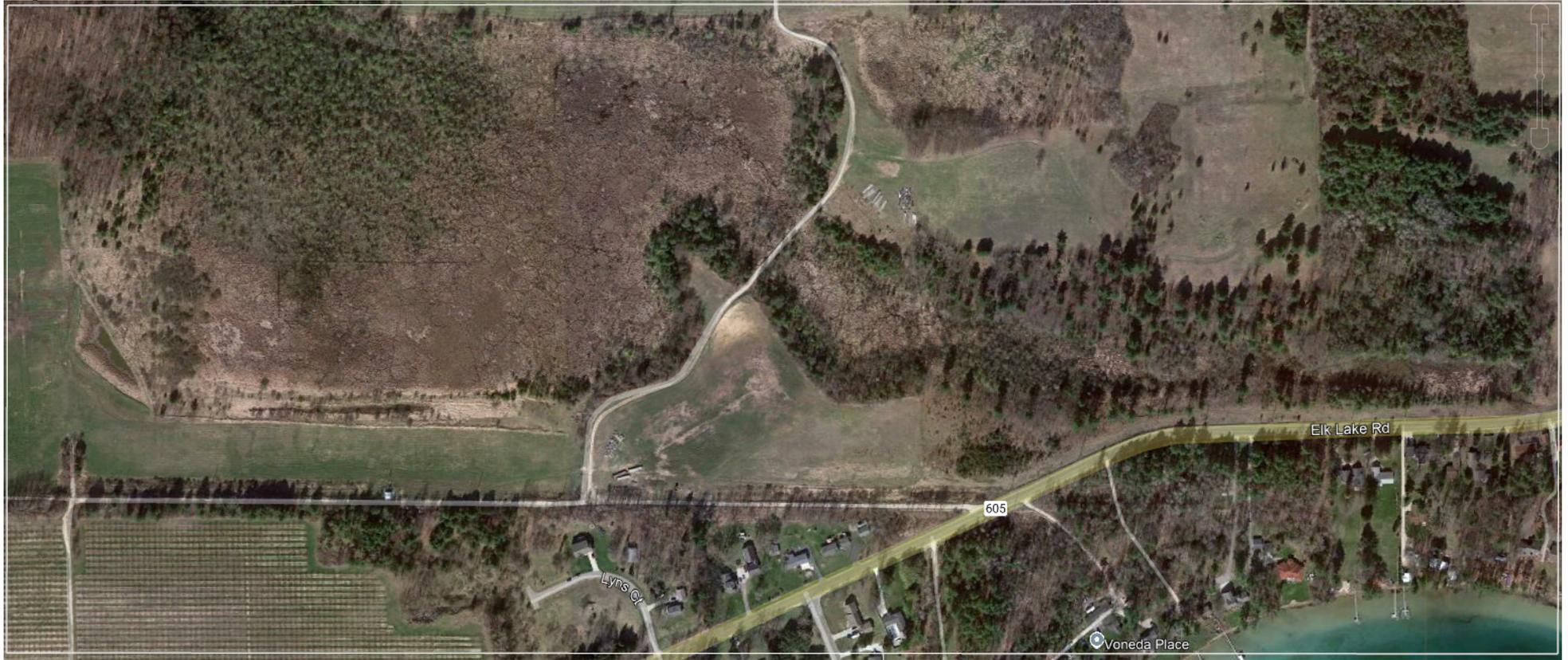
April 30, 2020



October 10, 2020



May 6, 2022



Appendix D

July 30, 2021, Video Snapshots



North of outlet -
July 30, 2021



Outlet of Spencer
Creek – July 30,
2021



South of outlet -
July 30, 2021