



Exhibit K

**2020 EWM Treatment and
Monitoring Results**



Memorandum

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)

The purpose of this memorandum is to present the results of the Beaver Dam Lake 2020 EWM management program. Memorandum contents include:

- Discussion of herbicide treatment of EWM during 2020.
- Overview of EWM in Beaver Dam Lake.
- Discussion of EWM in individual management areas.
- Discussion of treatment of navigation channels.

In this memorandum:

- EWM frequency of occurrence in the littoral zone is the percent of sample points up to the 25-foot depth that contained EWM.
- EWM extent is the acres of EWM.
- Percent of littoral zone with EWM is the acres of EWM divided by the total acres of the littoral zone, which is the area up to the 25-foot depth, and then multiplied by 100 to convert to percent.

Two whole lake point-intercept plant surveys were completed in 2020 to assess the results of EWM management efforts. A survey of all plants was completed July 12 through July 15. A survey of invasive species (EWM and curly-leaf pondweed) was completed October 3, 4, and 10. Sample locations are shown

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 2

on maps found in Appendix E of the *Beaver Dam Lake Aquatic Plant Management Plan*.¹ The 2020 EWM data, together with historical data, are summarized in Tables 1 through 3.

The 2020 EWM management of Beaver Dam Lake included (1) spot treatment of EWM in West Lake, the west canal of Rabbit Island Bay, Norwegian Bay, and City Bay and (2) large scale treatment of EWM in Cemetery Bay.

EWM management was not needed in East Lake, Williams Bay, and Library Lake in 2020 either because EWM was not observed during the fall 2019 plant survey (East Lake) or all EWM observed in the fall 2019 plant survey was rake removed (Williams Bay and Library Lake).

¹ Barr Engineering Company. 2020. *Beaver Dam Lake Aquatic Plant Management Plan*, Prepared for Beaver Dam Lake Management District. <http://www.beaverdamlake.org/apmp>

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 3

Table 1 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Beaver Dam Lake

Location	% of sample points up to 25-foot depth with Eurasian watermilfoil, including visuals																													
	Fall 2006	Fall 2007	Fall 2008	July 2009	Fall 2009	July 2010	Fall 2010	July 2011	Fall 2011	June 2012	July 2012	Fall 2012	May 2013	June 2013	July 2013	Fall 2013	July 2014	Fall 2014	July 2015	Fall 2015	July 2016	Fall 2016	July 2017	Fall 2017	July 2018	Fall 2018	July 2019	Fall 2019	July 2020	Fall 2020
Norwegian Bay	28.57	16.39	52.46	39.71	80.00	33.82	28.36	11.76	51.52	13.24	54.41	72.13	39.71	0.00	7.35	58.82	4.41	44.12	1.47	1.47	8.82	22.06	10.29	17.65	1.47	2.94	0.00	4.41	0.00	0.00
East Lake	5.13	0.00	13.38	14.00	27.86	22.70	27.54	28.78	33.79	N/A ¹	17.57	27.86	N/A ¹	N/A ¹	2.88	19.73	0.73	2.10	0.00	0.00	0.00	1.36	1.41	1.36	0.00	0.00	0.00	0.00	0.00	0.71 ⁶
City Bay	59.12	7.74	72.84	32.78	62.13	21.67	55.93	54.40	70.39	8.89	48.07	58.90	46.93	0.00	21.67	46.11	1.67	9.44	0.00	7.78	0.00	1.67	2.22	5.56	0.00	1.67	0.00	2.22	0.00	3.89
Cemetery Bay	41.10	0.00	40.00	0.00	6.82	0.00	10.23	3.37	47.73	N/A ¹	0.00	18.39	N/A ¹	3.37	0.00	2.25	0.00	1.14	4.49	44.94	5.62	26.97	0.00	0.00	0.00	0.00	5.62	14.61	3.37	2.25
West Lake	18.77	11.07	21.19	14.84	13.33	10.59	13.61	7.35	10.18	N/A ¹	8.64	14.15	N/A ¹	N/A ²	6.69	17.31	5.50	11.52	0.00	1.21	4.28	8.36	5.83	11.64	2.76	6.83	0.31	0.31 ⁴	1.85	13.54
Williams Bay	13.33	28.05	23.81	16.98	11.01	3.85	12.15	9.80	10.19	N/A ¹	3.85	15.96	N/A ¹	N/A ²	0.96	6.36	0.00	9.43	0.00	0.00	1.87	8.33	1.89	0.93	0.94	1.90	0.94	0.94 ⁴	12.15	27.10
Rabbit Island Bay	39.39	28.72	30.10	18.49	20.54	12.82	26.79	10.17	17.86	0.00	1.67	11.43	N/A ²	N/A ²	0.85	3.33	1.68	5.00	0.00	1.67	4.20	10.00	0.00	3.33	0.84	4.17	0.00	3.36 ⁵	5.88	16.81
Library Lake	73.33	61.97	47.30	5.04	2.60	0.72	7.41	0.00	0.00	N/A ¹	2.88	1.79	N/A ¹	N/A ¹	0.00	0.72	0.00	1.44	5.76	12.23	0.00	0.00	1.44	3.60	5.76	10.07	0.00	0.72 ⁴	2.16	5.04
East Lake Basins	12.74	24.17	26.45	13.84	12.90	7.93	14.26	7.02	10.71	N/A³	5.53	12.54	N/A³	N/A³	3.48	10.95	2.88	8.06	1.17	3.31	2.30	9.09	2.71	4.96	0.21	1.05	1.04	4.18	0.63	2.09
West Lake Basins	16.79	5.52	44.89	21.97	43.72	19.67	34.89	31.38	54.31	N/A³	30.86	43.24	N/A³	N/A³	10.08	33.12	1.46	10.65	1.05	11.46	3.03	6.98	3.33	6.98	2.75	6.27	0.29	1.01	4.20	14.49
Beaver Dam Lake—All Basins	14.42	15.77	34.46	17.17	25.96	12.77	22.64	17.43	29.51	N/A³	16.03	26.16	N/A³	N/A³	6.17	20.29	2.30	9.11	1.12	6.64	2.73	7.84	3.08	6.16	1.71	4.12	0.60	2.31	2.74	9.42

N/A¹ Frequency of occurrence not available because the area was not surveyed

N/A² Frequency of occurrence not available because limited areas were surveyed - not the whole lake/bay area. Rabbit Island Bay channels surveyed and a small area near the Eagle Point boat launch.

N/A³ Frequency of occurrence not available because some areas were not surveyed and/or only limited areas were surveyed in West Lake (area near Eagle Point boat landing) and Rabbit Island Bay (only the channels)

⁴All EWM was rake removed during the 2019 fall plant survey.

⁵The majority of the EWM was in the west canal and all EWM in Rabbit Island Bay were rake removed during the 2019 fall plant survey.

⁶All EWM was rake removed during the 2020 fall plant survey.

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 4

Table 2 2006-2020 EWM Extent in Beaver Dam Lake

Location	Acreage of EWM (based on plant surveys)																													
	Fall 2006	Fall 2007	Fall 2008	July 2009	Fall 2009	July 2010	Fall 2010	July 2011	Fall 2011	June 2012	July 2012	Fall 2012	May 2013	June 2013	July 2013	Fall 2013	July 2014	Fall 2014	July 2015	Fall 2015	July 2016	Fall 2016	July 2017	Fall 2017	July 2018	Fall 2018	July 2019	Fall 2019	July 2020	Fall 2020
Norwegian Bay	3.64	4.75	18.12	8.65	28.23	12.09	9.61	1.99	19.67	3.36	21.21	26.91	15.16	0.00	2.19	23.37	1.10	17.89	0.45	0.81	2.48	6.94	4.66	6.19	0.30	0.65	0.00	0.70	0.00	0.00
East Lake	0.00	0.00	9.34	8.14	19.37	14.13	17.48	17.18	23.93	N/A ¹	11.33	19.98	N/A ¹	N/A ¹	1.18	15.72	0.33	0.90	0.00	0.00	0.00	1.97	0.63	0.48	0.00	0.00	0.00	0.00	0.00	0.24 ⁵
City Bay	60.25	3.94	68.06	27.89	61.62	20.11	54.01	47.97	73.66	7.65	48.76	55.75	50.85	0.00	20.70	49.01	0.79	7.26	0.00	6.87	0.00	1.50	2.37	5.13	0.00	1.56	0.00	0.97	0.00	3.75
Cemetery Bay	10.90	0.00	17.80	0.00	1.81	0.00	3.97	0.86	21.32	N/A ¹	0.00	7.17	N/A ¹	0.75	0.00	0.51	0.00	0.26	1.54	31.56	1.70	13.76	0.00	0.00	0.00	0.00	1.22	4.10	1.41	0.74
West Lake	25.27	11.36	33.19	24.59	19.67	15.80	25.15	8.65	14.78	N/A ¹	15.31	23.11	N/A ¹	3.15 ²	10.05	29.13	7.23	29.94	0.00	1.72	6.83	20.64	9.46	21.05	5.46	12.35	1.55	0.36 ³	4.41	27.89
Williams Bay	3.63	10.23	12.64	9.48	4.80	1.15	6.68	4.57	4.65	N/A ¹	1.68	6.92	N/A ¹	0.26 ²	0.33	2.46	0.00	7.45	0.00	0.00	0.92	5.78	1.89	0.26	0.72	0.54	0.27	0.25 ³	8.76	17.29
Rabbit Island Bay	5.80	12.36	13.21	10.57	8.51	6.26	11.47	4.22	8.01	0.00	0.51	5.64	0.00 ²	N/A ²	0.38	1.45	0.61	3.11	0.00	1.37	1.41	9.51	0.00	0.83	0.27	1.32	0.00	0.62 ⁴	3.96	11.26
Library Lake	0.66	0.59	3.62	0.40	0.09	0.04	0.72	0.00	0.00	N/A ¹	0.20	0.04	N/A ¹	N/A ¹	0.00	0.06	0.00	0.14	0.70	1.90	0.02	0.00	0.20	0.43	0.76	1.85	0.00	0.04 ³	0.24	0.51
East Lake Basins	74.79	8.69	113.32	44.68	111.03	46.33	85.07	67.99	138.58	N/A³	81.30	109.81	N/A³	N/A³	24.07	88.60	2.22	26.31	1.99	39.24	4.18	24.16	7.66	11.80	0.30	2.21	1.22	5.77	1.41	4.73
West Lake Basins	35.36	34.54	62.66	45.04	33.07	23.25	44.02	17.44	27.44	N/A³	17.70	35.70	N/A³	N/A³	10.76	33.10	7.84	40.64	0.70	4.99	9.18	35.93	11.55	22.57	7.21	16.06	1.82	1.27	17.37	56.95
Beaver Dam Lake—All Basins	110.15	43.23	175.98	89.72	144.10	69.58	129.09	85.43	166.02	N/A³	99.00	145.51	N/A³	N/A³	35.88	121.70	10.06	66.96	2.68	44.23	13.36	60.10	19.21	34.37	7.52	18.27	3.04	7.05	18.78	61.68

N/A¹ EWM extent not available because the area was not surveyed

² EWM extent is based on survey of limited areas—not the whole lake/bay area. Rabbit Island Bay channels surveyed and a small area near the Eagle Point boat launch which included portions of West Lake and Williams Bay.

³All EWM was rake removed during the 2019 fall plant survey.

⁴The majority of the EWM in the west canal and all EWM in Rabbit Island Bay were rake removed during the 2019 fall plant survey.

⁵All EWM was rake removed during the 2020 fall plant survey.

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 5

Table 3 2006-2020 % of Littoral Zone with EWM in Beaver Dam Lake

Location	% of Littoral Zone with EWM (based on plant surveys)																											
	Fall 2006	Fall 2007	Fall 2008	July 2009	Fall 2009	July 2010	Fall 2010	July 2011	Fall 2011	July 2012	Fall 2012	July 2013	Fall 2013	July 2014	Fall 2014	July 2015	Fall 2015	July 2016	Fall 2016	July 2017	Fall 2017	July 2018	Fall 2018	July 2019	Fall 2019	July 2020	Fall 2020	
Norwegian Bay	9.52	12.42	47.38	22.62	73.82	31.62	25.13	0.05	51.44	55.47	70.38	5.72	61.11	2.88	46.79	1.18	2.12	6.49	18.15	12.18	16.19	0.78	1.70	0.00	1.83	0.00	0.00	
East Lake	0.00	0.00	14.83	12.92	30.75	22.43	27.75	27.27	37.98	17.98	31.71	1.87	24.95	0.53	1.43	0.00	0.00	0.00	3.13	0.93	0.71	0.00	0.00	0.00	0.00	0.00	0.36 ³	
City Bay	59.45	3.89	67.15	27.52	60.80	31.92	53.29	47.33	72.68	48.11	55.01	20.42	48.36	0.78	7.17	0.00	6.78	0.00	1.48	2.34	5.06	0.00	1.54	0.00	0.96	0.00	3.70	
Cemetery Bay	20.21	0.00	33.00	0.00	3.36	0.00	7.36	1.59	39.53	0.00	13.29	0.00	0.94	0.00	0.48	2.86	58.51	3.15	25.51	0.00	0.00	0.00	0.00	2.26	7.60	2.62	1.37	
West Lake	17.60	7.91	23.12	17.13	13.70	11.01	17.52	6.03	10.30	10.67	16.10	7.00	20.29	5.04	20.86	0.00	1.20	4.76	14.86	6.43	14.30	3.70	8.37	1.05	0.24 ¹	2.99	18.90	
Williams Bay	7.95	22.41	27.70	20.77	10.52	2.52	0.15	10.01	10.19	3.68	15.15	0.72	5.39	0.00	12.29	0.00	0.00	2.02	11.74	3.93	0.54	1.51	1.13	0.57	0.52 ¹	18.40	36.30	
Rabbit Island Bay	9.56	20.38	21.78	17.43	14.03	10.32	18.91	6.96	13.21	0.84	9.30	0.63	2.39	1.01	5.13	0.00	2.26	2.33	15.72	0.00	1.36	0.44	2.16	0.00	1.01 ²	6.47	18.40	
Library Lake	4.81	4.30	26.40	2.92	0.66	0.29	5.25	0.00	0.00	1.46	0.27	0.00	0.45	0.00	0.99	5.11	13.86	0.15	0.00	1.44	3.14	5.54	13.49	0.00	0.29 ¹	1.76	3.69	
East Lake Basins	29.15	3.39	44.17	17.42	43.28	18.06	33.16	26.51	54.02	31.69	42.81	9.38	34.54	0.87	10.26	1.99	15.30	1.63	9.42	2.93	4.52	0.12	0.85	0.47	2.22	0.54	1.82	
West Lake Basins	13.42	13.11	23.78	17.09	12.55	8.82	16.70	6.62	10.41	6.72	13.55	4.08	12.56	2.98	15.42	0.70	1.89	3.48	13.69	4.27	8.35	2.67	5.95	0.67	0.47	6.43	21.08	
Beaver Dam Lake—All Basins	21.18	8.31	33.84	17.25	27.71	13.38	24.82	16.43	31.92	19.04	27.98	6.90	23.40	1.93	12.87	2.68	8.50	2.57	11.58	3.62	6.47	1.42	3.45	0.57	1.33	3.54	11.63	

¹All EWM was rake removed during the 2019 fall plant survey.

²The majority of the EWM in the west canal and all EWM in Rabbit Island Bay were rake removed during the 2019 fall plant survey.

³All EWM was rake removed during the 2020 fall plant survey.

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 6

1.0 Herbicide Treatment of EWM

Goal 1 of the Beaver Dam Lake Aquatic Plant Management Plan is “Reduce Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) levels to 7 percent of the littoral zone while minimizing harm to native aquatic plants.”¹ The goal was attained in 2017 (Table 3) and treatments in 2018 through 2020 were intended to continue goal attainment. In 2020, the Beaver Dam Lake Management District treated 70.41 acres of EWM with herbicide: 53.37 acres with 2,4-D, 14.85 acres with diquat, and 2.19 acres with Aquasrike (Table 4). Five areas of the lake received herbicide treatment in 2020—West Lake, the west canal of Rabbit Island Bay, Norwegian Bay, City Bay and Cemetery Bay (Table 4). Herbicide treatment areas are shown in Figure 1 and Figure 2.

Table 4 2020 Beaver Dam Lake EWM Herbicide Treatment Program

Location	EWM Extent (ac)	EWM Management Method	EWM Management Area	Name of Herbicide	Herbicide Dose Applied to Treatment Area	Expected Whole Bay/Lake Concentration (ppm)
West Lake	NA ¹	Herbicide	2.19	Aquasrike	6.5 quarts/acre foot	--
Rabbit Island Bay West Canal	0.62	Herbicide	0.81	Diquat	2 gallons/acre	--
City Bay	0.97	Herbicide	7.01	Diquat	2 gallons/acre	--
Norwegian Bay	0.70	Herbicide	7.03	Diquat	2 gallons/acre	--
Cemetery Bay	4.10	Herbicide	53.37	2,4-D	0.8 ppm ae ²	0.8 ppm ae ²

¹The EWM treatment area is based on a citizen observation. Because EWM was not observed during the fall plant survey, EWM extent is not available.

²ae is acid equivalent which is the concentration of the active ingredient in 2,4-D (i.e., the ingredient that kills EWM)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 7

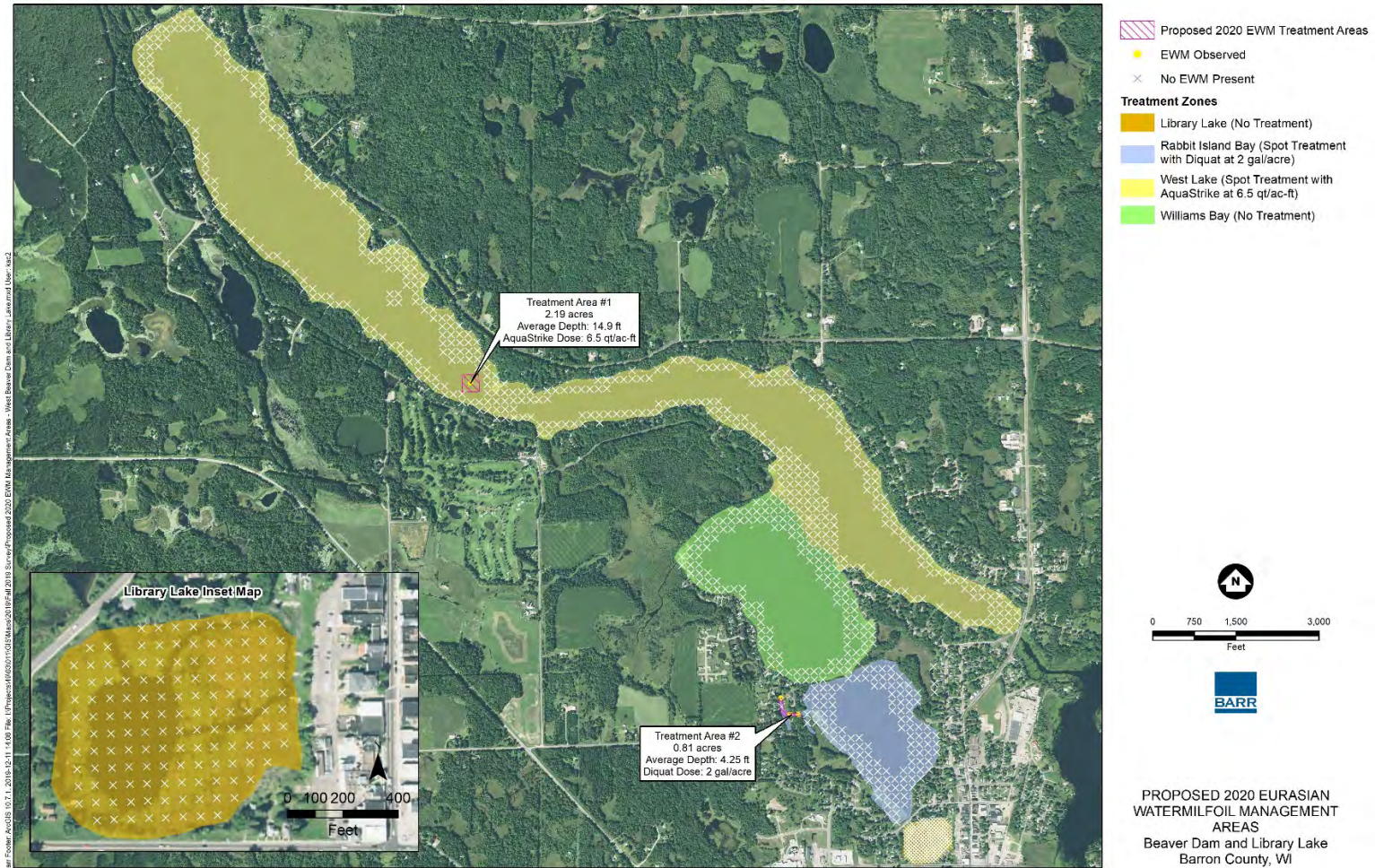


Figure 1 2020 Beaver Dam Lake Eurasian Watermilfoil Treatment Areas: West Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 8

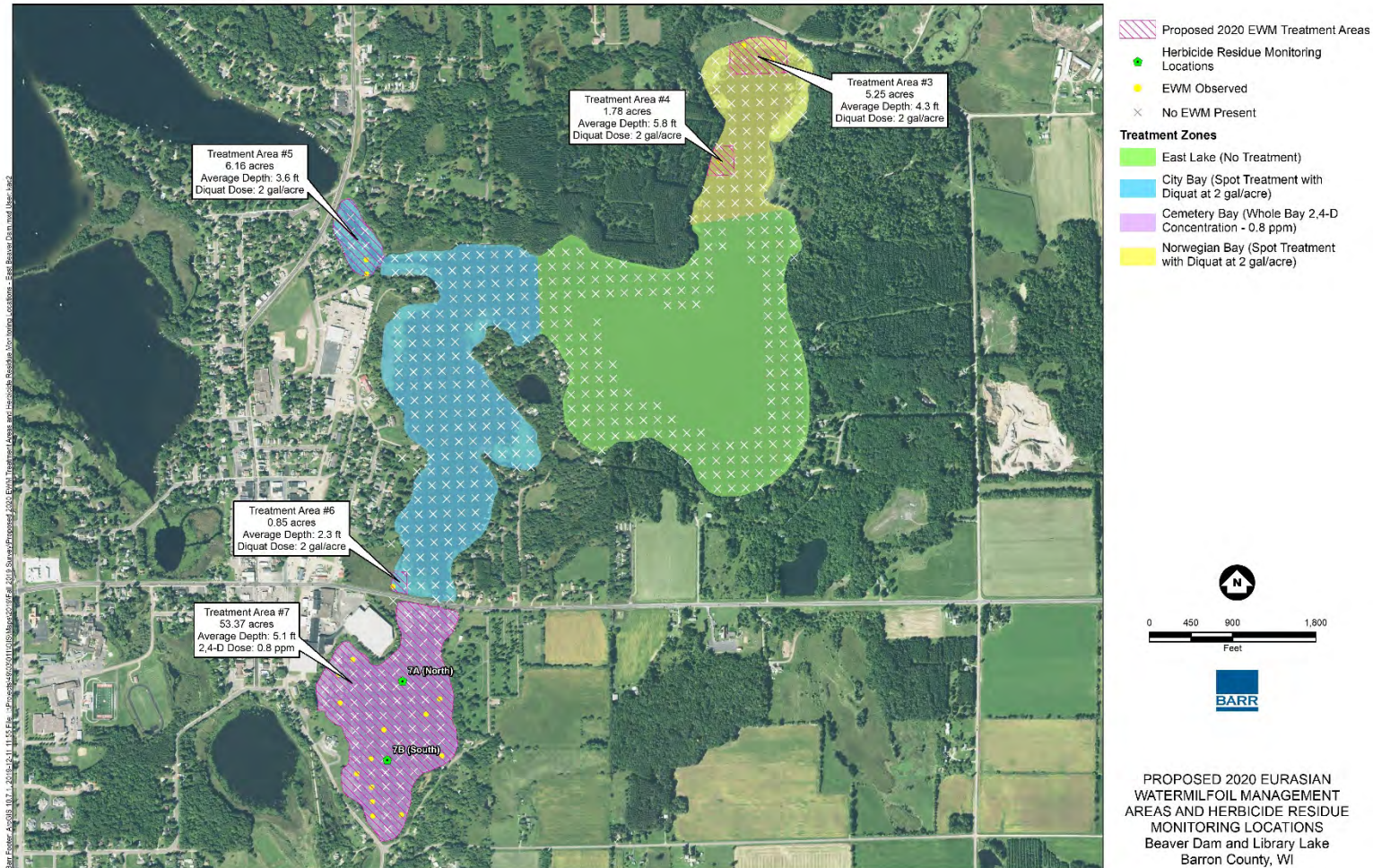


Figure 2 2020 Beaver Dam Lake Eurasian Watermilfoil Treatment Areas and Herbicide Residue Monitoring Locations: East Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 9

In 2020, 2,4-D residue samples were collected from two Cemetery Bay locations: 7A and 7B. Herbicide residue sample locations are shown in Figure 2. Samples were collected at intervals of approximately 0.04, 0.16, 1, 2, 3, 5, 7, 12, 19, and 26 days after treatment (DAT). Samples at each site were collected at mid-depth (above the thermocline) and preserved with 3 drops of muriatic acid to fix the 2,4-D and prevent degradation. Samples were stored in a refrigerator until shipped to the Wisconsin Department of Hygiene Laboratory in Madison, Wisconsin for analysis of 2,4-D.

2.0 Lake-Wide EWM

The 2020 EWM management efforts were successful and EWM was not observed within the following treated areas during the July plant survey:

- West Lake Treatment Area 1 (Figure 1 and Figure 6)
- West canal of Rabbit Island Bay, Treatment Area 2 (Figure 1 and Figure 6)
- Norwegian Bay Treatment Areas 3 and 4 (Figure 2 and Figure 7)
- City Bay Treatment Area 5 (Figure 2 and Figure 7)

The Cemetery Bay whole bay treatment reduced EWM extent from 4.10 acres in fall of 2019 to 1.41 acres in July of 2020 (Figure 2 and Figure 7).

Despite the success of the 2020 EWM management efforts, EWM was observed in many untreated areas during the July plant survey (Figure 6 and Figure 7) resulting in the following lake-wide increases in EWM during July:

- EWM frequency increased from 2 percent in October 2019 to 3 percent in July 2020 (Table 1 and Figure 3),
- EWM extent increased from 7 acres in October 2019 to 19 acres in July 2020 (Table 2 and Figure 4), and
- Percent of littoral zone with EWM increased from 1 percent in October 2019 to 4 percent in July 2020 (Table 3 and Figure 5).

Further expansion of EWM between July (Figure 6 and Figure 7) and October of 2020 (Figure 8 and Figure 9):

- Tripled EWM frequency from 3 percent in July to 9 percent in October (Table 1 and Figure 3),
- More than tripled EWM extent from 19 acres in July to 62 acres in October (Table 2 and Figure 4), and
- Tripled percent of littoral zone with EWM from 4 percent in July to 12 percent in October (Table 3 and Figure 5).

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 10

The 12 percent of the littoral zone with EWM in October fails to meet the District goal of reducing Eurasian watermilfoil (EWM) to no more than 7 percent of the littoral zone. Hence, management of EWM in 2021 will be needed to attain the District goal.



Figure 3 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in the Littoral Zone

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 11

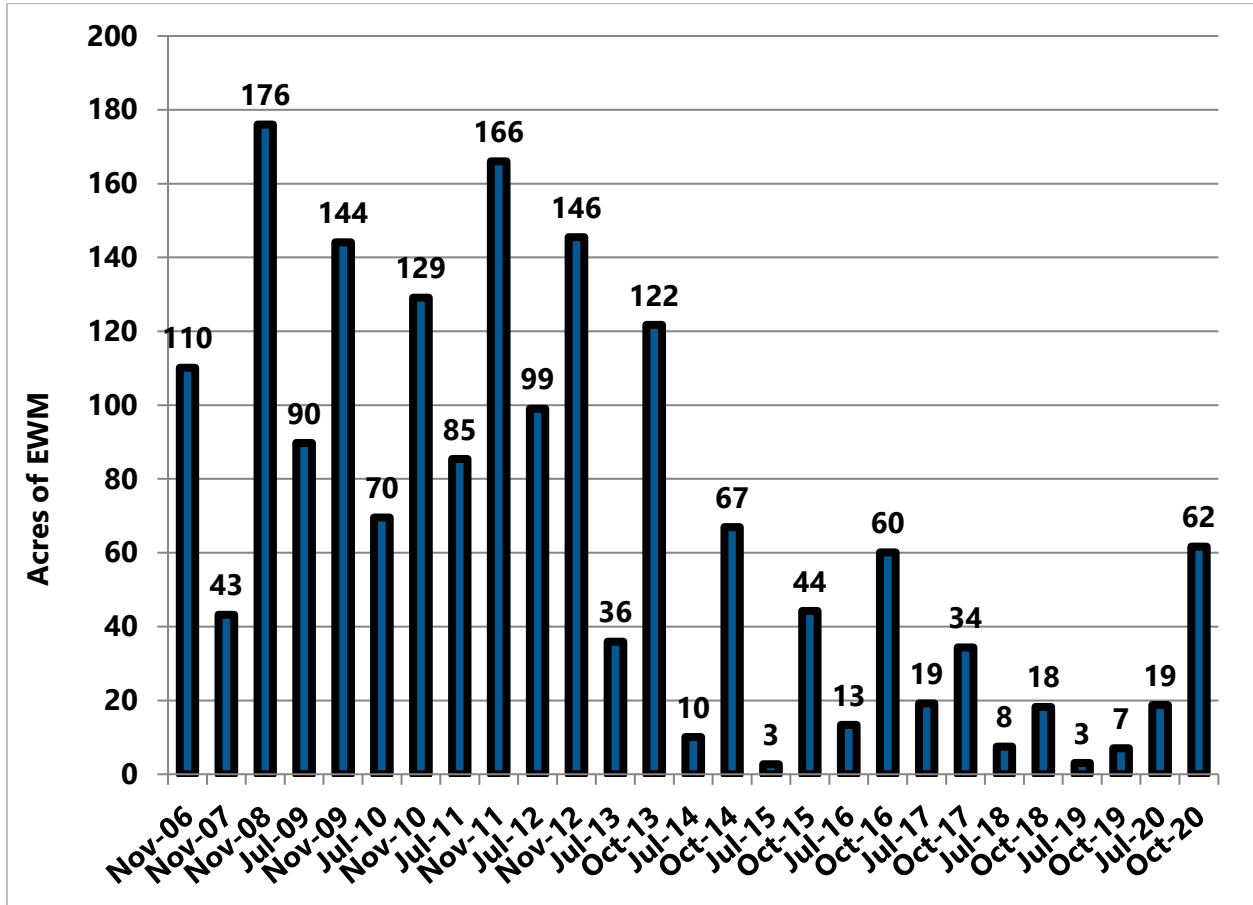


Figure 4 2006-2020 Beaver Dam Lake EWM Acreage

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 12

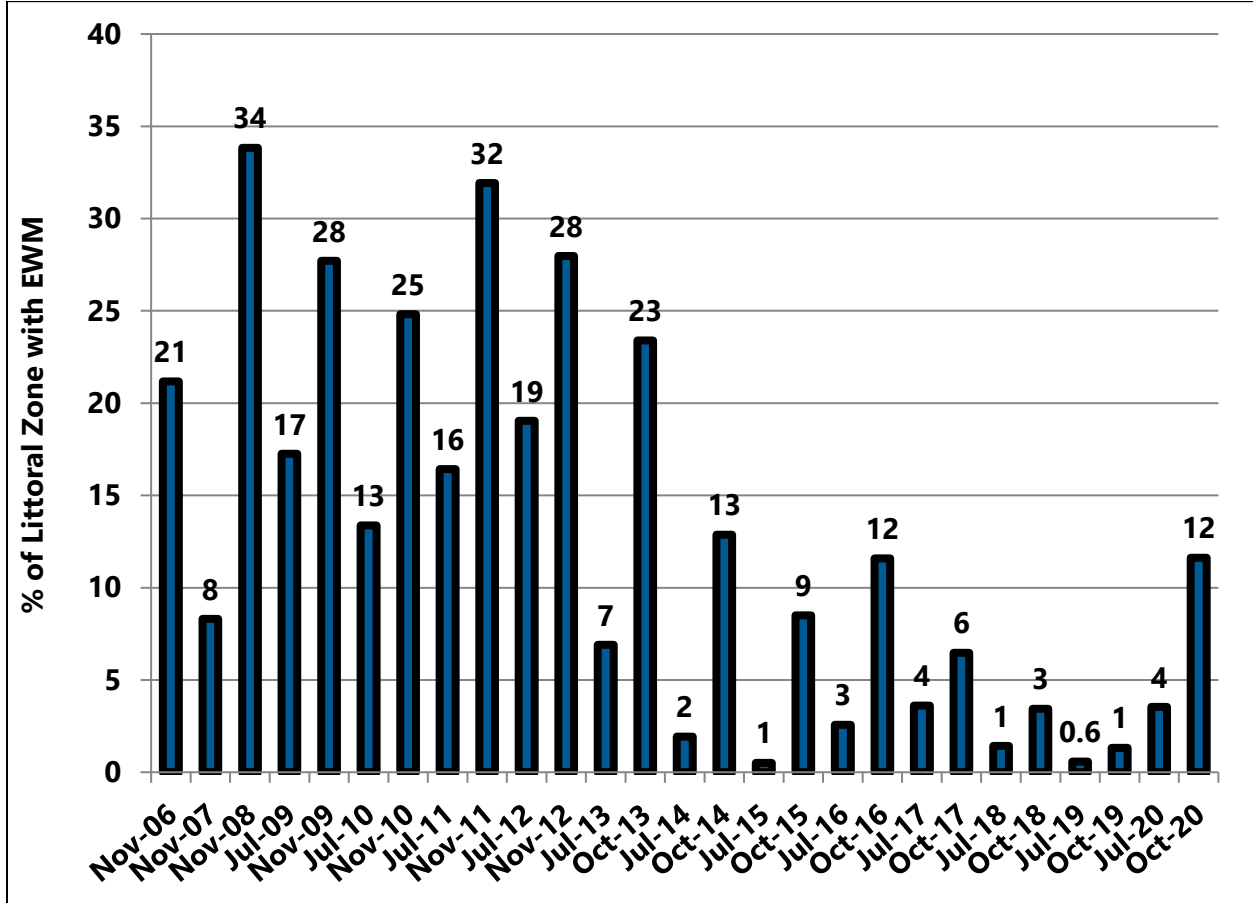


Figure 5 2006-2020 Beaver Dam Lake Percent of Littoral Zone with EWM

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 13

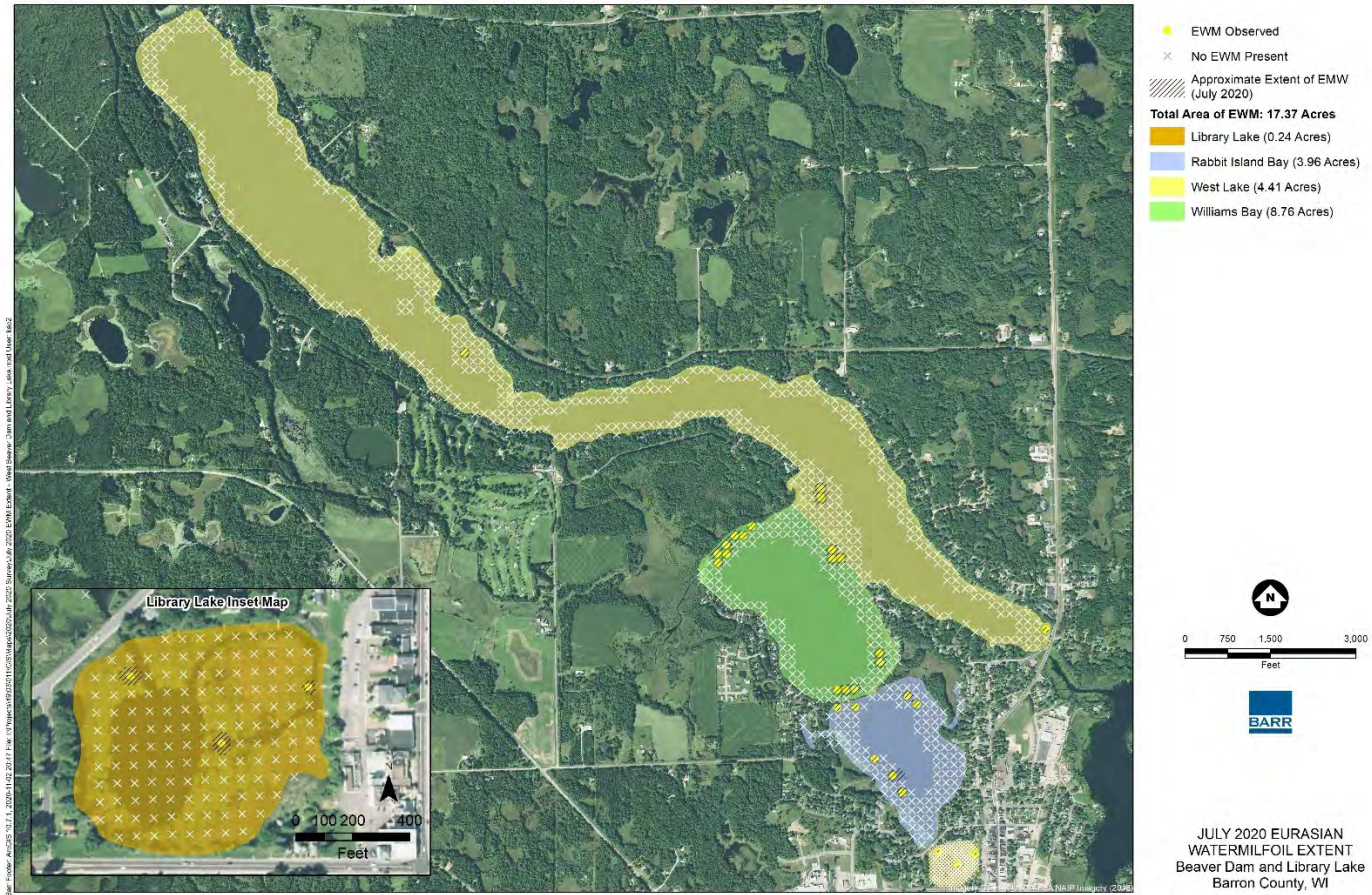


Figure 6 July 2020 Eurasian Watermilfoil Extent in Beaver Dam Lake (West Basins)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 14

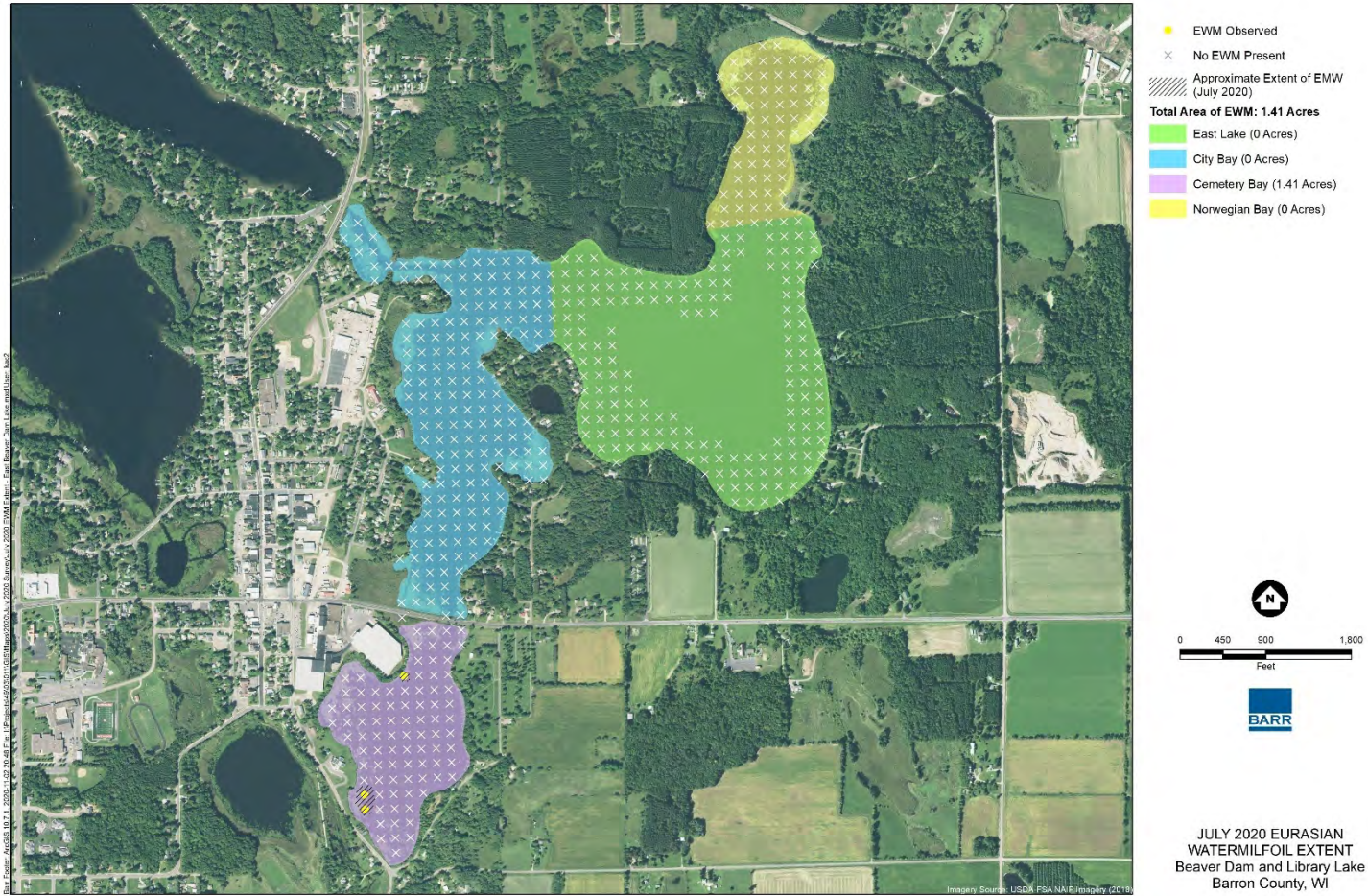


Figure 7 July 2020 Eurasian Watermilfoil Extent in Beaver Dam Lake (East Basins)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 15

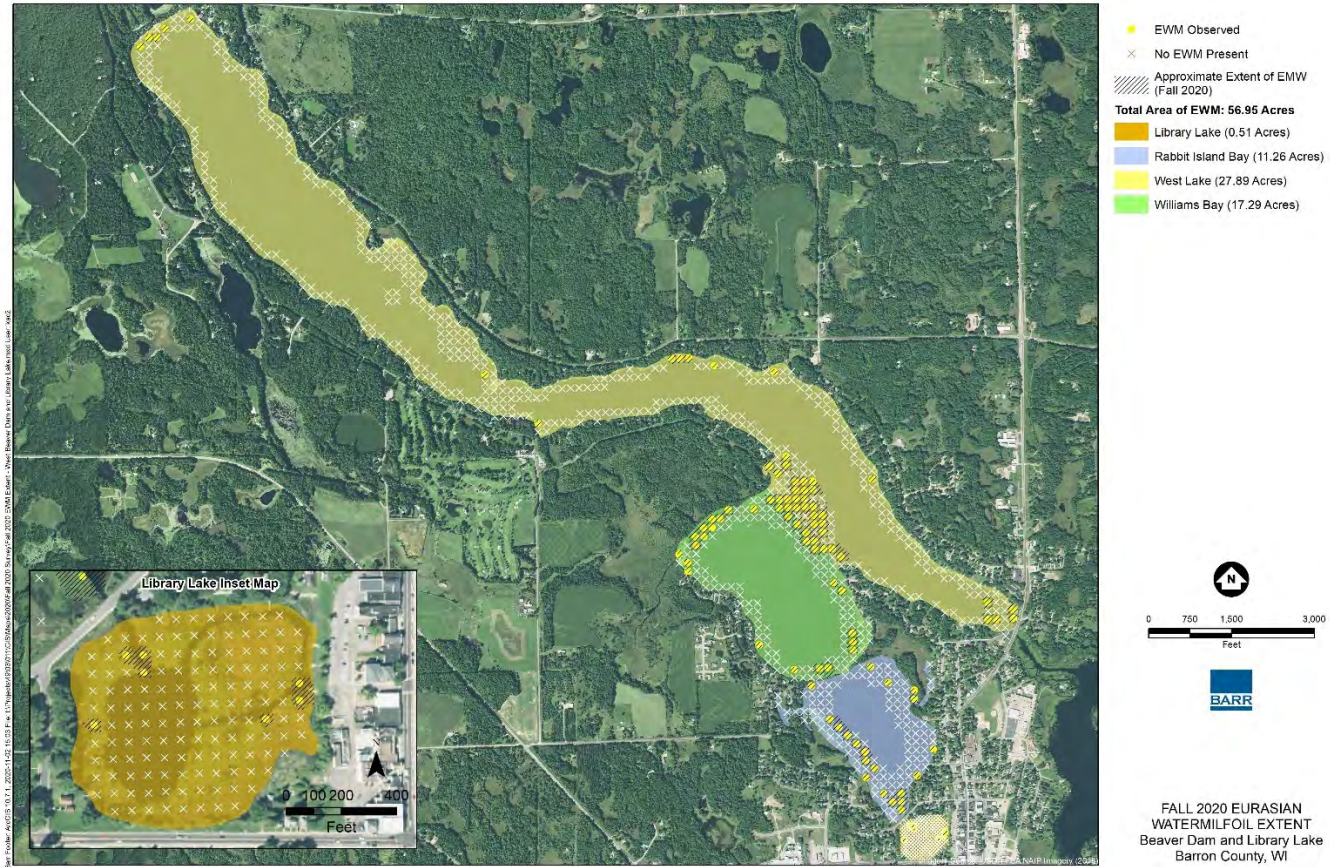


Figure 8 October 2020 Eurasian Watermilfoil Extent in Beaver Dam Lake (West Basins)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 16

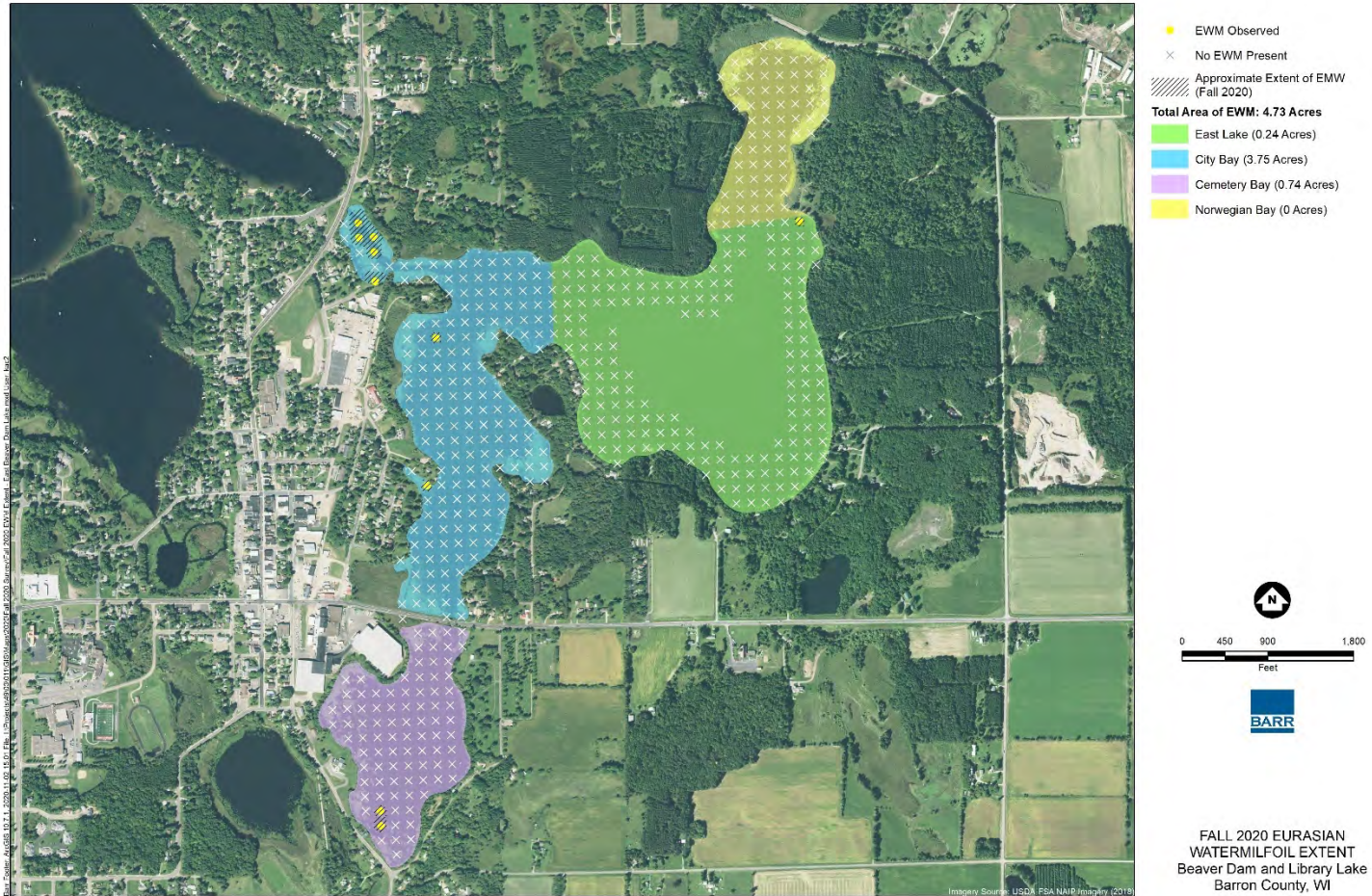


Figure 9 October 2020 Eurasian Watermilfoil Extent in Beaver Dam Lake (East Basins)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 17

3.0 Individual EWM Management Areas

3.1 West Lake

In 2020, EWM management in West Lake consisted of herbicide treatment of 2.19 acres in one location, Treatment Area 1 in Figure 1 (1 percent of the littoral area of West Lake). The herbicide Aquastrike was applied at a dose of 6.5 quarts/acre foot on June 3. The treatment was successful and EWM was not observed in the treated location during either July (Figure 6) or October (Figure 8).

Despite the success of the 2020 herbicide treatment, EWM was observed in untreated areas during the July plant survey (Figure 6). The appearance of EWM in untreated areas resulted in the following increases in EWM during July:

- EWM frequency increased from 0.3 percent in October 2019 to 2 percent in July 2020 (Table 1 and Figure 10),
- EWM extent increased from 0.3 acres in October 2019 to 4 acres in July 2020 (Table 2 and Figure 11), and
- Percent of littoral zone with EWM increased from 0.2 percent in October 2019 to 3 percent in July 2020 (Table 3 and Figure 12).

Rapid EWM growth and expansion between July and October of 2020 resulted in the following EWM increases (Figure 6 and Figure 8):

- Increased EWM frequency from 2 percent in July to 14 percent in October (Table 1 and Figure 10),
- Increased EWM extent from 4 acres in July to 28 acres in October (Table 2 and Figure 11), and
- Increased percent of littoral zone with EWM from 3 percent in July to 19 percent in October (Table 3 and Figure 12).

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 18

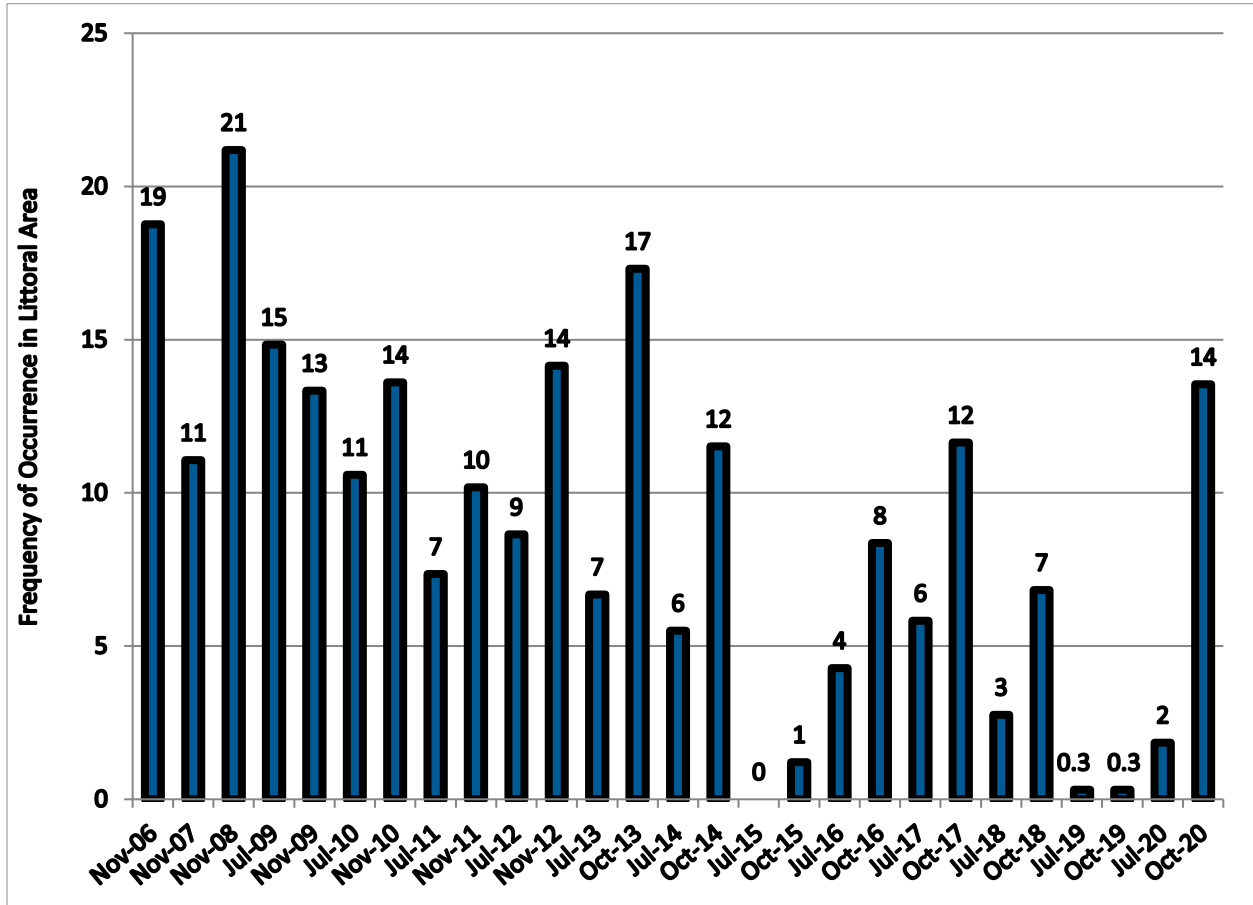


Figure 10 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: West Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 19

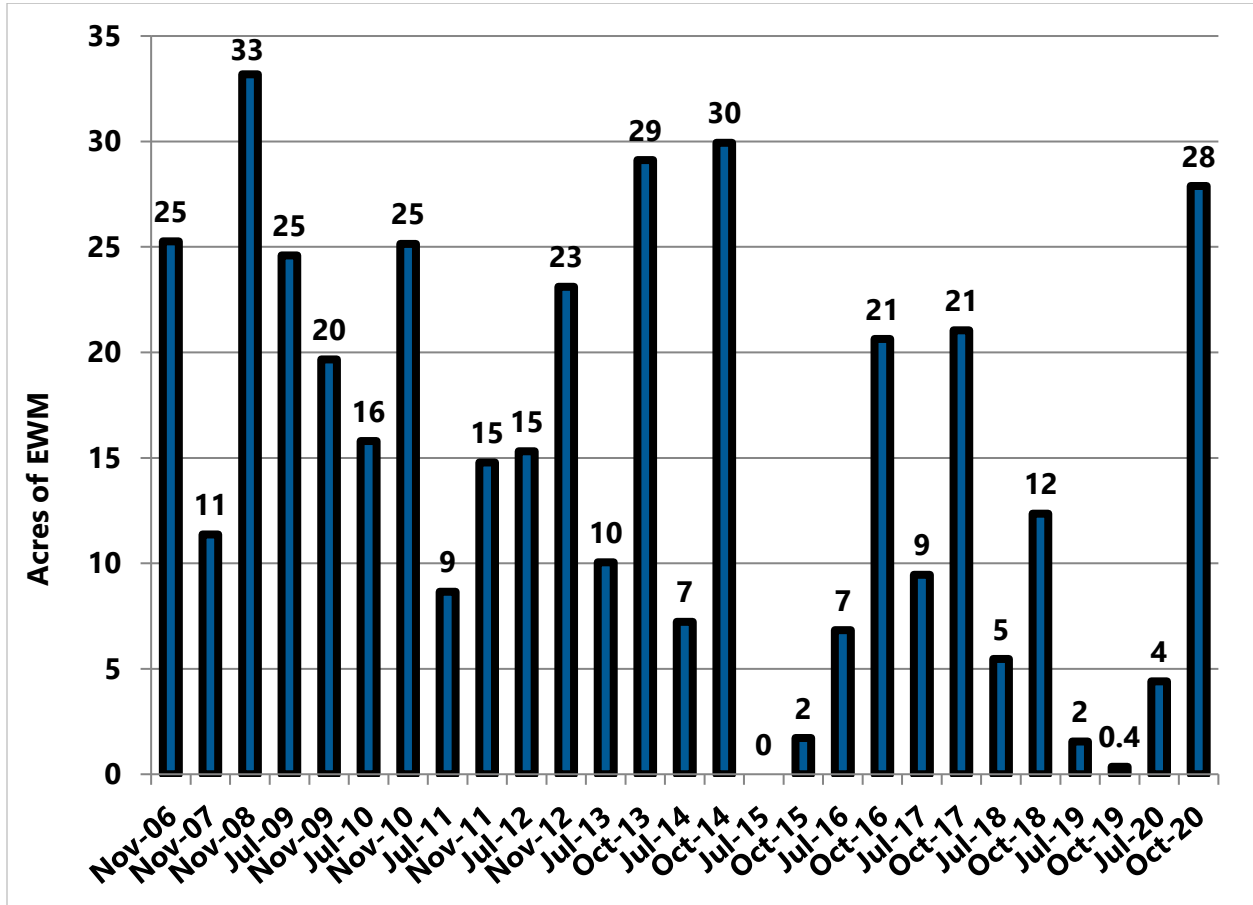


Figure 11 2006-2020 Beaver Dam Lake EWM Acreage: West Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 20

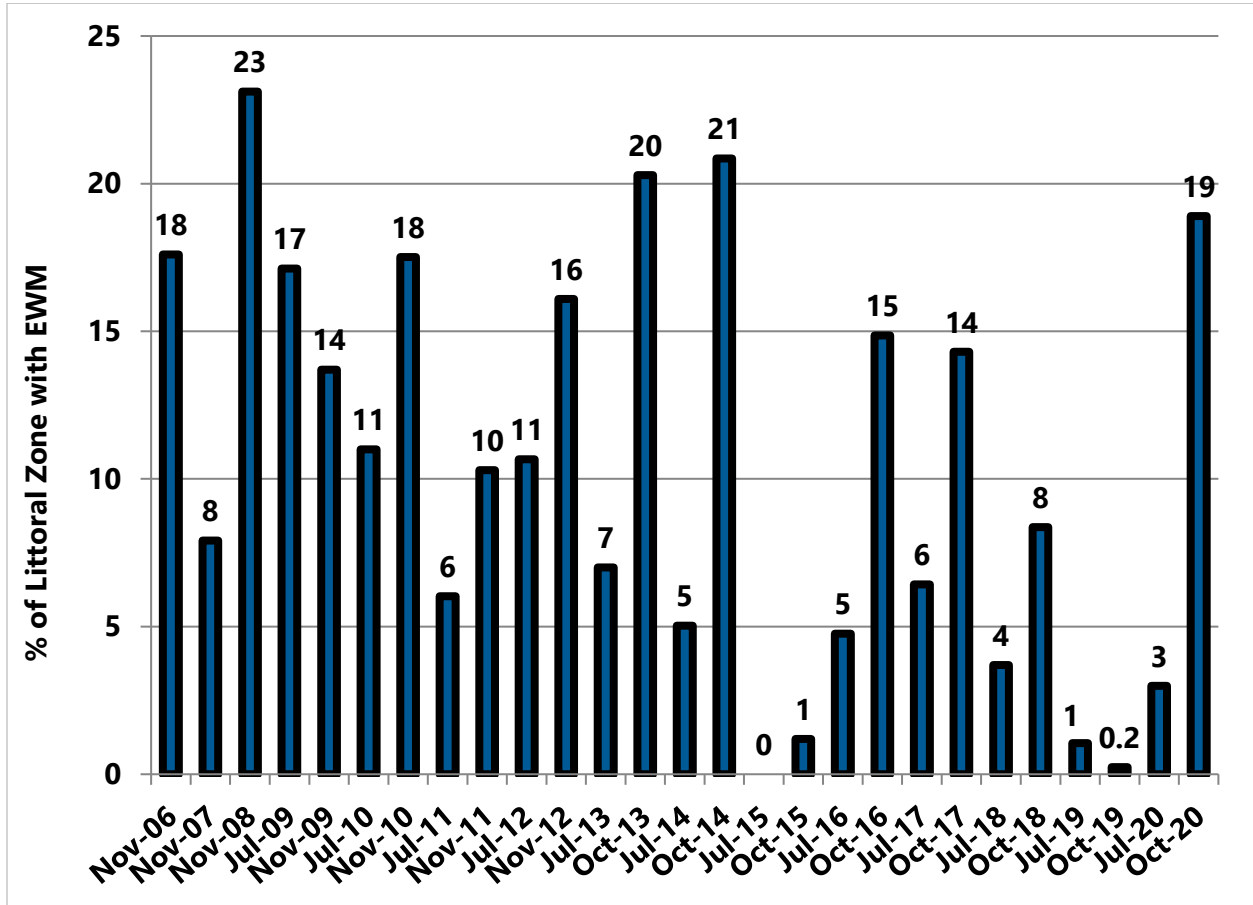


Figure 12 2006-2020 Percent of Littoral Zone with EWM: West Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 21

3.2 Williams Bay

During the October 2019 plant survey, EWM was only observed at one location and was rake removed. Hence, EWM management was not needed in 2020. However, EWM reappeared during the July 2020 plant survey and then rapidly expanded during July (Figure 6) through October (Figure 8):

- EWM frequency increased from 12 percent in July to 27 percent in October (Table 1 and Figure 13),
- EWM extent increased from 9 acres in July to 17 acres in October (Table 2 and Figure 14), and
- Percent of littoral zone with EWM increased from 18 percent in July to 36 percent in October (Table 3 and Figure 15).

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 22

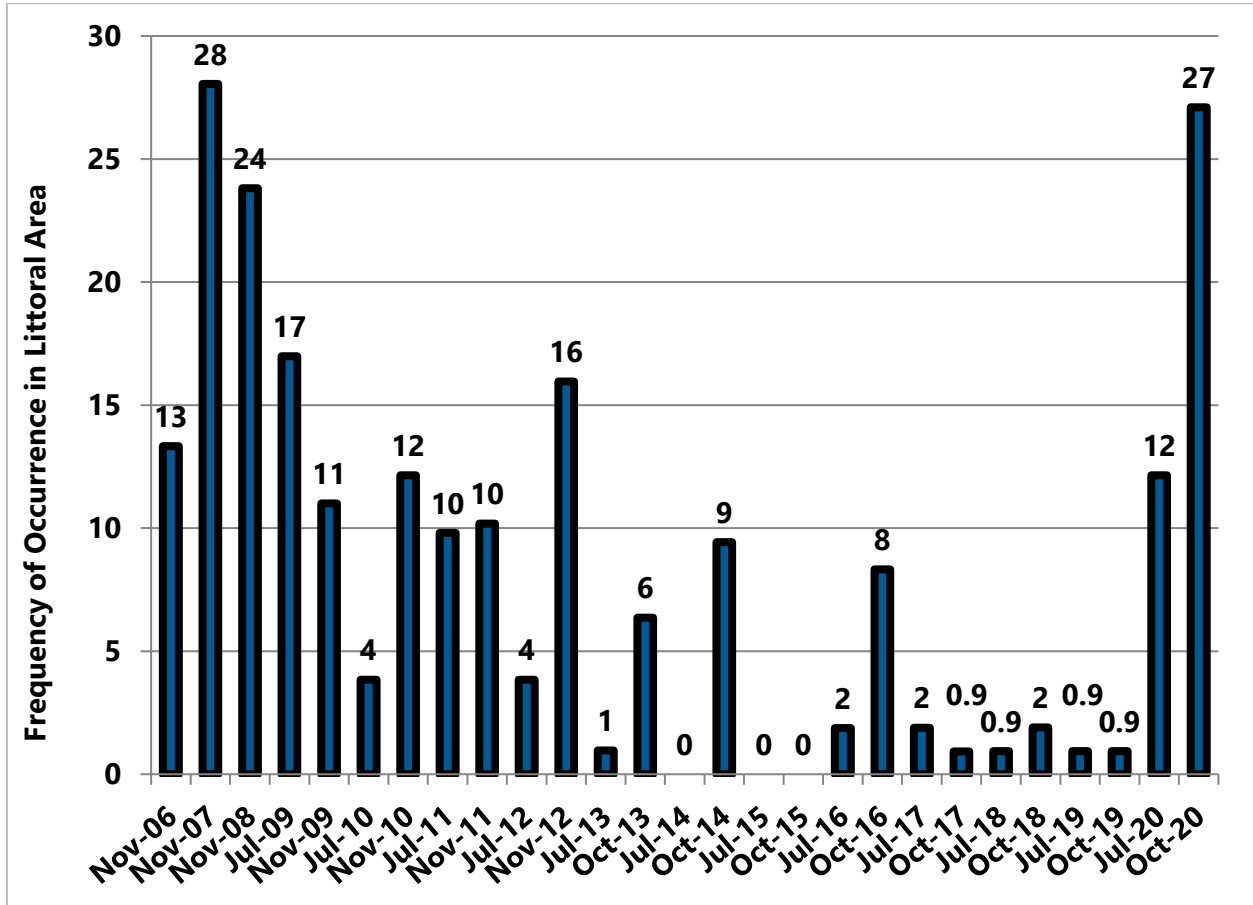


Figure 13 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone:
 Williams Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 23

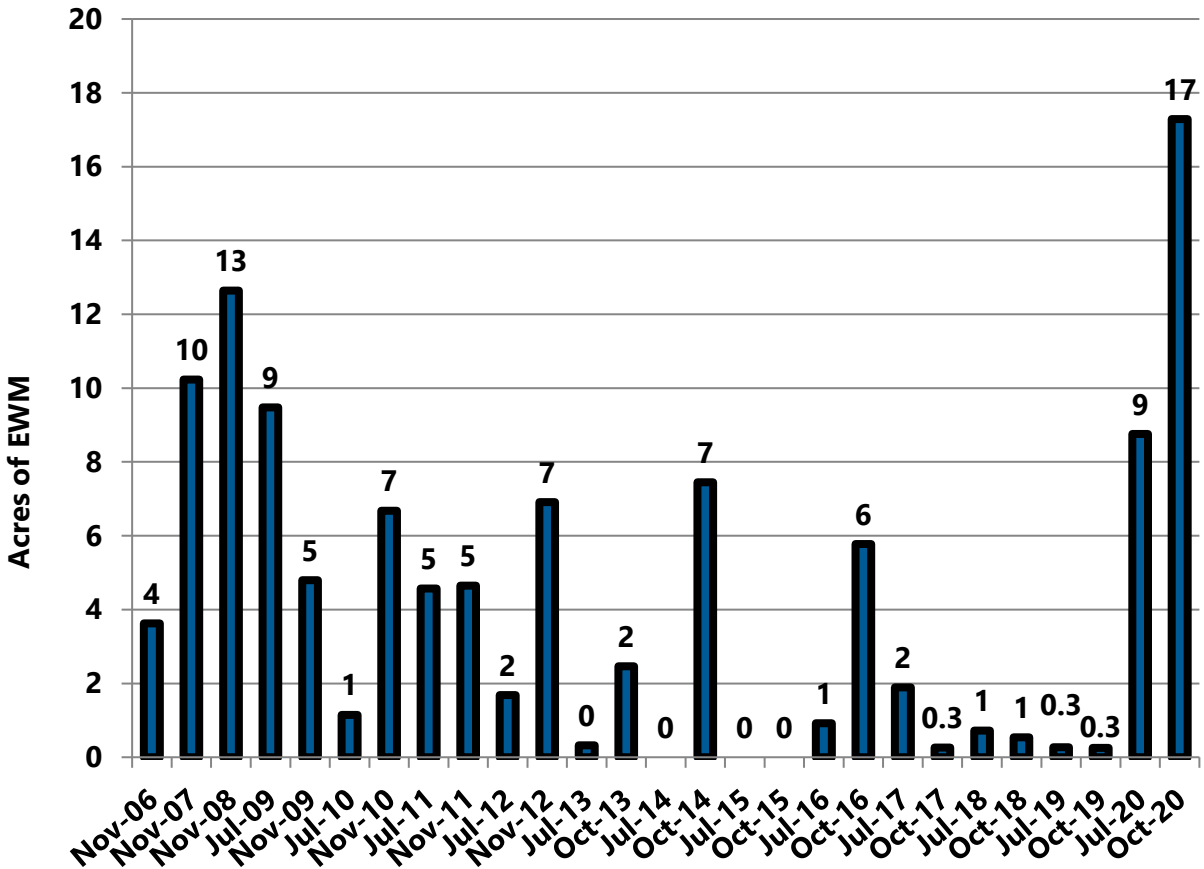


Figure 14 2006-2020 Beaver Dam Lake EWM Acreage: Williams Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 24

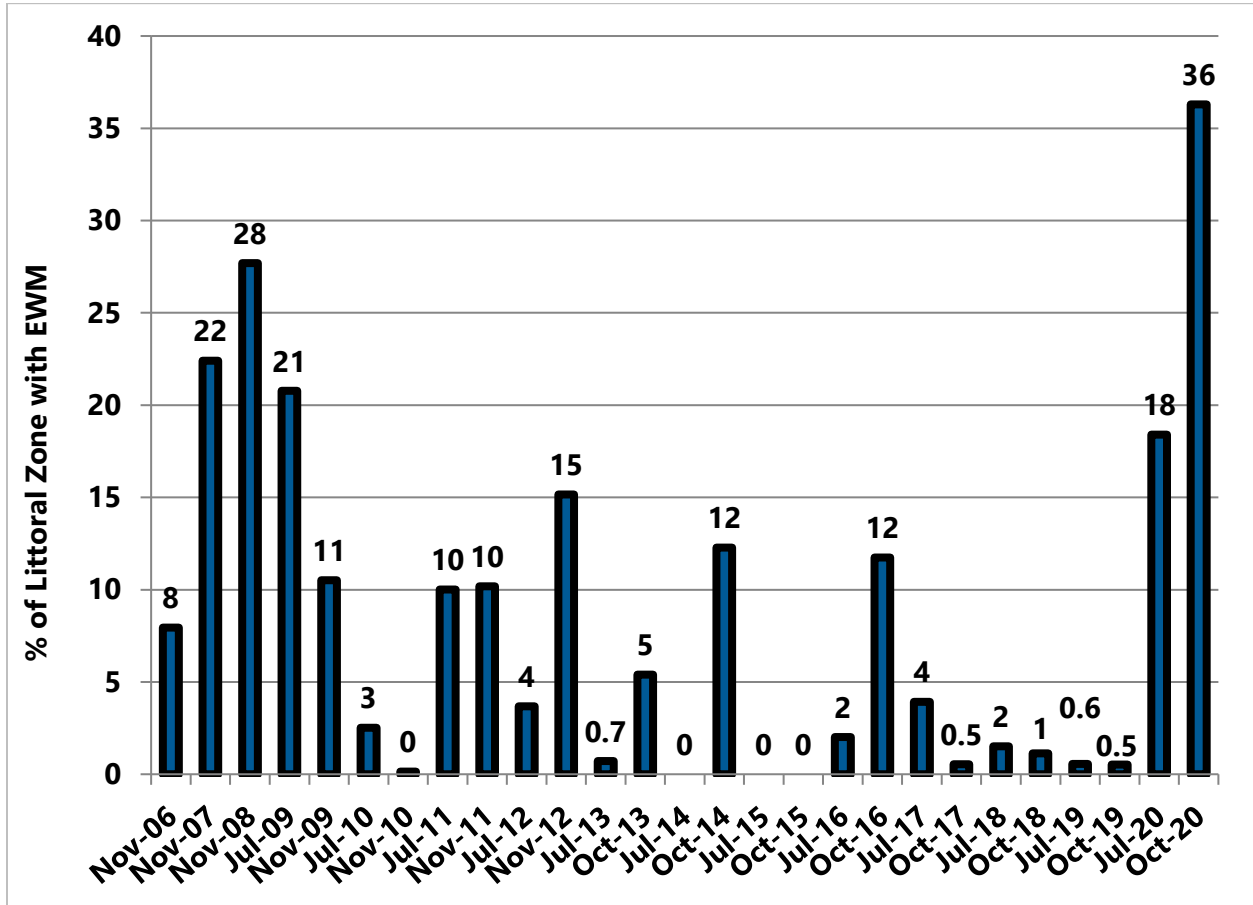


Figure 15 2006-2020 Percent of Littoral Zone with EWM: Williams Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 25

3.3 Rabbit Island Bay

In 2020, EWM management in Rabbit Island Bay consisted of herbicide treatment in the west canal, Treatment Area 2 in Figure 1, totaling 0.81 acres. The area was treated with the herbicide diquat at a dose of 2 gallons per acre on May 21. The treatment attained EWM control and EWM was not observed in the west canal of Rabbit Island Bay during either the July (Figure 6) or October 2020 (Figure 8) plant surveys.

Despite the success of the 2020 herbicide treatment, EWM was observed in untreated areas during the July plant survey (Figure 6). The appearance of EWM in untreated areas resulted in the following increases in EWM during July:

- EWM frequency doubled from 3 percent in October 2019 to 6 percent in July 2020 (Table 1 and Figure 16),
- EWM extent increased from 0.6 acres in October 2019 to 4 acres in July 2020 (Table 2 and Figure 17), and
- Percent of littoral zone with EWM increased from 1 percent in October 2019 to 6 percent in July 2020 (Table 3 and Figure 18).

Rapid EWM growth and expansion between July (Figure 6) and October (Figure 8) of 2020 resulted in the following EWM increases:

- Increased EWM frequency from 6 percent in July to 17 percent in October (Table 1 and Figure 16),
- Increased EWM extent from 4 acres in July to 11 acres in October (Table 2 and Figure 17),
- Percent of littoral zone with EWM tripled from 6 percent in July to 18 percent in October (Table 3 and Figure 18).

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 26

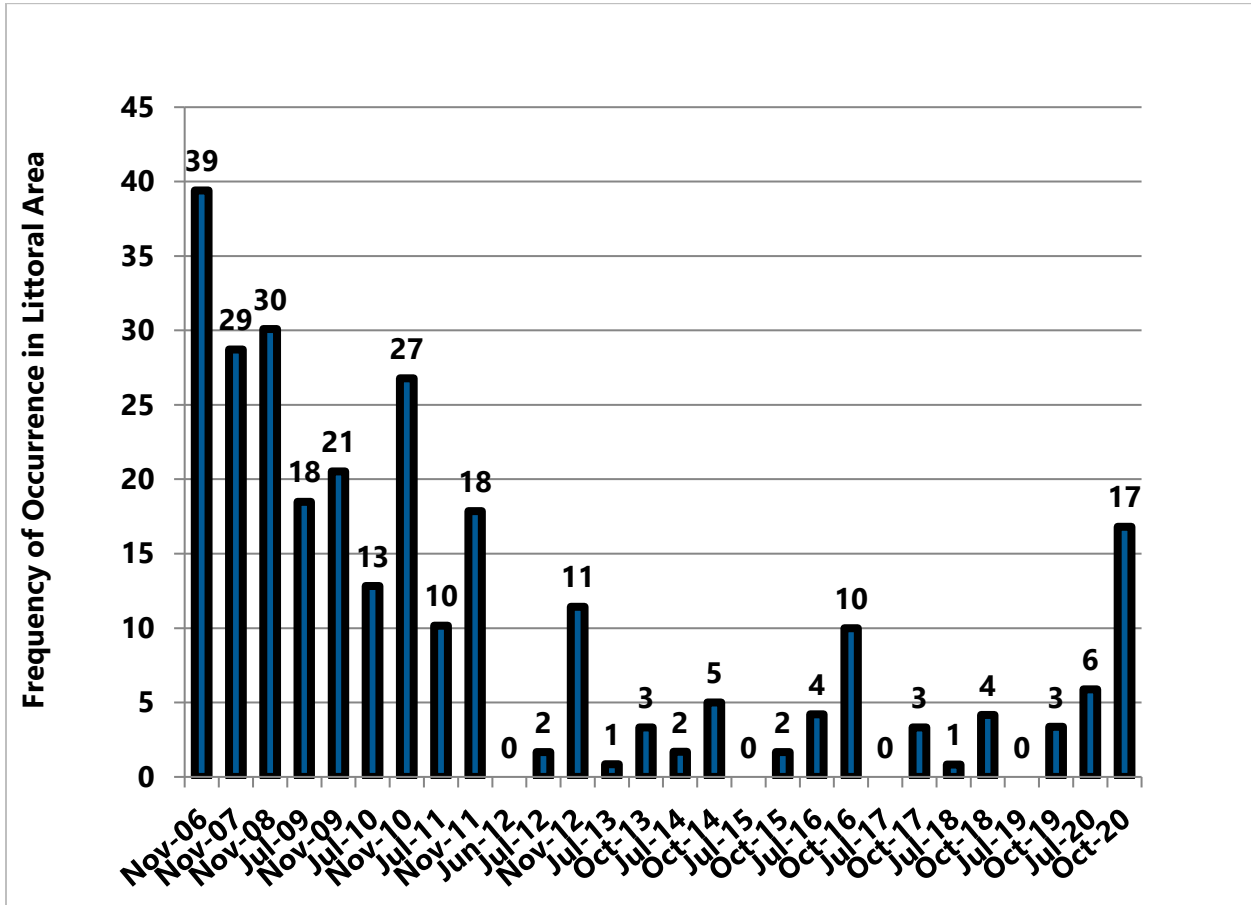


Figure 16 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: Rabbit Island Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 27

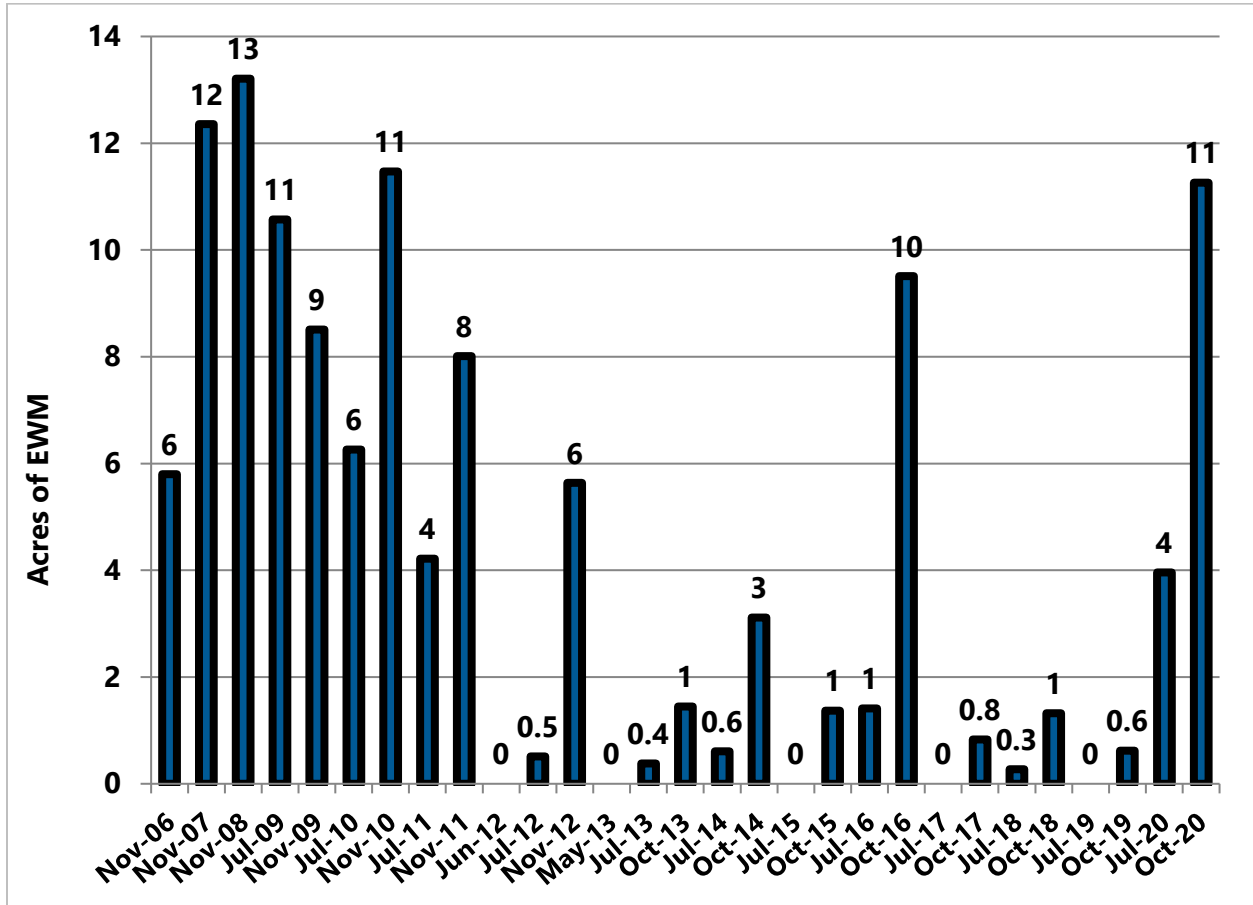


Figure 17 2006-2020 Beaver Dam Lake EWM Acreage: Rabbit Island Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 28

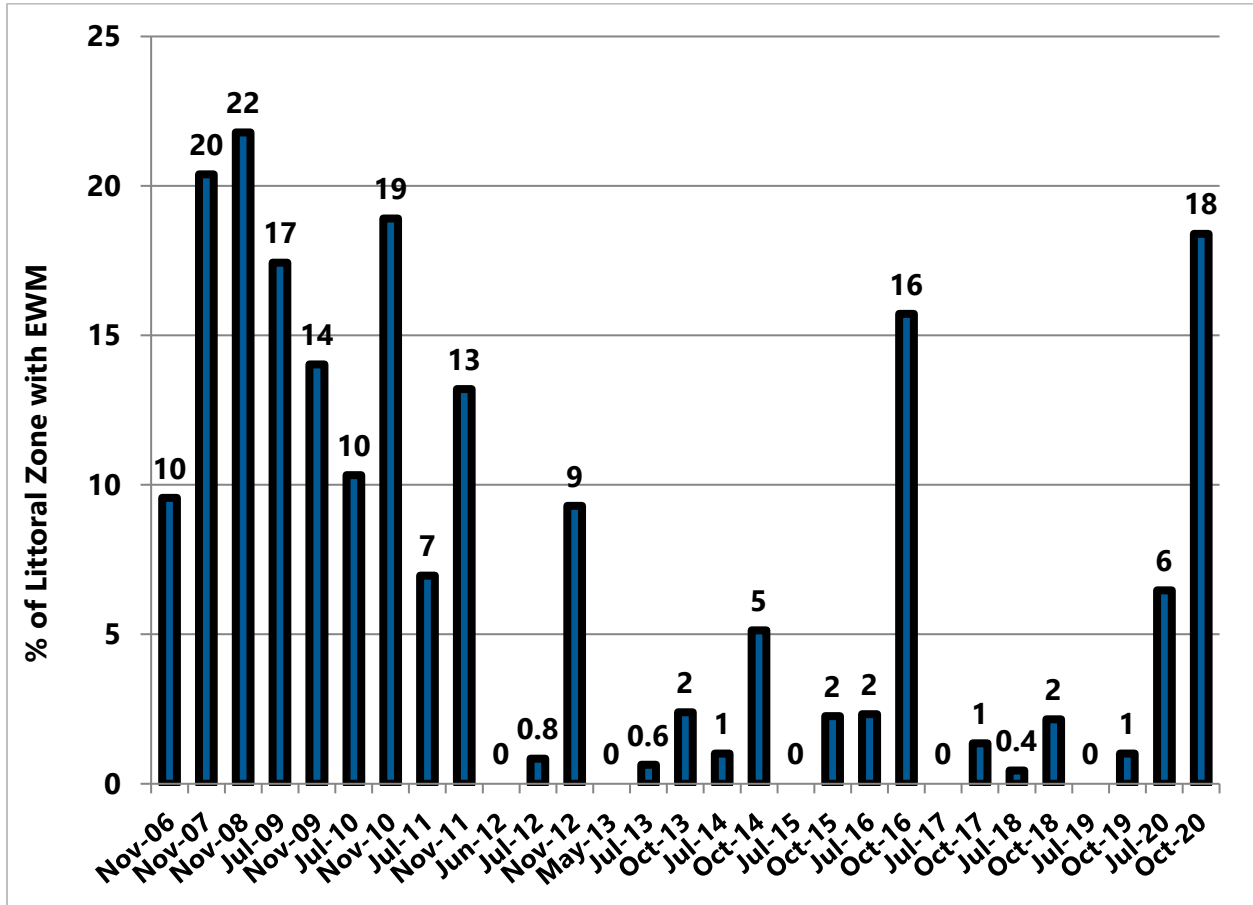


Figure 18 2006-2020 Percent of Littoral Zone with EWM: Rabbit Island Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 29

3.4 Library Lake

During the October 2019 plant survey, EWM was only observed at one location and was rake removed. Hence, EWM management was not needed in 2020. However, EWM reappeared during the July 2020 plant survey and then expanded during July (Figure 6) through October (Figure 8):

- EWM frequency increased from 2 percent in July to 5 percent in October (Table 1 and Figure 19),
- EWM extent increased from 0.2 acres in July to 0.5 acres in October (Table 2 and Figure 20), and
- Percent of littoral zone with EWM increased from 2 percent in July to 4 percent in October (Table 3 and Figure 21).

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 30

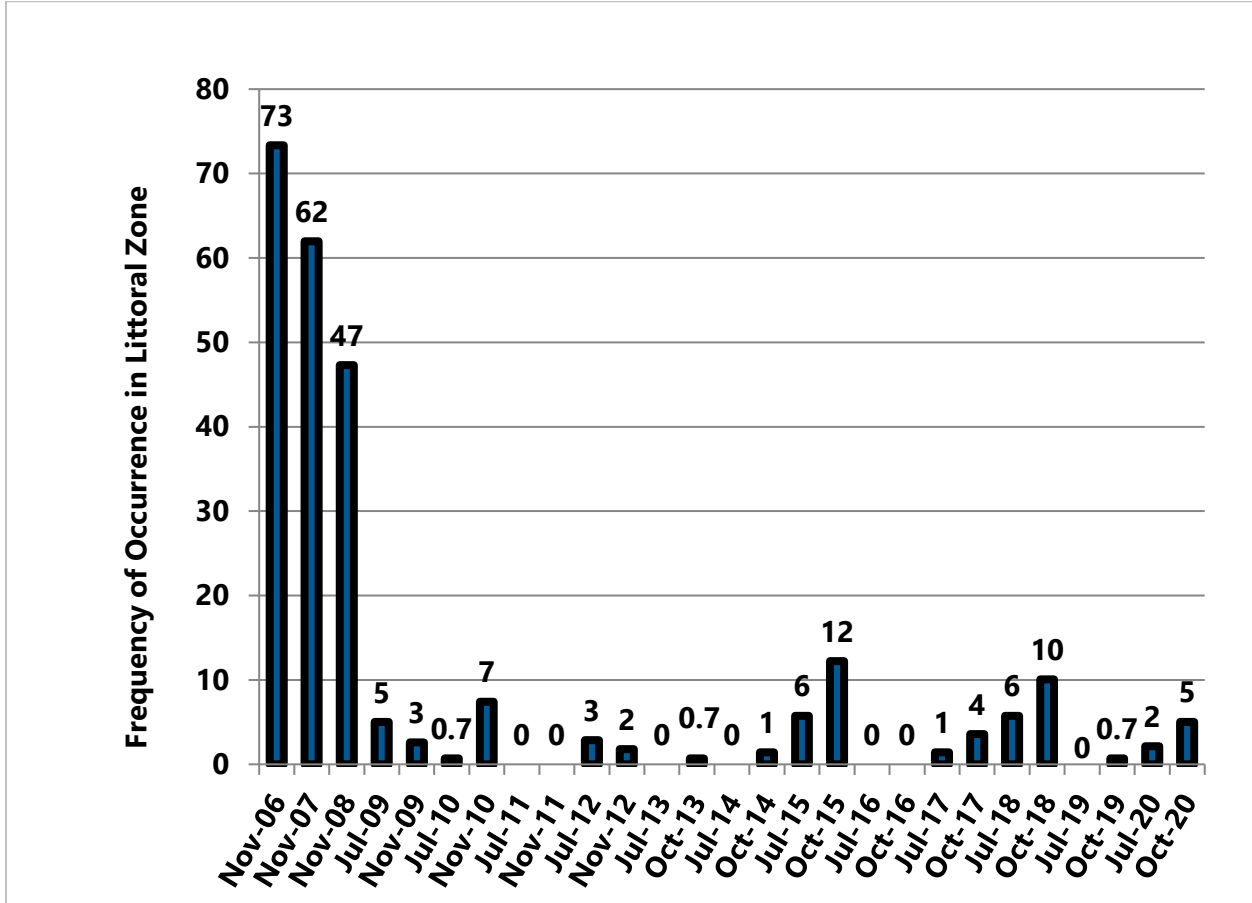


Figure 19 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: Library Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 31

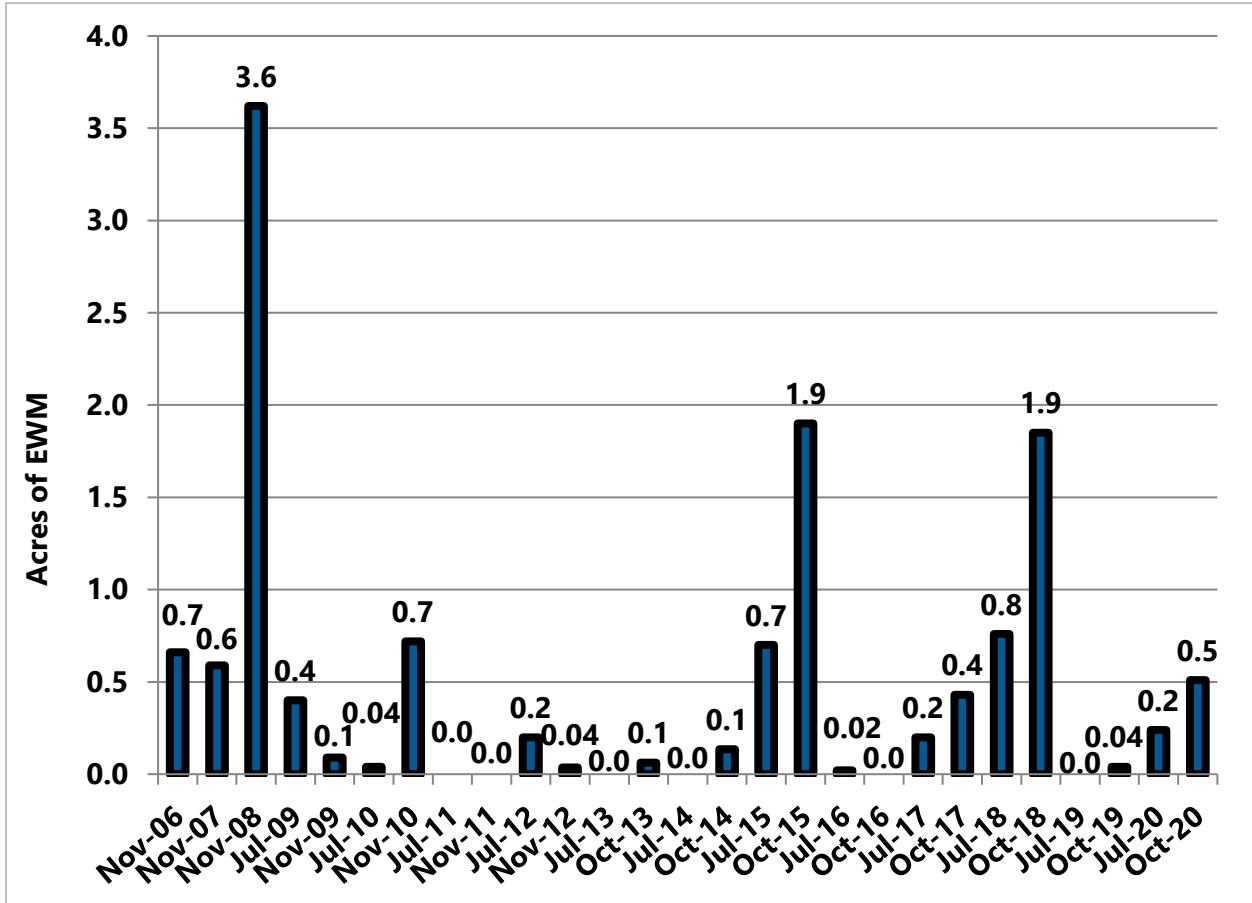


Figure 20 2006-2020 Beaver Dam Lake EWM Acreage: Library Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 32

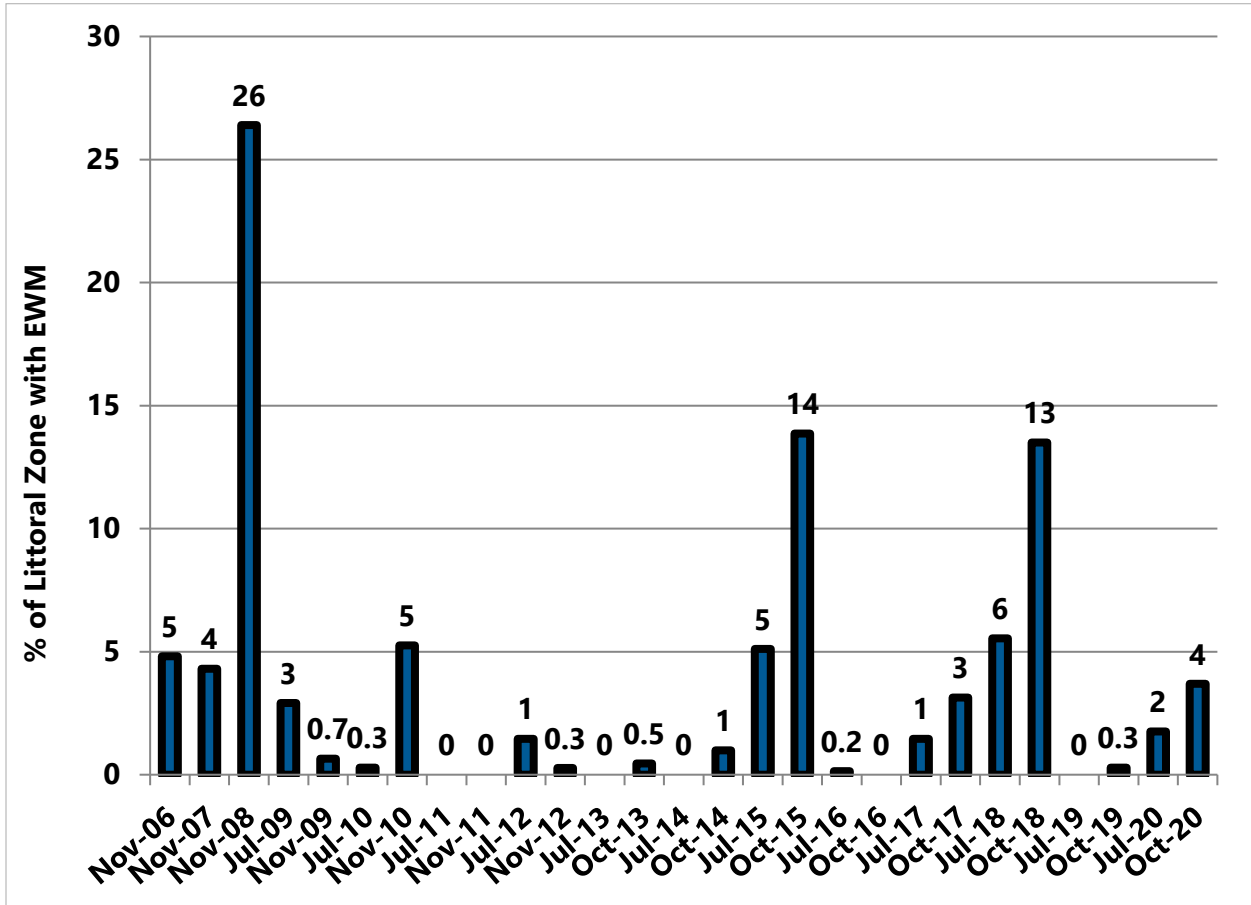


Figure 21 2006-2020 Percent of Littoral Zone with EWM: Library Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 33

3.5 Cemetery Bay

A large scale 2,4-D treatment of Cemetery Bay occurred on May 4, 2020. A 2,4-D dose of 0.8 ppm ae² was applied to the entire bay (53.37 acres), Treatment Area 7 in Figure 2. After the treatment, 2,4-D samples were collected from two locations within the treatment area (Figure 2). Samples were collected at intervals of approximately 0.04, 0.16, 1, 2, 3, 5, 7, 12, 19, and 26 days after treatment (DAT). Sample results are presented in Figure 22. As shown in Figure 23, a 2,4-D concentration of 0.3 ae² ppm sustained for at least 4 days has been found to be lethal to EWM. The 2,4-D concentrations in Cemetery Bay were at least 0.3 ppm ae³ (300 µg/L ae²) for at least 5 days after treatment at both sample locations (Figure 22). Hence, the herbicide treatment was lethal to the EWM.

The 2020 herbicide treatment:

- Reduced EWM frequency from 15 percent in fall of 2019 to 3 percent in July of 2020 (Table 1 and Figure 24);
- Reduced EWM extent from 4 acres in fall of 2019 to 1 acre in July of 2020 (Table 2 and Figure 25); and
- Reduced percent of littoral zone with EWM from 8 percent in fall of 2019 to 3 percent in July of 2019 (Table 3 and Figure 26).

The fall plant survey documented additional reductions in EWM between July and October:

- EWM frequency declined from 3 percent July to 2 percent in October (Table 1 and Figure 24);
- EWM extent declined from 1 acre in July to 0.7 acres in October (Table 2 and Figure 25); and
- Percent of littoral zone with EWM declined from 3 percent in July to 1 percent in October (Table 3 and Figure 26).

² ae is acid equivalent which is the concentration of the active ingredient in 2,4-D (i.e., the ingredient that kills EWM)

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 34

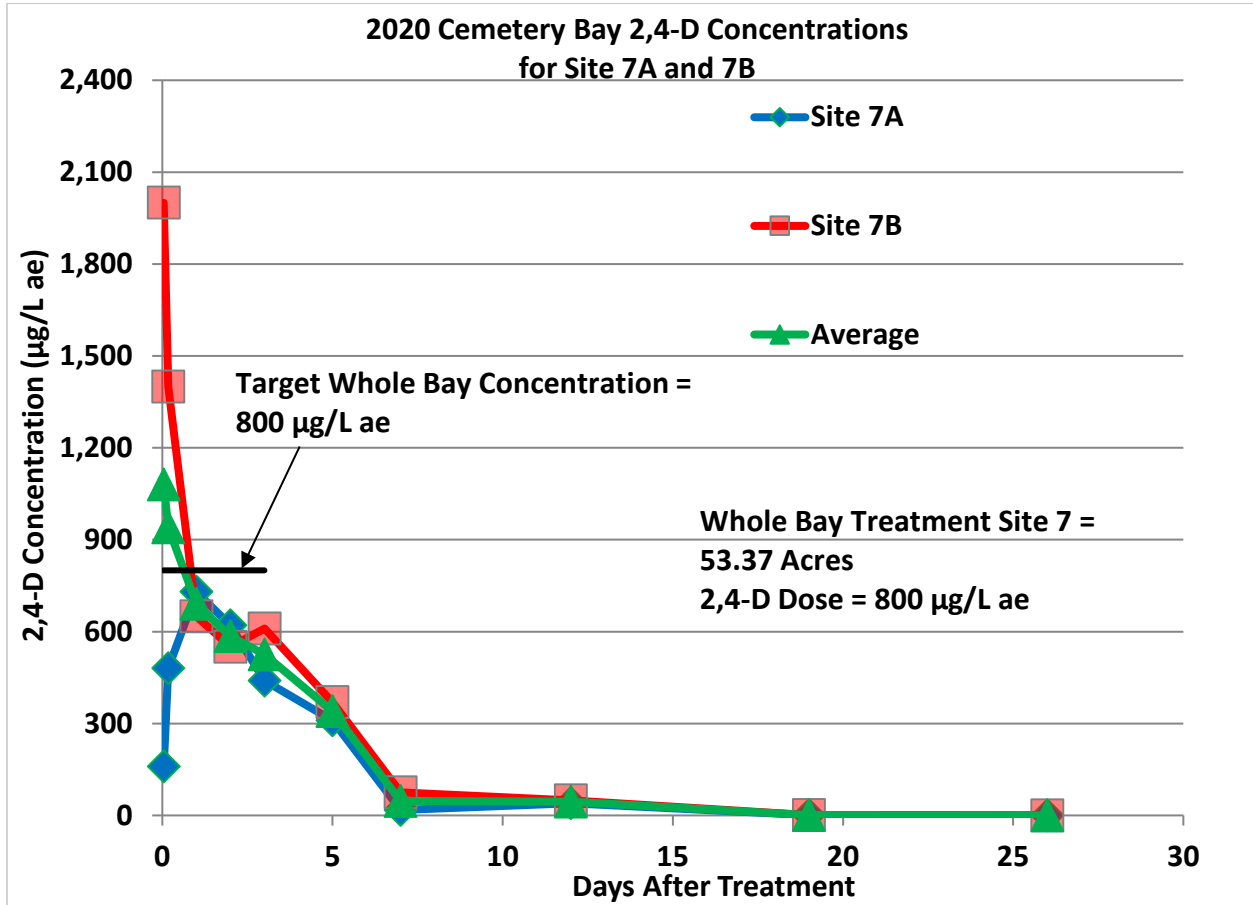


Figure 22 2020 Cemetery Bay 2,4-D Concentrations for Site 7A and 7B

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 35

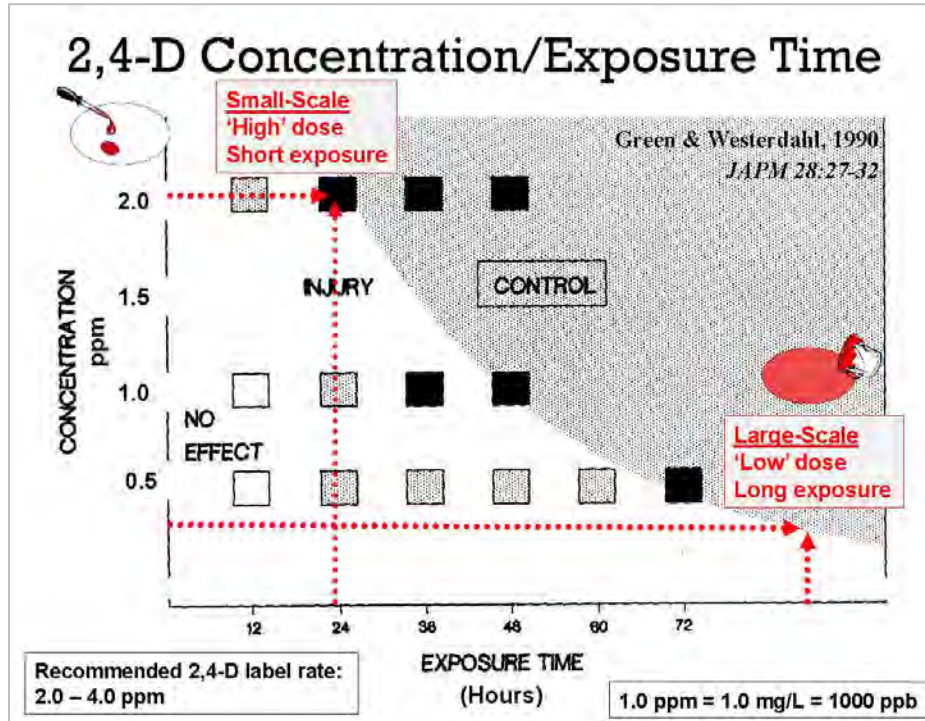


Figure 23 2,4-D Concentration/Exposure Time Relationship and EWM Control (Figure Credit: Nault, Michelle and John Skogerboe. 2014. *Scientific Evaluation of Efficacy and Selectivity of Herbicide Treatments in Wisconsin Lakes*. Presentation at UMISC—October 22, 2014 in Duluth, Minnesota)

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 36

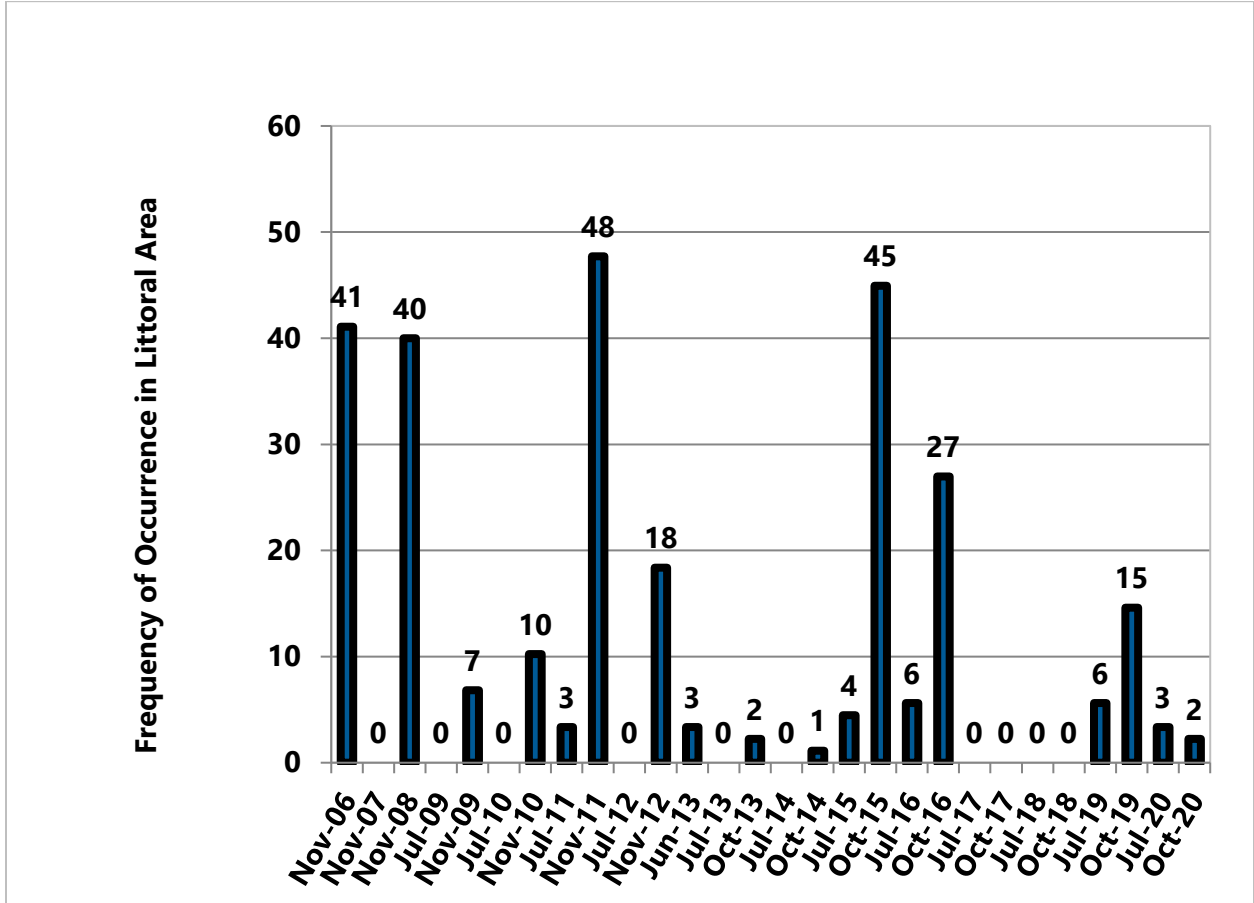


Figure 24 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: Cemetery Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 37

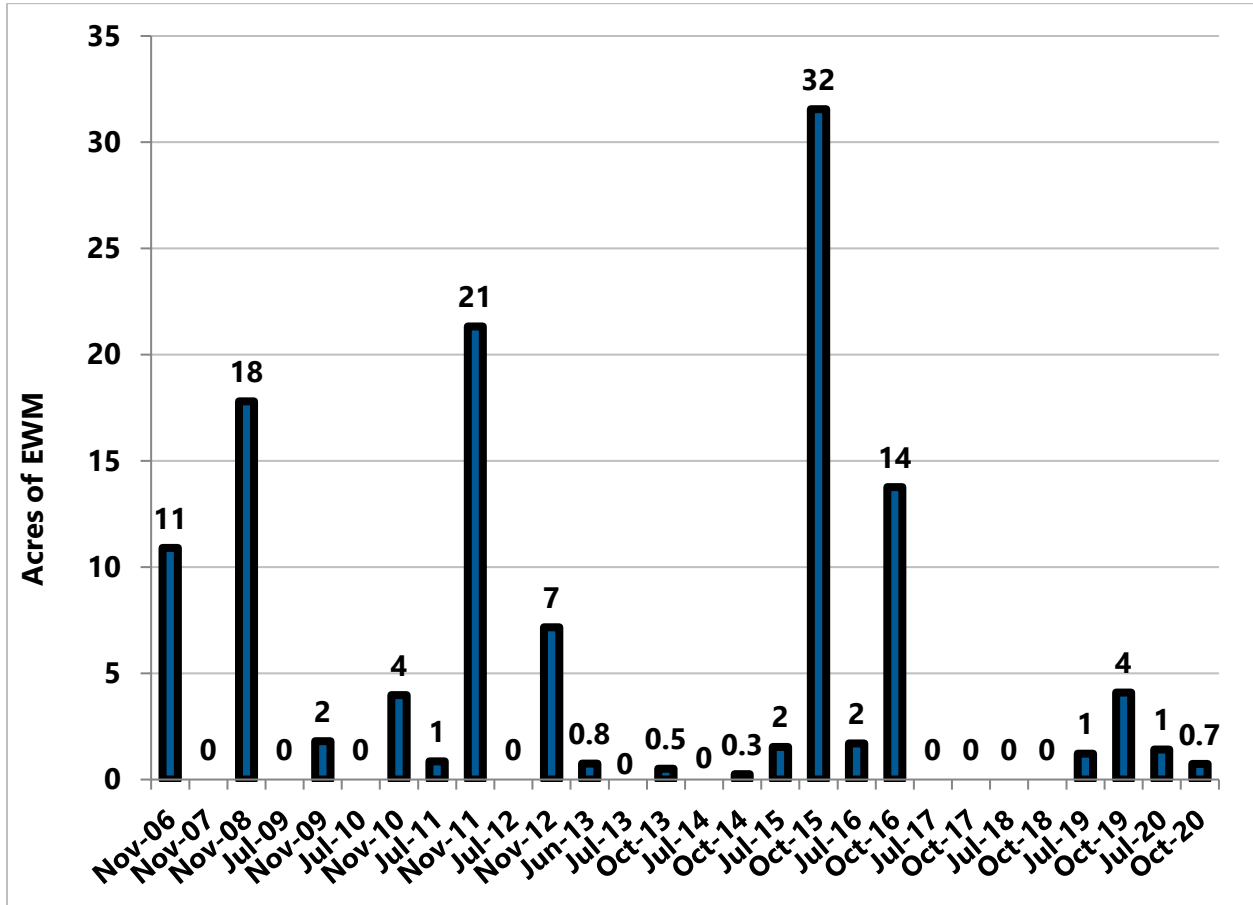


Figure 25 2006-2020 Beaver Dam Lake EWM Acreage: Cemetery Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 38

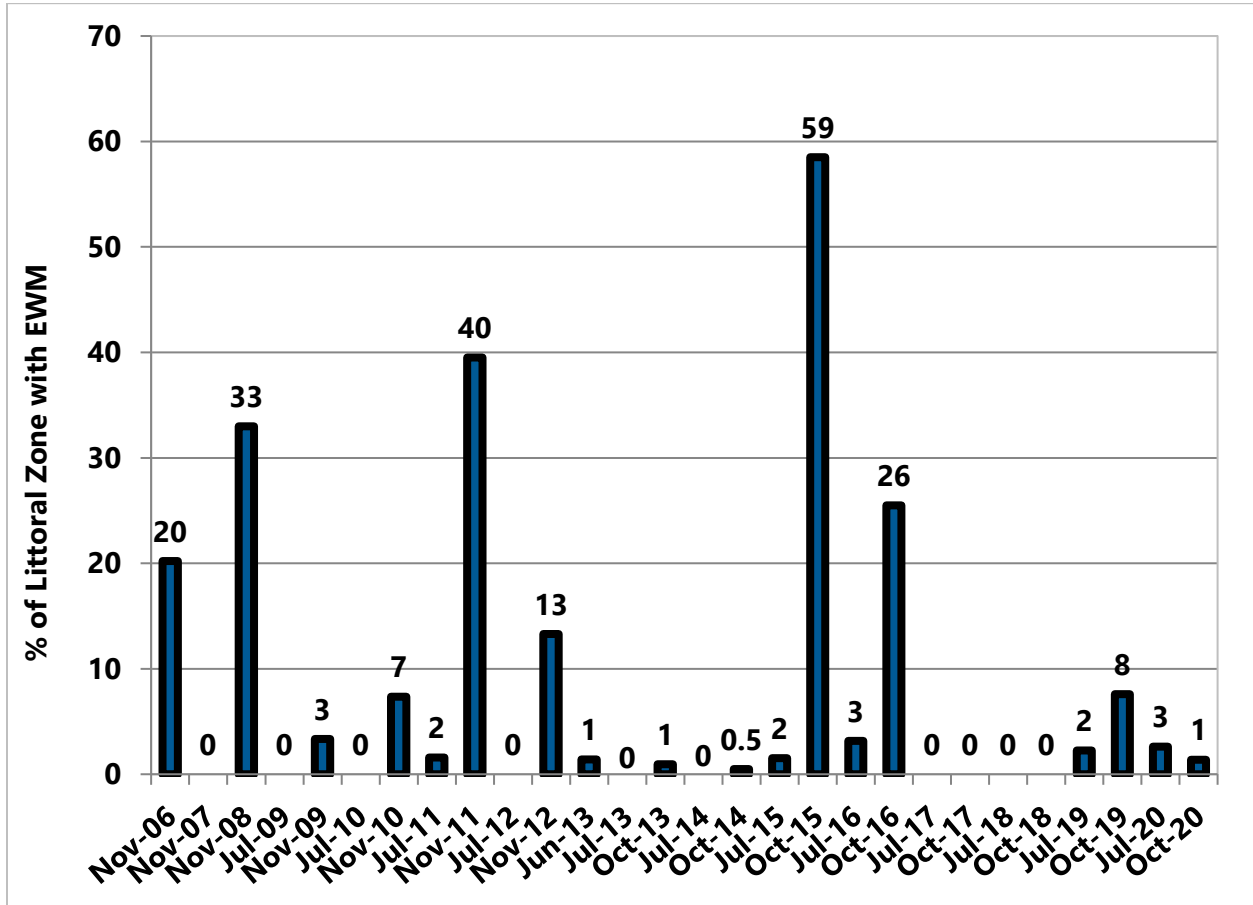


Figure 26 2006-2020 Percent of Littoral Zone with EWM: Cemetery Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 39

3.6 City Bay

In 2020, EWM management in City Bay consisted of herbicide treatment in two locations, Treatment Areas 5 and 6 (Figure 2), totaling 7.01 acres (7 percent of the littoral area of City Bay). The areas were treated with the herbicide diquat at a dose of 2 gallons per acre. Treatment Area 6 was treated on May 21 and Treatment Area 5 on June 2. The treatment was successful and EWM was not observed in City Bay during the July plant survey.

Despite the success of the herbicide treatment, EWM reappeared in October:

- EWM frequency increased from 0 percent in July to 4 percent in October (Table 1 and Figure 27),
- EWM extent increased from 0 acres in July to 4 acres in October (Table 2 and Figure 28),
- Percent of littoral zone with EWM increased from 0 percent in July to 4 percent in October (Table 3 and Figure 29).

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 40

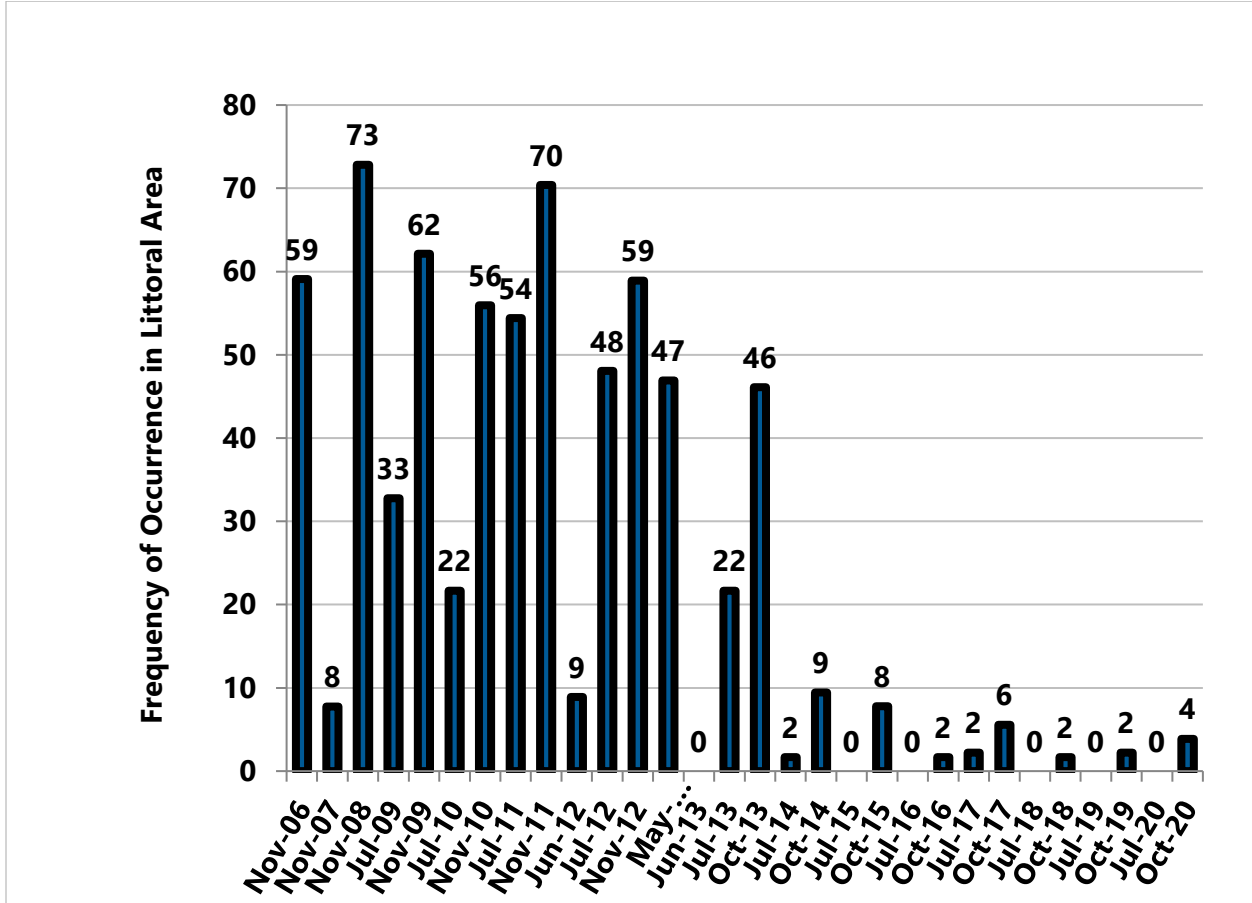


Figure 27 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: City Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 41

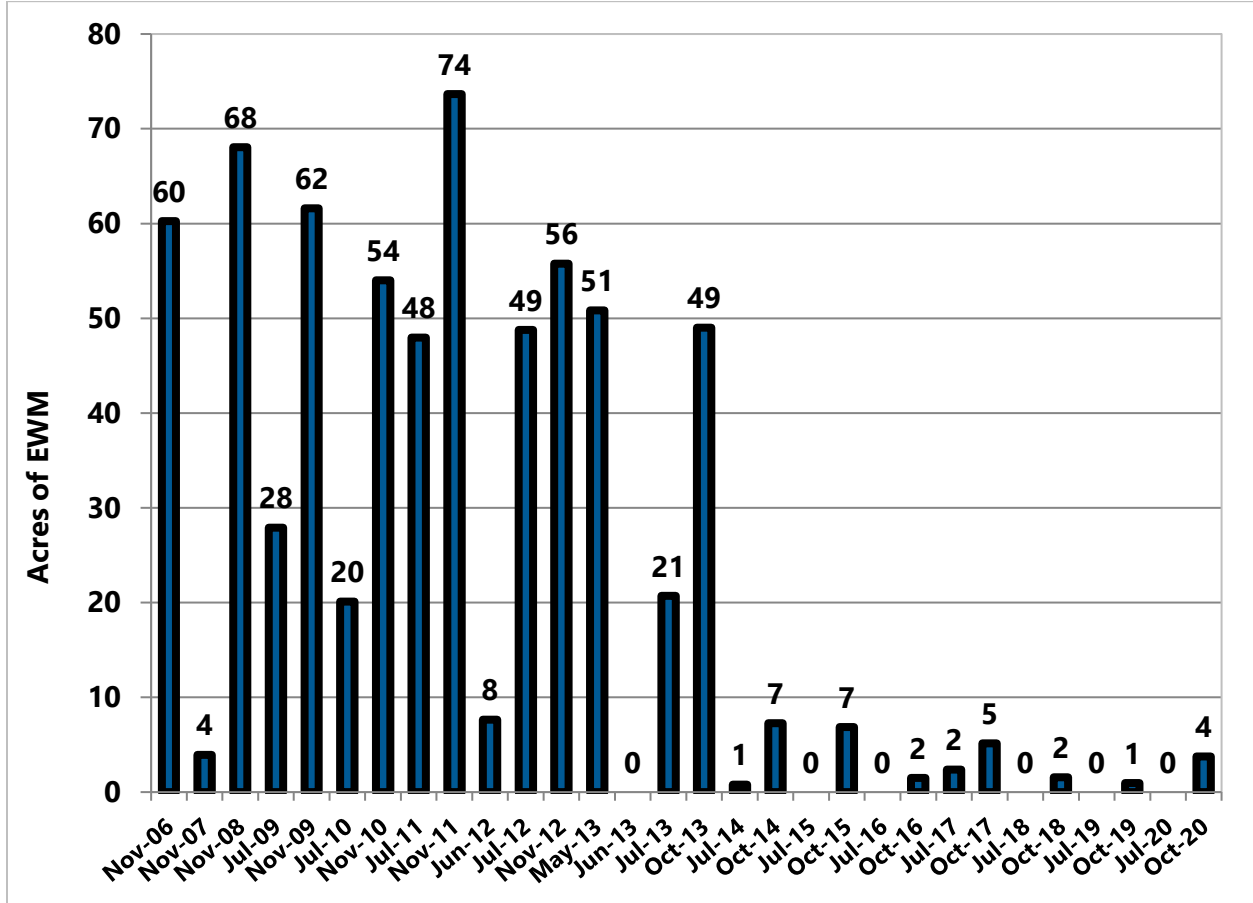


Figure 28 2006-2020 Beaver Dam Lake EWM Acreage: City Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 42

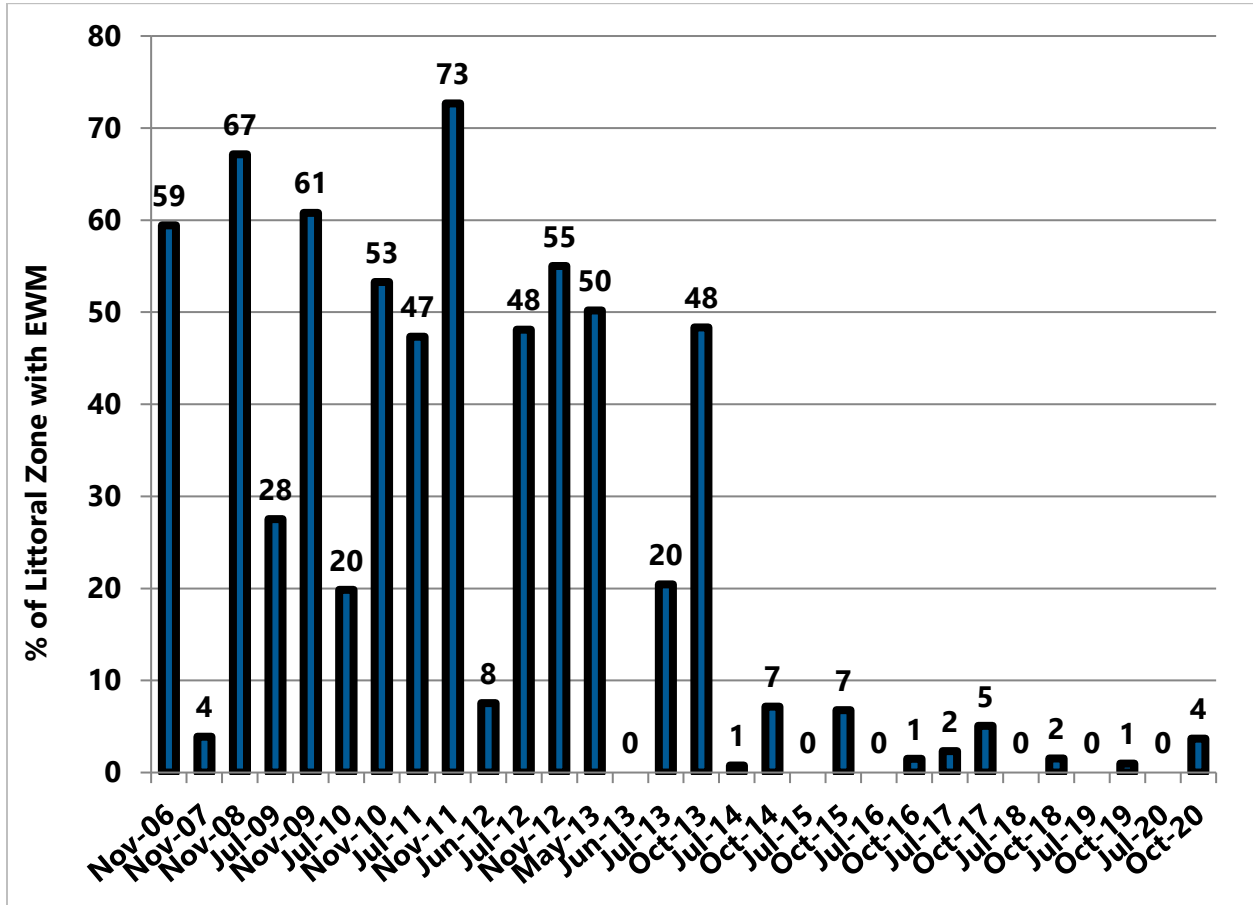


Figure 29 2006-2020 Percent of Littoral Zone with EWM: City Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 43

3.7 East Lake

Because EWM was not observed in East Lake during 2018 and 2019, EWM management was not needed in 2020. EWM was not observed in July 2020. However, EWM was observed at one location near the northeast corner of East Lake during October:

- EWM frequency was 0.7 percent (Table 1 and Figure 30);
- EWM extent was 0.2 acres (Table 2 and Figure 31); and
- Percent littoral with EWM was 0.4 percent (Table 3 and Figure 32).

All EWM observed in October was rake removed.

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 44

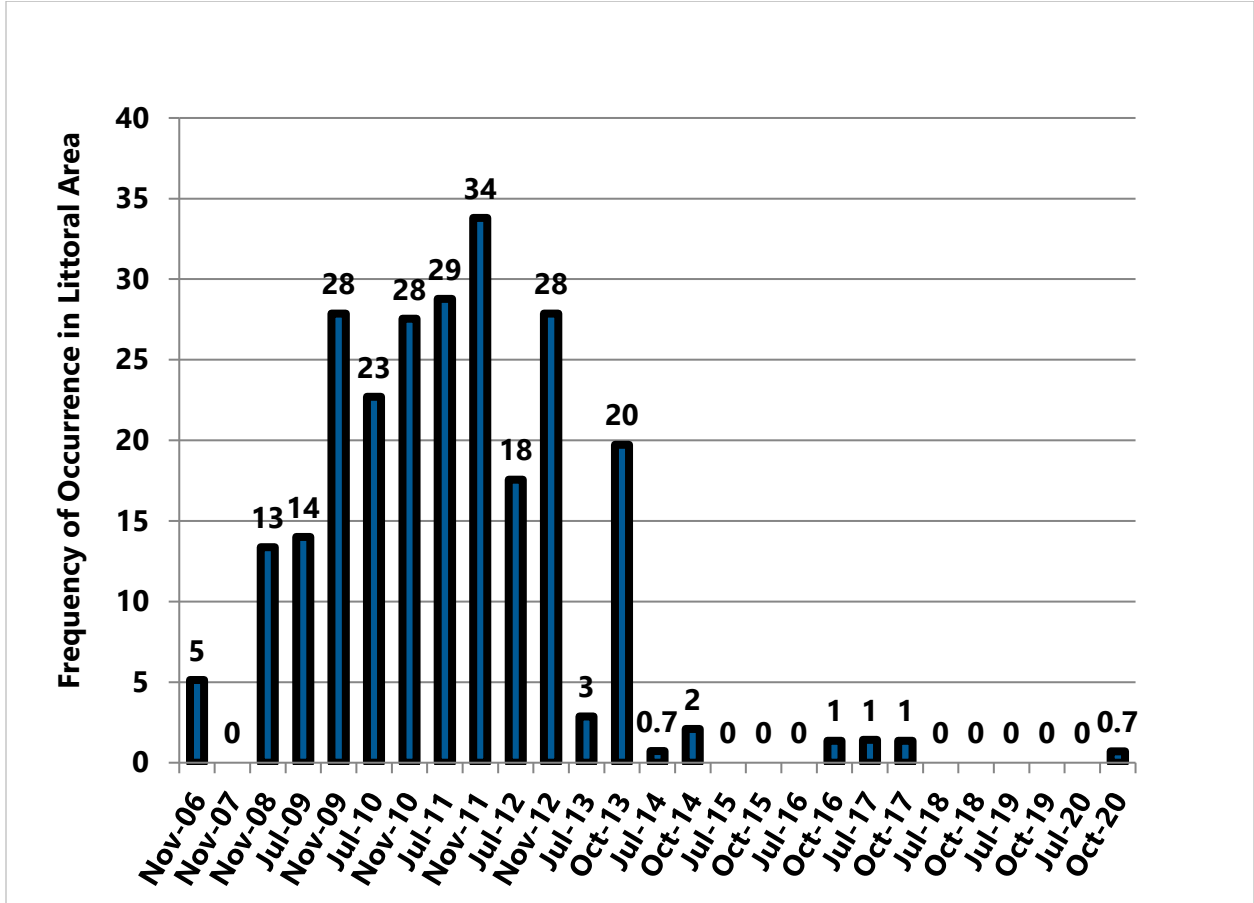


Figure 30 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: East Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 45

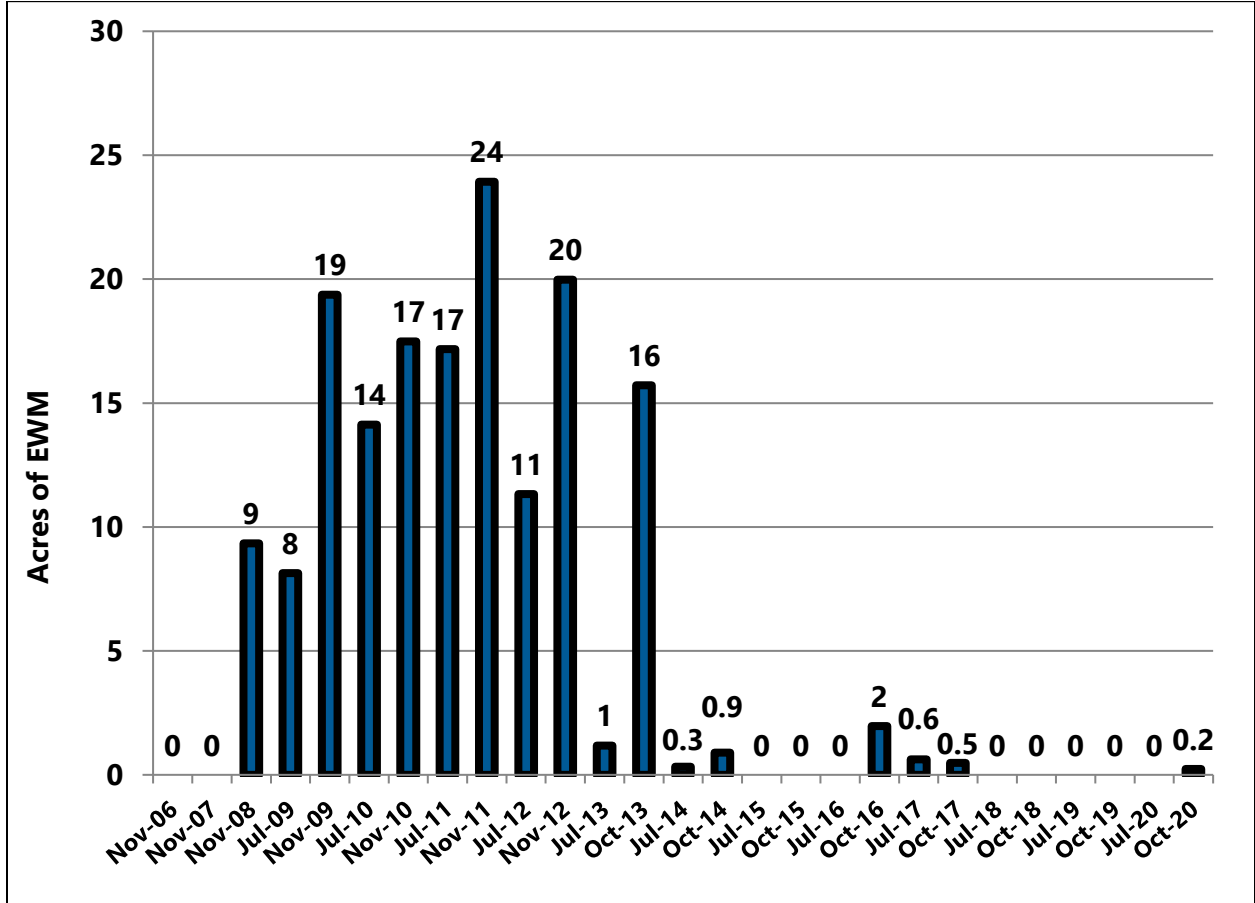


Figure 31 2006-2020 Beaver Dam Lake EWM Acreage: East Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 46

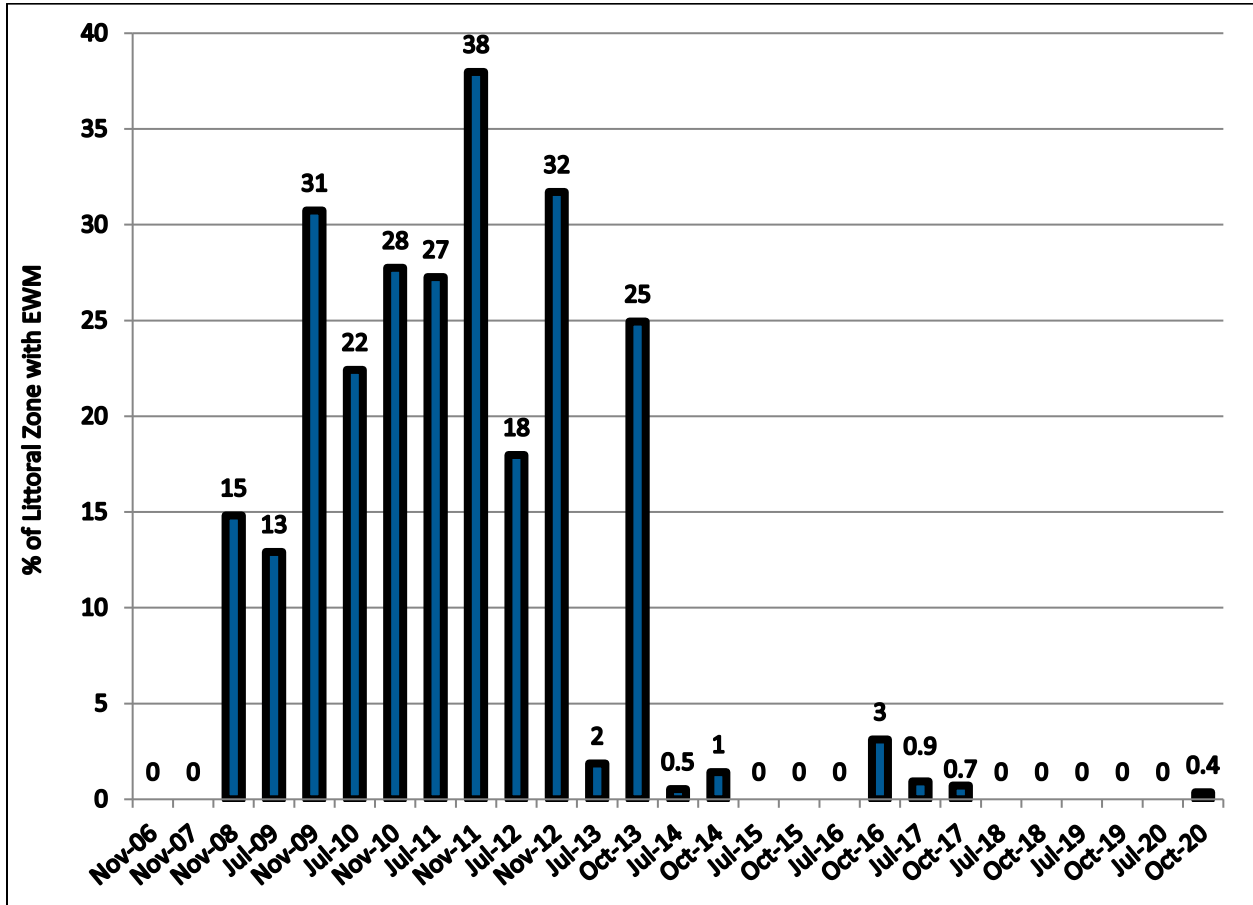


Figure 32 2006-2020 Percent of Littoral Zone with EWM: East Lake

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 47

3.8 Norwegian Bay

In 2020, EWM management in Norwegian Bay consisted of herbicide treatment at two locations, Treatment Area 3 and Treatment Area 4 (Figure 2), totaling 7.03 acres (18 percent of the littoral area of Norwegian Bay). The areas were treated with the herbicide diquat at a dose of 2 gallons per acre on May 28. The treatment was successful and EWM was not observed in Norwegian Bay during either the July or October plant surveys (Table 1, Table 2, Table 3, Figure 33, Figure 34, and Figure 35).

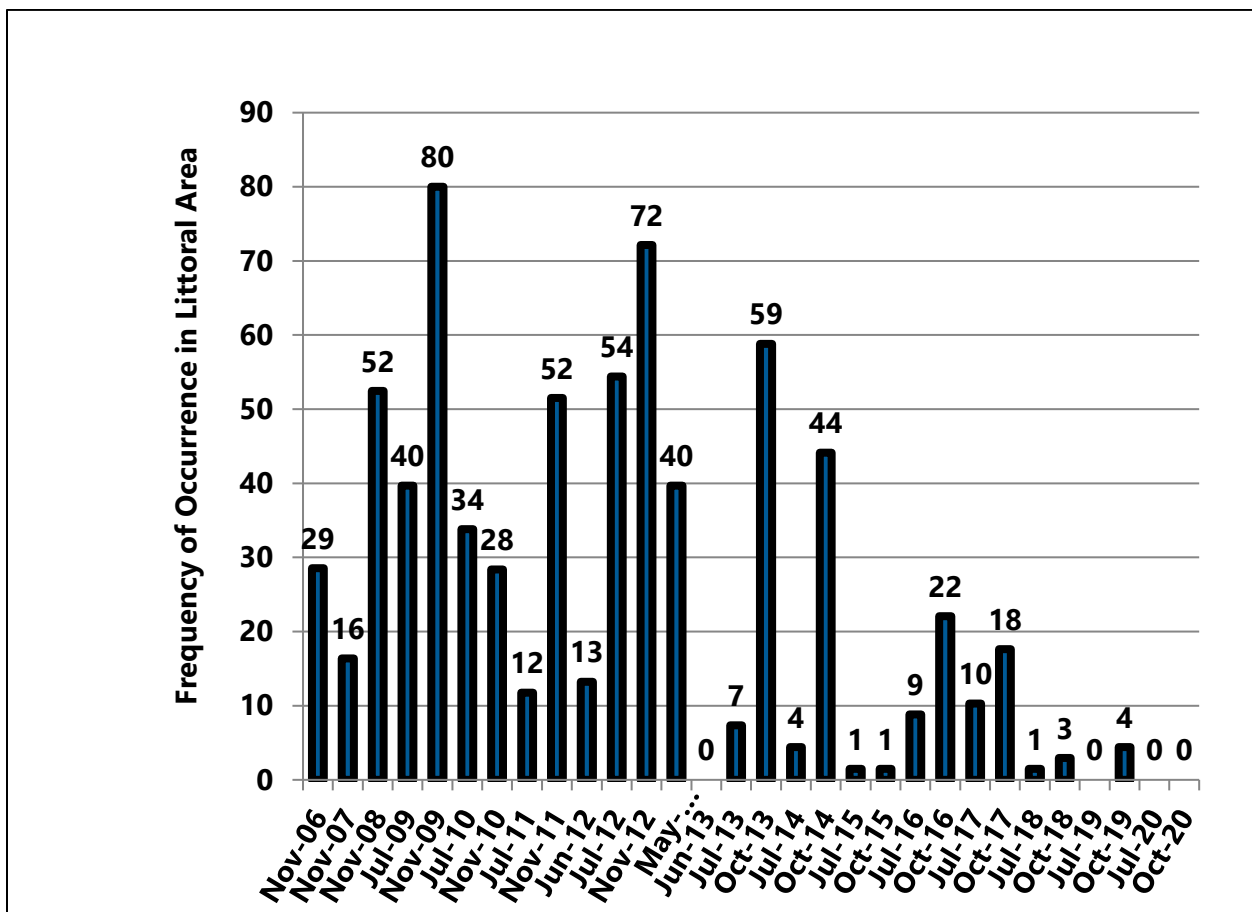


Figure 33 2006-2020 Beaver Dam Lake EWM Frequency of Occurrence in Littoral Zone: Norwegian Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 48

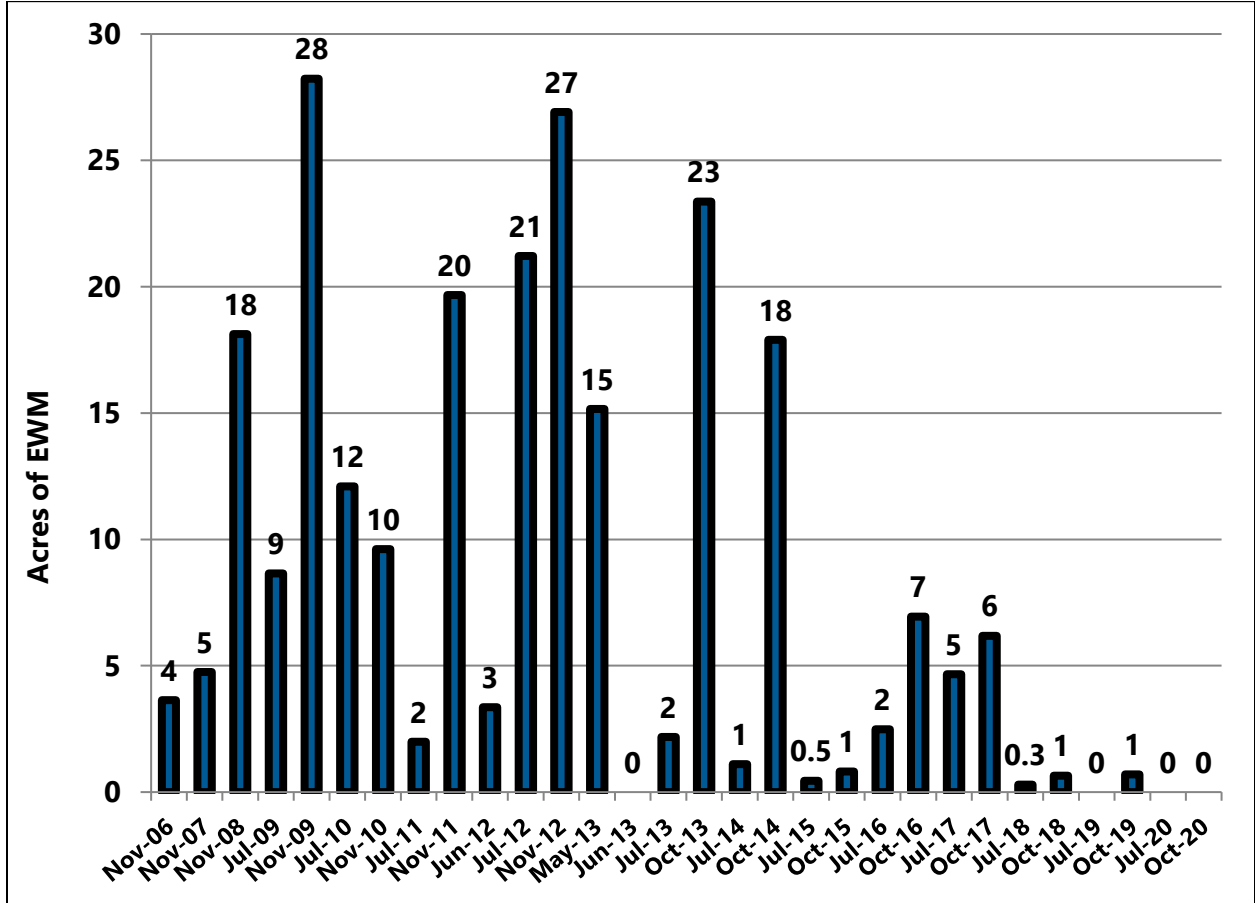


Figure 34 2006-2020 Beaver Dam Lake EWM Acreage: Norwegian Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
 From: Barr Engineering Co. (Meg Rattei)
 Subject: 2020 EWM Treatment Results
 Date: November 9, 2020
 Project: 49030011.21
 c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
 Page 49

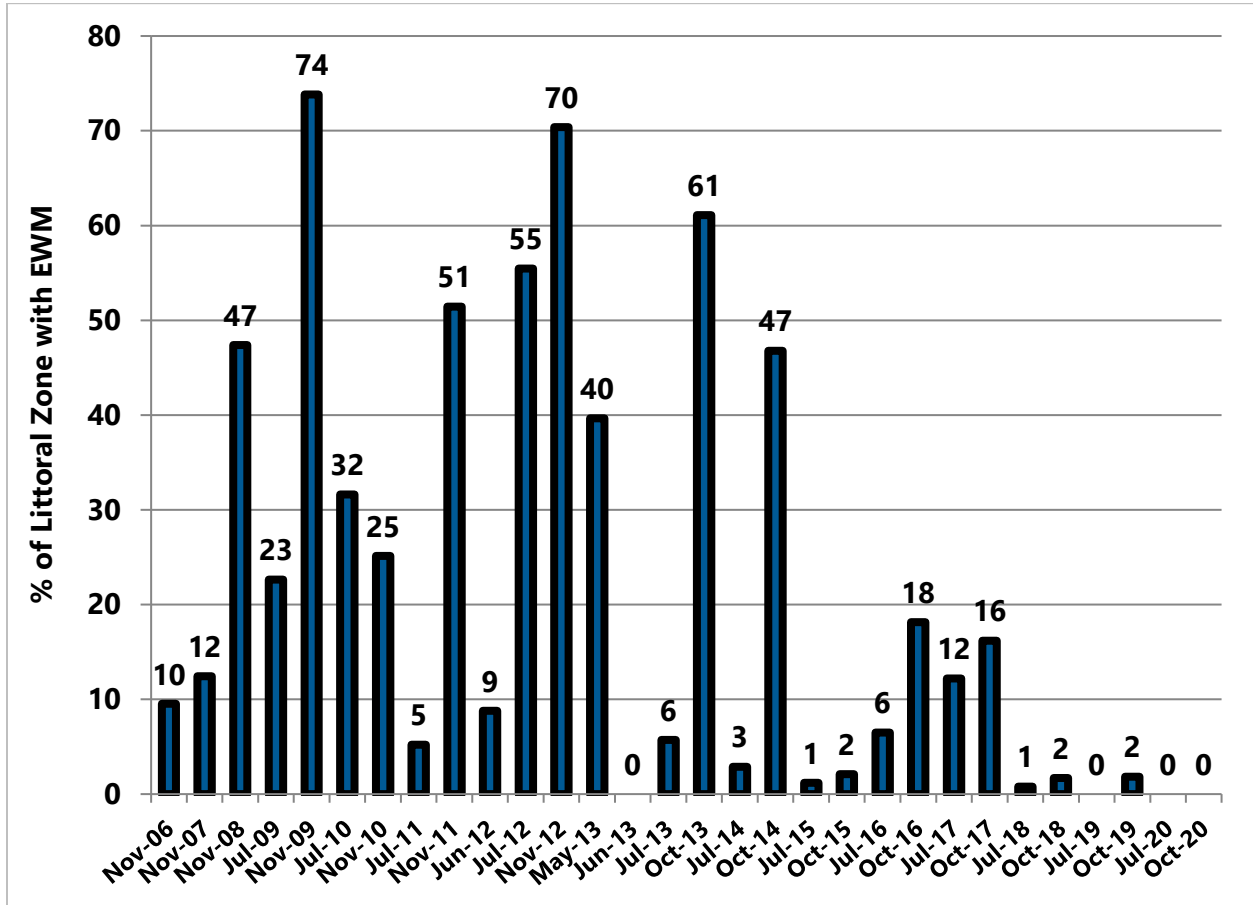


Figure 35 2006-2020 Percent of Littoral Zone with EWM: Norwegian Bay

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 50

4.0 Treatment of Navigation Channels

Goal 2 of the Beaver Dam Lake Aquatic Plant Management Plan is "Maintain navigation channels that are not impaired by native plants and invasive plant growth." The objectives of this goal are: (1) Protect the lake's ability to support recreational uses such as boating, pontooning, and fishing; and (2) Provide riparian owners with the ability to access the lake with their boats and pontoons. The strategy to attain the goal as detailed in the Beaver Dam Lake Aquatic Plant Management plan is (1) inspect navigation channels during July to document impairment of navigation channels by plants, (2) obtain a WDNR permit to treat any impaired navigation channels documented by the inspection, and (3) treat impaired navigation channels.¹

During 2020, navigation channel impairment was documented during July, a WDNR herbicide treatment permit was obtained, and herbicide treatment of navigation channels occurred:

- In Cemetery Bay on July 15;
- In City Bay on July 15, July 16, and July 23; and
- In Library Lake on July 29.

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 51

5.0 Summary

Goal 1 of the Beaver Dam Lake Aquatic Plant Management Plan is “Reduce Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) levels to 7 percent of the littoral zone while minimizing harm to native aquatic plants.¹ The goal was attained in 2017 and treatments in 2018 through 2020 were intended to continue goal attainment. In 2020, the Beaver Dam Lake Management District treated 70.41 acres of EWM in Beaver Dam Lake with herbicide. The 2020 treatment consisted of a whole bay treatment with 2,4-D in Cemetery Bay (53.37 acres) and spot treatments in the following four areas: West Lake (2.19 acres with Aquastrike), the west canal of Rabbit Island Bay (0.81 acres with diquat), City Bay (7.01 acres with diquat), and Norwegian Bay (7.03 acres with diquat). EWM management was not needed in East Lake, Williams Bay, and Library Lake in 2020 either because EWM was not observed during the fall 2019 plant survey (East Lake) or all EWM observed in the fall 2019 plant survey was rake removed (Williams Bay and Library Lake).

The 2020 herbicide treatment was successful and EWM was not observed within treated areas in West Lake, the west canal of Rabbit Island Bay, City Bay, and Norwegian Bay in July. EWM extent in Cemetery Bay was reduced from 4.10 acres in the fall of 2019 to 1.41 acres in July of 2020.

Despite the success of the 2020 herbicide treatment, EWM was observed in many untreated areas in July and further expanded between July and October.

- EWM frequency tripled, from 3 percent in July to 9 percent in October (Table 1 and Figure 3)
- EWM more than tripled in extent, from 19 acres in July to 62 acres in October (Table 2 and Figure 4), and
- Percent of the littoral area with EWM tripled, from 4 percent in July to 12 percent in October (Table 3 and Figure 5).

The 12 percent of the littoral zone with EWM in October fails to meet the District goal of reducing EWM to no more than 7 percent of the littoral zone. Hence, management of EWM in 2021 will be needed to attain the District goal.

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 52

A summary of EWM in the eight individual treatment zones during 2020 is detailed in the following paragraphs.

West Lake—Rapid growth and expansion of EWM between July and October increased (1) EWM frequency from 2 percent in July to 14 percent in October (Table 1 and Figure 10) , (2) EWM extent from 4 acres in July to 28 acres in October (Table 2 and Figure 11), and (3) percent of littoral zone with EWM from 3 percent in July to 19 percent in October (Table 3 and Figure 12).

Williams Bay—Rapid growth and expansion of EWM between July and October increased (1) EWM frequency from 12 percent in July to 27 percent in October (Table 1 and Figure 13), (2) EWM extent from 9 acres in July to 17 acres in October (Table 2 and Figure 14), and (3) percent of littoral zone with EWM from 18 percent in July to 36 percent in October (Table 3 and Figure 15).

Rabbit Island Bay—Rapid growth and expansion of EWM between July and October increased (1) EWM frequency from 6 percent in July to 17 percent in October (Table 1 and Figure 16), (2) EWM extent from 4 acres in July to 11 acres in October (Table 2 and Figure 17), and (3) percent of littoral zone with EWM from 6 percent in July to 18 percent in October (Table 3 and Figure 18).

Library Lake—Growth and expansion of EWM between July and October increased (1) EWM frequency from 2 percent in July to 5 percent in October (Table 1 and Figure 19), (2) EWM extent from 0.2 acres in July to 0.5 acres in October (Table 2 and Figure 20), and (3) percent of littoral zone with EWM from 2 percent in July to 4 percent in October (Table 3 and Figure 21).

Cemetery Bay—EWM frequency and extent declined after the whole bay treatment and then further declined between July and October. (1) EWM frequency declined from 3 percent in July to 2 percent in October (Table 1 and Figure 24); (2) EWM extent declined from 1 acre in July to 0.7 acre in October (Table 2 and Figure 25); and (3) percent of littoral area with EWM declined from 3 percent in July to 1 percent in October (Table 3 and Figure 26).

City Bay—EWM was not observed in July, but reappeared in October, increasing (1) EWM frequency from 0 percent in July to 4 percent in October (Table 1 and Figure 27); (2) EWM extent from 0 acres in July to 4 acres in October (Table 2 and Figure 28); and (3) percent of littoral zone with EWM from 0 percent in July to 4 percent in October (Table 3 and Figure 29).

East Lake—EWM was observed in East Lake during 2018, 2019, and July 2020. However, EWM was observed in one location near the northeast corner of East Lake during October. (1) EWM frequency was 0.7 percent (Table 1 and Figure 30); (2) EWM extent was 0.2 acres (Table 2 and Figure 31); and (3) percent of Littoral zone with EWM was 0.4 percent (Table 3 and Figure 32). All EWM observed in October 2020 was rake removed.

To: Beaver Dam Lake Management District (Board of Commissioners)
From: Barr Engineering Co. (Meg Rattei)
Subject: 2020 EWM Treatment Results
Date: November 9, 2020
Project: 49030011.21
c: James Bartlett (Lake Restoration, Inc.) and Alex Smith (WDNR)
Page 53

Norwegian Bay—The 2020 herbicide treatment was successful and EWM was not observed in Norwegian Bay during the July and October plant surveys (Table 1, Table 2, Table 3, Figure 33, Figure 34, and Figure 35).

Goal 2 of the Beaver Dam Lake Aquatic Plant Management Plan is “Maintain navigation channels that are not impaired by native plants and invasive plant growth.” Impaired navigation channels in Cemetery Bay, City Bay, and Library Lake were identified and treated with herbicide during July 2020.