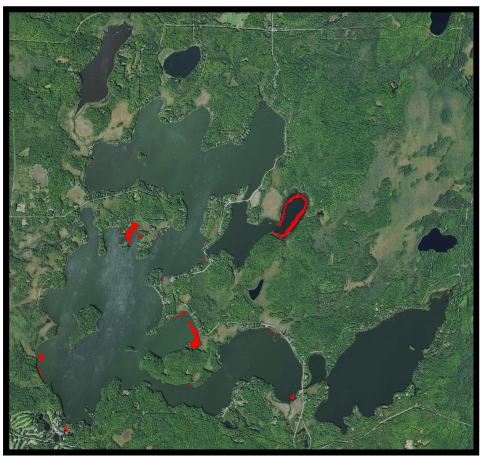
Hybrid Eurasian water-milfoil (*Myriophyllum spicatum* X *sibiricum*) Pre/Posttreatment Surveys Namekagon Lake - WBIC: 2732600 Bayfield County, Wisconsin

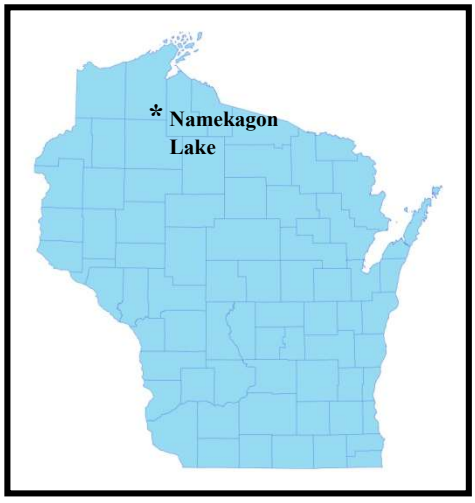


Hybrid Water-milfoil Beds (Red) - 8/26/23

Canopied bed of Hybrid water-milfoil in Bluegill Bay – 9/9/23

Project Initiated by:

The Namekagon Lake Association, Harmony Environmental, the Wisconsin Department of Natural Resources, and the Bayfield County Land & Water Conservation Department



Burned but not killed HWM in Bluegill Bay's 2,4-D Treatment Area - 8/19/24

Surveys Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
Saint Croix Falls, Wisconsin
September 9, 2023 and August 19, 2024

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INTRODUCTION:

Namekagon Lake (WBIC 2732600) is a 2,897-acre drainage lake in south-central Bayfield County, Wisconsin in the Towns of Namekagon and Grand View (T43/44N R5/6W). It has a maximum depth of 51ft and an average depth of approximately 16ft. The lake is eutrophic bordering on mesotrophic in nature, and water clarity is generally fair with summer Secchi readings from 1995-2018 (the last year data was available) ranging from 6-14ft and averaging 8.1ft in the deep hole northeast of Paines Island (Figure 1) (WDNR 2024). The lake's bottom substrate is variable with sand and rock occurring along the majority of shorelines and around the lake's numerous islands, while sandy and organic muck dominate the deep flats and sheltered bays (Holt et al. 1971).

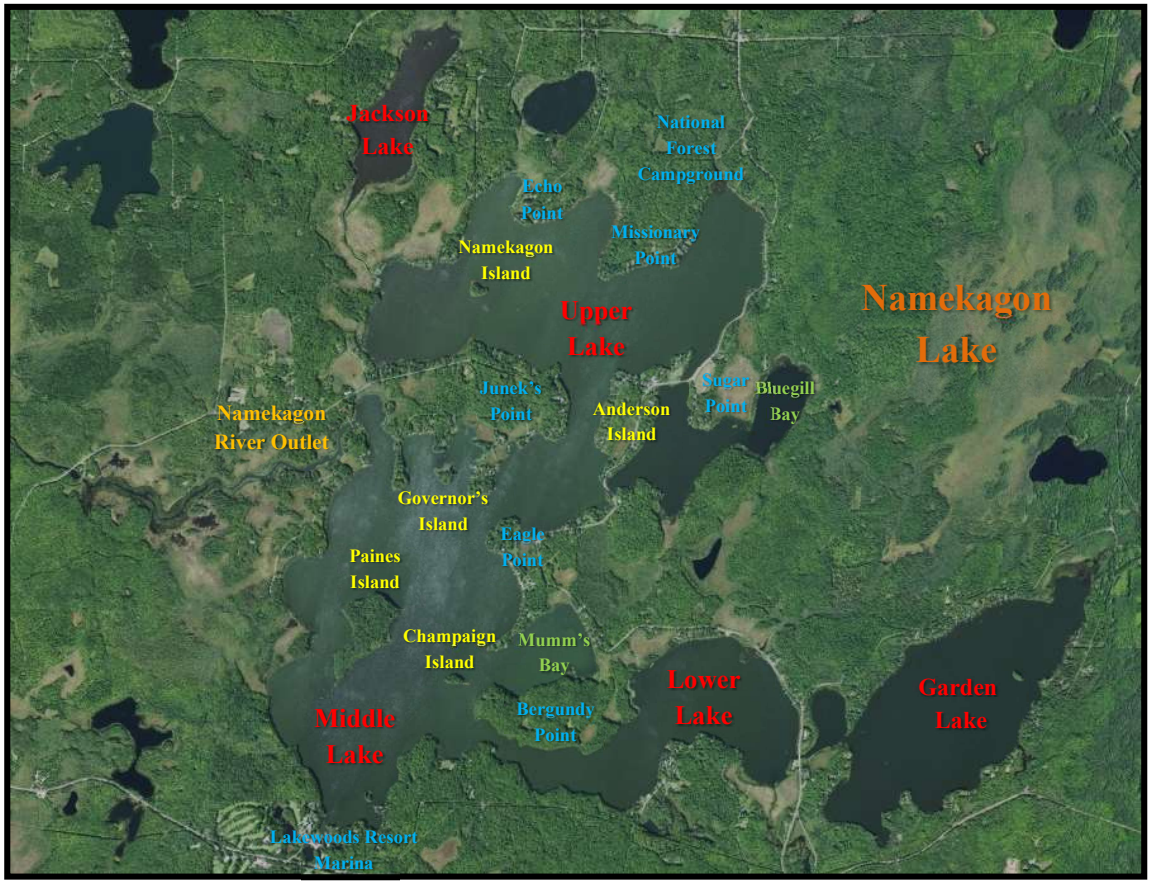


Figure 1: Namekagon Lake Aerial Photo

STUDY BACKGROUND AND RATIONALE:

On June 17, 2016, while doing bird surveys on the lake, we discovered plants at the Lakewoods Resort Marina boat landing that looked to be intermittent between the exotic invasive Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) and native Northern water-milfoil (*Myriophyllum sibiricum*) (NWM). Wisconsin Department of Natural Resources (WDNR) and Bayfield County Land and Water Conservation Department (BCLWCD) immediately followed-up with a collection of plants that were sent to the state lab where DNA analysis confirmed them as Hybrid water-milfoil (HWM).

In response to these findings, we were asked by the Namekagon Lake Association (NLA) and the WDNR to complete a full warm-water point-intercept macrophyte survey on Namekagon Lake from August 23-25, 2016. These data were used to develop the lake's initial Aquatic Plant Management Plan (APMP) which outlined manual removal and limited herbicide treatments to control the infestation.

Manually removal efforts continued from 2016-2018, but a fall shoreline survey in 2018 found that Hybrid water-milfoil had broken out of these original areas and was spreading throughout the entire lake. Because of this, in 2019, the NLA decided to treat four areas totaling 6.92 acres (0.24% of the lake's total surface area) with Diquat (Tribune – 2gal/acre) and lead seven additional hand pulling workshops. Unfortunately, these efforts proved largely unsuccessful as our fall 2019 survey delineated 18 areas covering 12.30 acres (0.42% surface area). After a further chemical treatment of 10.03 acres (0.35% surface area) with Diquat in June of 2020, our late-summer bed mapping survey found slightly reduced acreage of HWM; but it also documented a thickening of established beds and many new satellite areas (26 beds covering 9.87 acres or 0.34% of the lake). Based on these results, in 2021 the NLA decided to experiment with different herbicides (Diquat/2,4-D/ProcellaCor) and further expand its treatment program (22.86 acres – 0.79% of the lake). We were disappointed to report that these treatments again proved unsuccessful as our fall survey found a further expansion in HWM (33 beds covering 23.14 acres – 0.80% of the lake).

In an effort to reverse this trend in 2022, the NLA, under the guidance Harmony Environmental (HE – Cheryl Clemens) and with the WDNR's authorization, decided to treat 24 Hybrid water-milfoil beds as well as buffer areas (43.14 acres – 1.49% of the lake). This treatment proved highly successful at reducing HWM acreage in the lake as our August 2022 survey found six beds covering 5.19 acres (0.18% of the lake's 2,897 acres) – a nearly 18-acre decline **(-77.57%)** compared to 2021. Based on these results, the NLA decided to forego any chemical treatments in 2023. However, after the August 2023 bed mapping survey found HWM acreage rose sharply (38.24 acres – 1.32% of the lake), it was decided to resume chemical management in 2024. This report is the summary analysis of the pretreatment survey completed on September 9, 2023 and the posttreatment survey conducted on August 19, 2024 within the 2024 treatment areas.

METHODS:

Pre/Posttreatment Herbicide Surveys:

Following extensive discussion, the NLA and HE selected eight areas totaling 35.76 acres (1.23% of the lake's surface area) for chemical management. In Lakewoods, Governor's Island, and Mumm's Bays, because the treatment areas were small, it was decided to add treatment area buffers that increased the total survey area to 46.92 acres. Within the proposed treatment polygons and buffer areas, we created offset points at 31m resolution to form a 200-point sampling grid that approximated to more than 4.25pts/acre – just over the 4-10pts/acre required by WDNR protocol for pre/post treatment surveys (Appendix I). Of these, 66 points fell in Bluegill Bay (2,4-D area) and the other 134 were in the ProcellaCor areas.

These points were uploaded to a handheld mapping GPS (Garmin 76CSx) and located on the lake. At each point, we recorded the depth and bottom substrate and used a rake to sample an approximately 2.5ft section of the bottom. HWM was assigned a rake fullness value of 1-3 as an estimation of abundance (Figure 2), and we also recorded visual sightings of HWM within six feet of the sample point. Because visual sightings are not calculated into the pre/post statistical formulas, we only assigned a rake fullness value for non-HWM plants. A cumulative rake fullness value was also noted.

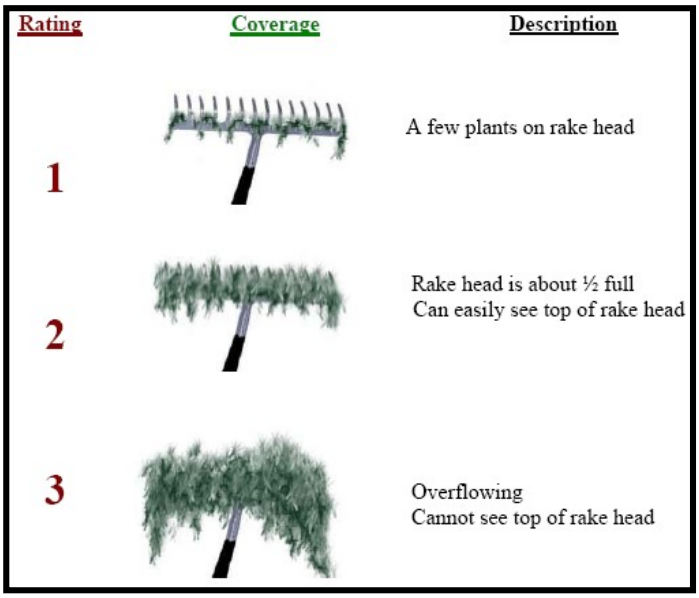


Figure 2: Rake Fullness Ratings

We entered all data collected into the standard WDNR aquatic plant management spreadsheet (Appendix II). Data was analyzed using the linked statistical summary sheet and the WDNR pre/post analysis worksheet (UWEX 2010). For pre/post differences of individual plant species as well as count data, we used the Chi-square analysis on the WDNR pre/post survey worksheet. For comparing averages (mean species/point and mean rake fullness/point), we used t-tests. Differences were determined to be significant at $p<0.05$, moderately significant at $p<0.01$ and highly significant at $p<0.001$.

RESULTS AND DISCUSSION:

Finalization of Treatment Areas:

After analyzing the 2023 late-summer bed mapping survey and noting the pretreatment survey again found Hybrid water-milfoil at or inter-point in all areas, the NLA decided to treat all areas as initially proposed (Figure 3) (Appendix I). The eight beds at five sites selected for treatment totaled 35.76 acres and ranged in size from 0.71 acre (east bed in Governor's Island Bay) up to 15.95 acres (Bluegill Bay). Due to past success and lower cost/acre, Bluegill Bay was treated with liquid 2,4-D. All other areas were treated with ProcellaCor at varied concentrations as specified by the herbicide vendor's recommendations which are based on individual bed acreage.

Treatment occurred on June 21, 2024 with Northern Aquatic Services (Dale Dressel – Dresser, WI) applying 503.7 product dosage units of ProcellaCor at a rate of 4-6 pdu/acre foot (at 3.17 fl. oz./pdu) and 271.8 gallons of 2,4-D at a rate of 4ppm (Table 1). The reported water temperature at the time of treatment was 69°F, and the air temperature was 52°F. Winds were 1-3mph out of the northeast.

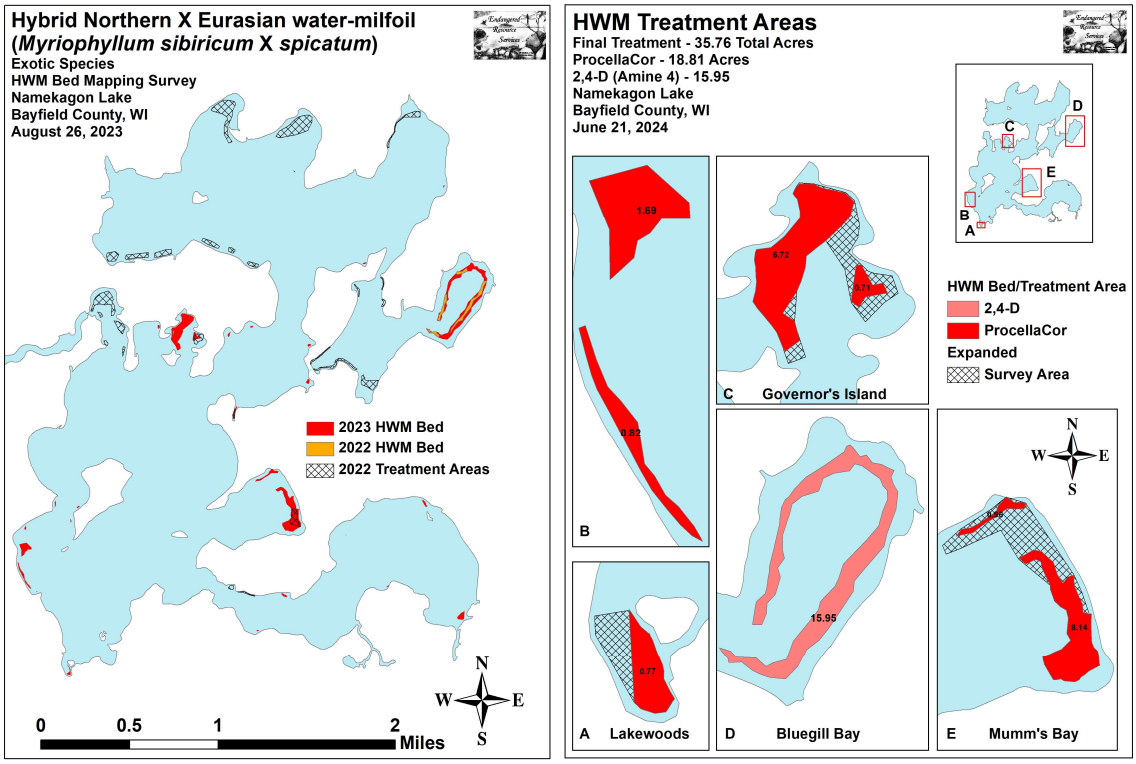


Figure 3: Late Summer 2023 HWM Bed Map and 2024 Treatment Areas

Table 1: Hybrid Water-milfoil Treatment Summary
Namekagon Lake - Bayfield County, Wisconsin
June 21, 2024

Lake Region	Final Treatment Area (acres)	Chemical, Rate, and Total Volume
Lakewoods Marina	0.77	ProcellaCor – 6pdu/af – 27.7pdu
Southwest of Paines Island – North Bed	1.69	ProcellaCor – 6pdu/af – 60.8pdu
Southwest of Paines Island – South Bed	0.82	ProcellaCor – 6pdu/af – 29.5pdu
Governor's Island Bay – West Bed	6.72	ProcellaCor – 4pdu/af – 134.4pdu
Governor's Island Bay East – East Bed	0.71	ProcellaCor – 6pdu/af – 21.3pdu
Bluegill Bay (Tank Lake)	15.95	2,4-D (Amine 4) – 4ppm – 271.8gal
Mumm's Bay – North Bed	0.96	ProcellaCor – 6pdu/af – 34.6pdu
Mumm's Bay – South Bed	8.14	ProcellaCor – 4pdu/af – 195.4pdu
Total Acres	**35.76**	**ProcellaCor/2,4-D 503.7pdu/271.8gal**

Hybrid Water-milfoil Pre/Post Herbicide Surveys:

All survey points occurred in areas between 0.5ft and 9.0ft of water. Within the beds, plants grew at a mean of 5.7ft and a median of 5.5ft during the pretreatment survey (5.8ft and 5.5ft in the 2,4-D area/5.6ft and 5.5ft in the ProcellaCor areas). Posttreatment, the mean and median were unchanged at 5.7ft/5.5ft (5.8ft and 5.5ft in the 2,4-D area/5.7ft and 5.5ft in the ProcellaCor areas) (Table 2). Most Hybrid water-milfoil beds were established over sandy and organic muck, although we also found some growing in pure sand and rocky substrate areas; albeit usually at lower densities (Figure 4) (Appendix III).

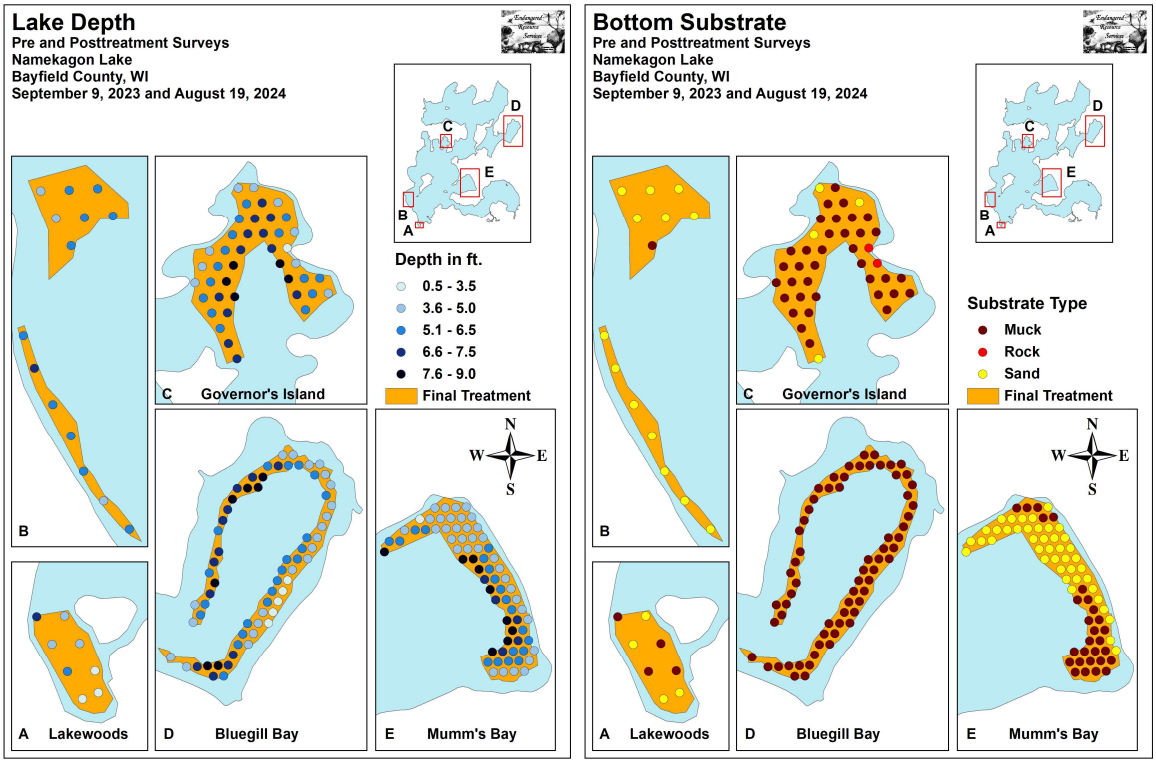


Figure 4: Treatment Area Depths and Bottom Substrate

All pretreatment points fell within the 9.0ft littoral. During the posttreatment survey, a single point was over the 9.0ft littoral limit. The overall frequency of plant occurrence was almost unchanged at 197 points pretreatment (98.5% littoral coverage) and 196 points posttreatment (98.5% littoral coverage) (Figure 5) (Appendix IV).

Table 2: Pre/Posttreatment Surveys Summary Statistics
Namekagon Lake - Bayfield County, Wisconsin
September 9, 2023 and August 19, 2024

Summary Statistics:	All Pre	All Post	2,4-D Pre	2,4-D Post	PCor Pre	PCor Post
Total number of points sampled	200	200	66	66	134	134
Total number of sites with vegetation	197	196	66	66	131	130
Total number of sites shallower than the maximum depth of plants	200	199	66	66	134	133
Freq. of occur. at sites shallower than max. depth of plants (in percent)	98.5	98.5	100.0	100.0	97.8	97.7
Simpson Diversity Index	0.91	0.89	0.88	0.79	0.91	0.89
Mean Coefficient of Conservatism	6.8	6.7	6.6	6.2	6.6	6.7
Floristic Quality Index	33.3	32.3	28.0	22.2	31.1	31.6
Maximum depth of plants (ft)	9.0	9.0	8.5	8.5	9.0	9.0
Mean depth of plants (ft)	5.7	5.7	5.8	5.8	5.6	5.7
Median depth of plants (ft)	5.5	5.5	5.5	5.5	5.5	5.5
Average number of all species per site (shallower than max depth)	3.53	2.91	3.35	2.21	3.62	3.26
Average number of all species per site (veg. sites only)	3.58	2.95	3.35	2.21	3.70	3.33
Average number of native species per site (shallower than max depth)	3.17	2.90	2.95	2.20	3.27	3.26
Average number of native species per site (sites with native veg. only)	3.21	2.95	2.95	2.20	3.34	3.33
Species Richness	25	24	19	14	23	22
Mean Rake Fullness (veg. sites only)	2.50	2.06	2.82	2.26	2.34	1.95

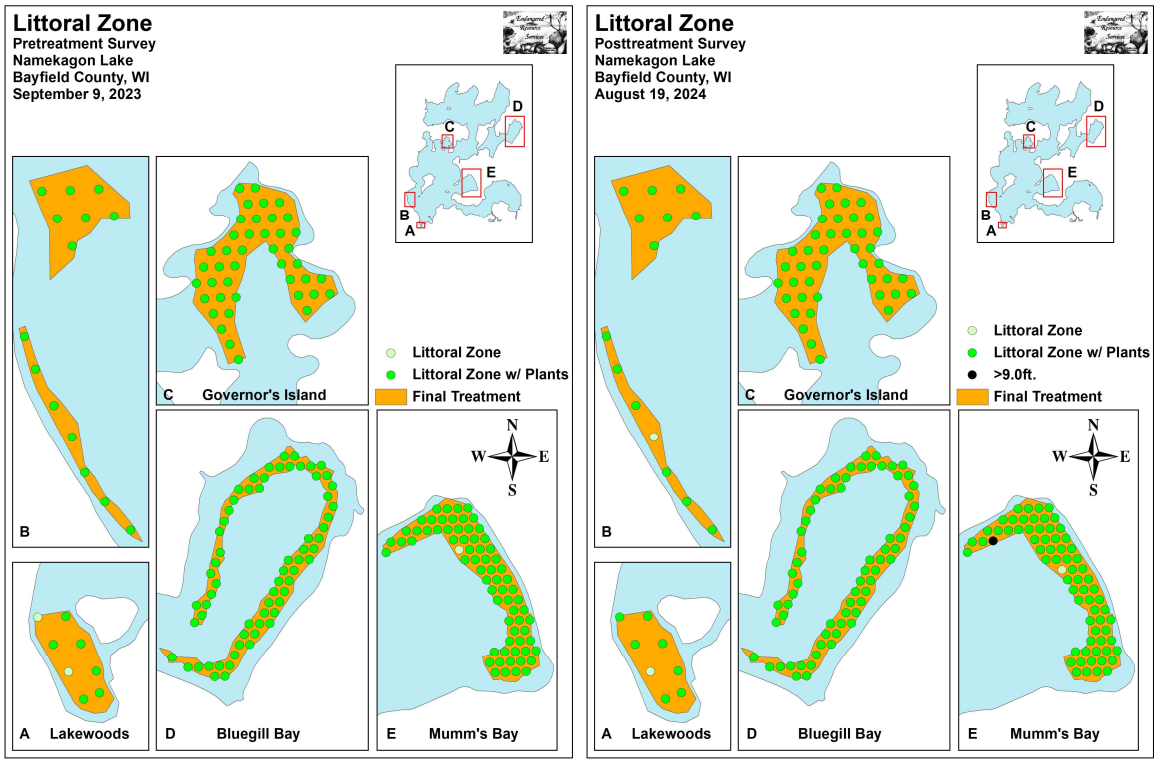


Figure 5: Pre/Posttreatment Littoral Zone

Overall diversity fell from 0.91 pretreatment to 0.89 posttreatment (0.88 pre/0.79 post in the 2,4-D area/0.91 pre/0.89 post in the ProcellaCor areas). When looking at just the native plant community health, the Floristic Quality Index fell slightly from 33.3 pretreatment to 32.3 posttreatment (28.0 pre/22.2 post in the 2,4-D area/31.1 pre/31.6 post in the ProcellaCor areas). Total richness fell from 25 species pretreatment to 24 species posttreatment (19 pre/14 post in the 2,4-D area/23 pre/22 post in the ProcellaCor areas). Mean native species richness at points with native vegetation demonstrated a significant decline **(p=0.02)** from 3.21 species/point pretreatment to 2.95/point posttreatment. This decline was especially pronounced in the 2,4-D area where it fell from 2.95 species/point pre to 2.20 post (3.34/point pre and 3.33/point post in the ProcellaCor areas) (Figure 6) (Appendix IV).

Mean total rake fullness underwent a highly significant decline **(p<0.001)** from a very high 2.50 pretreatment to a moderate 2.06 posttreatment (2.82 pre/2.26 post in the 2,4-D area and 2.34 pre/1.95 post in the ProcellaCor areas) (Figure 7) (Appendix IV).

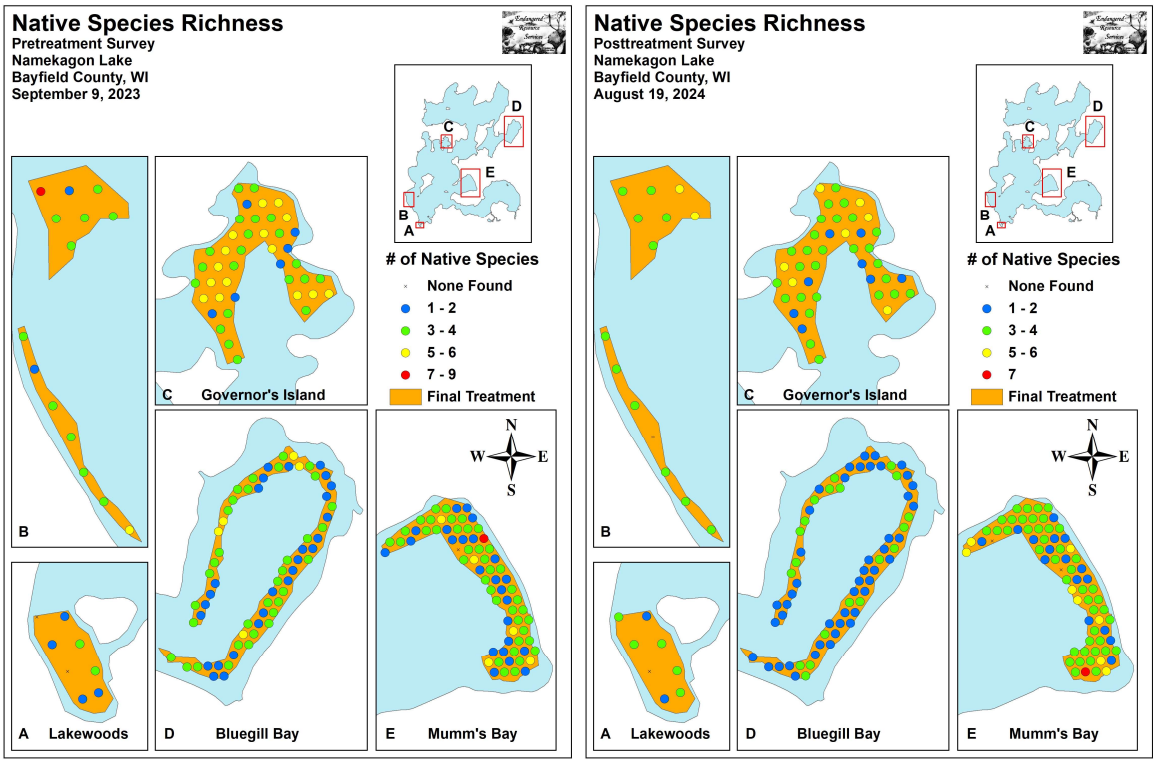


Figure 6: Pre/Posttreatment Native Species Richness

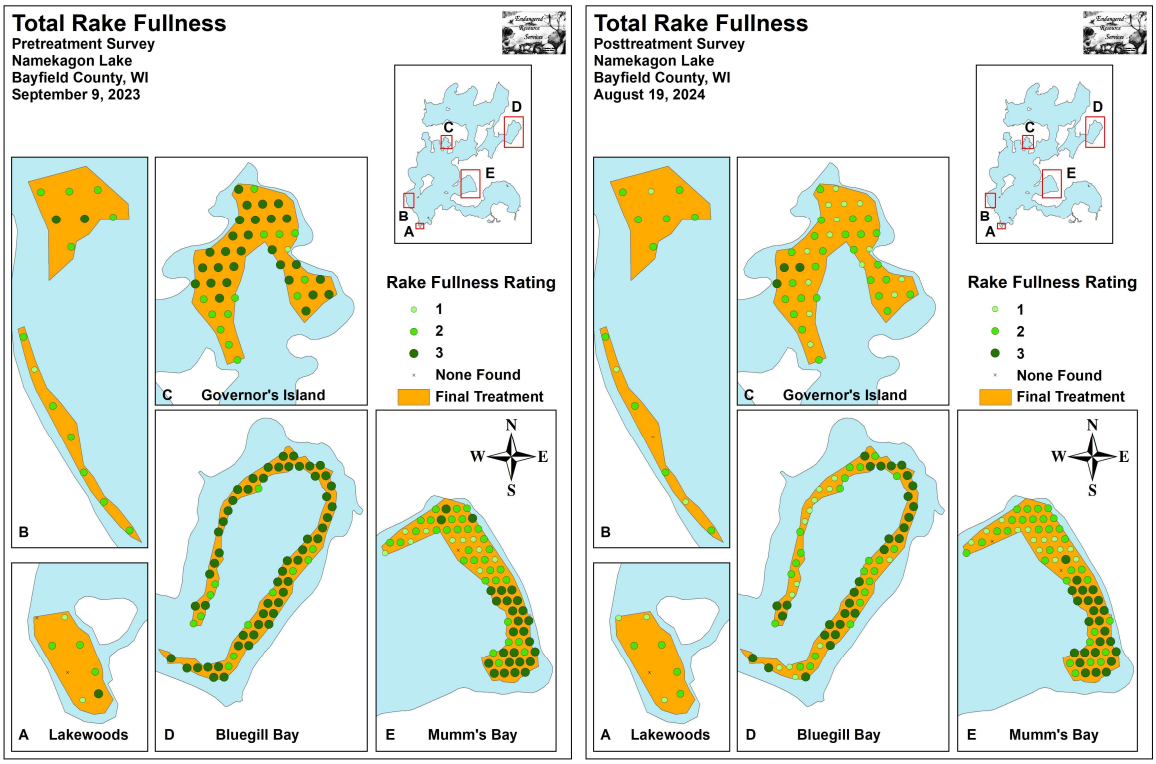


Figure 7: Pre/Posttreatment Total Rake Fullness

During the pretreatment survey, we found Hybrid water-milfoil in the rake at 73 points (36.50% coverage) with 73 additional visual sightings (Table 3). We rated 12 points a rake fullness of 3, 27 a 2, and the remaining 34 a 1 for a mean rake fullness of 1.70. The 39 points with a rake fullness of 2 or 3 suggested 19.50% of the treatment areas had a significant infestation (Figure 8) (Appendix V).

Broken out by treatment regime, 26 of the 73 points with HWM occurred within the 2,4-D area's 66 points (39.39% coverage), while the remaining 47 were in the ProcellaCor areas' 134 points (35.07% coverage). In the 2,4-D area, four points rated a 3, ten were a 2 (21.21% significant infestation), and the other 12 were a 1 for a mean rake of 1.69. We also recorded HWM as a visual at 33 points (Table 4).

In the ProcellaCor areas, we found eight points that had a rake fullness rating of 3, 17 points that rated a 2 (18.66% significant infestation), and 22 points that were a 1. This produced a mean rake fullness of 1.70. We also recorded HWM as a visual at 40 points (Table 5).

Posttreatment, we found no evidence of HWM in the ProcellaCor areas, and it was only present in the rake at a single point in the 2,4-D area (0.50% total coverage/1.52% coverage in the 2,4-D area) (Tables 6-8). Unfortunately, we also recorded HWM as a visual at eight points and noted that severely burned but not dead plants were still common throughout Bluegill Bay. We also observed that these surviving plants consistently showed evidence of regrowth and were already actively fragmenting (see picture on report cover).

Statistically, our results suggested the overall treatment produced a highly significant decline ($p<0.001$) in total density, total distribution, rake fullness 3, rake fullness 2, , rake fullness 1, and visual sightings (Figure 9). Breaking the data out by treatment type offered little additional information. In the 2,4-D area, all declines were highly significant except for rake fullness 2 which was moderately significant **($p=0.005$)**, and rake fullness 3 which was significant **($p=0.04$)** (Figure 10). In the ProcellaCor areas, all declines were highly significant except for rake fullness 3 which was moderately significant **($p=0.004$)** (Figure 11).

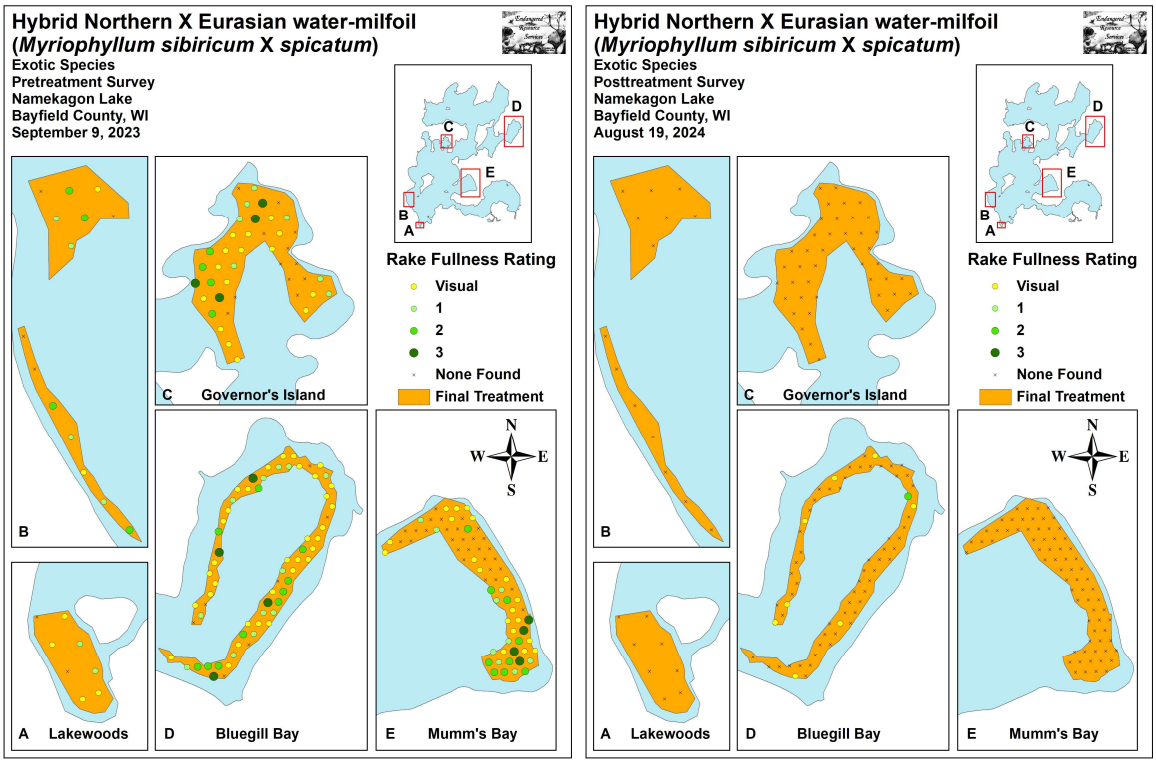
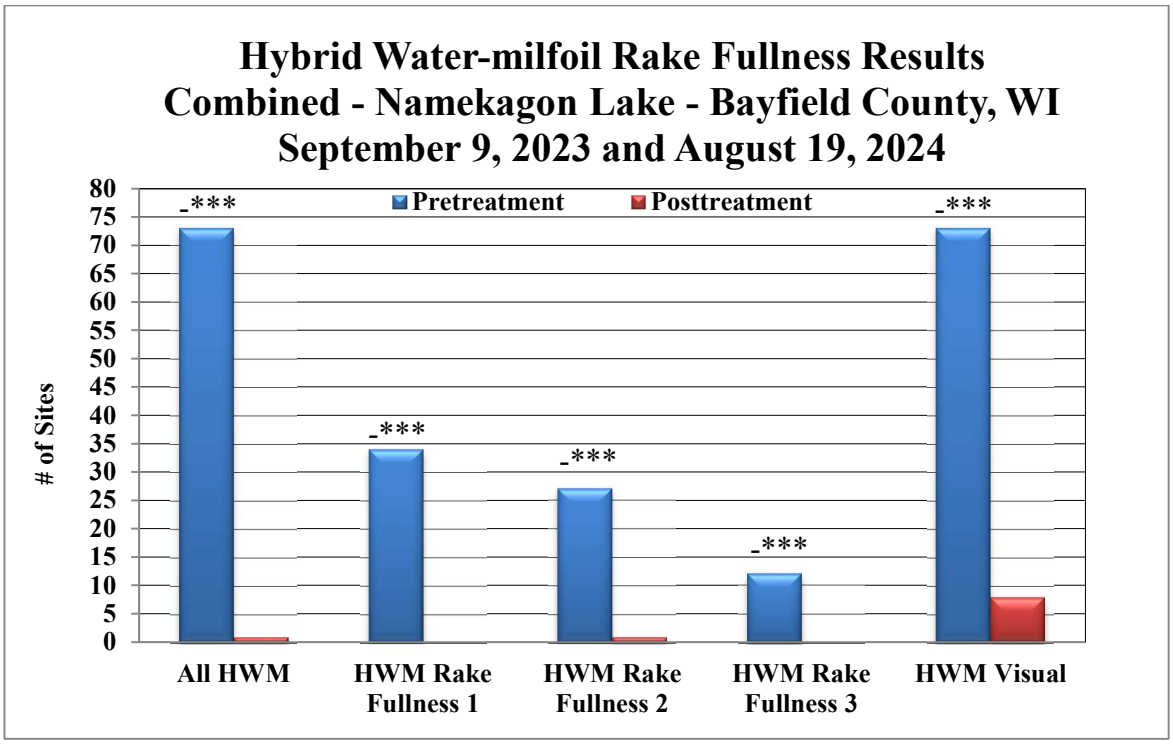
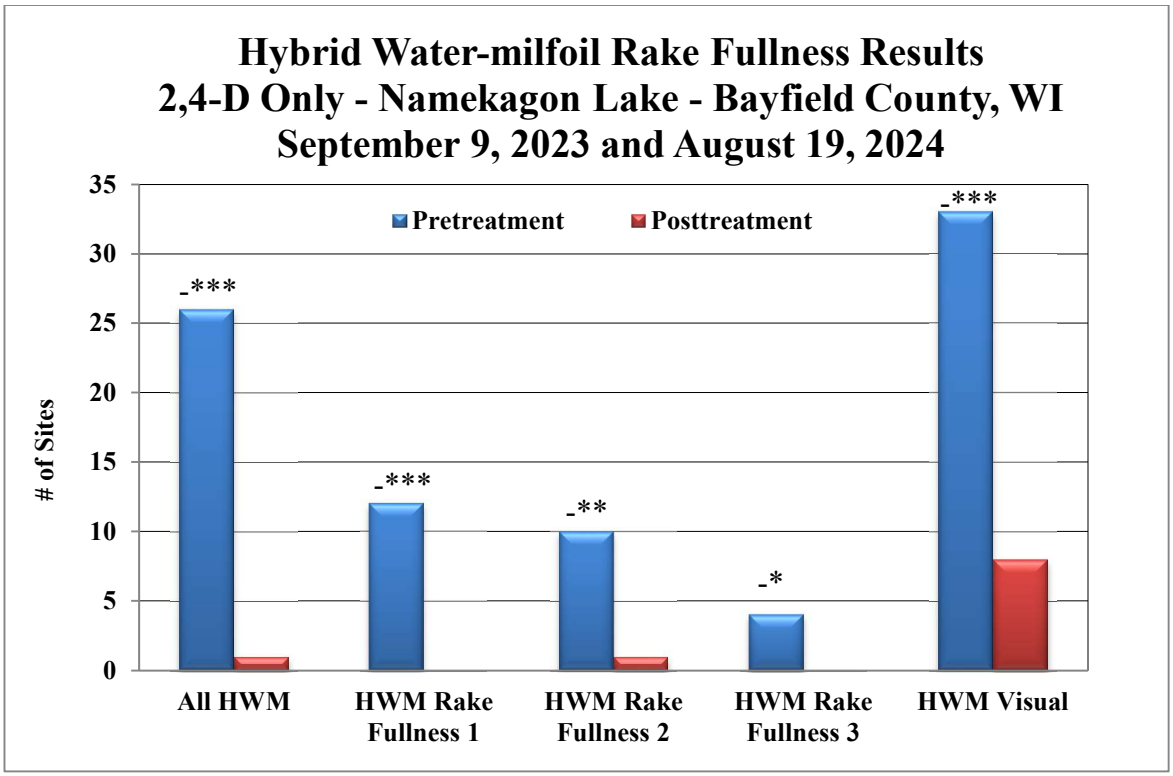


Figure 8: Pre/Posttreatment Hybrid Water-milfoil Density and Distribution



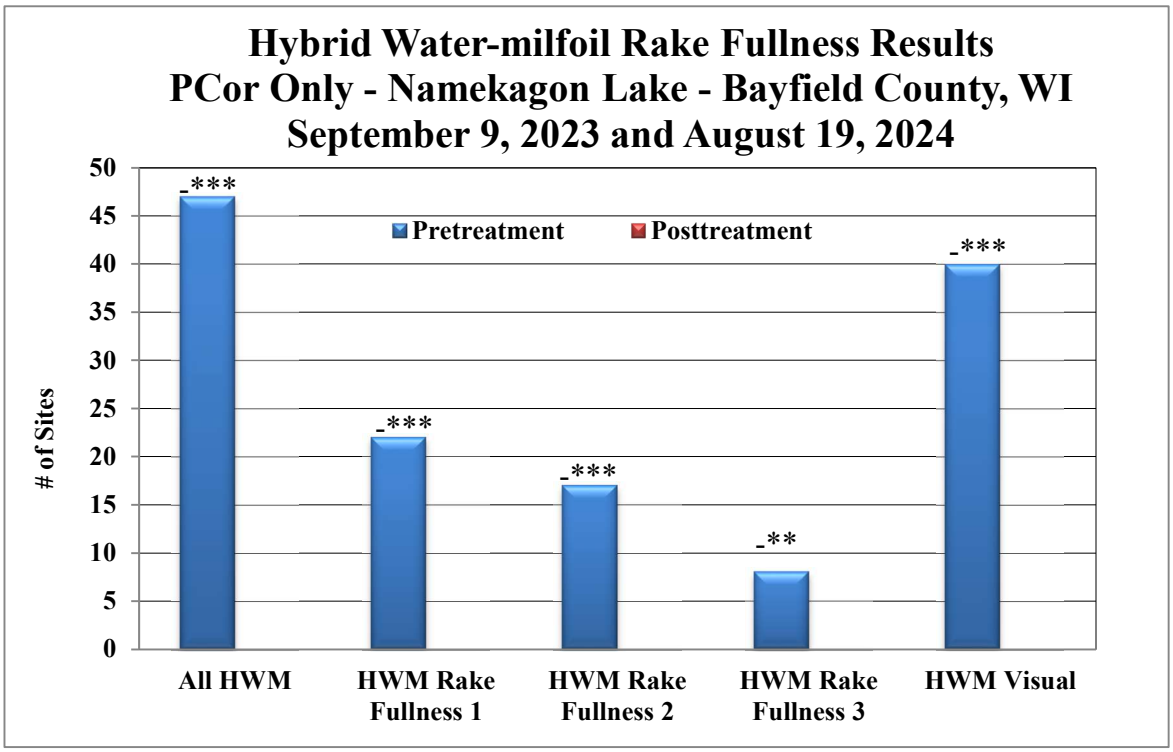
Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 9: Changes in Hybrid Water-milfoil Rake Fullness – All Areas



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 10: Changes in Hybrid Water-milfoil Rake Fullness – 2,4-D Area



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 11: Changes in Hybrid Water-milfoil Rake Fullness – PCor Areas

Wild celery (*Vallisneria americana*) was the most widely-distributed native species during the pretreatment survey (Figure 12) (Tables 3-5) and the third-ranked posttreatment (Tables 6-8). Present at 104 sites with a mean rake fullness of 1.44, it saw non-significant posttreatment declines (p=0.09/p=0.43) in both distribution (87 sites) and density (1.43 mean rake fullness).

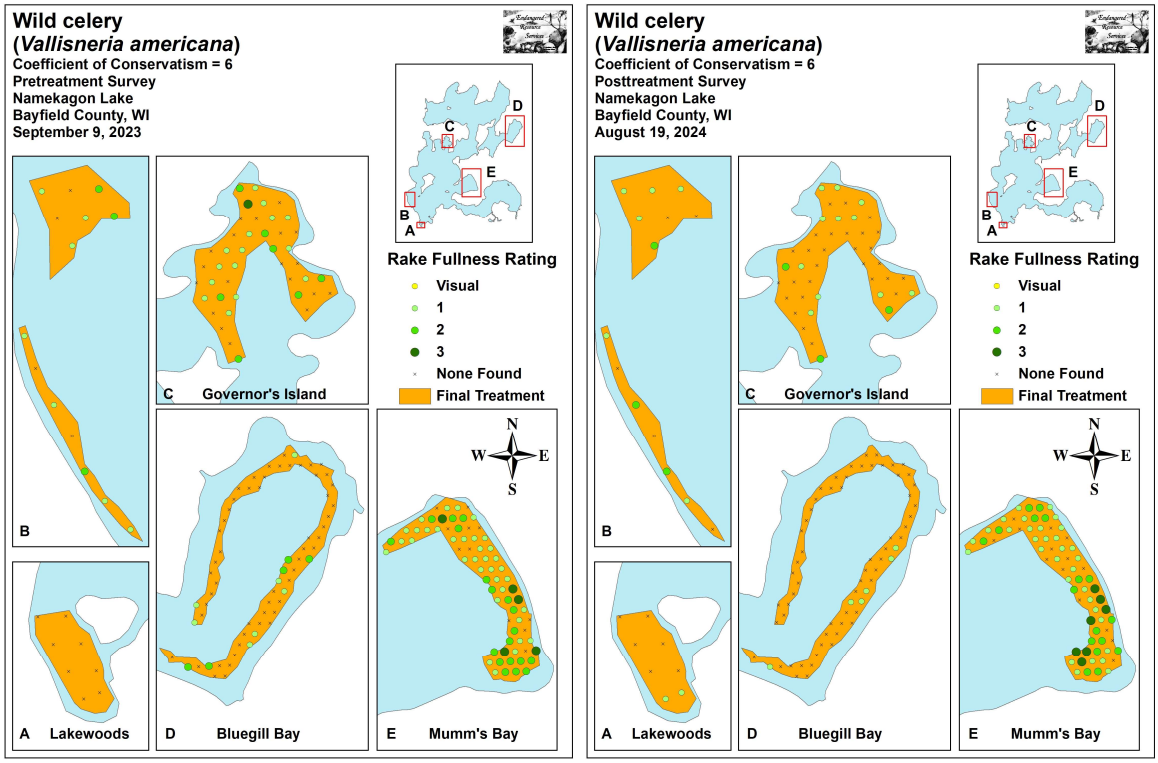
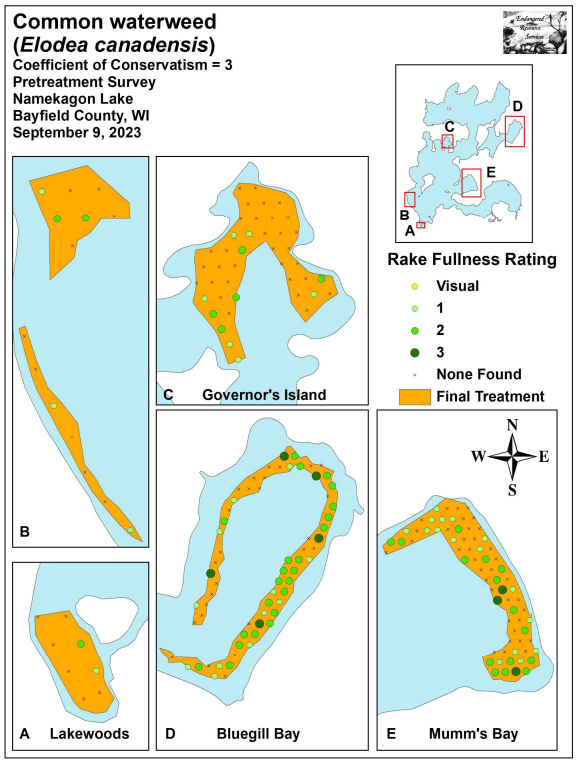


Figure 12: Pre/Posttreatment Wild Celery Density and Distribution

Common waterweed (*Elodea canadensis*), the second most common species pretreatment and the most common posttreatment, experienced a non-significant increase (p=0.13) in distribution (92 sites pre/107 sites post), but a highly significant decline **(p<0.001)** in density (mean rake fullness 1.67 pre/1.27 post) (Figure 13). Visual analysis of the maps showed most of the declines in density occurred in the 2,4-D treatment area.

Fern pondweed (*Potamogeton robbinsii*) was the third most common native species in the pretreatment survey (76 sites/mean rake 1.97). We documented a nearly-significant increase (p=0.05) in distribution to 95 sites posttreatment as it rose to the second-ranked species in the overall community. The corresponding increase in density to a mean rake of 1.99 was, however, not significant (p=0.45) (Figure 14).



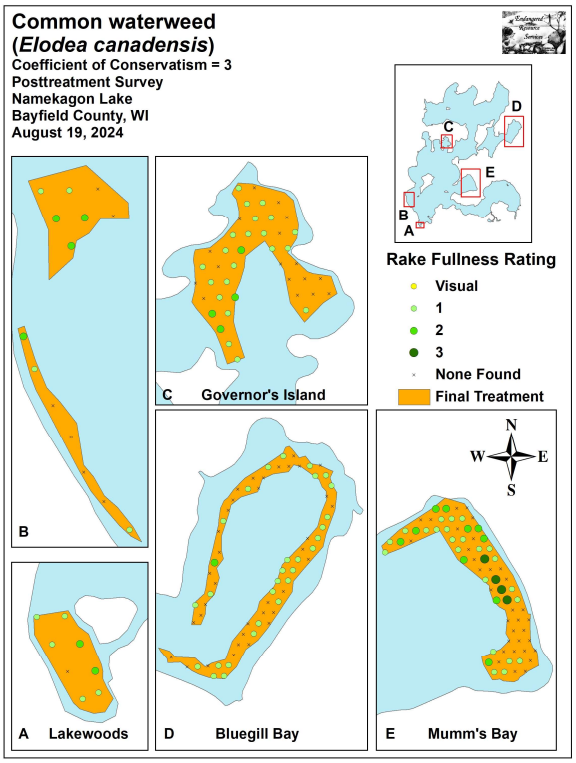
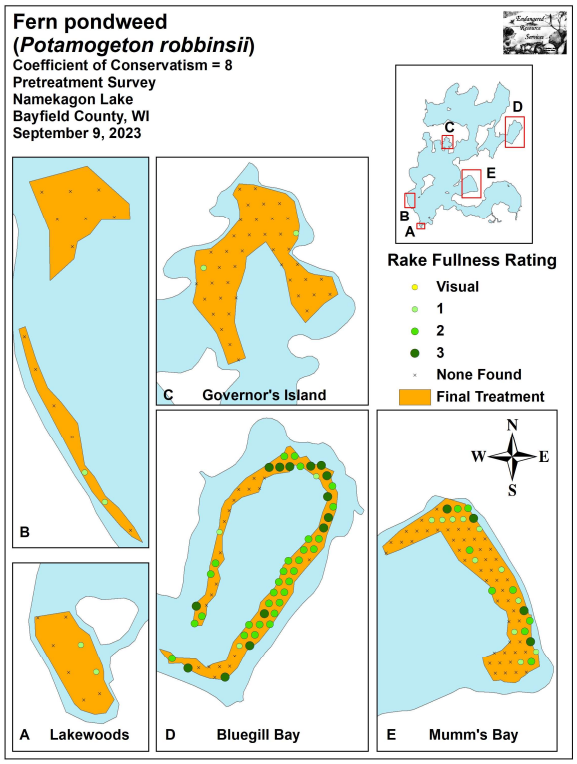


Figure 13: Pre/Posttreatment Common waterweed Density and Distribution



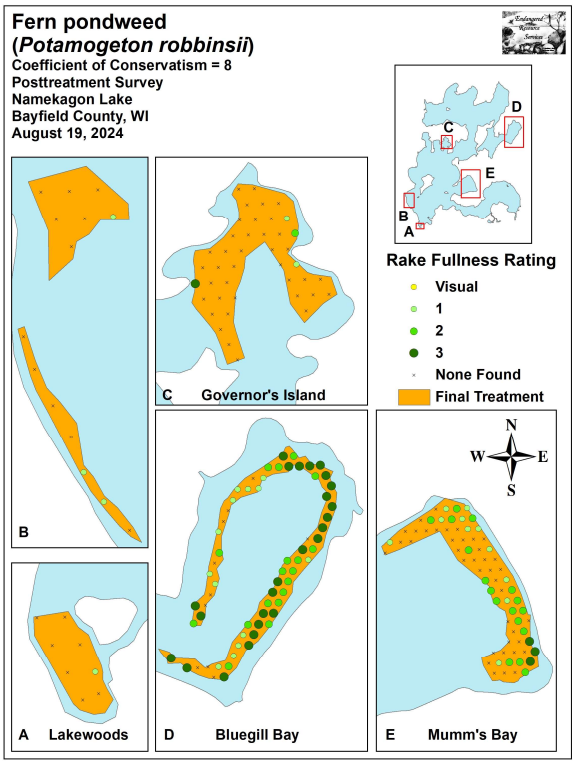


Figure 14: Pre/Posttreatment Fern pondweed Density and Distribution

Small pondweed (*Potamogeton pusillus*), suffered a moderately significant decline **(*p*=0.001)** in distribution (57 sites pre/31 sites post) and a highly significant decline **(*p*<0.001)** in density (mean rake fullness of 1.67 pre/1.10 post) (Figure 15). The fourth most widely-distributed native species in the pretreatment survey, it fell to the sixth-ranked plant posttreatment.

We documented Slender naiad (*Najas flexilis*) as the fifth most common native species in the pretreatment survey (50 sites/mean rake of 1.34) (Figure 16). Posttreatment, it saw a moderately significant decline **(*p*=0.003)** in distribution (27 sites) and a nearly-significant decline (*p*=0.08) in density (mean rake of 1.19) as it fell to the seventh-ranked species in the community.

Coontail (*Ceratophyllum demersum*) was the sixth most widely-distributed native species pretreatment (47 sites/mean rake of 1.26) (Figure 17). Posttreatment, it underwent a non-significant decline (*p*=0.33) in distribution (39 sites), but a highly significant decline **(*p*<0.001)** in density (mean rake of 1.03). Despite this, it rose to the fifth-ranked plant in the overall community.

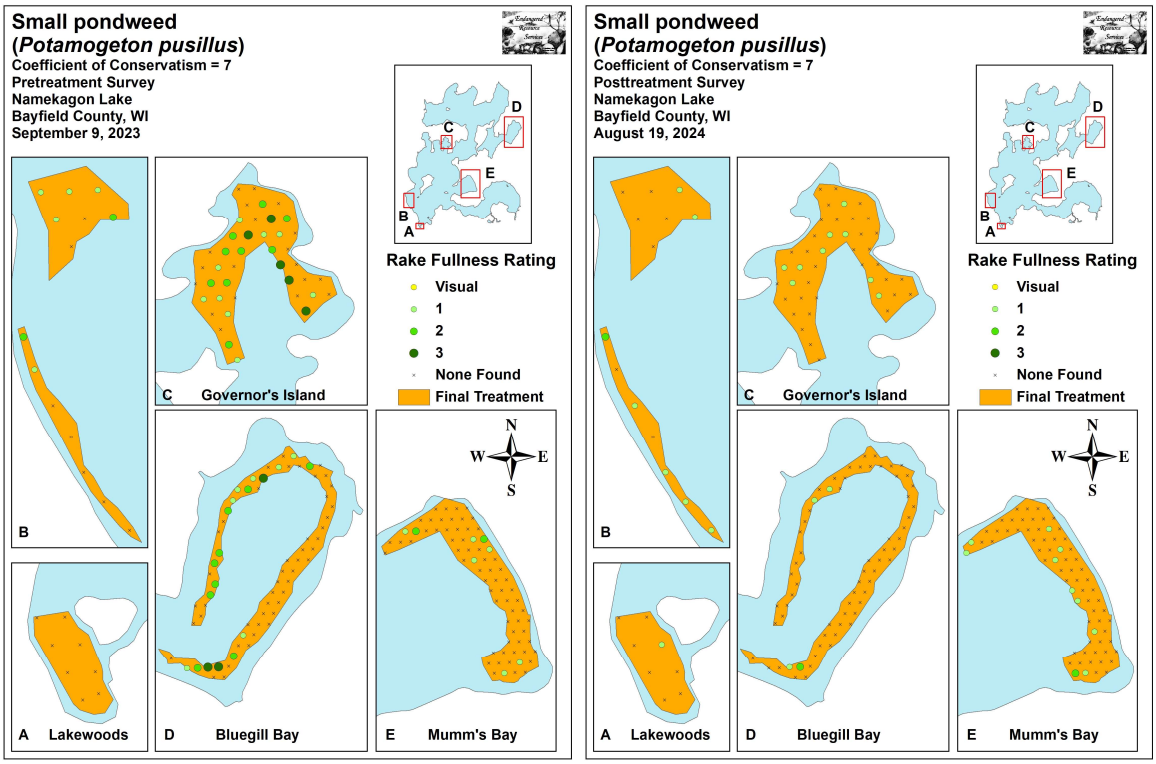


Figure 15: Pre/Posttreatment Small pondweed Density and Distribution

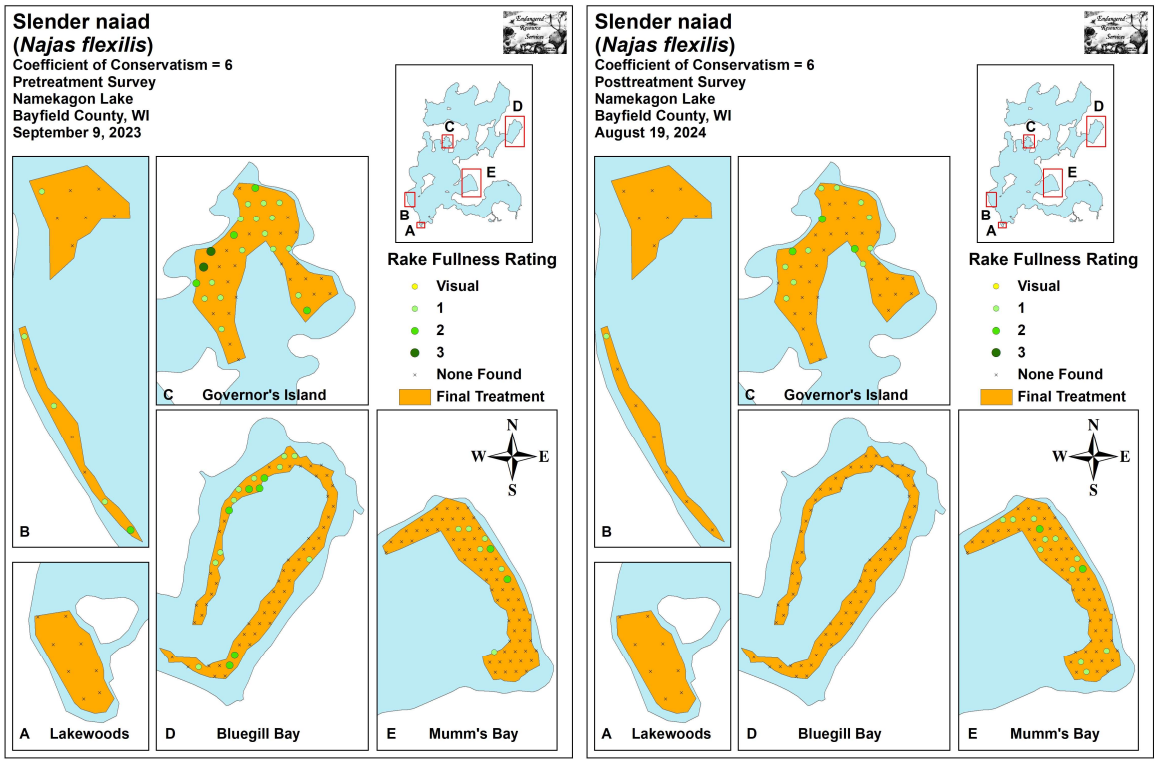


Figure 16: Pre/Posttreatment Slender Naiad Density and Distribution

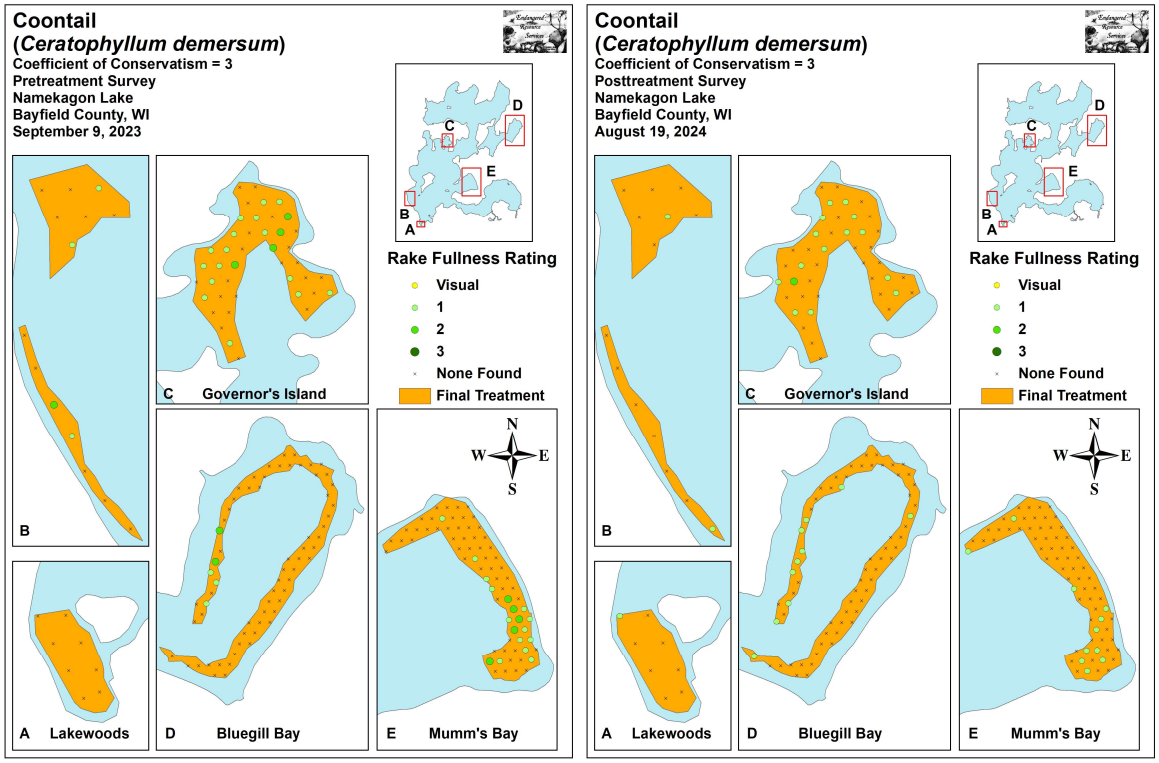


Figure 17: Pre/Posttreatment Coontail Density and Distribution

Flat-stem pondweed (*Potamogeton zosteriformis*), the seventh most common species pretreatment (43 sites), saw a nearly significant increase (p=0.05) in distribution (60 sites) as it rose to the fourth most common species posttreatment (Figure 18). Despite this expansion in coverage, its density was almost unchanged (mean rake fullness of 1.26 pretreatment/1.25 posttreatment).

Water marigold (*Bidens beckii*), a species known to be sensitive to both 2,4-D and ProcellaCor, fell from the twelfth-ranked native species pretreatment to the eighteenth-ranked posttreatment (Figure 19). The decline in distribution (14 sites pre/two sites post) was moderately significant **(p=0.002)**, but the loss in mean density (mean rake fullness 1.14 pretreatment/1.00 posttreatment) was only nearly-significant (p=0.08).

Similar to Hybrid water-milfoil, the native Northern water-milfoil was essentially eliminated from the treatment areas (Figure 20). During the pretreatment survey, it was present at 11 sites with a mean rake of 1.45. Posttreatment, we didn't see it at any point or inter-point in any treatment area. Statistically, both the declines in distribution and density were highly significant **(p<0.001)**.

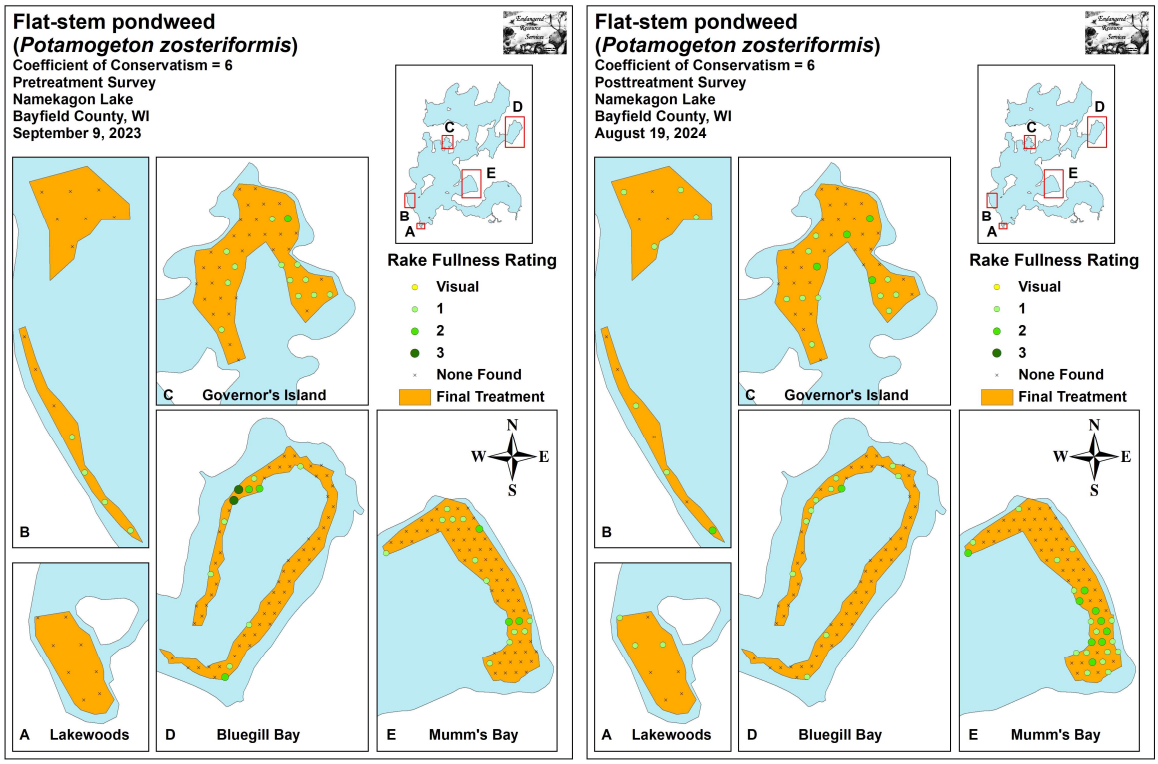
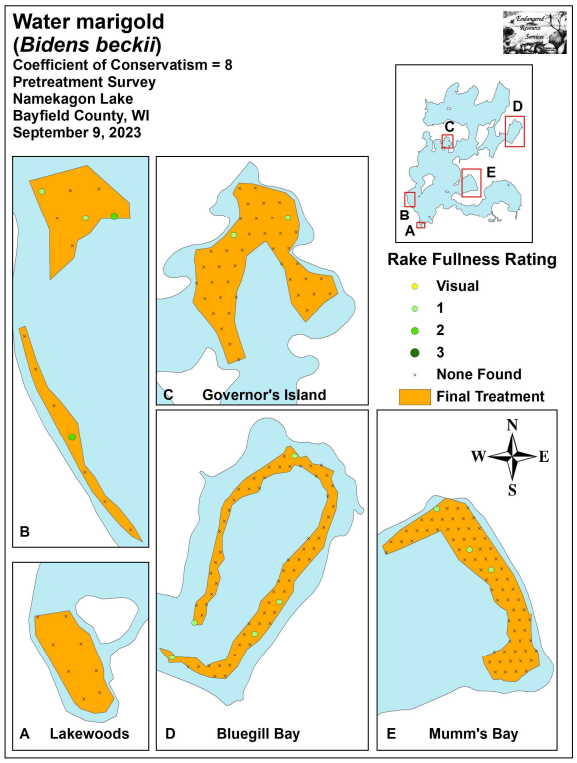


Figure 18: Pre/Posttreatment Flat-stem Pondweed Density and Distribution



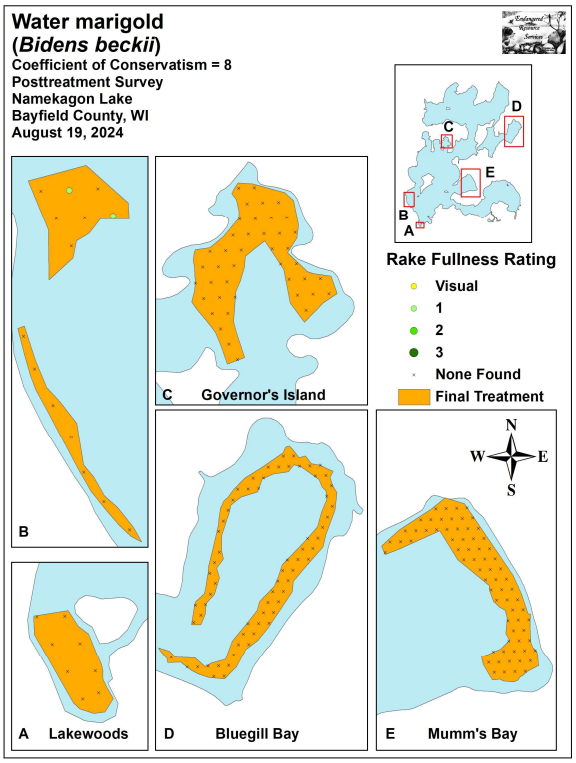
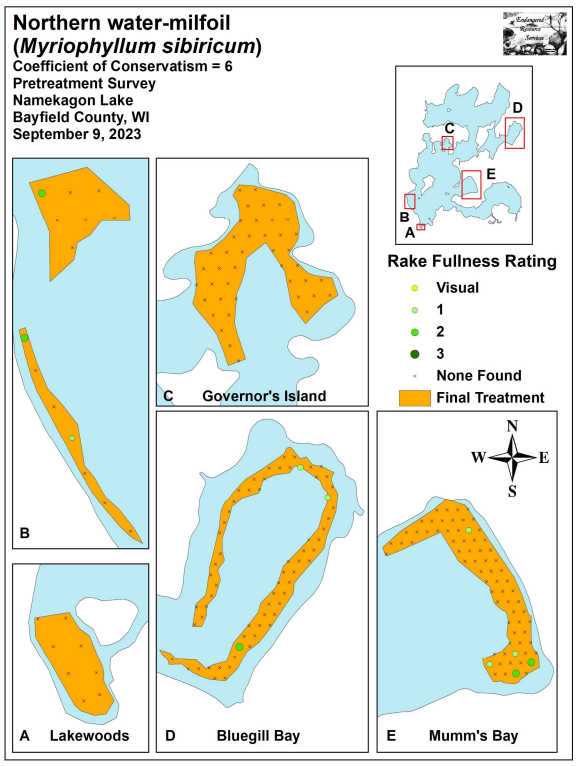


Figure 19: Pre/Posttreatment Water marigold Density and Distribution



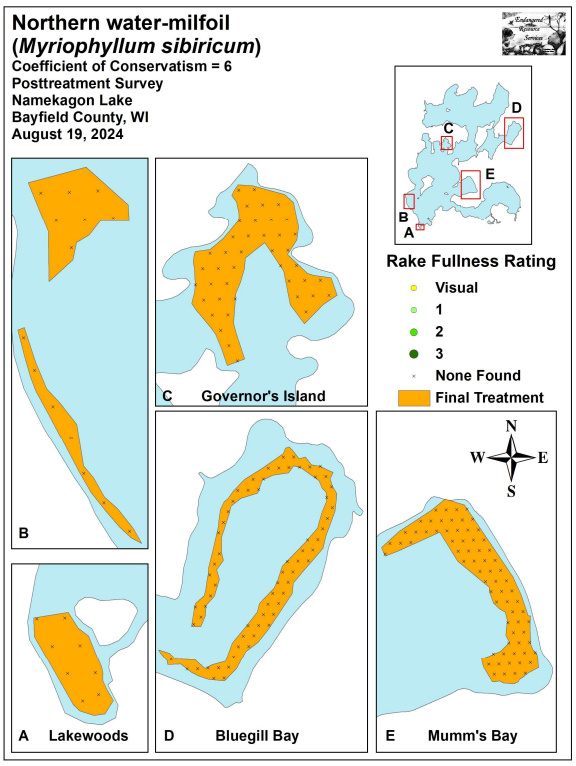


Figure 20: Pre/Posttreatment Northern Water-milfoil Density and Distribution

Table 3: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Pretreatment Survey – Combined – Namekagon Lake – Bayfield County, Wisconsin
September 9, 2023

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Vallisneria americana	Wild celery	104	14.73	52.79	52.00	1.44	0
Elodea canadensis	Common waterweed	92	13.03	46.70	46.00	1.67	0
Potamogeton robbinsii	Fern pondweed	76	10.76	38.58	38.00	1.97	0
Myriophyllum spicatum* X *sibiricum	**Hybrid water-milfoil**	**73**	**10.34**	**37.06**	**36.50**	**1.70**	**73**
Potamogeton pusillus	Small pondweed	57	8.07	28.93	28.50	1.67	0
Najas flexilis	Slender naiad	50	7.08	25.38	25.00	1.34	0
Ceratophyllum demersum	Coontail	47	6.66	23.86	23.50	1.26	0
Potamogeton zosteriformis	Flat-stem pondweed	43	6.09	21.83	21.50	1.26	0
Potamogeton richardsonii	Clasping-leaf pondweed	33	4.67	16.75	16.50	1.55	0
Potamogeton praelongus	White-stem pondweed	22	3.12	11.17	11.00	1.27	0
Chara sp.	Muskgrass	18	2.55	9.14	9.00	1.56	0
Potamogeton amplifolius	Large-leaf pondweed	16	2.27	8.12	8.00	1.31	0
Bidens beckii	Water marigold	14	1.98	7.11	7.00	1.14	0
Potamogeton epihydrus	Ribbon-leaf pondweed	14	1.98	7.11	7.00	1.29	0
Myriophyllum sibiricum	Northern water-milfoil	11	1.56	5.58	5.50	1.45	0
Potamogeton spirillus	Spiral-fruited pondweed	11	1.56	5.58	5.50	1.27	0
Potamogeton gramineus	Variable pondweed	8	1.13	4.06	4.00	1.88	0
Nitella sp.	Nitella	6	0.85	3.05	3.00	1.67	0
	Filamentous algae	5	*	2.54	2.50	1.20	0
Heteranthera dubia	Water star-grass	2	0.28	1.02	1.00	1.50	0
Potamogeton friesii	Fries' pondweed	2	0.28	1.02	1.00	1.50	0
Sparganium emersum	Short-stemmed bur-reed	2	0.28	1.02	1.00	1.00	0
Utricularia vulgaris	Common bladderwort	2	0.28	1.02	1.00	1.00	0

* Excluded from the relative frequency calculation **Exotic species in bold**

Table 3 (continued): Frequencies and Mean Rake Sample of Aquatic Macrophytes Pretreatment Survey – Combined – Namekagon Lake – Bayfield County, Wisconsin September 9, 2023

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Ceratophyllum echinatum	Spiny hornwort	1	0.14	0.51	0.50	1.00	0
Nymphaea odorata	White water lily	1	0.14	0.51	0.50	2.00	0
Pontederia cordata	Pickerelweed	1	0.14	0.51	0.50	3.00	0

Table 4: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Pretreatment Survey – 2,4-D Area Only – Namekagon Lake – Bayfield County, Wisconsin
September 9, 2023

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Potamogeton robbinsii	Fern pondweed	47	21.27	71.21	71.21	2.23	0
Elodea canadensis	Common waterweed	40	18.10	60.61	60.61	1.83	0
Myriophyllum spicatum	**Eurasian water milfoil**	**26**	**11.76**	**39.39**	**39.39**	**1.69**	**33**
Potamogeton pusillus	Small pondweed	19	8.60	28.79	28.79	1.79	0
Najas flexilis	Slender naiad	16	7.24	24.24	24.24	1.38	0
Potamogeton epihydrus	Ribbon-leaf pondweed	12	5.43	18.18	18.18	1.33	0
Vallisneria americana	Wild celery	12	5.43	18.18	18.18	1.42	0
Potamogeton zosteriformis	Flat-stem pondweed	11	4.98	16.67	16.67	1.64	0
Potamogeton amplifolius	Large-leaf pondweed	10	4.52	15.15	15.15	1.20	0
Bidens beckii	Water marigold	5	2.26	7.58	7.58	1.00	0
Ceratophyllum demersum	Coontail	5	2.26	7.58	7.58	1.40	0
Potamogeton richardsonii	Clasping-leaf pondweed	4	1.81	6.06	6.06	1.50	0
Chara sp.	Muskgrass	3	1.36	4.55	4.55	1.67	0
Myriophyllum sibiricum	Northern water-milfoil	3	1.36	4.55	4.55	1.33	0
Nitella sp.	Nitella	2	0.90	3.03	3.03	2.50	0
Potamogeton praelongus	White-stem pondweed	2	0.90	3.03	3.03	1.00	0
Utricularia vulgaris	Common bladderwort	2	0.90	3.03	3.03	1.00	0
Ceratophyllum echinatum	Spiny hornwort	1	0.45	1.52	1.52	1.00	0
Potamogeton gramineus	Variable pondweed	1	0.45	1.52	1.52	1.00	0
	Filamentous algae	1	*	1.52	1.52	1.00	0

* Excluded from the relative frequency calculation **Exotic species in bold**

Table 5: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Pretreatment Survey – ProcellaCor Areas Only – Namekagon Lake – Bayfield County, Wisconsin
September 9, 2023

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Vallisneria americana	Wild celery	92	18.97	70.23	68.66	1.45	0
Elodea canadensis	Common waterweed	52	10.72	39.69	38.81	1.56	0
Myriophyllum spicatum	**Eurasian water-milfoil**	**47**	**9.69**	**35.88**	**35.07**	**1.70**	**40**
Ceratophyllum demersum	Coontail	42	8.66	32.06	31.34	1.24	0
Potamogeton pusillus	Small pondweed	38	7.84	29.01	28.36	1.61	0
Najas flexilis	Slender naiad	34	7.01	25.95	25.37	1.32	0
Potamogeton zosteriformis	Flat-stem pondweed	32	6.60	24.43	23.88	1.13	0
Potamogeton richardsonii	Clasping-leaf pondweed	29	5.98	22.14	21.64	1.55	0
Potamogeton robbinsii	Fern pondweed	29	5.98	22.14	21.64	1.55	0
Potamogeton praelongus	White-stem pondweed	20	4.12	15.27	14.93	1.30	0
Chara sp.	Muskgrass	15	3.09	11.45	11.19	1.53	0
Potamogeton spirillus	Spiral-fruited pondweed	11	2.27	8.40	8.21	1.27	0
Bidens beckii	Water marigold	9	1.86	6.87	6.72	1.22	0
Myriophyllum sibiricum	Northern water-milfoil	8	1.65	6.11	5.97	1.50	0
Potamogeton gramineus	Variable pondweed	7	1.44	5.34	5.22	2.00	0
Potamogeton amplifolius	Large-leaf pondweed	6	1.24	4.58	4.48	1.50	0
Nitella sp.	Nitella	4	0.82	3.05	2.99	1.25	0
	Filamentous algae	4	*	3.05	2.99	1.25	0
Heteranthera dubia	Water star-grass	2	0.41	1.53	1.49	1.50	0
Potamogeton epihydrus	Ribbon-leaf pondweed	2	0.41	1.53	1.49	1.00	0
Potamogeton friesii	Fries' pondweed	2	0.41	1.53	1.49	1.50	0
Sparganium emersum	Short-stemmed bur-reed	2	0.41	1.53	1.49	1.00	0
Nymphaea odorata	White water lily	1	0.21	0.76	0.75	2.00	0
Pontederia cordata	Pickerelweed	1	0.21	0.76	0.75	3.00	0

* Excluded from the relative frequency calculation **Exotic species in bold**

Table 6: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Posttreatment Survey – Combined – Namekagon Lake – Bayfield County, Wisconsin
August 19, 2024

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Elodea canadensis	Common waterweed	107	18.48	54.59	53.77	1.27	0
Potamogeton robbinsii	Fern pondweed	95	16.41	48.47	47.74	1.99	0
Vallisneria americana	Wild celery	87	15.03	44.39	43.72	1.43	0
Potamogeton zosteriformis	Flat-stem pondweed	60	10.36	30.61	30.15	1.25	0
Ceratophyllum demersum	Coontail	39	6.74	19.90	19.60	1.03	0
	Filamentous algae	33	*	16.84	16.58	1.39	0
Potamogeton pusillus	Small pondweed	31	5.35	15.82	15.58	1.10	0
Najas flexilis	Slender naiad	27	4.66	13.78	13.57	1.19	0
Potamogeton praelongus	White-stem pondweed	26	4.49	13.27	13.07	1.62	0
Chara sp.	Muskgrass	24	4.15	12.24	12.06	1.29	0
Potamogeton richardsonii	Clasping-leaf pondweed	23	3.97	11.73	11.56	1.13	0
Potamogeton amplifolius	Large-leaf pondweed	16	2.76	8.16	8.04	1.56	0
Nitella sp.	Nitella	11	1.90	5.61	5.53	1.45	0
Potamogeton gramineus	Variable pondweed	7	1.21	3.57	3.52	1.29	0
Nymphaea odorata	White water lily	6	1.04	3.06	3.02	1.33	0
Heteranthera dubia	Water star-grass	4	0.69	2.04	2.01	1.25	0
Potamogeton epihydrus	Ribbon-leaf pondweed	4	0.69	2.04	2.01	1.25	0
Potamogeton friesii	Fries' pondweed	3	0.52	1.53	1.51	1.33	0
Bidens beckii	Water marigold	2	0.35	1.02	1.01	1.00	0
Utricularia vulgaris	Common bladderwort	2	0.35	1.02	1.01	1.50	0
Ceratophyllum echinatum	Spiny hornwort	1	0.17	0.51	0.50	1.00	0
Lemna trisulca	Forked duckweed	1	0.17	0.51	0.50	1.00	0
Myriophyllum spicatum	**Eurasian water-milfoil**	**1**	**0.17**	**0.51**	**0.50**	**2.00**	**8**
Pontederia cordata	Pickerelweed	1	0.17	0.51	0.50	3.00	0
Potamogeton spirillus	Spiral-fruited pondweed	1	0.17	0.51	0.50	1.00	0

* Excluded from the relative frequency calculation **Exotic species in bold**

Table 7: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Posttreatment Survey – 2,4-D Area Only – Namekagon Lake – Bayfield County, Wisconsin
August 19, 2024

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Potamogeton robbinsii	Fern pondweed	56	38.36	84.85	84.85	2.21	0
Elodea canadensis	Common waterweed	30	20.55	45.45	45.45	1.03	0
Potamogeton zosteriformis	Flat-stem pondweed	11	7.53	16.67	16.67	1.09	0
Ceratophyllum demersum	Coontail	10	6.85	15.15	15.15	1.00	0
Potamogeton amplifolius	Large-leaf pondweed	9	6.16	13.64	13.64	1.78	0
Vallisneria americana	Wild celery	6	4.11	9.09	9.09	1.00	0
Nitella sp.	Nitella	5	3.42	7.58	7.58	1.40	0
Potamogeton praelongus	White-stem pondweed	5	3.42	7.58	7.58	1.20	0
Chara sp.	Muskgrass	4	2.74	6.06	6.06	1.25	0
Potamogeton pusillus	Small pondweed	4	2.74	6.06	6.06	1.25	0
Potamogeton richardsonii	Clasping-leaf pondweed	2	1.37	3.03	3.03	1.00	0
Utricularia vulgaris	Common bladderwort	2	1.37	3.03	3.03	1.50	0
Myriophyllum spicatum	**Eurasian water-milfoil**	**1**	**0.68**	**1.52**	**1.52**	**2.00**	**8**
Nymphaea odorata	White water lily	1	0.68	1.52	1.52	1.00	0
	Filamentous algae	1	*	1.52	1.52	1.00	0

* Excluded from the relative frequency calculation **Exotic species in bold**

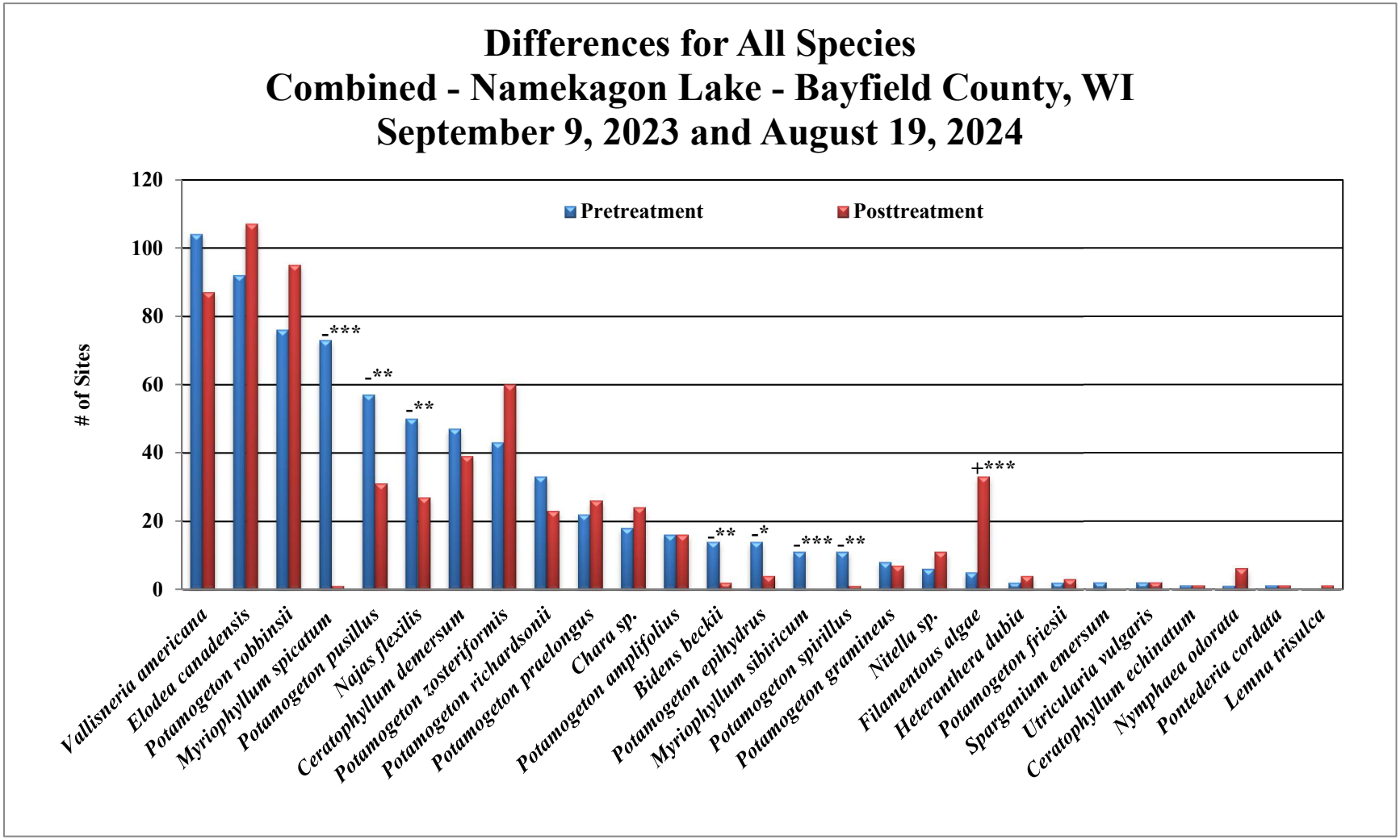
Table 8: Frequencies and Mean Rake Sample of Aquatic Macrophytes
Posttreatment Survey – ProcellaCor Areas Only – Namekagon Lake – Bayfield County, Wisconsin
August 19, 2024

Species	Common Name	Total Sites	Relative Freq.	Freq. in Veg.	Freq. in Lit.	Mean Rake	Visual Sites
Vallisneria americana	Wild celery	81	18.71	62.31	60.90	1.46	0
Elodea canadensis	Common waterweed	77	17.78	59.23	57.89	1.36	0
Potamogeton zosteriformis	Flat-stem pondweed	49	11.32	37.69	36.84	1.29	0
Potamogeton robbinsii	Fern pondweed	39	9.01	30.00	29.32	1.67	0
	Filamentous algae	32	*	24.62	24.06	1.41	0
Ceratophyllum demersum	Coontail	29	6.70	22.31	21.80	1.03	0
Najas flexilis	Slender naiad	27	6.24	20.77	20.30	1.19	0
Potamogeton pusillus	Small pondweed	27	6.24	20.77	20.30	1.07	0
Potamogeton praelongus	White-stem pondweed	21	4.85	16.15	15.79	1.71	0
Potamogeton richardsonii	Clasping-leaf pondweed	21	4.85	16.15	15.79	1.14	0
Chara sp.	Muskgrass	20	4.62	15.38	15.04	1.30	0
Potamogeton amplifolius	Large-leaf pondweed	7	1.62	5.38	5.26	1.29	0
Potamogeton gramineus	Variable pondweed	7	1.62	5.38	5.26	1.29	0
Nitella sp.	Nitella	6	1.39	4.62	4.51	1.50	0
Nymphaea odorata	White water lily	5	1.15	3.85	3.76	1.40	0
Heteranthera dubia	Water star-grass	4	0.92	3.08	3.01	1.25	0
Potamogeton epihydrus	Ribbon-leaf pondweed	4	0.92	3.08	3.01	1.25	0
Potamogeton friesii	Fries' pondweed	3	0.69	2.31	2.26	1.33	0
Bidens beckii	Water marigold	2	0.46	1.54	1.50	1.00	0
Ceratophyllum echinatum	Spiny hornwort	1	0.23	0.77	0.75	1.00	0
Lemna trisulca	Forked duckweed	1	0.23	0.77	0.75	1.00	0
Pontederia cordata	Pickerelweed	1	0.23	0.77	0.75	3.00	0
Potamogeton spirillus	Spiral-fruited pondweed	1	0.23	0.77	0.75	1.00	0

* Excluded from the relative frequency calculation

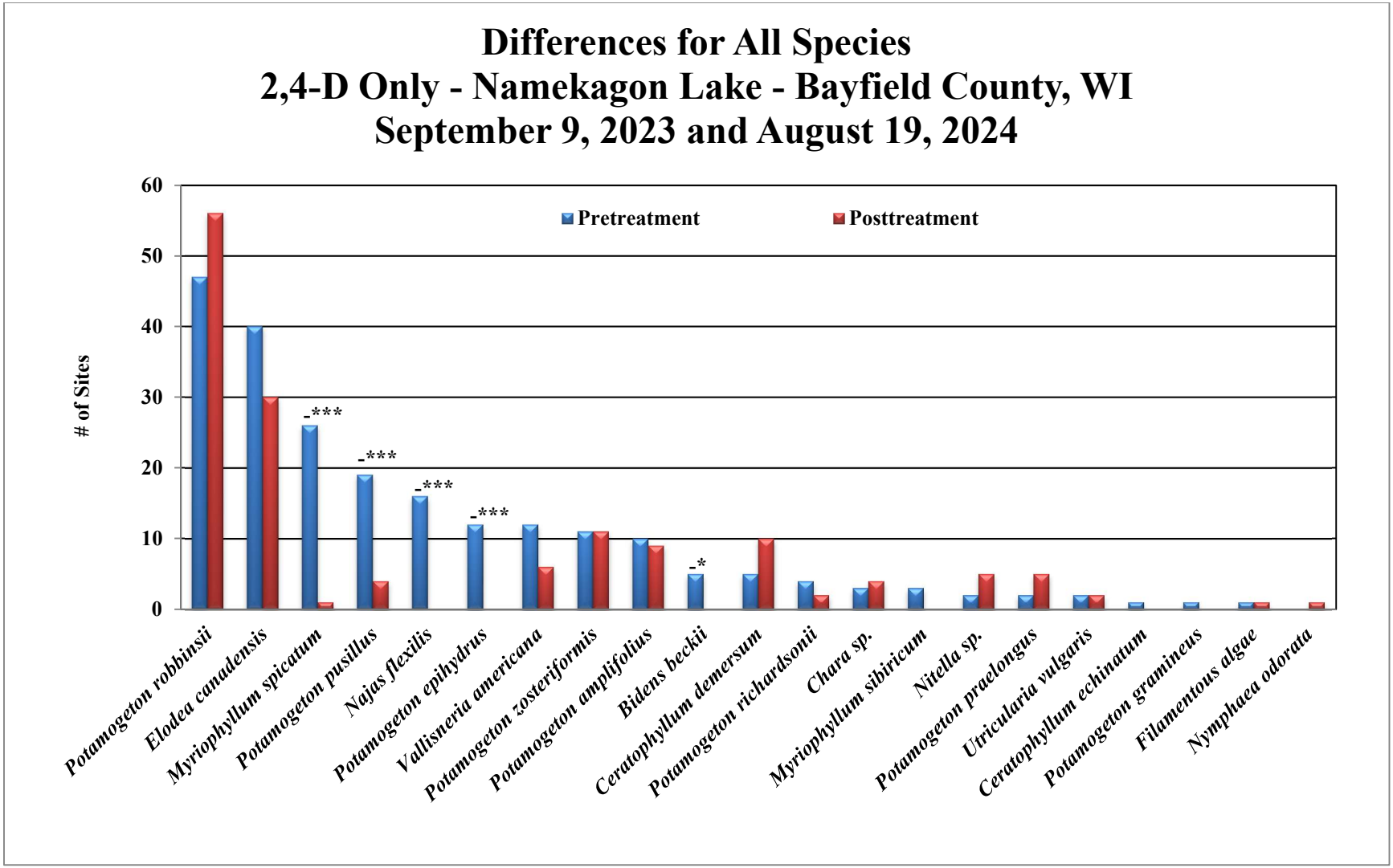
When combining all treatment areas, eight species showed significant changes in distribution. In addition to the previously mentioned highly significant declines in Hybrid water-milfoil and Norther water-milfoil and the moderately significant declines in Small pondweed, Slender naiad and Water marigold, we also documented a moderately significant decline **(p=0.003)** in Spiral-fruited pondweed, and a significant decline **(p=0.02)** in Ribbon-leaf pondweed. Filamentous algae were the only species that underwent a significant increase in distribution (five sites pretreatment/33 sites posttreatment), and it was highly significant **(p<0.001)** (Figure 21) (Maps for all native species from the pre and posttreatment surveys can be found in Appendixes VI and VII).

Breaking these changes out by treatment areas offered little additional information. In the 2,4-D area, the only notable change was the highly significant decline **(p<0.001)** in Ribbon-leaf pondweed (Figure 22). In the ProcellaCor areas, Common waterweed experienced a moderately significant increase **(p=0.002)**, while Flat-stem pondweed saw a significant increase **(p=0.003)** (Figure 23).



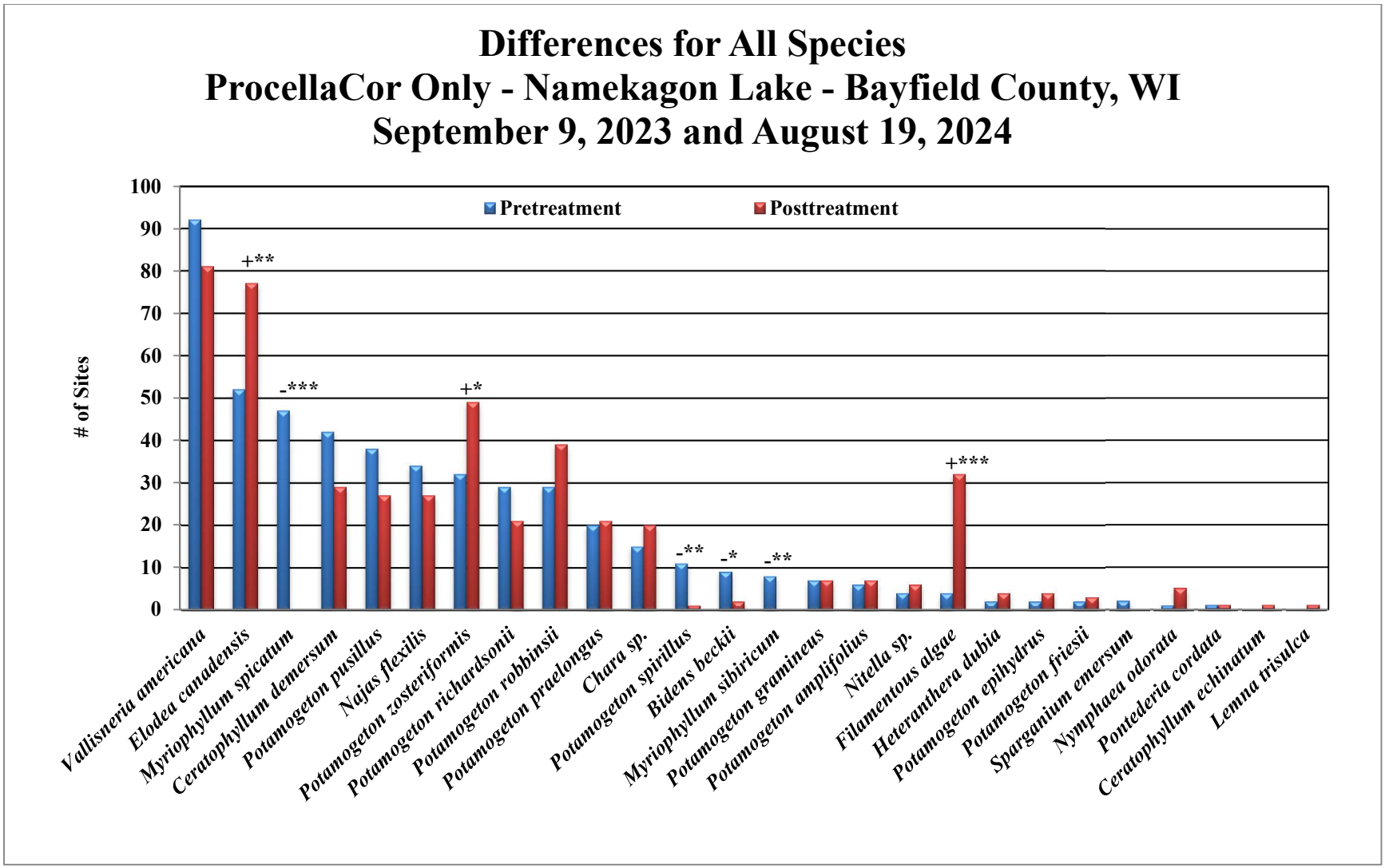
Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 21: Pre and Posttreatment Changes for All Species – All Treatment Areas



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 22: Pre and Posttreatment Changes for All Species – 2,4-D Area Only



Significant differences = * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Figure 23: Pre and Posttreatment Changes for All Species – ProcellaCor Areas Only

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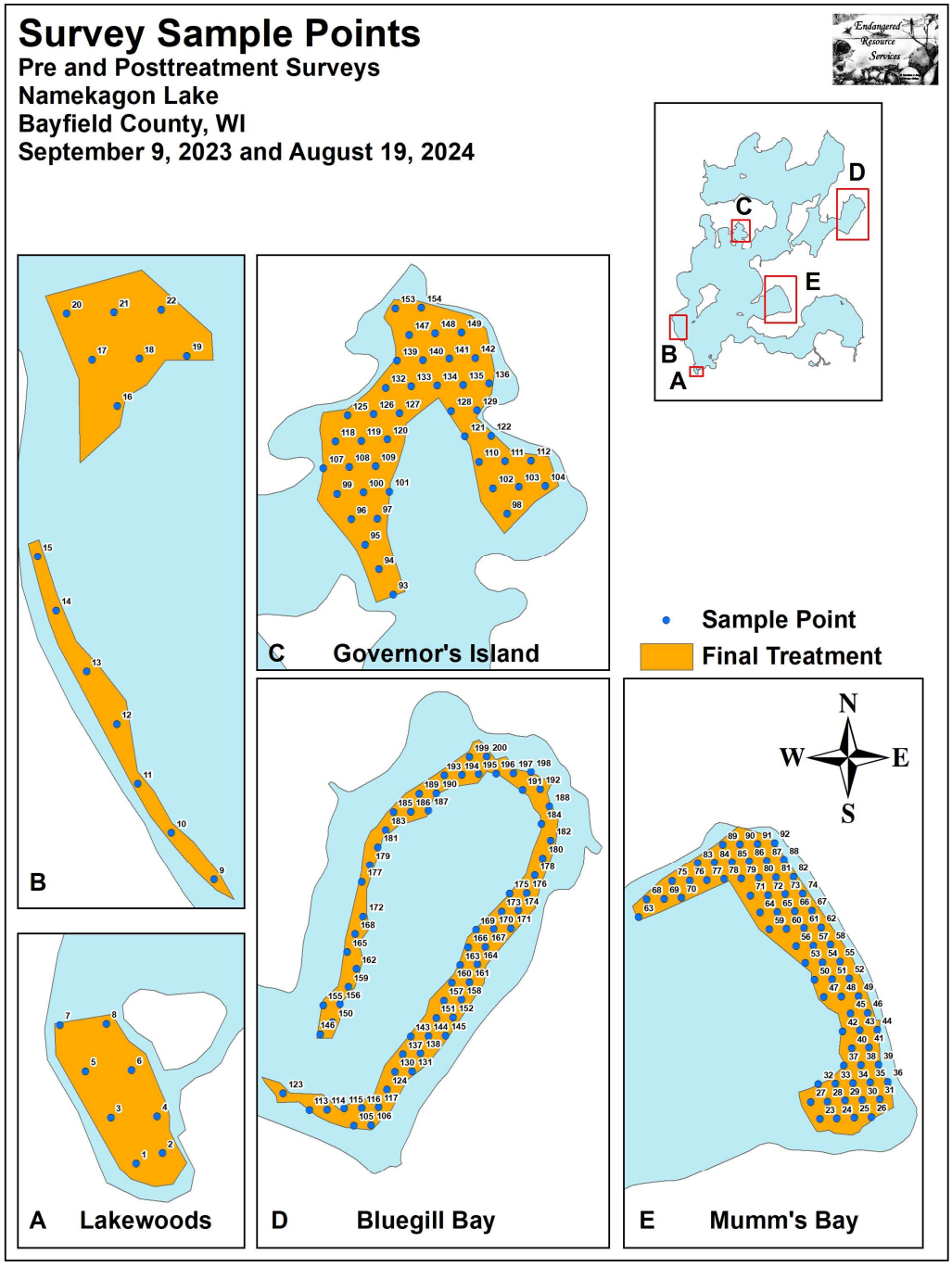
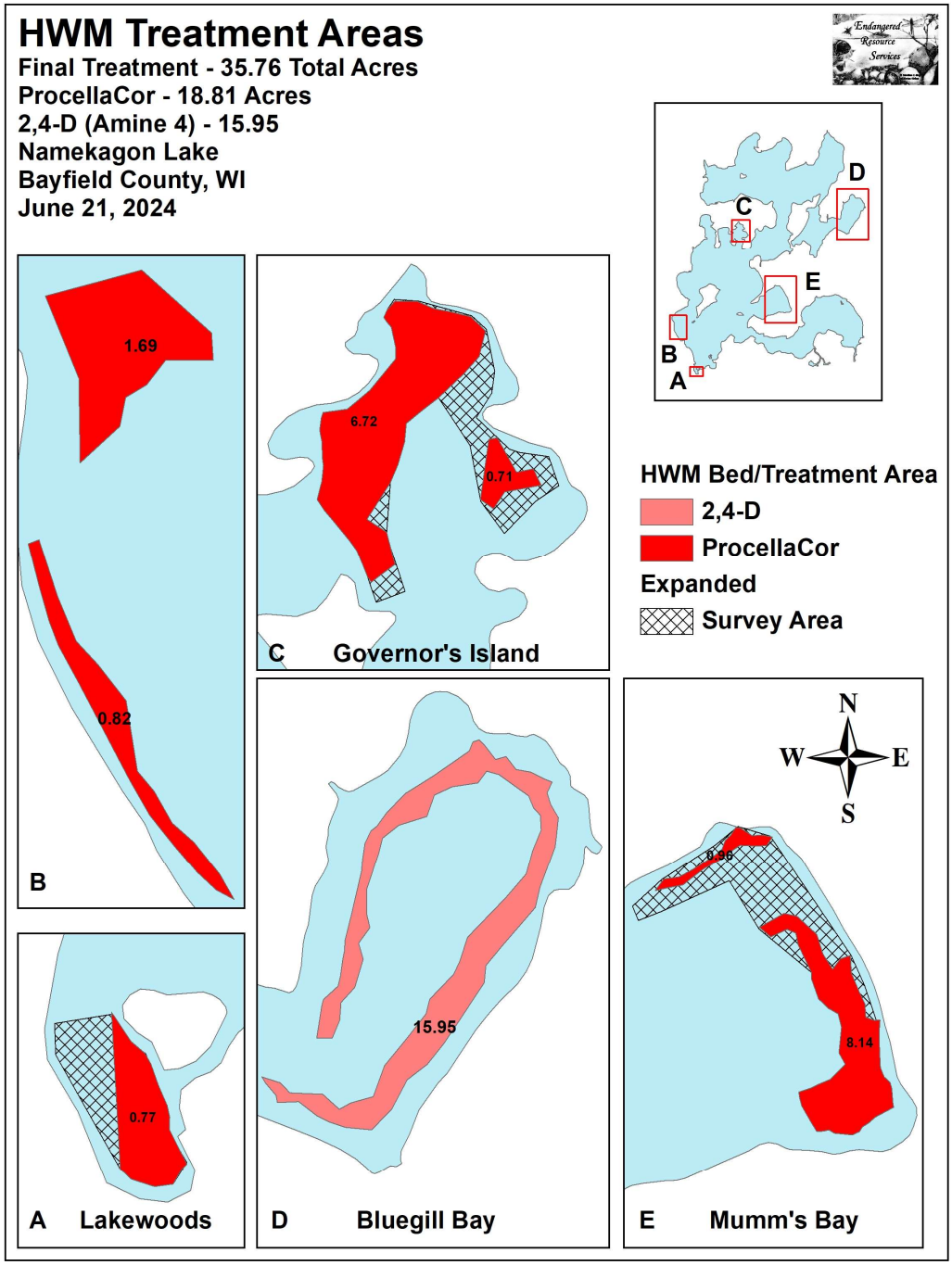
Appendix I: HWM Pre/Post Survey Sample Points and Treatment Areas

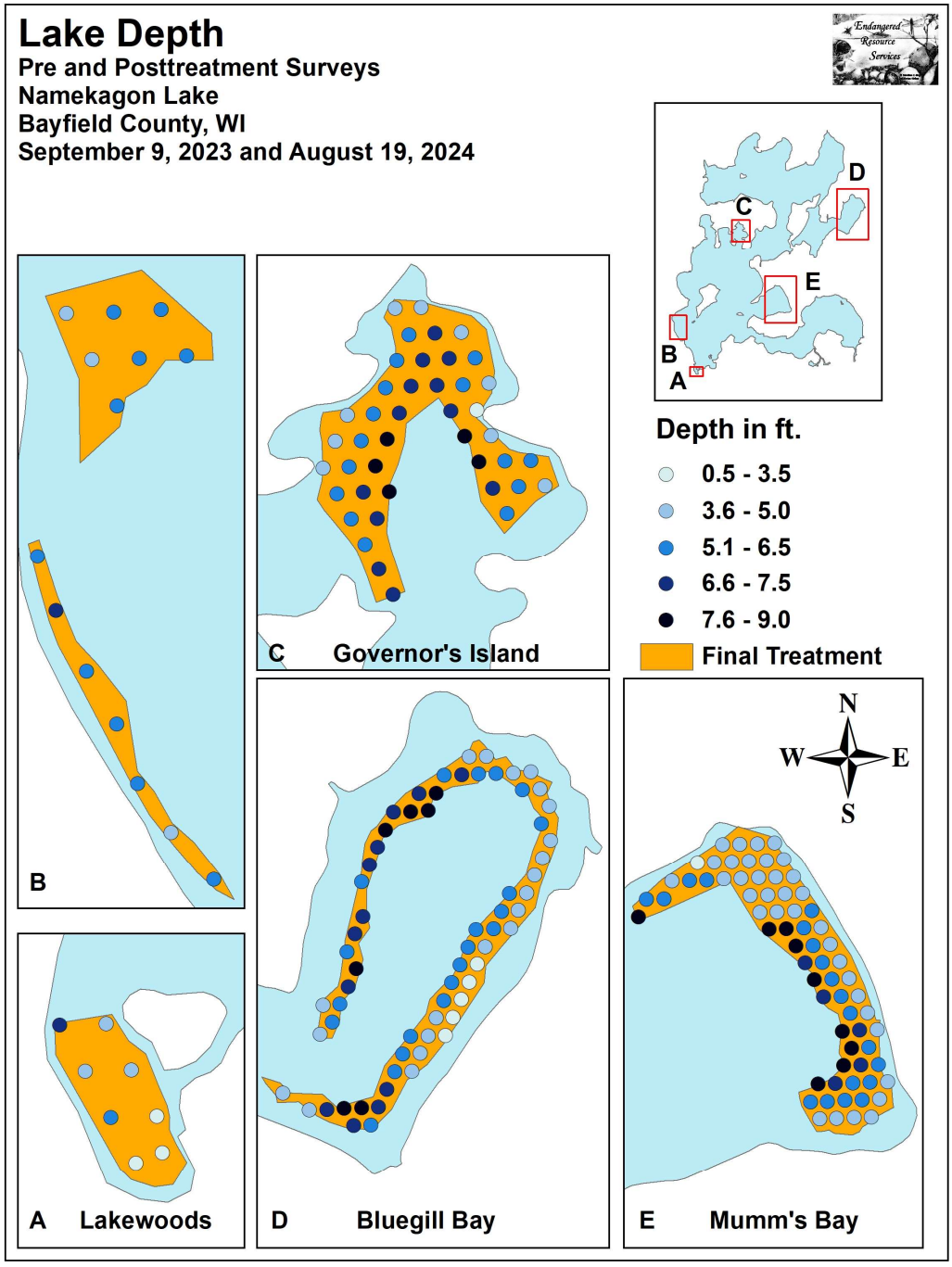

Survey Sample Points
Pre and Posttreatment Surveys
Namekagon Lake
Bayfield County, WI
September 9, 2023 and August 19, 2024
Endangered Resource Services
D
C
E
B
A
Sample Point
Final Treatment
N
W
E
S
B
C Governor's Island
A Lakewoods
D Bluegill Bay
E Mumm's Bay

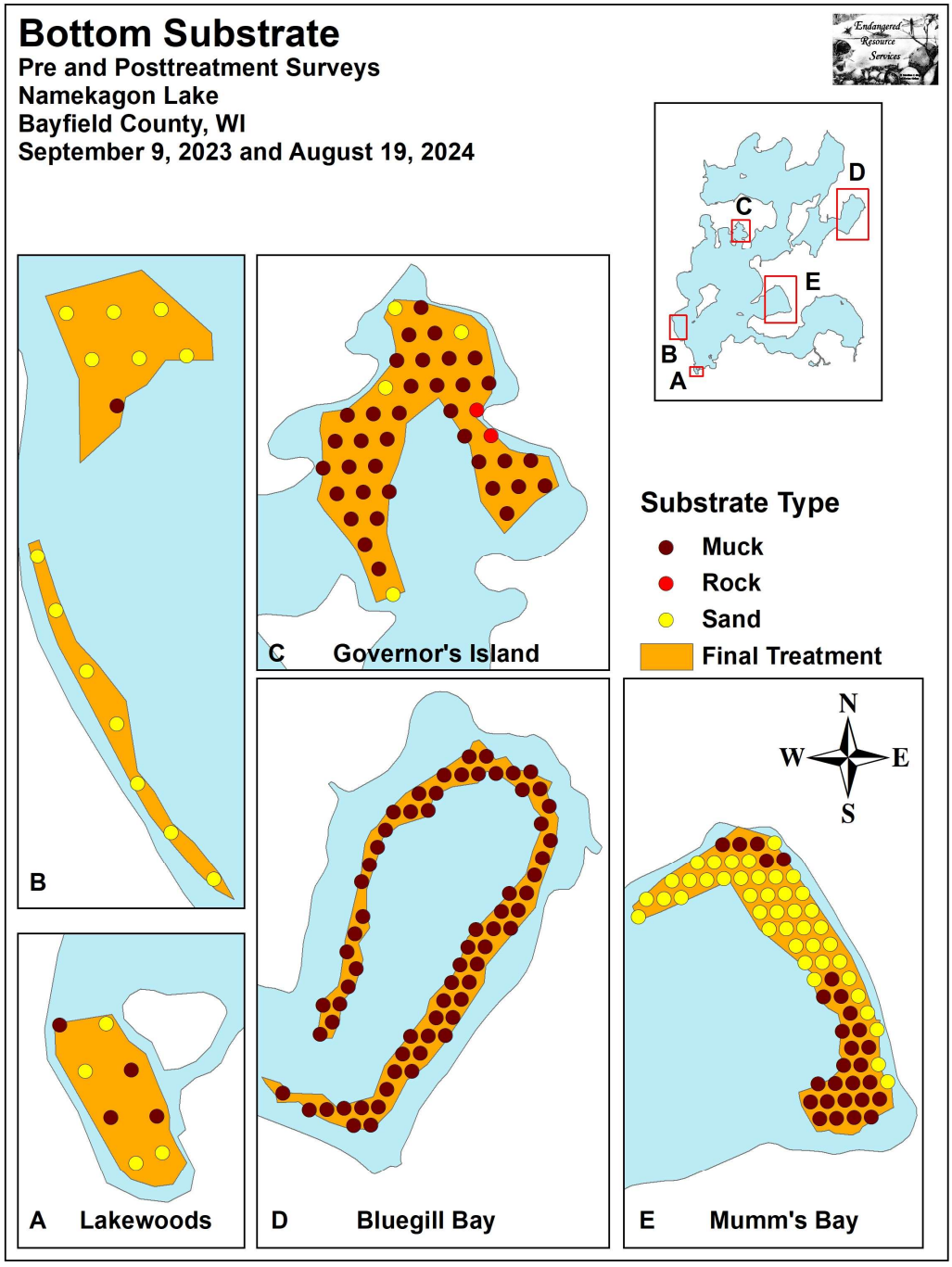

HWM Treatment Areas
Final Treatment - 35.76 Total Acres
ProcellaCor - 18.81 Acres
2,4-D (Amine 4) - 15.95
Namekagon Lake
Bayfield County, WI
June 21, 2024
Endangered Resource Services
D
C
E
B
A
HWM Bed/Treatment Area
2,4-D
ProcellaCor
Expanded
Survey Area
1.69
0.82
B
6.72
0.71
C Governor's Island
N
W
E
S
0.36
8.14
E Mumm's Bay
15.95
D Bluegill Bay
0.77
A Lakewoods

Appendix II: Vegetative Survey Datasheet

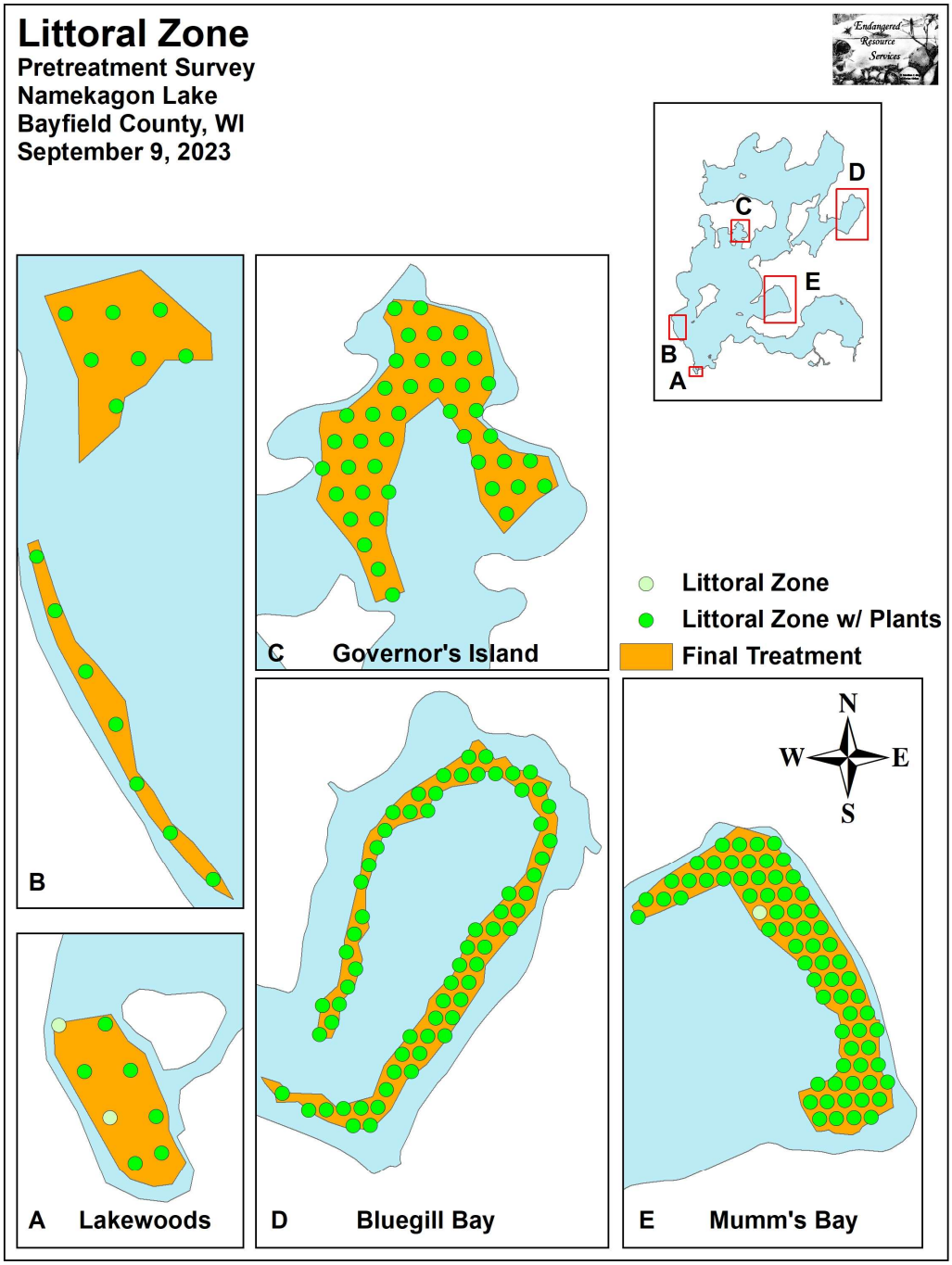
Observers for this lake: names and hours worked by each:																												
Lake:									WBIC										County							Date:	
Site #	Depth (ft)	Muck (M), Sand (S), Rock (R)	Rake pole (P) or rake rope (R)	Total Rake Fullness	HWM	HWM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									
13																									
14																									
15																									
16																									
17																									
18																									
19																									
20																									

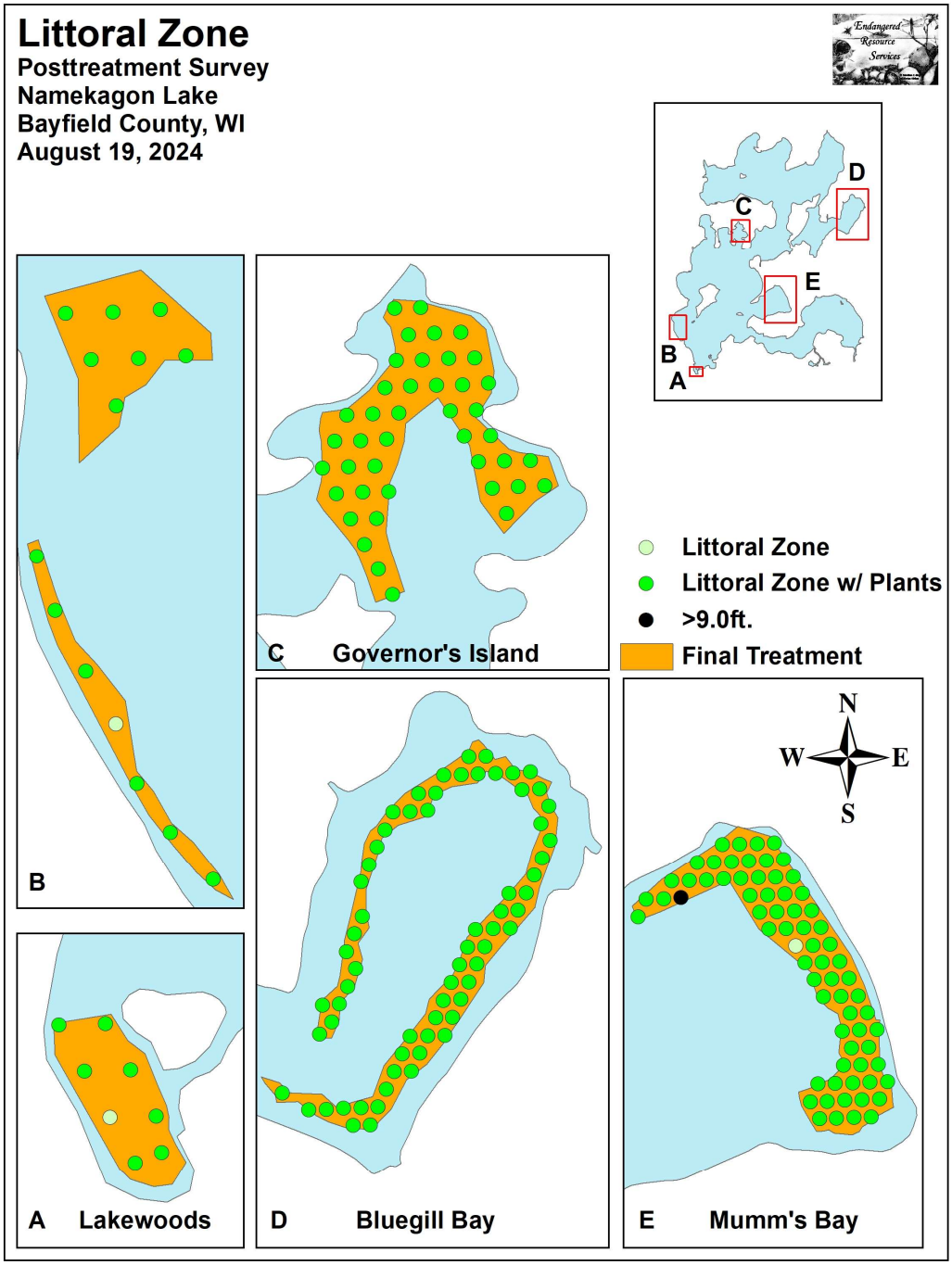
Appendix III: Pre/Post Habitat Variables

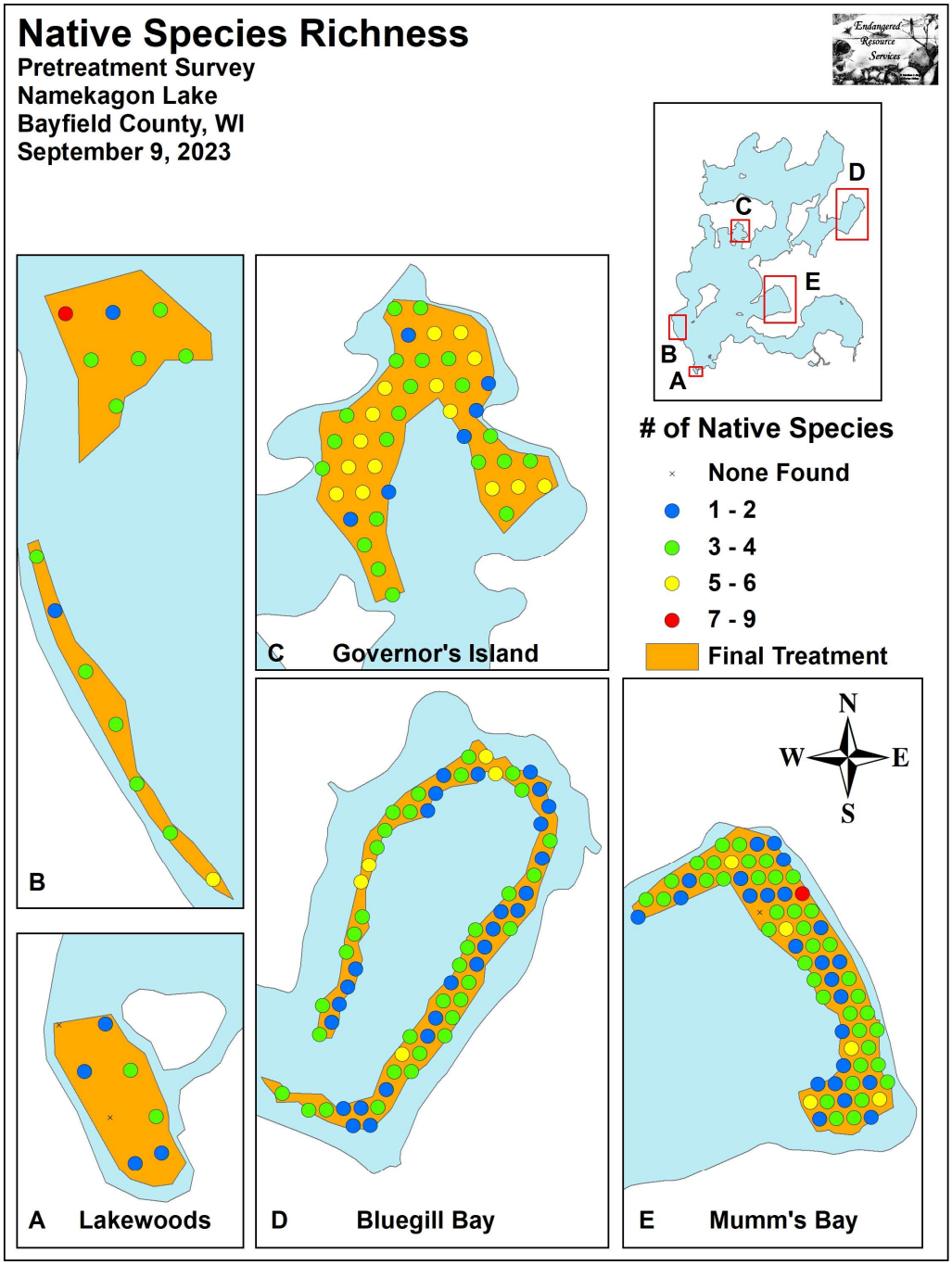

Lake Depth
Pre and Posttreatment Surveys
Namekagon Lake
Bayfield County, WI
September 9, 2023 and August 19, 2024
Endangered Resource Services
D
C
E
B
A
Depth in ft.
0.5 - 3.5
3.6 - 5.0
5.1 - 6.5
6.6 - 7.5
7.6 - 9.0
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

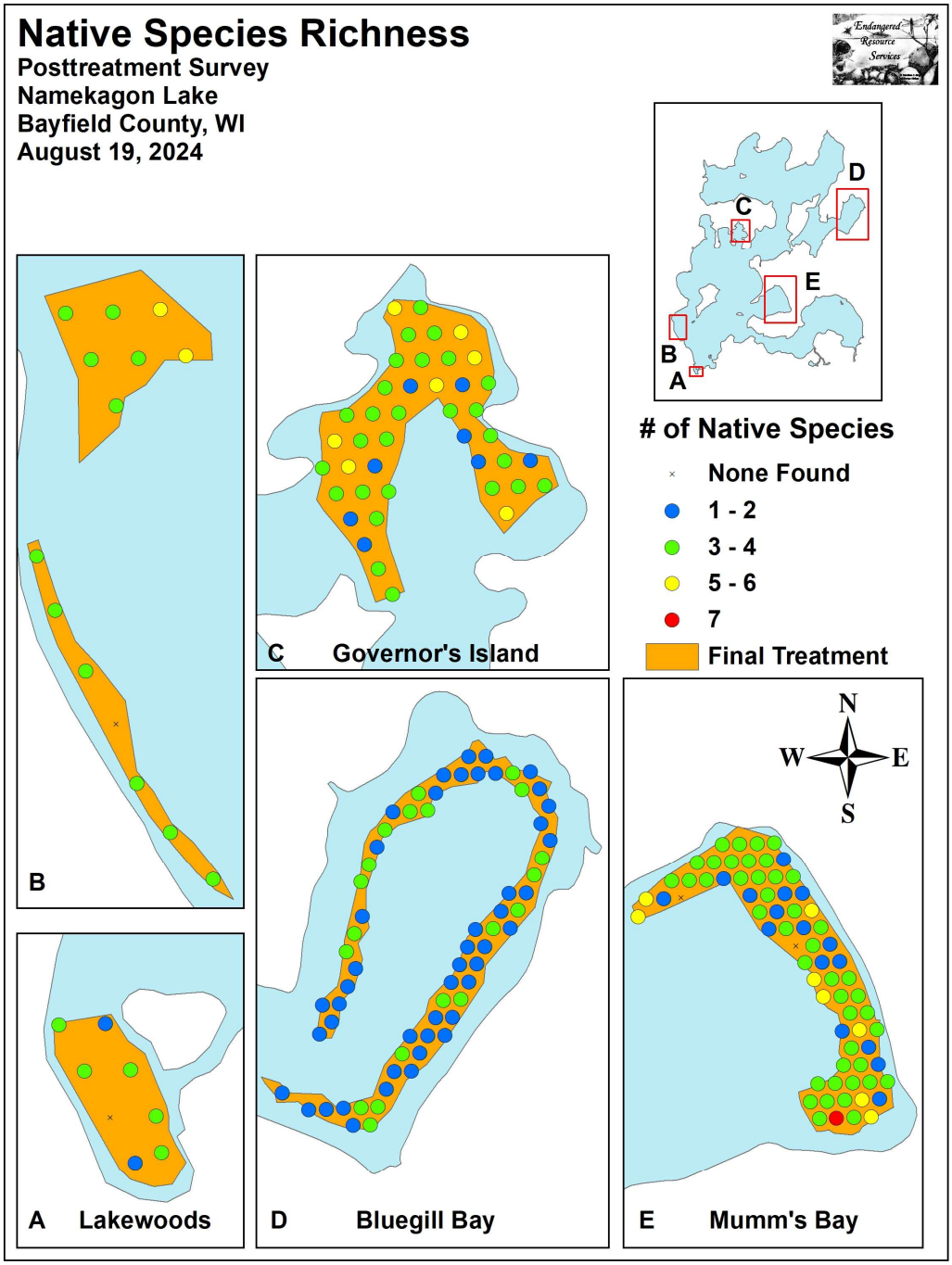

Bottom Substrate
Pre and Posttreatment Surveys
Namekagon Lake
Bayfield County, WI
September 9, 2023 and August 19, 2024
Endangered Resource Services
D
C
E
B
A
Substrate Type
Muck
Rock
Sand
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

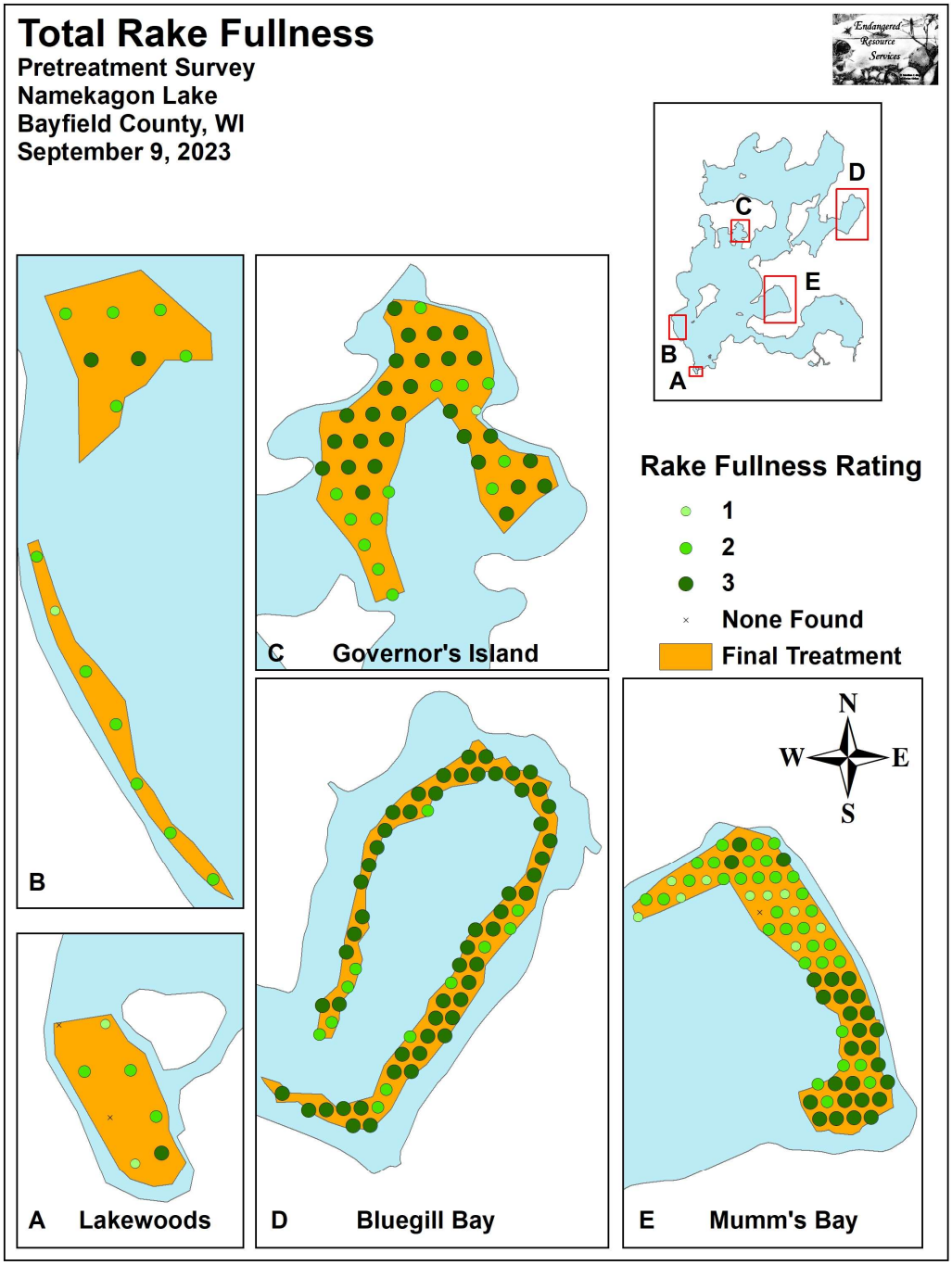
Appendix IV: Pre/Post Littoral Zone, Native Species Richness, and Total Rake Fullness

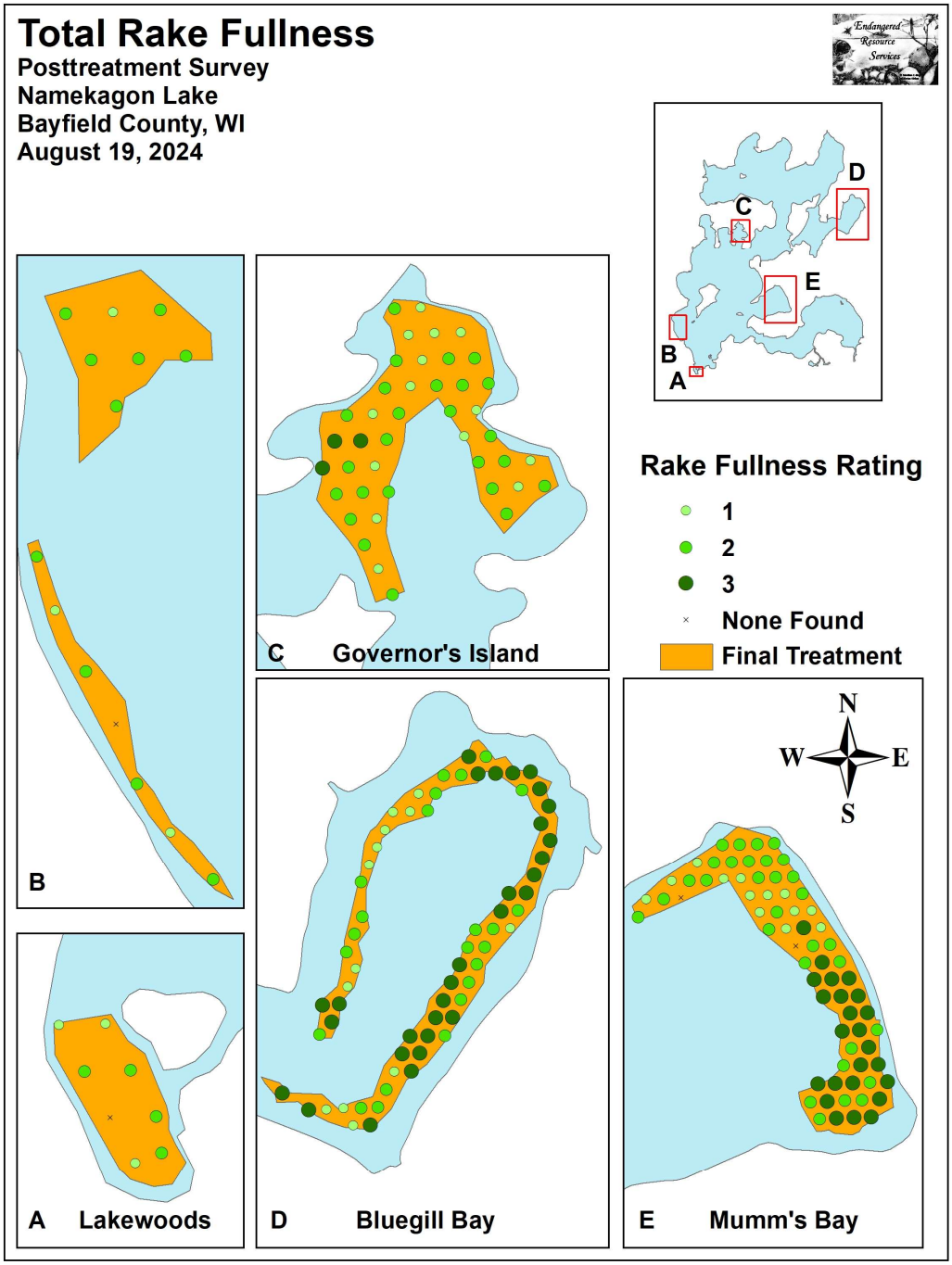

Littoral Zone
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Littoral Zone
Littoral Zone w/ Plants
Final Treatment
C Governor's Island
B
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Littoral Zone
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
A
Littoral Zone
Littoral Zone w/ Plants
>9.0ft.
Final Treatment
C Governor's Island
B
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

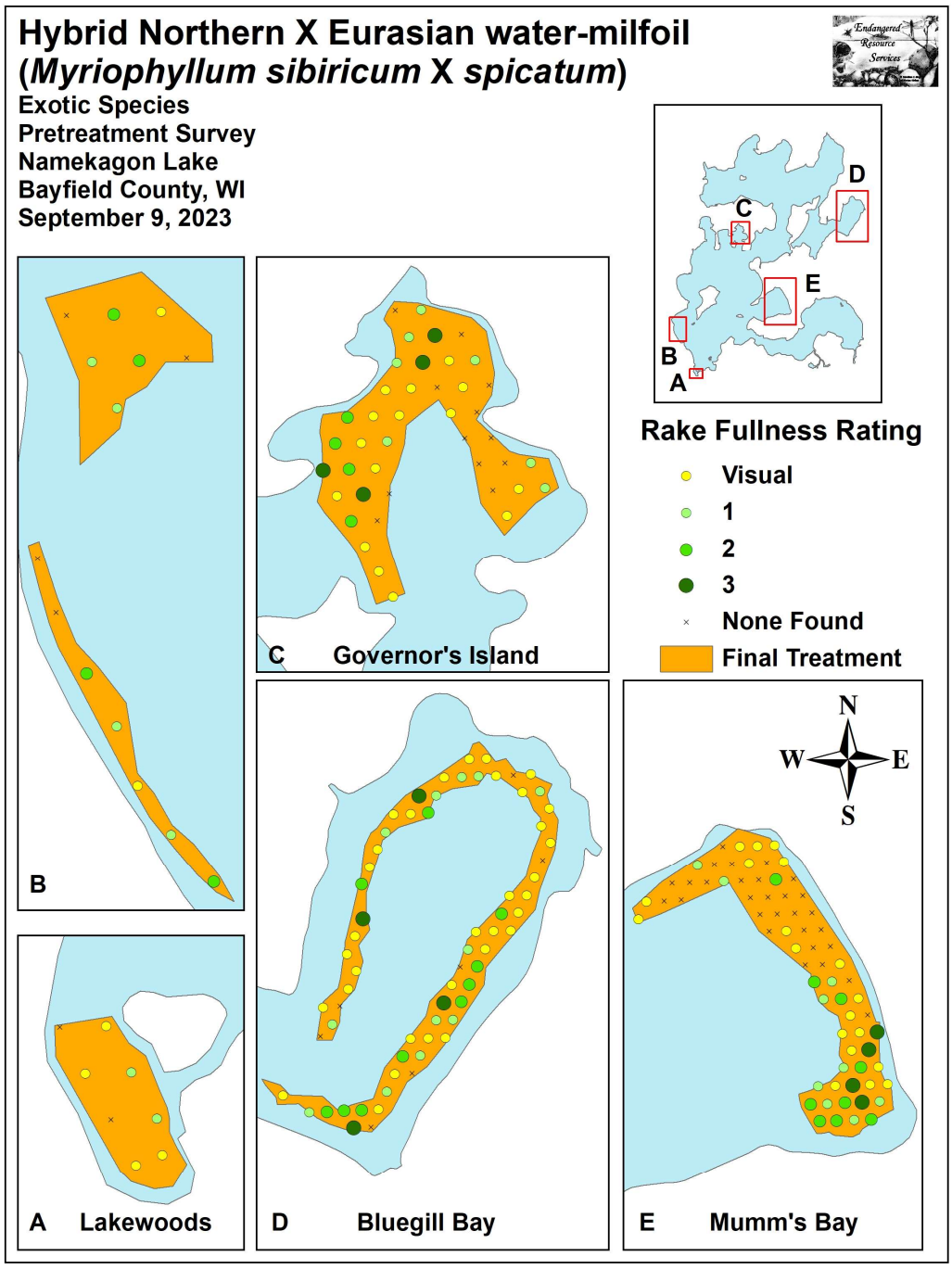

Native Species Richness
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
# of Native Species
None Found
1 - 2
3 - 4
5 - 6
7 - 9
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

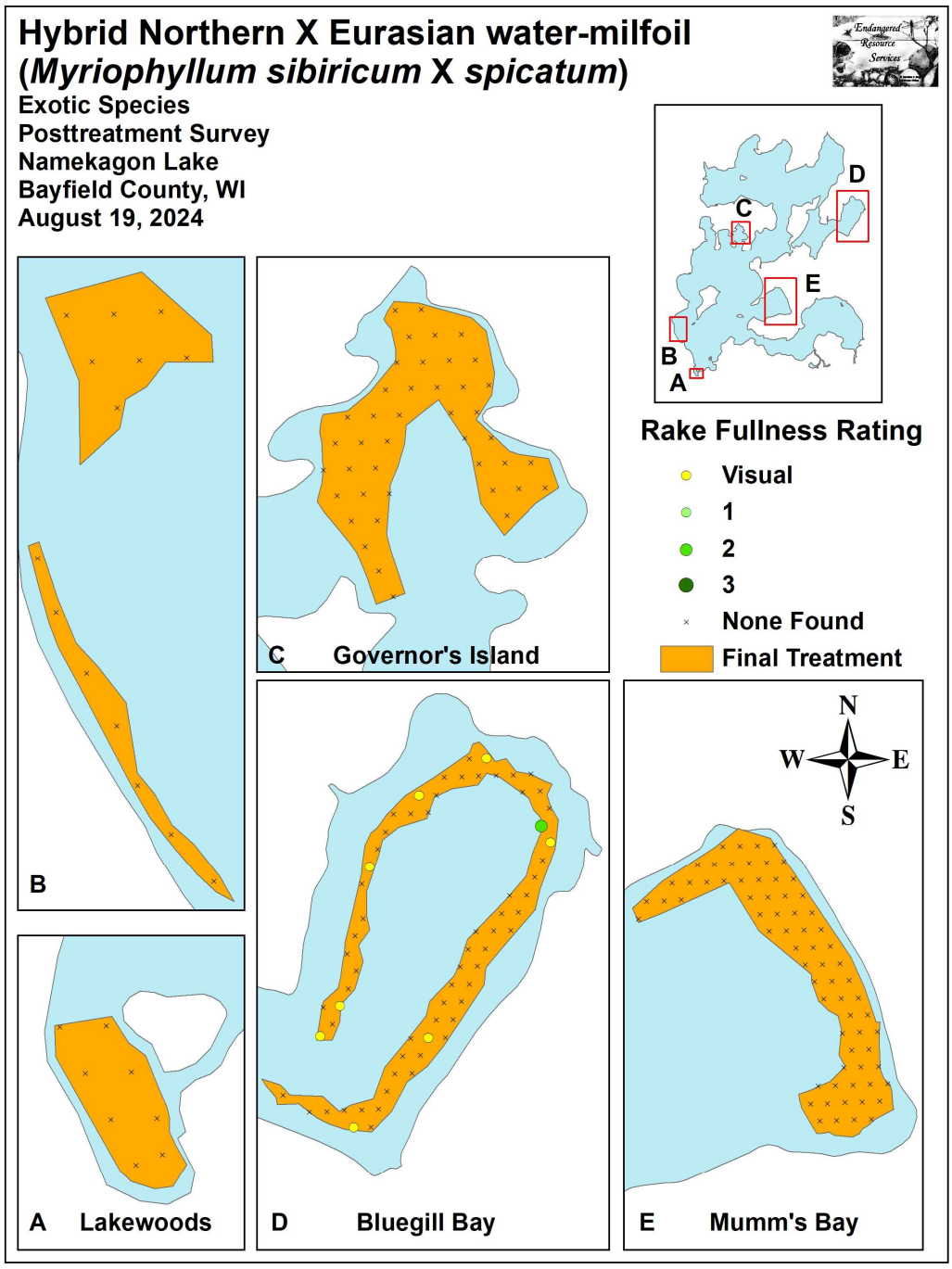

Native Species Richness
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
A
# of Native Species
None Found
1 - 2
3 - 4
5 - 6
7
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Total Rake Fullness
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
1
2
3
None Found
Final Treatment
C Governor's Island
B
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

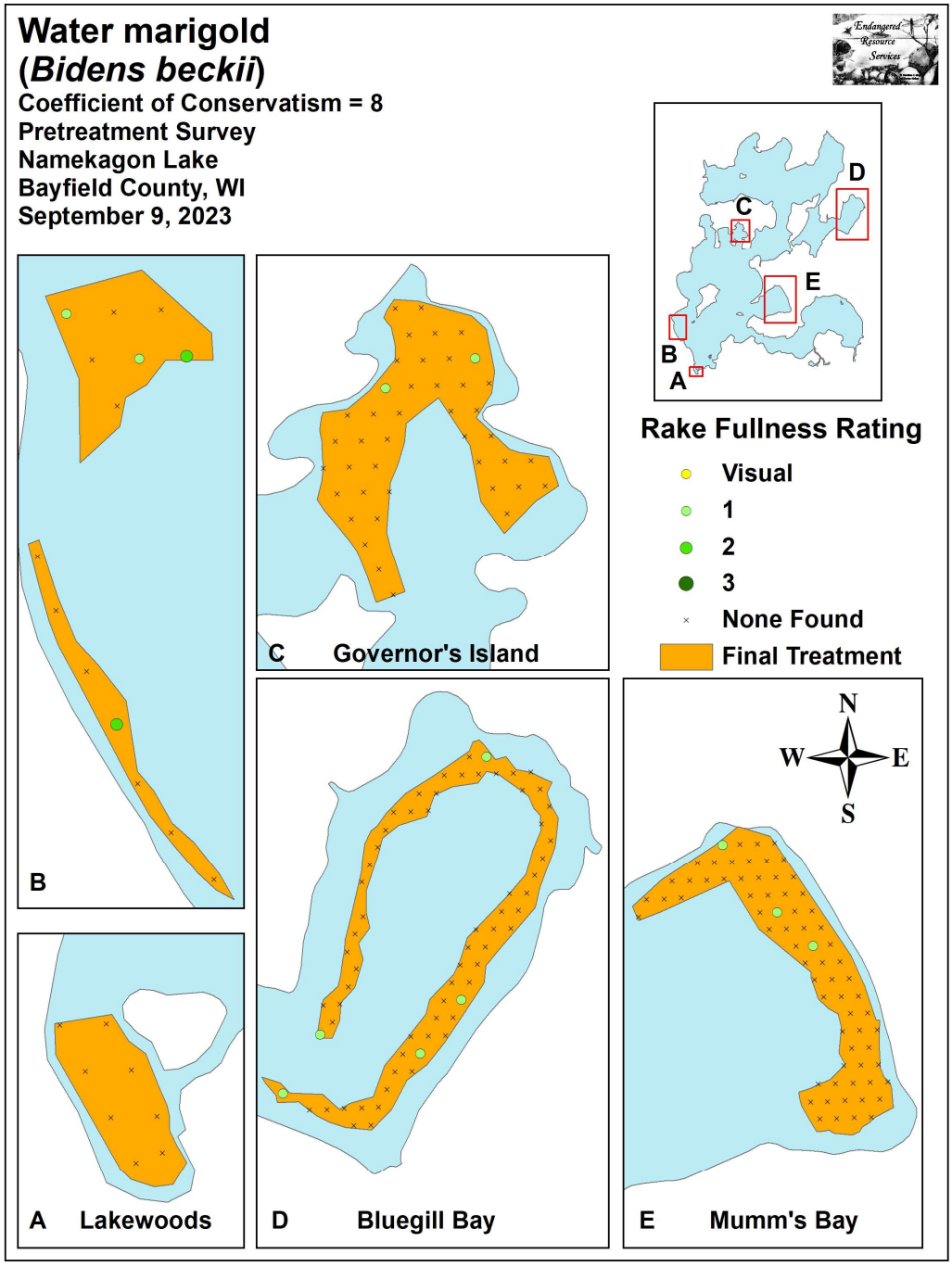

Total Rake Fullness
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
1
2
3
None Found
Final Treatment
C Governor's Island
B
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

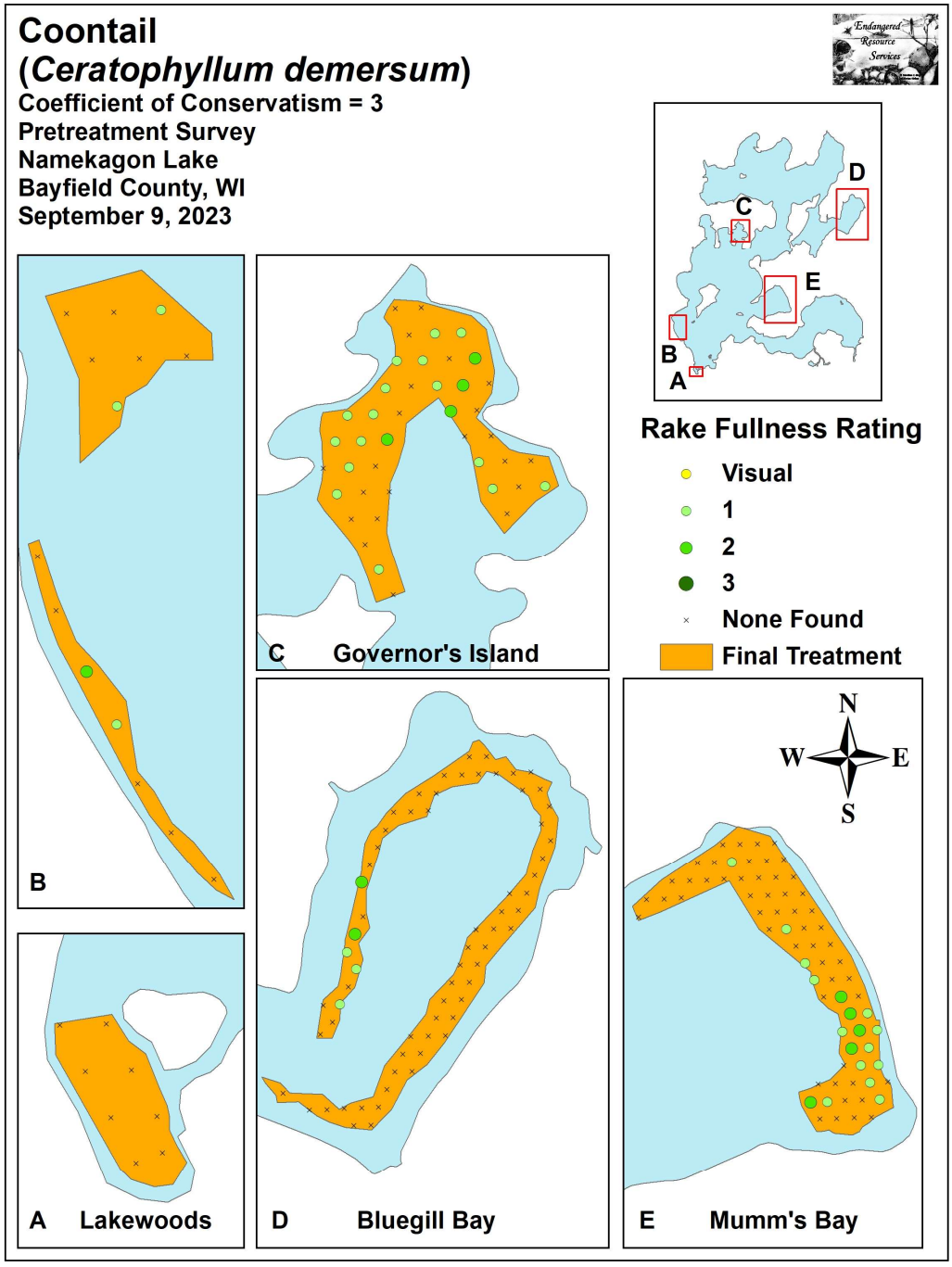
Appendix V: HWM Pre/Posttreatment Density and Distribution

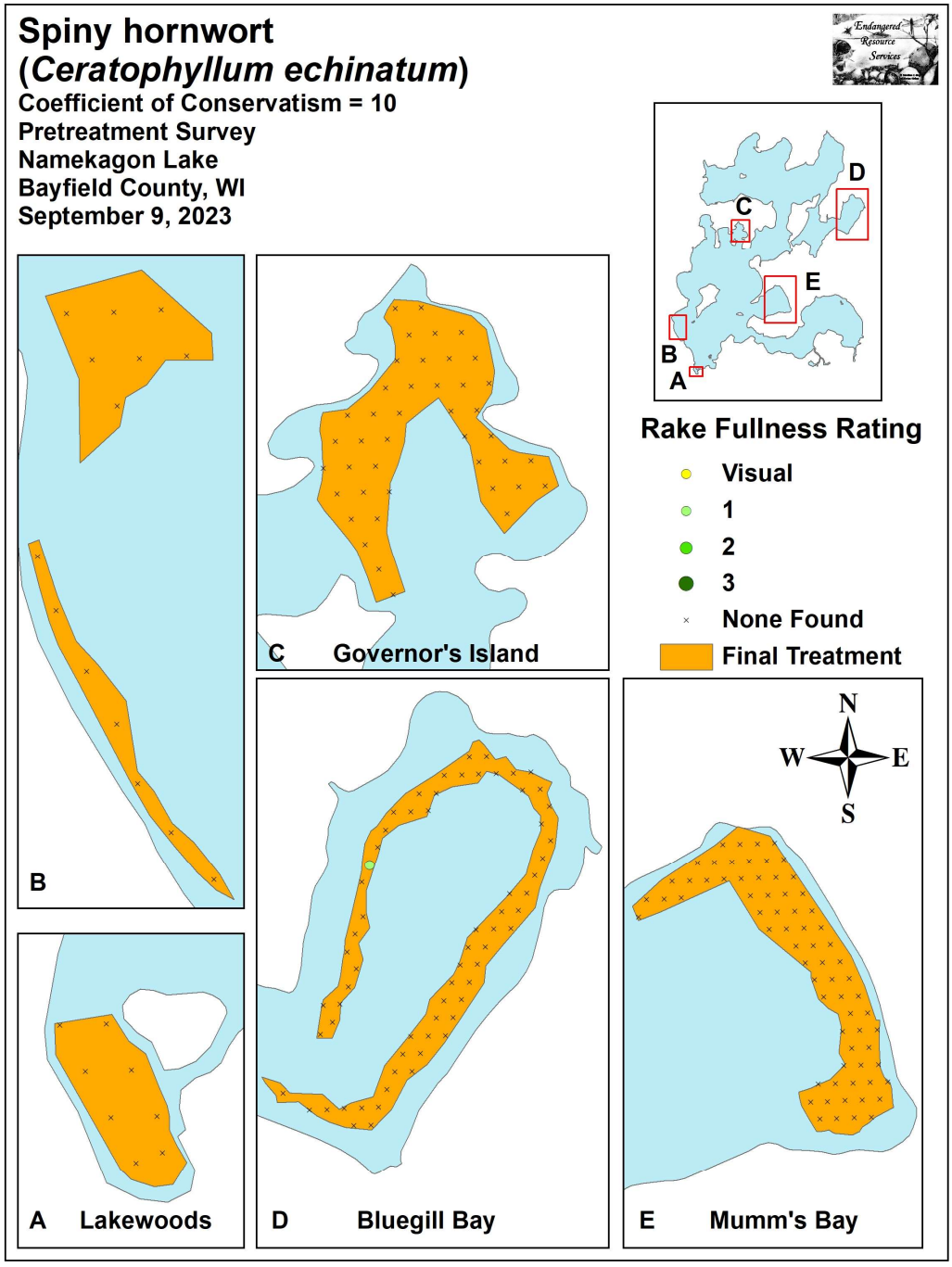

Hybrid Northern X Eurasian water-milfoil
(Myriophyllum sibiricum X spicatum)
Exotic Species
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

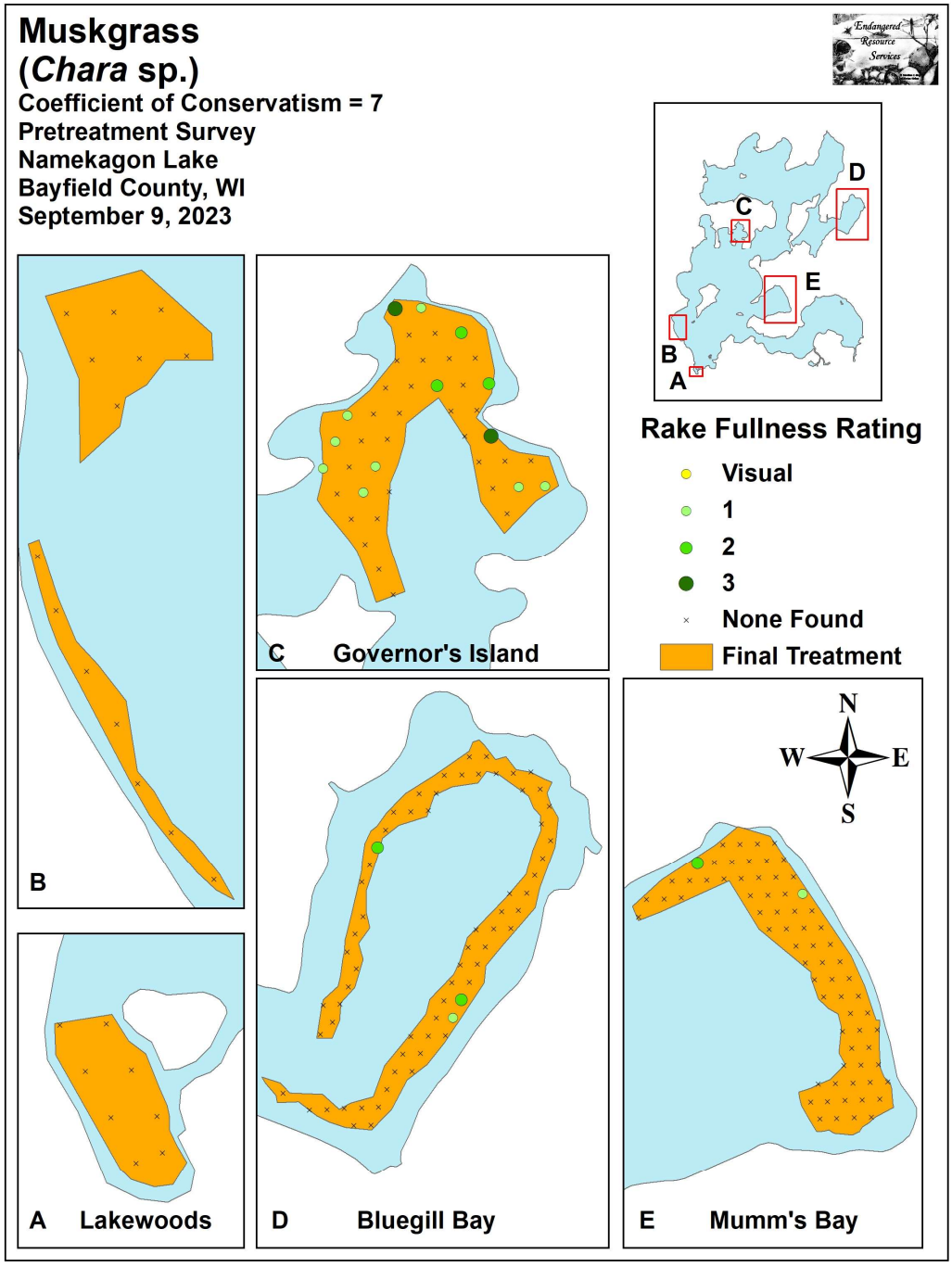

Hybrid Northern X Eurasian water-milfoil
(Myriophyllum sibiricum X spicatum)
Exotic Species
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

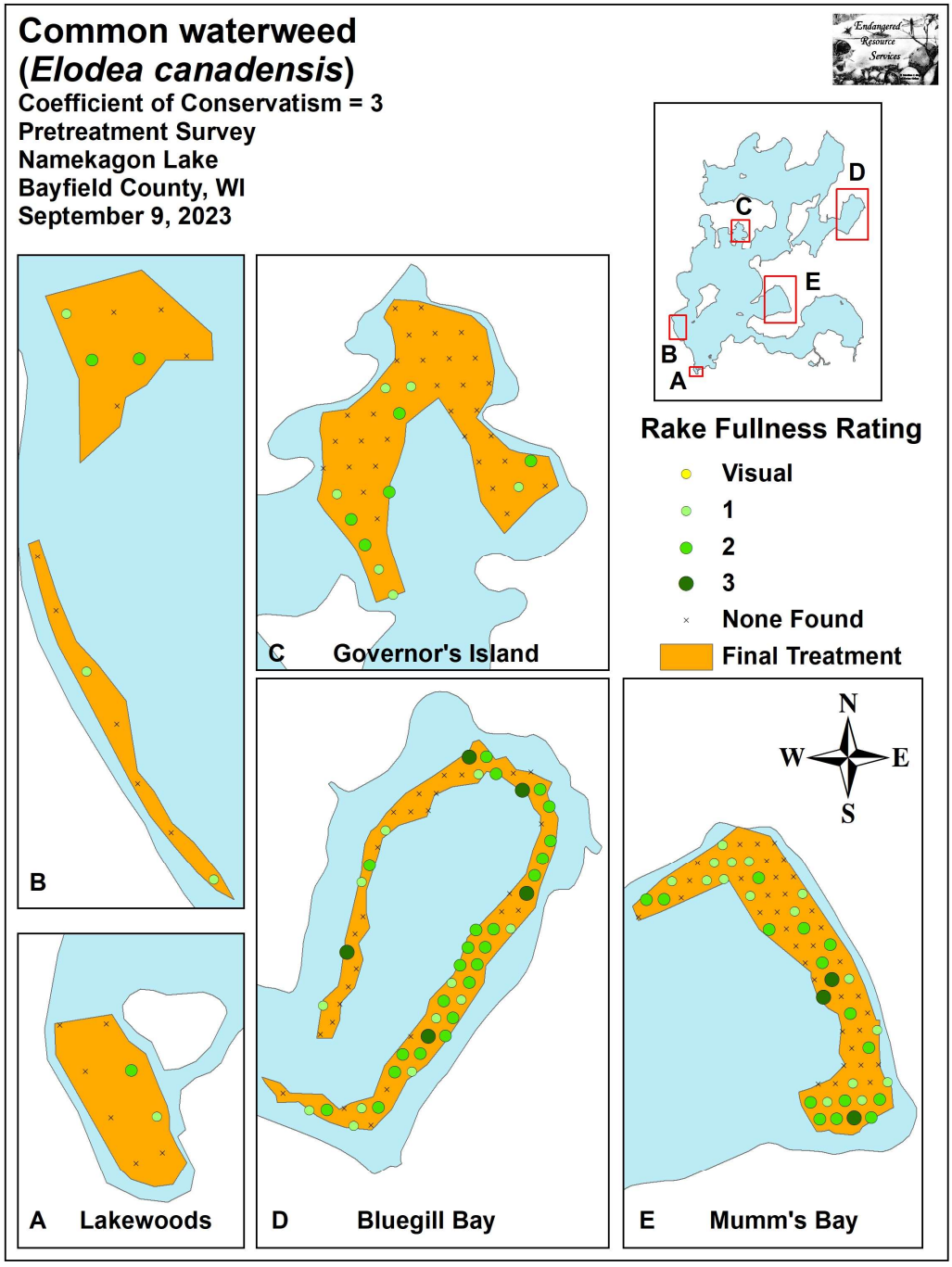
Appendix VI: Pretreatment Native Species Density and Distribution

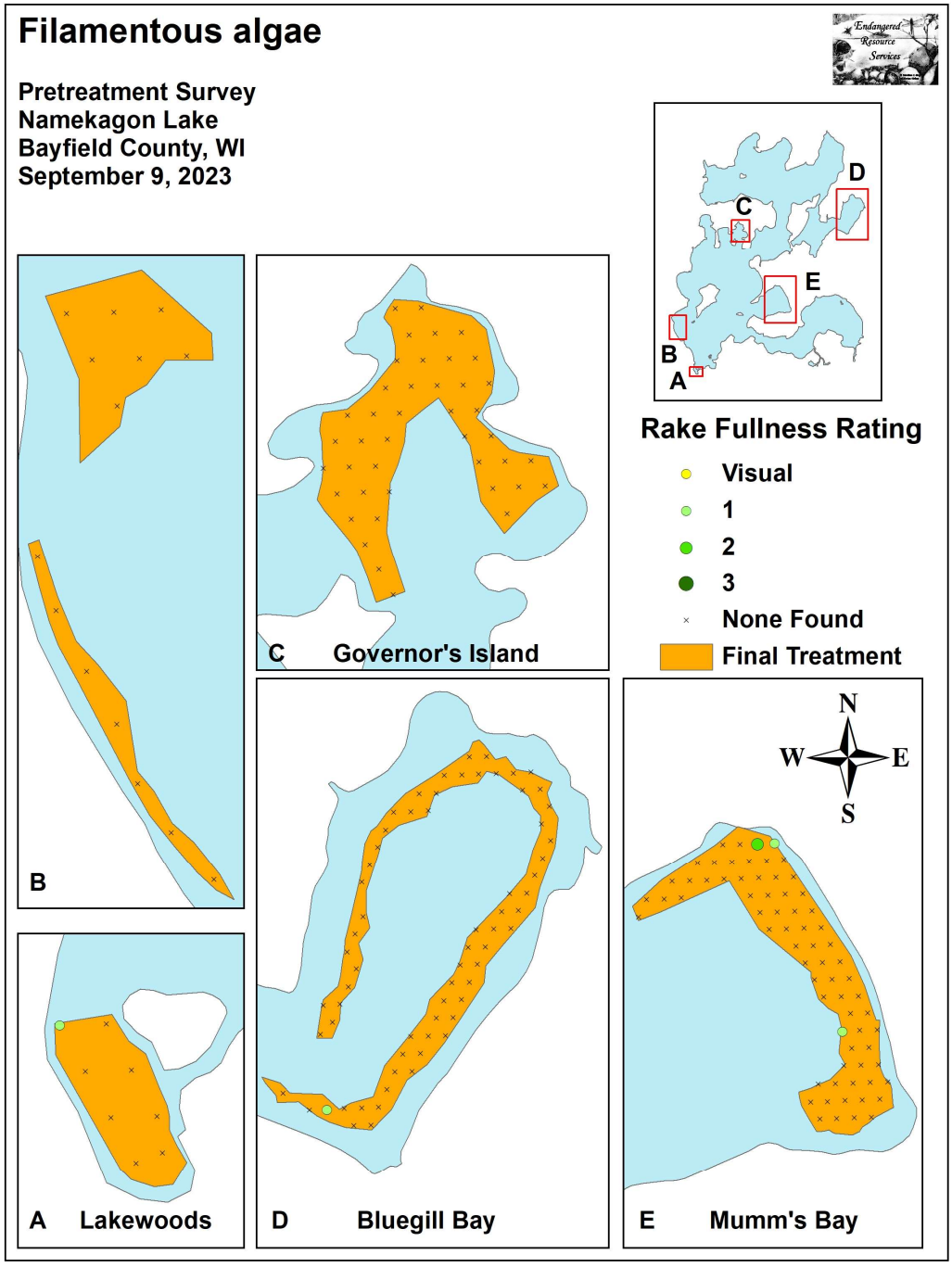

Water marigold
(Bidens beckii)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

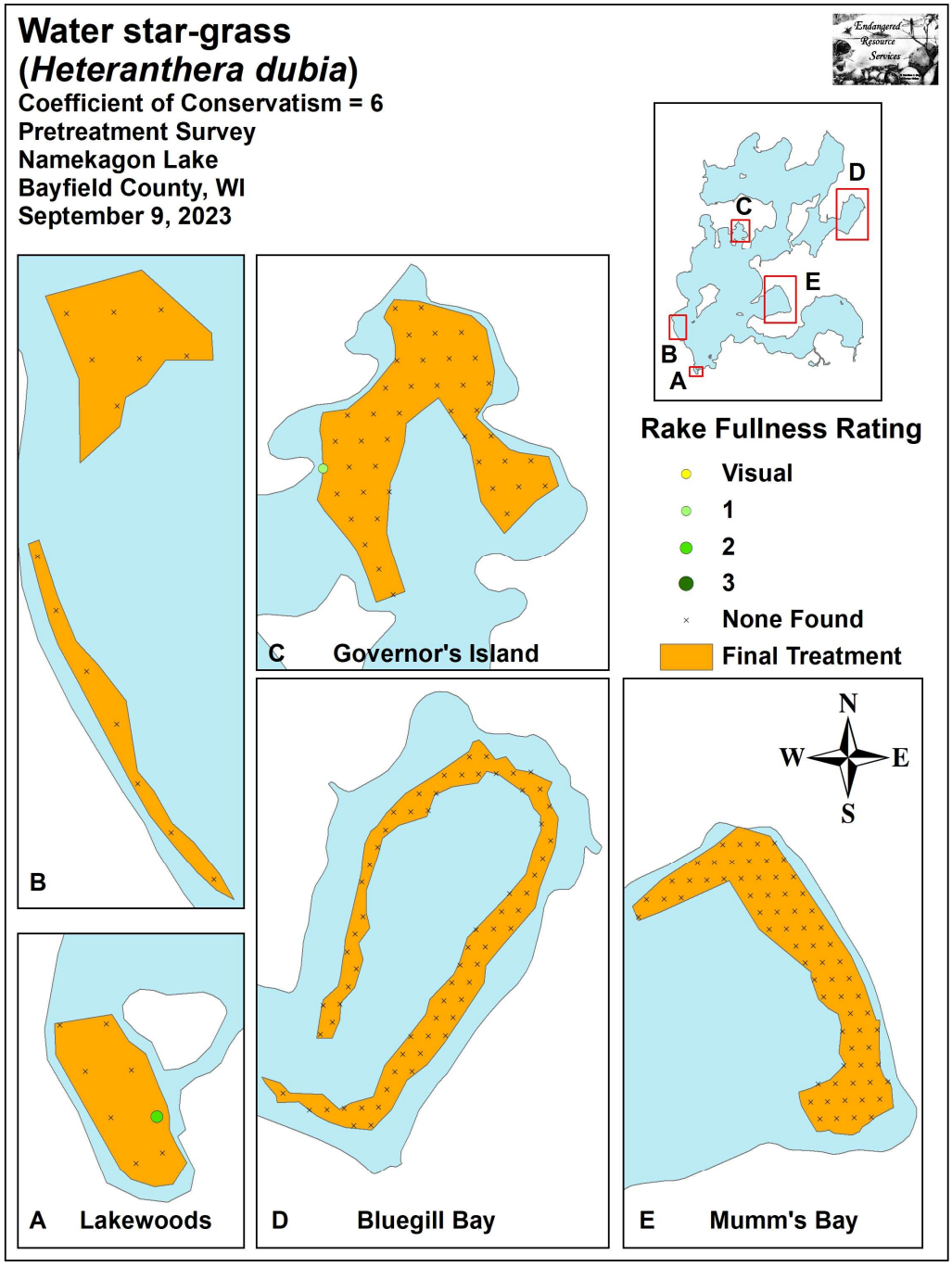

Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
N
W
E
S
B
C Governor's Island
A Lakewoods
D Bluegill Bay
E Mumm's Bay

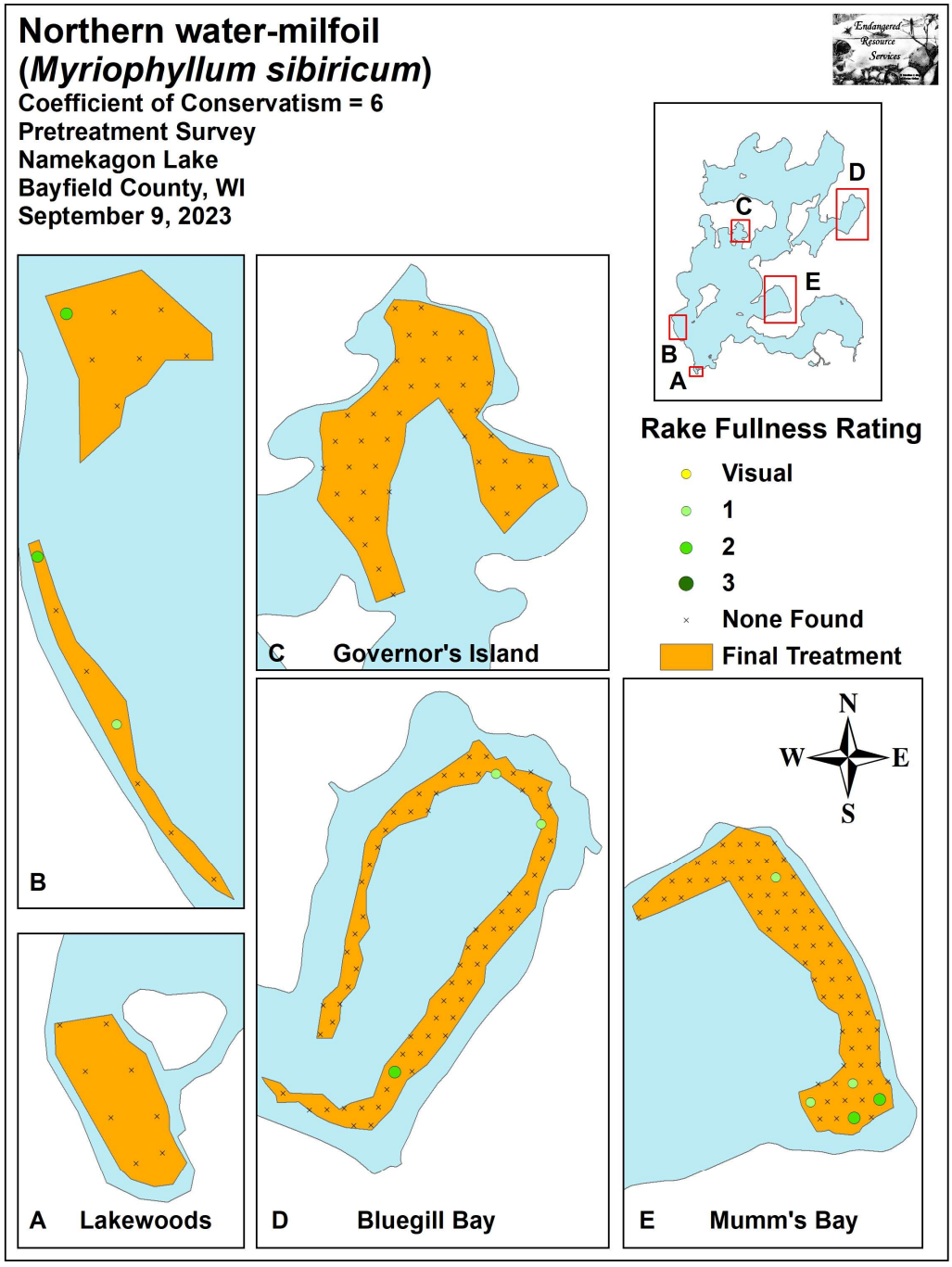

Spiny hornwort
(Ceratophyllum echinatum)
Coefficient of Conservatism = 10
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

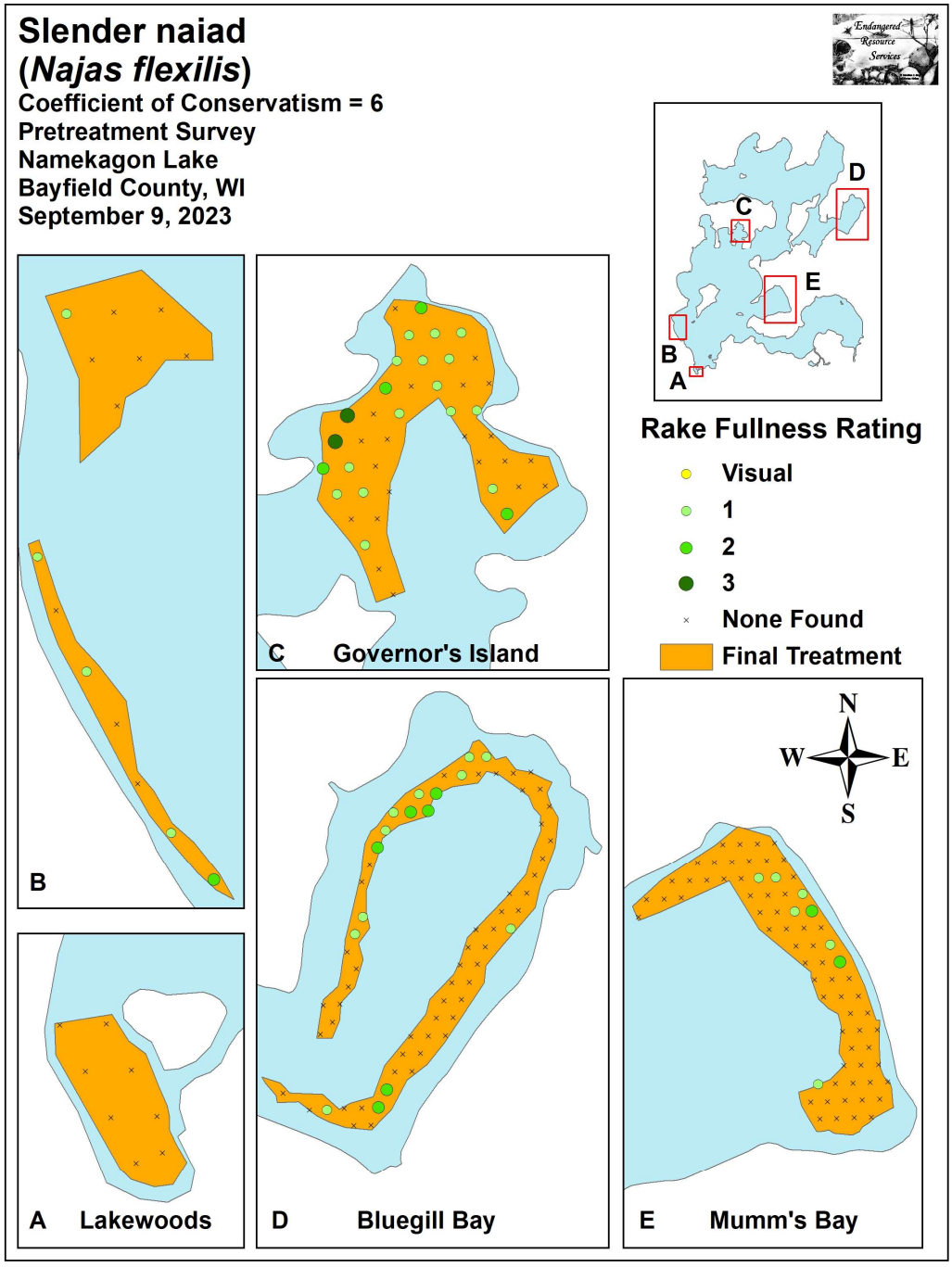

Muskgrass
(Chara sp.)
Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

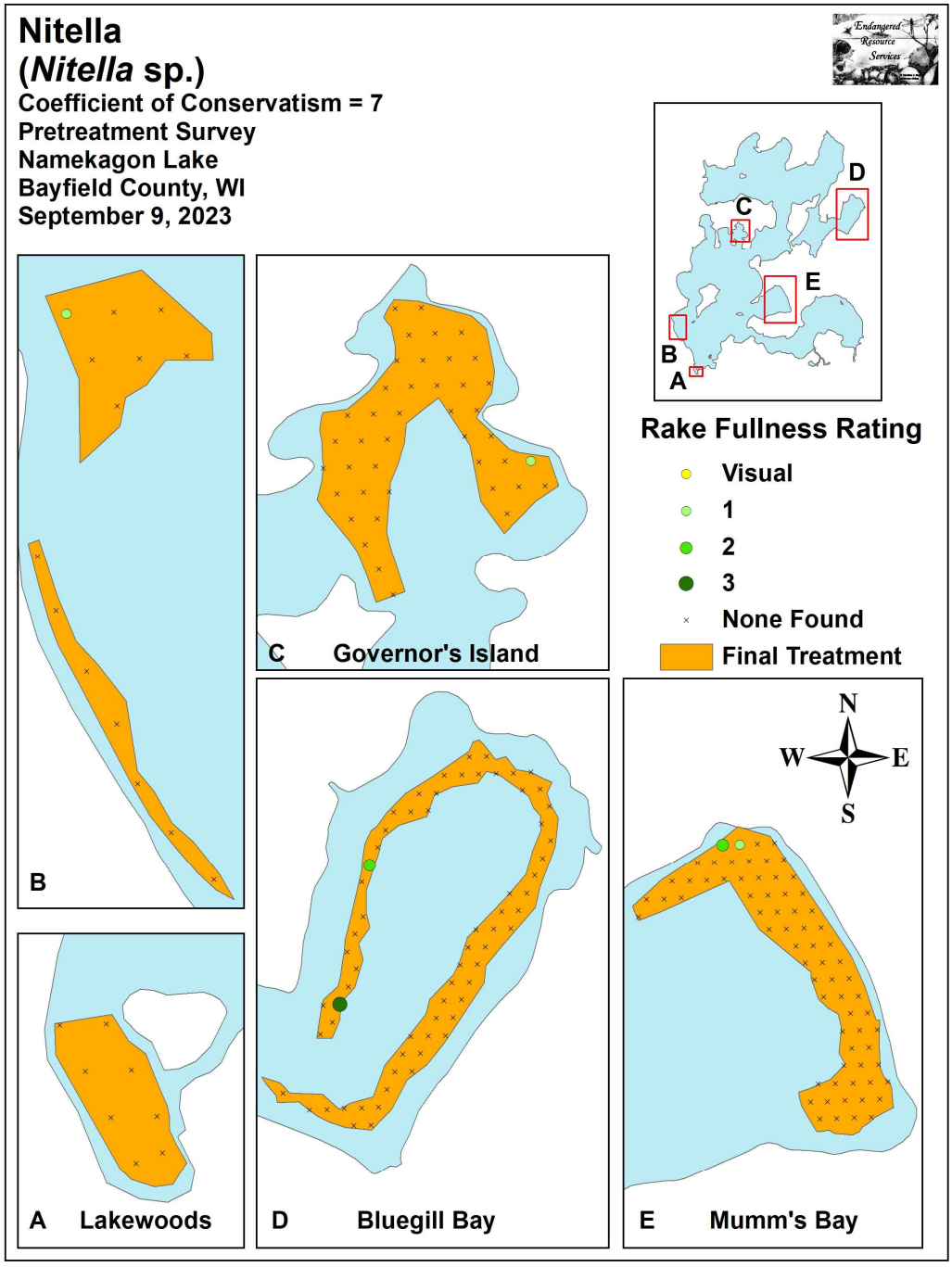

Common waterweed
(Elodea canadensis)
Coefficient of Conservatism = 3
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

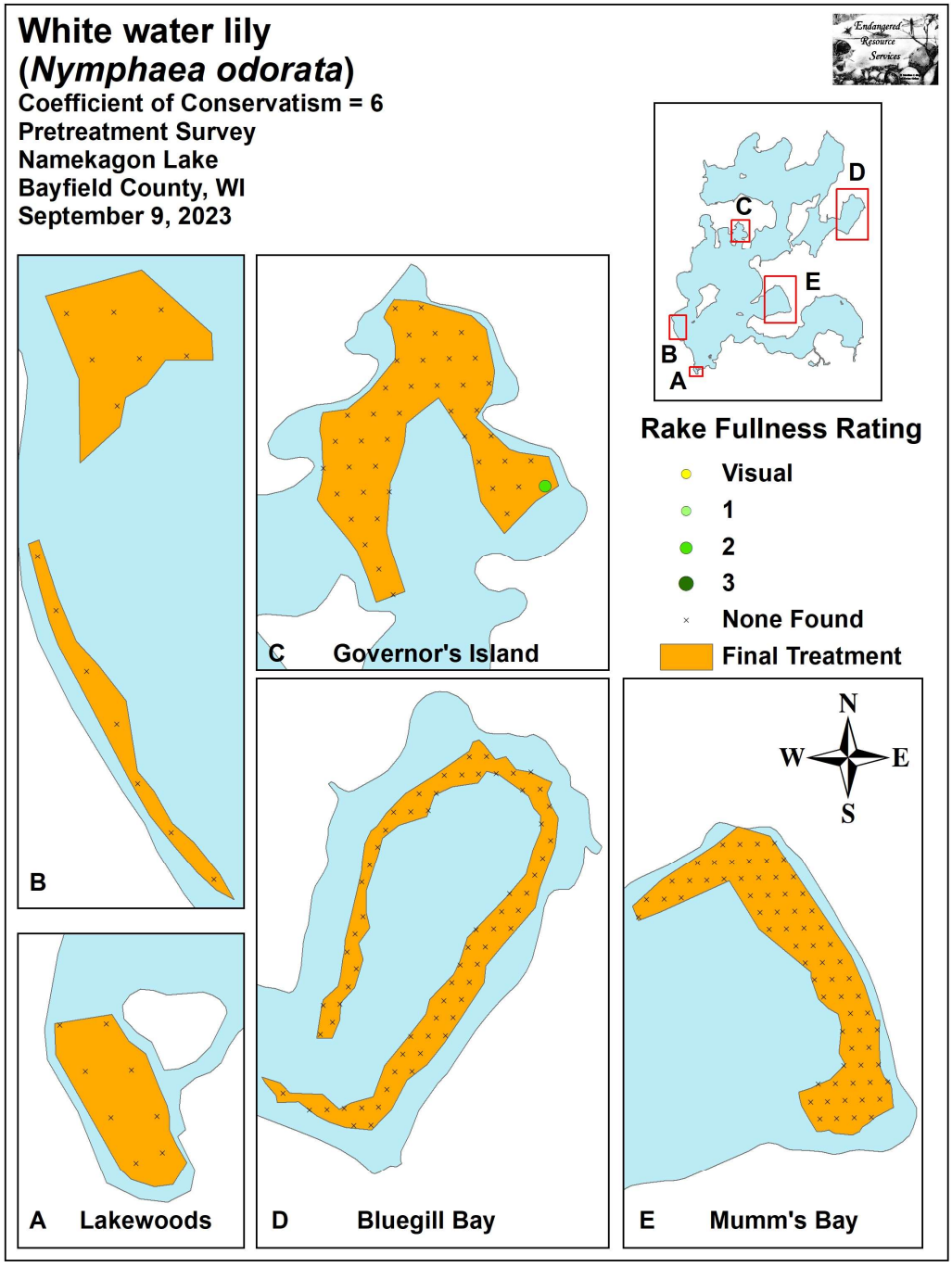

Filamentous algae
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

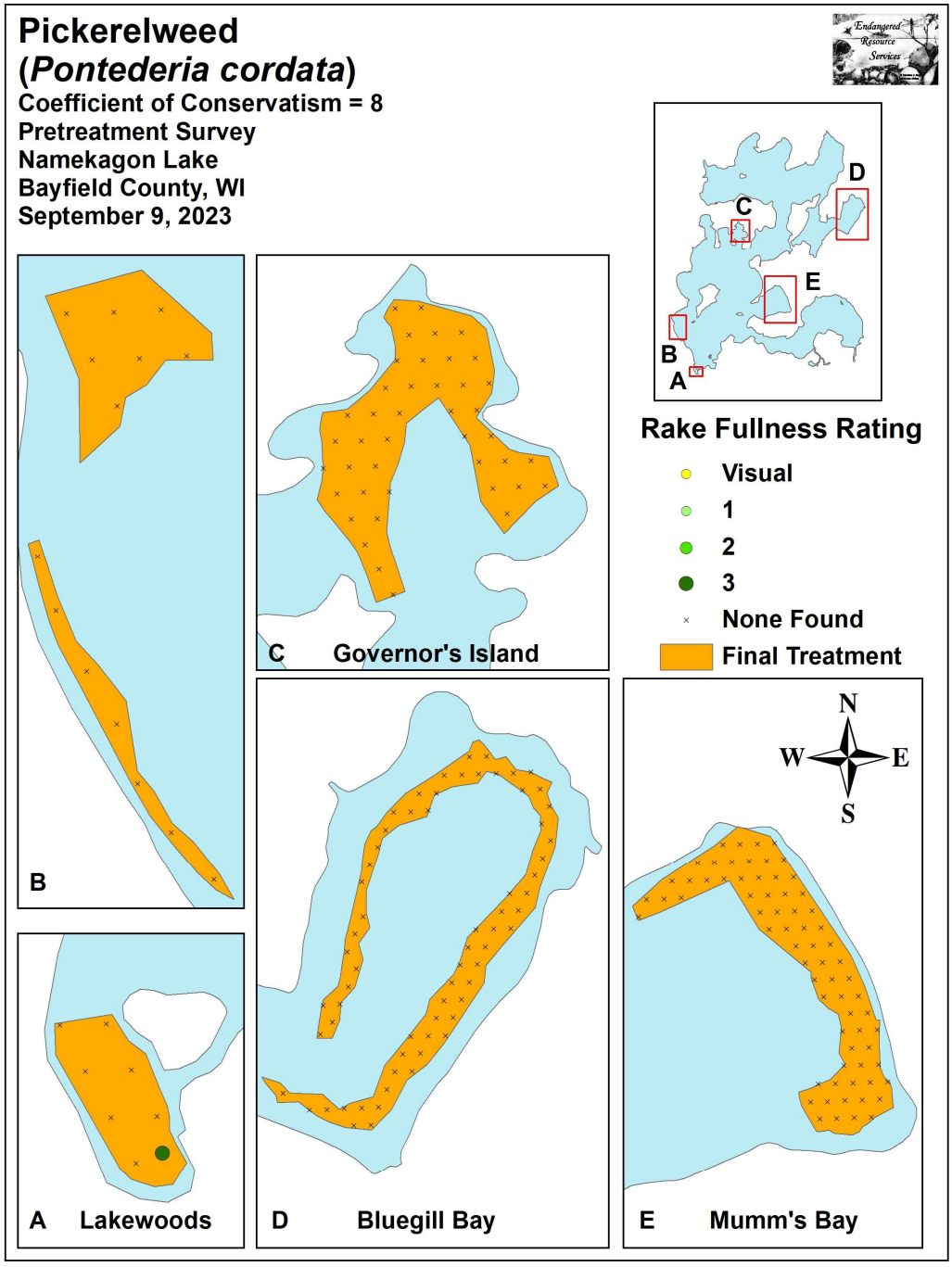

Water star-grass
(Heteranthera dubia)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

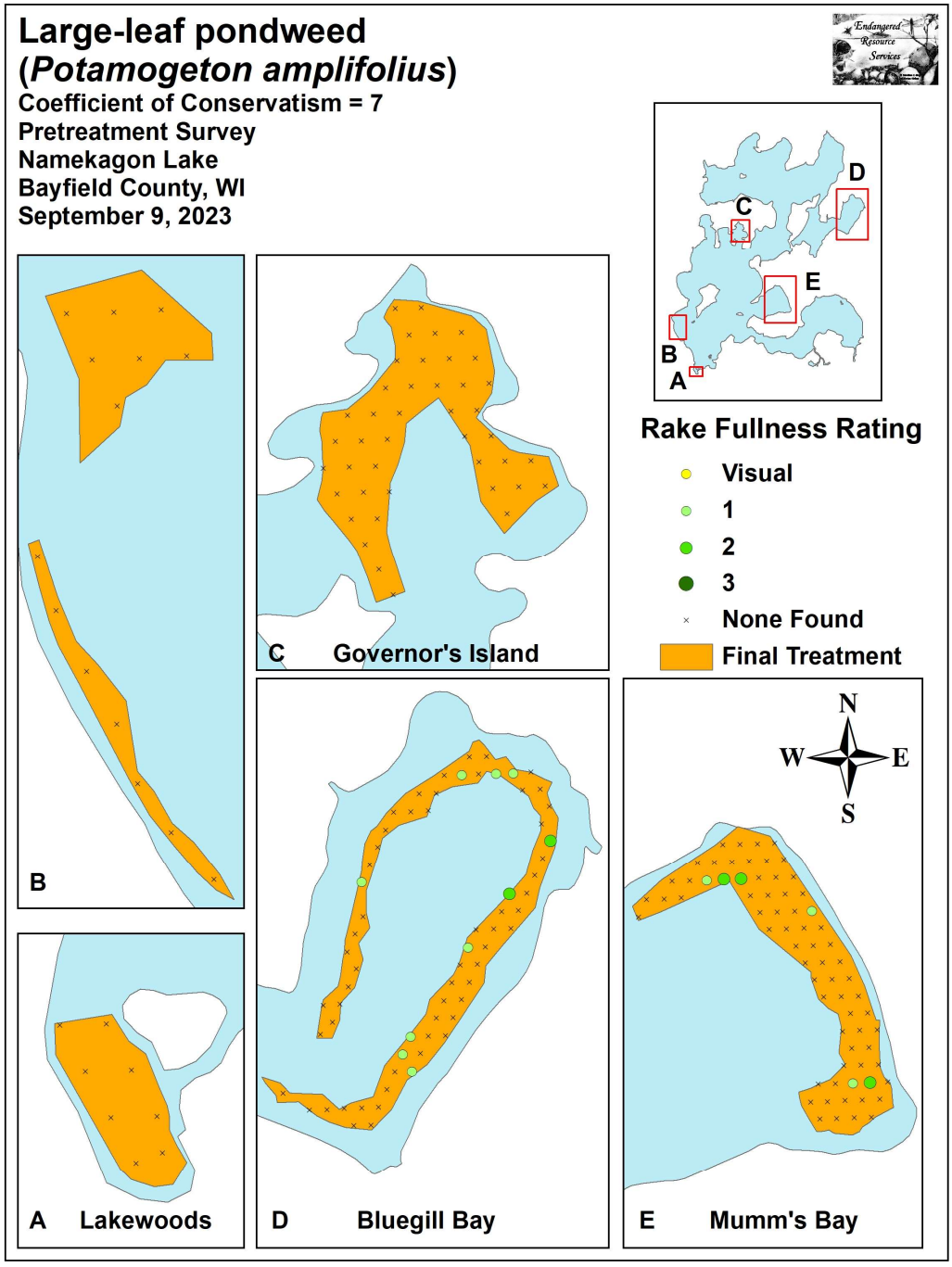

Northern water-milfoil
(Myriophyllum sibiricum)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

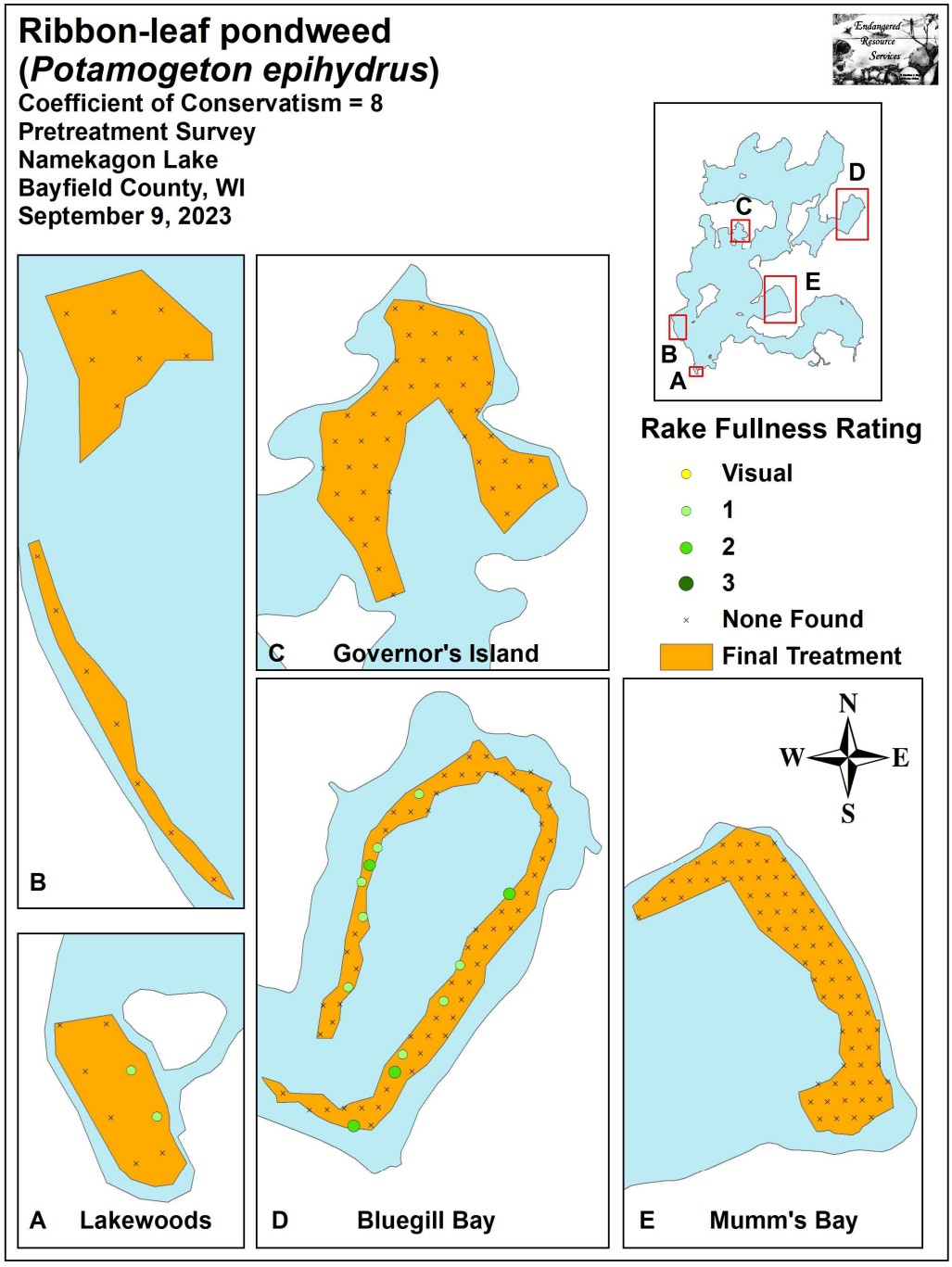

Slender naiad
(Najas flexilis)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay

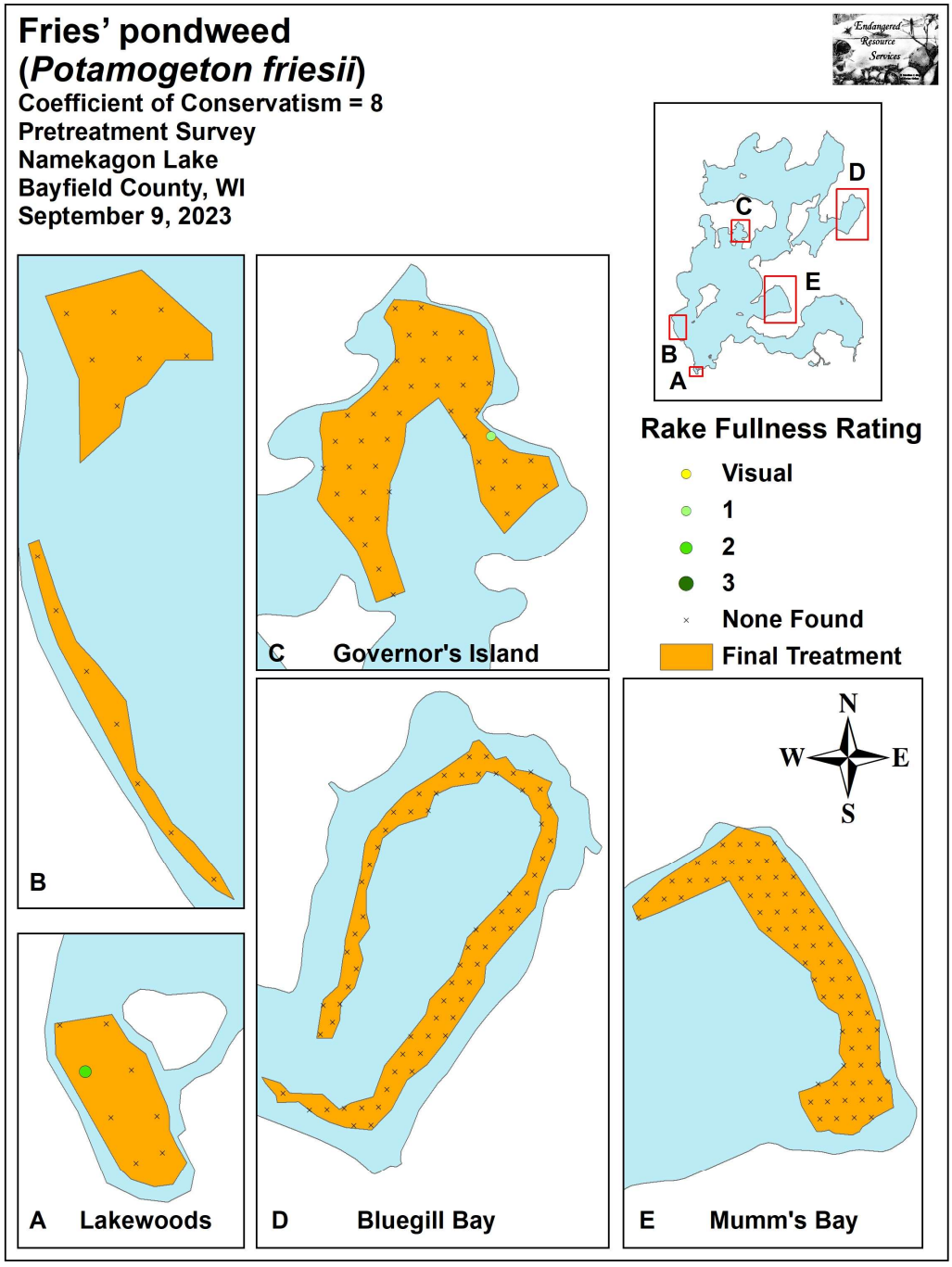

Nitella
(Nitella sp.)
Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay


White water lily
(Nymphaea odorata)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Pickerelweed
(Pontederia cordata)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

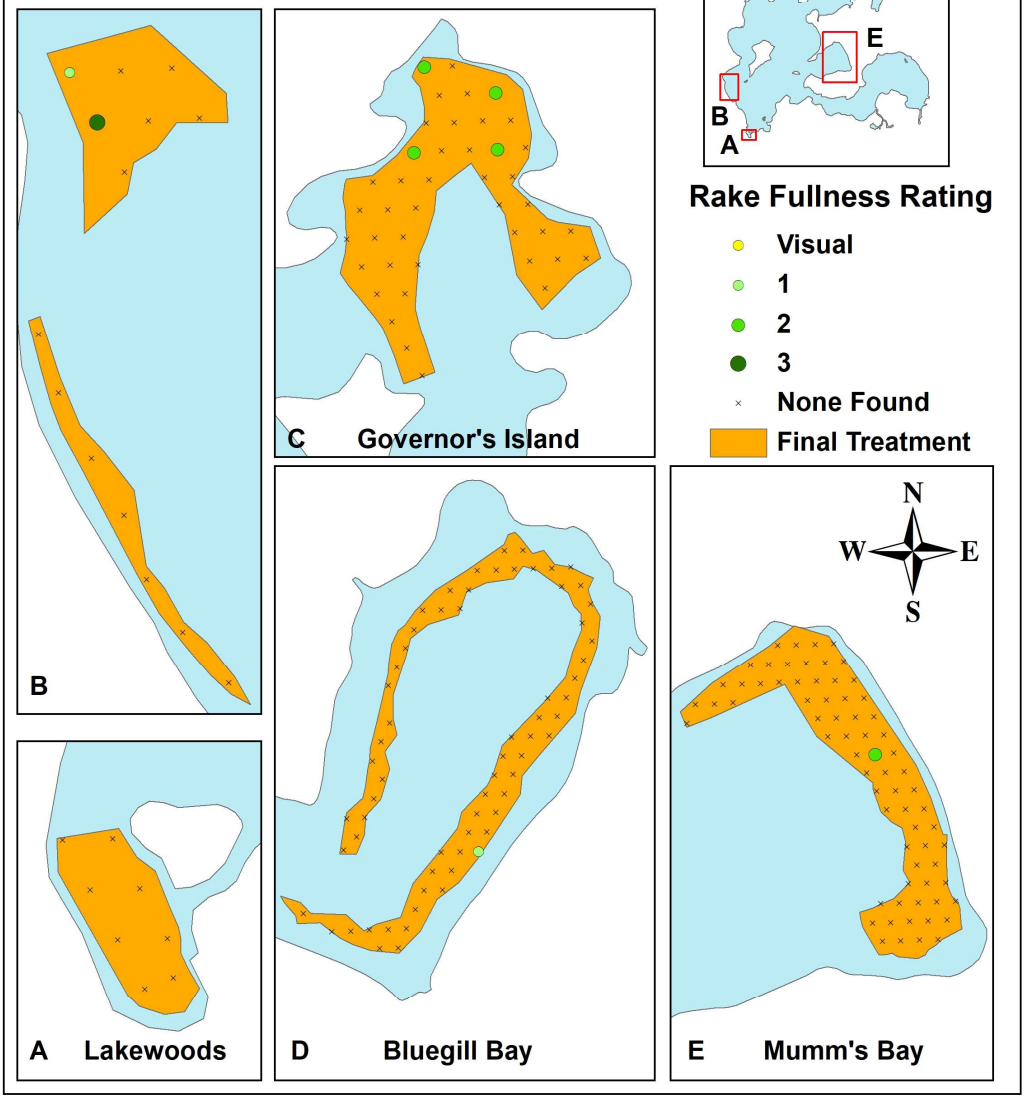

Large-leaf pondweed
(Potamogeton amplifolius)
Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

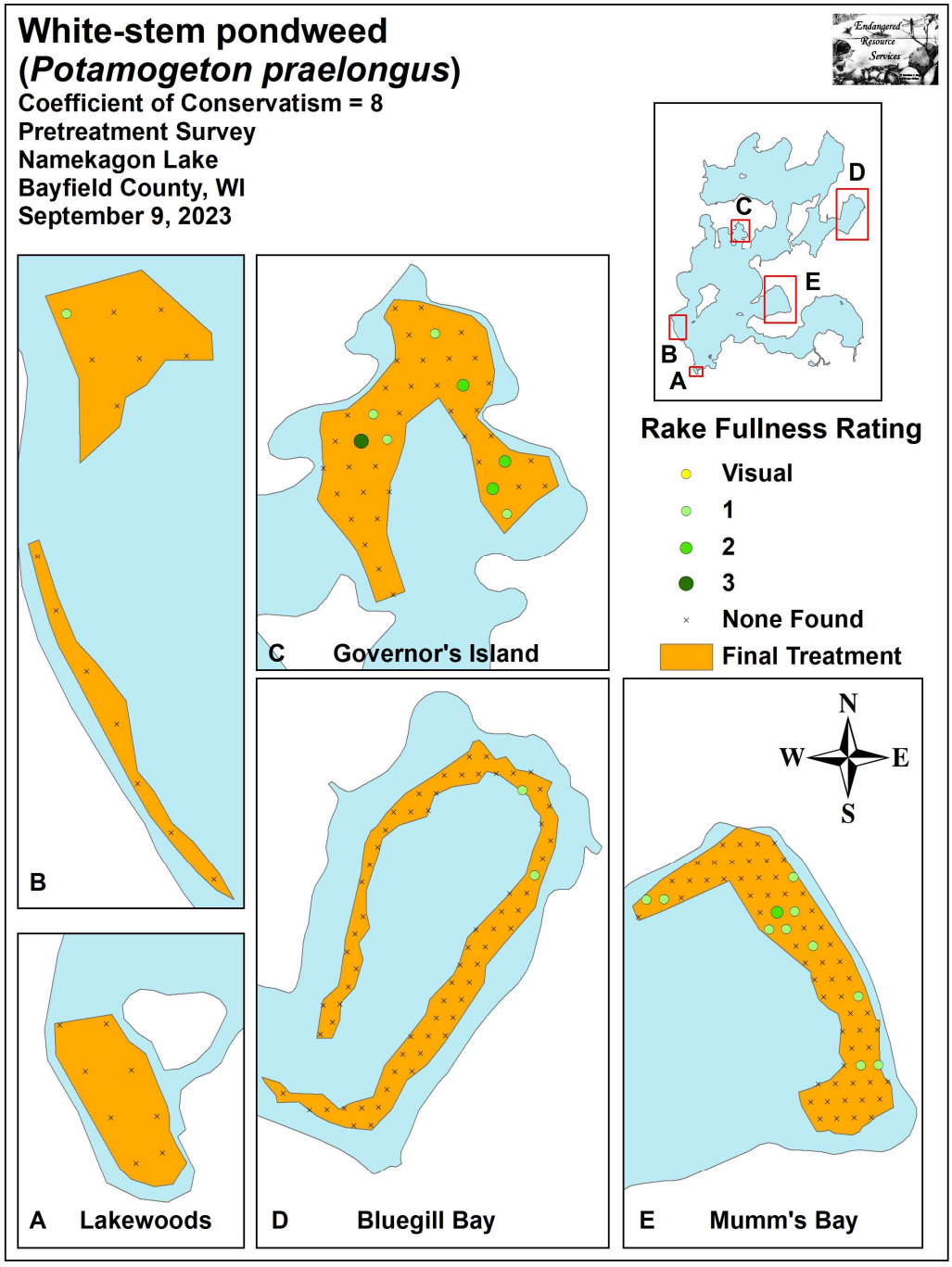

Ribbon-leaf pondweed
(Potamogeton epihydrus)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

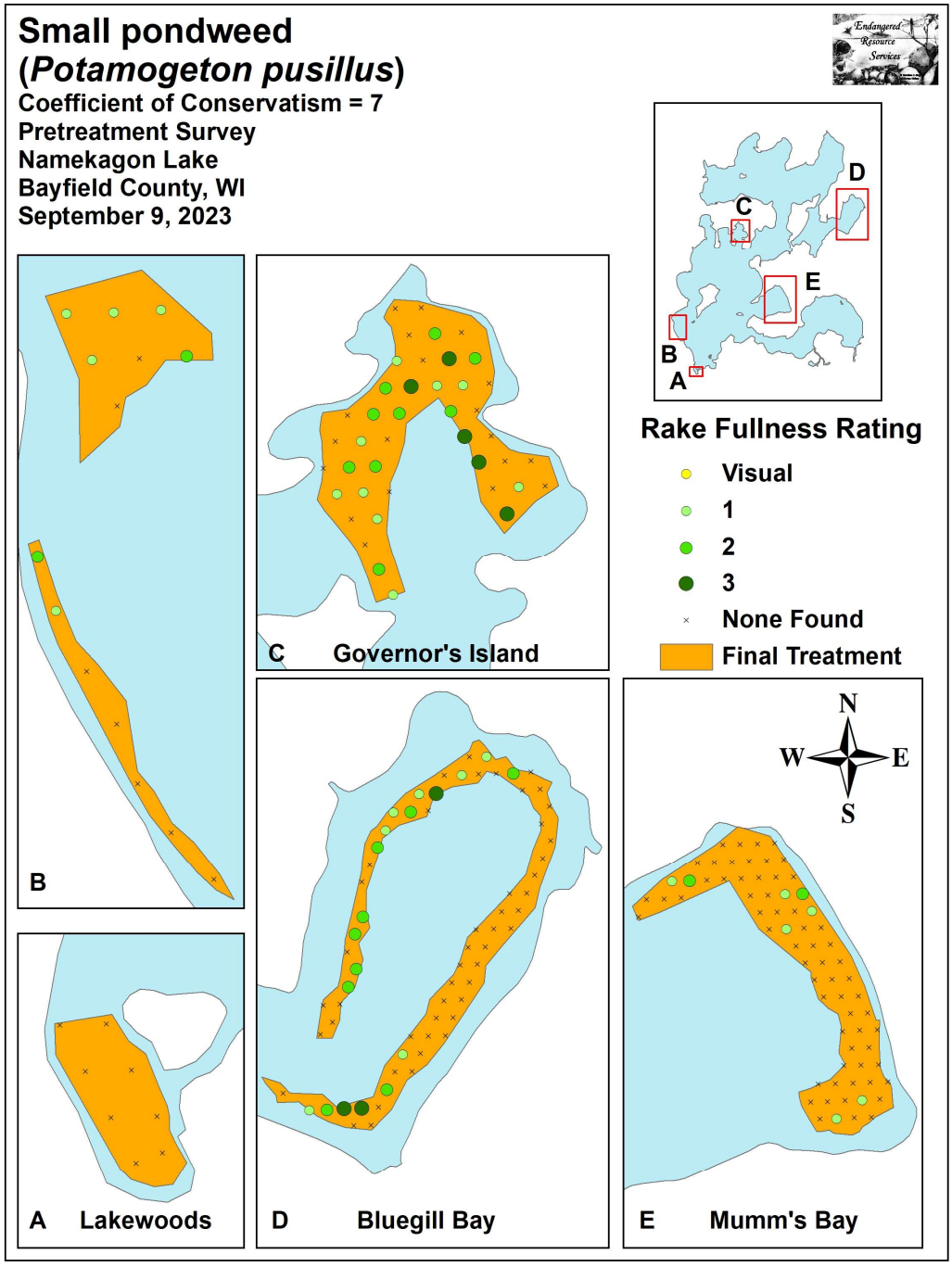

Fries' pondweed
(Potamogeton friesii)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay

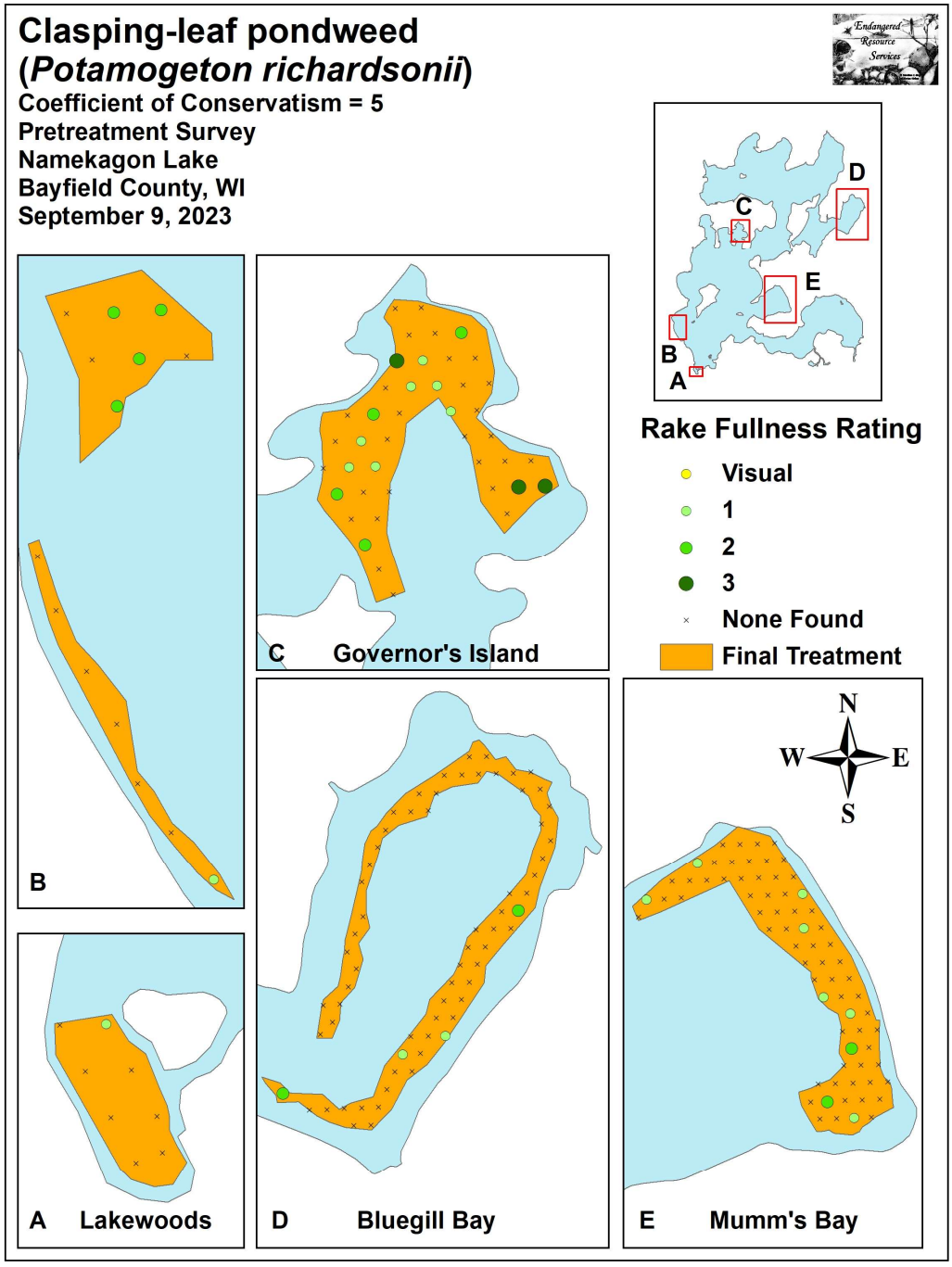
Variable pondweed
(*Potamogeton gramineus*)

Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023




White-stem pondweed
(Potamogeton praelongus)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
W
E
S
E Mumm's Bay


Small pondweed
(Potamogeton pusillus)
Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Clasping-leaf pondweed
(Potamogeton richardsonii)
Coefficient of Conservatism = 5
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
A Lakewoods
D Bluegill Bay
N
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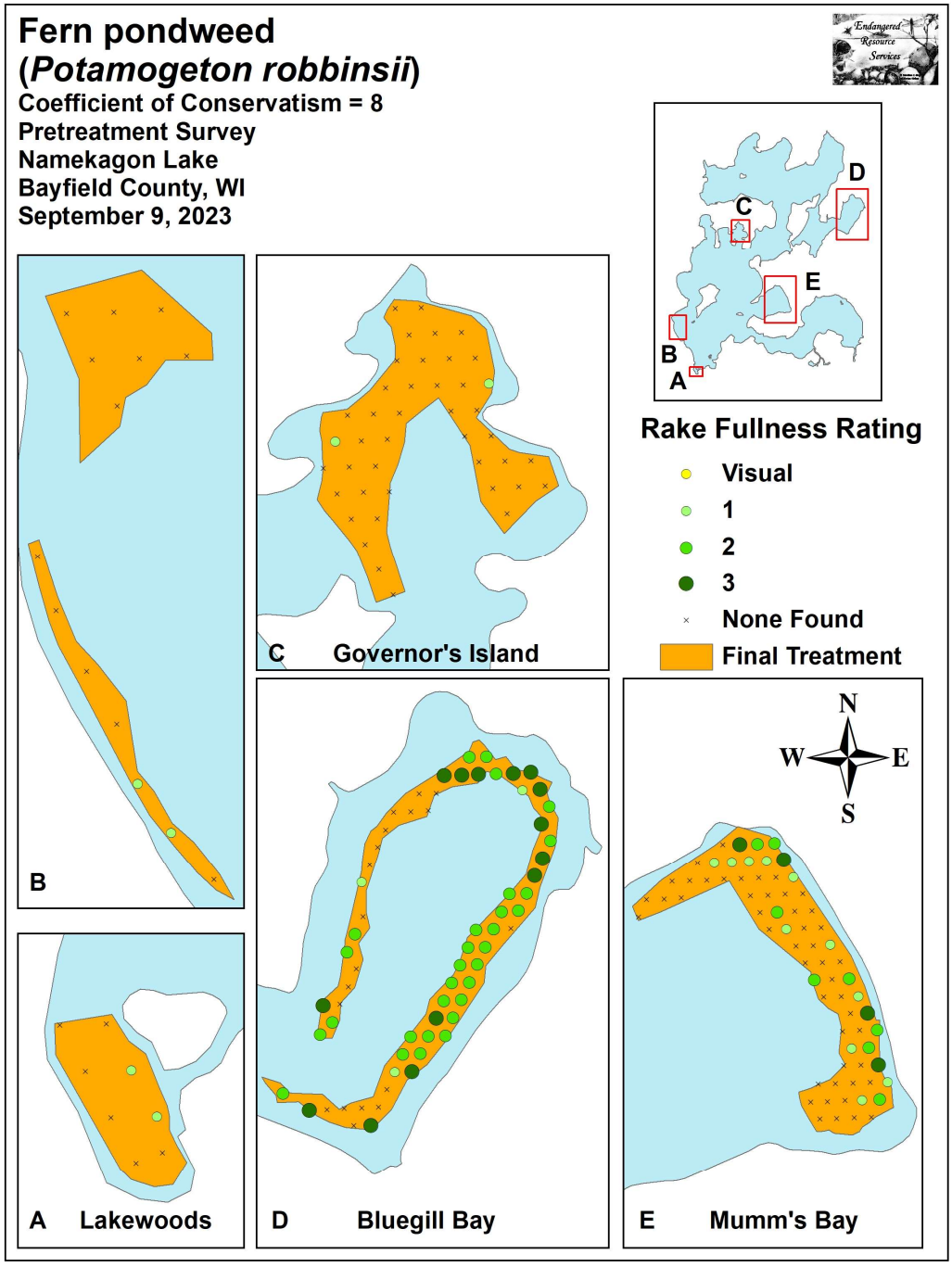
E
S
E Mumm's Bay


Fern pondweed
(Potamogeton robbinsii)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
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None Found
Final Treatment
B
C Governor's Island
N
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E
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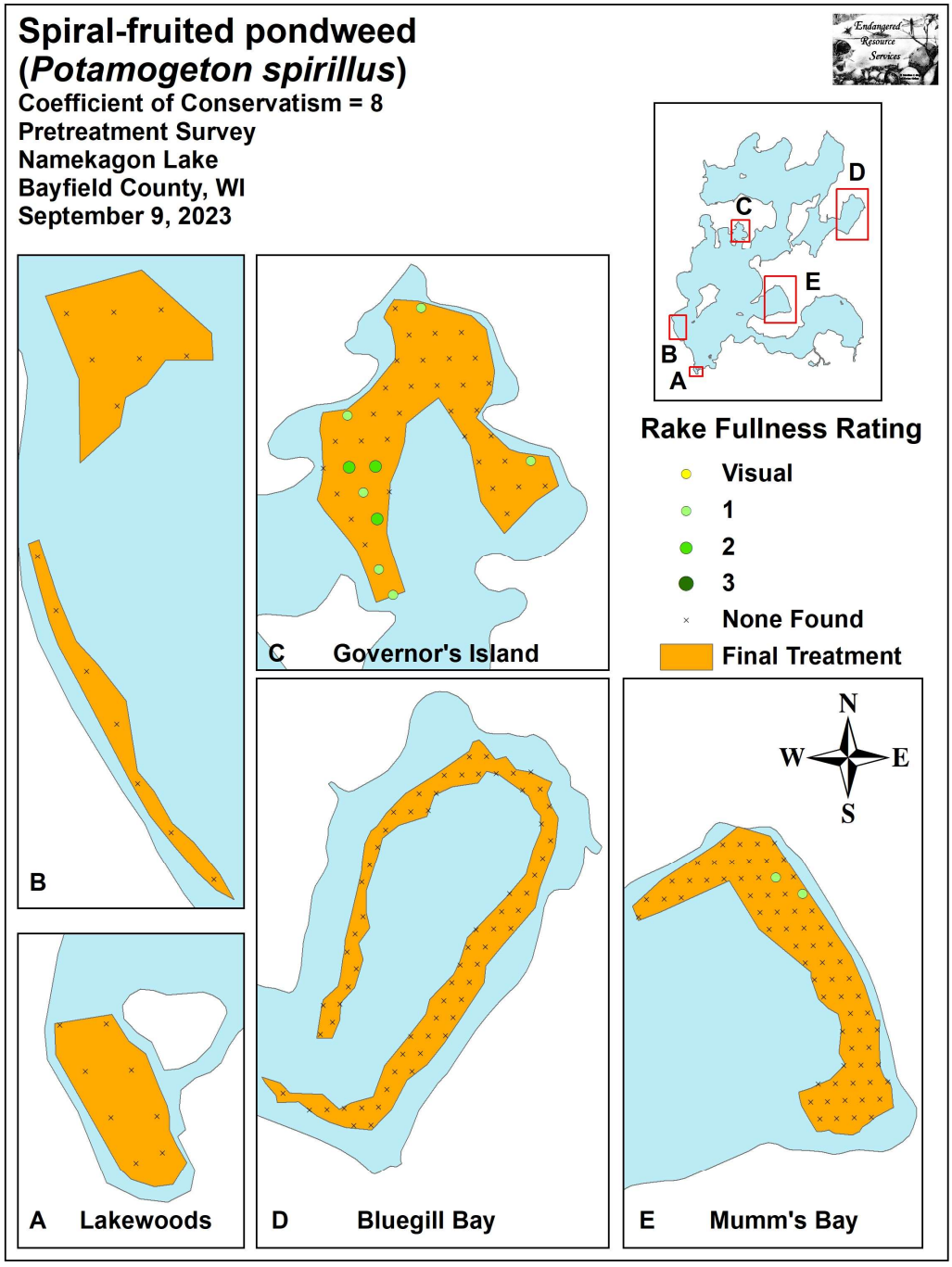
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Spiral-fruited pondweed
(Potamogeton spirillus)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
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None Found
Final Treatment
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C Governor's Island
A Lakewoods
D Bluegill Bay
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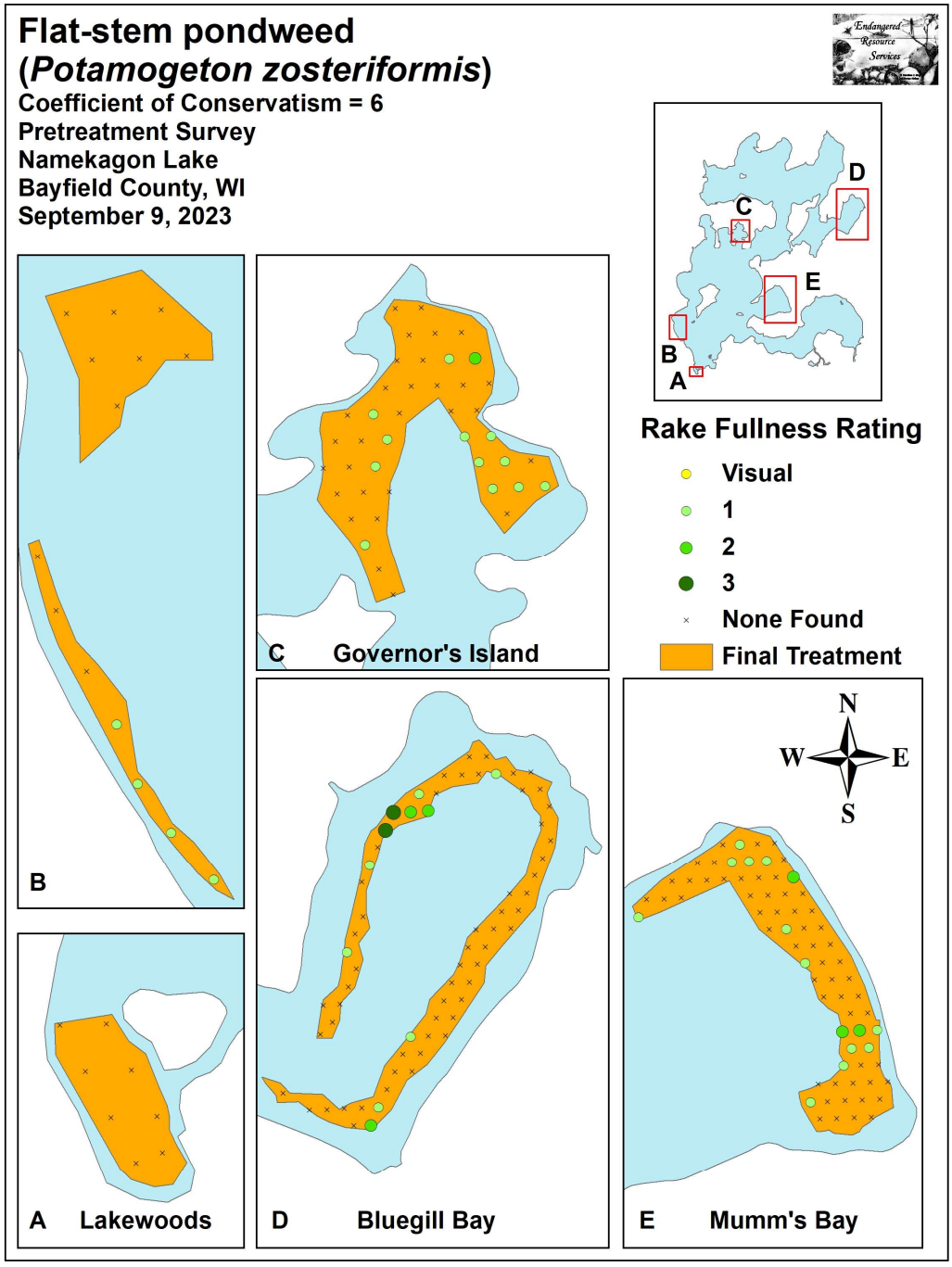
E
S
E Mumm's Bay


Flat-stem pondweed
(Potamogeton zosteriformis)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
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None Found
Final Treatment
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C Governor's Island
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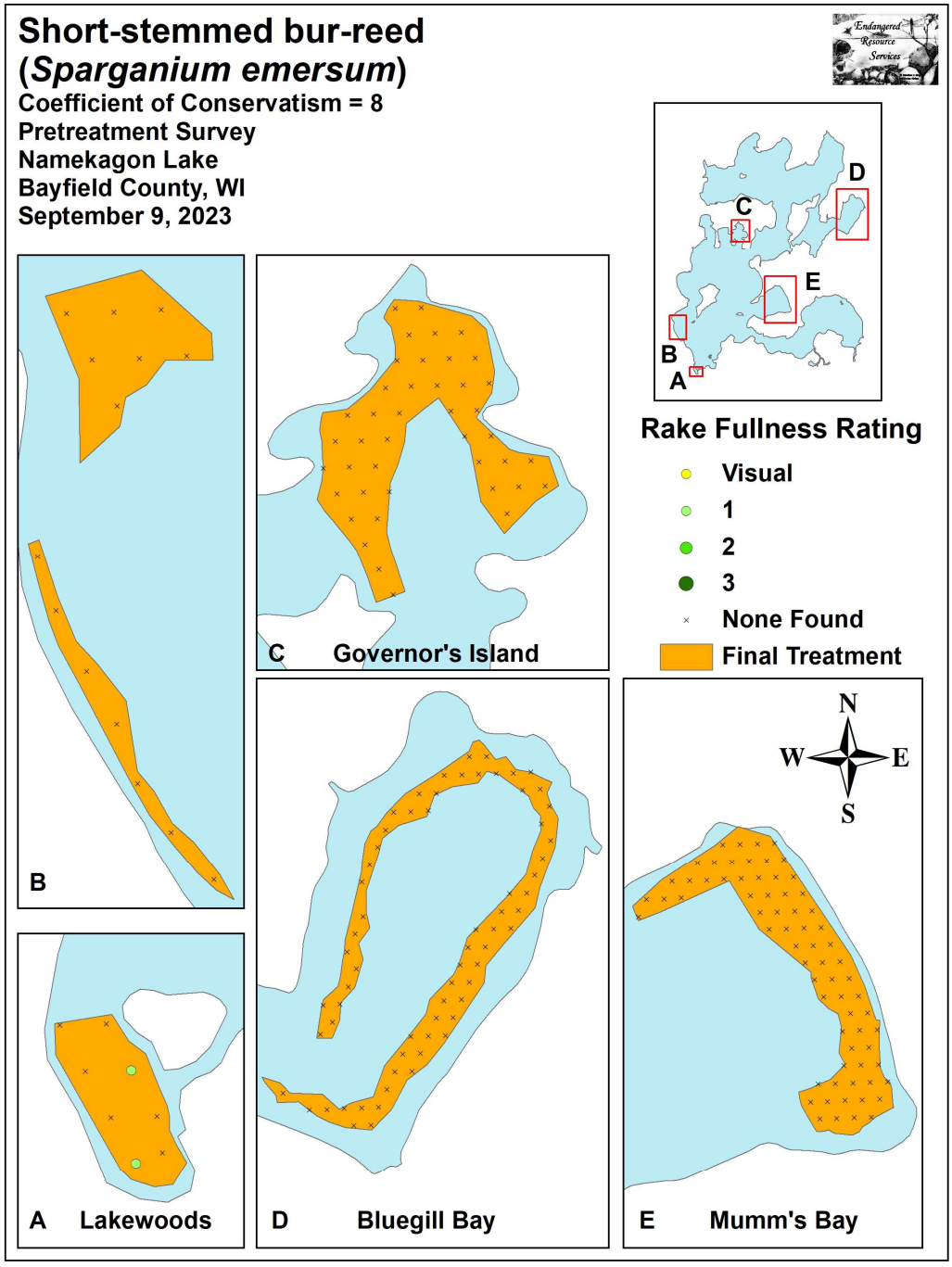
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Short-stemmed bur-reed
(Sparganium emersum)
Coefficient of Conservatism = 8
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
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E
B
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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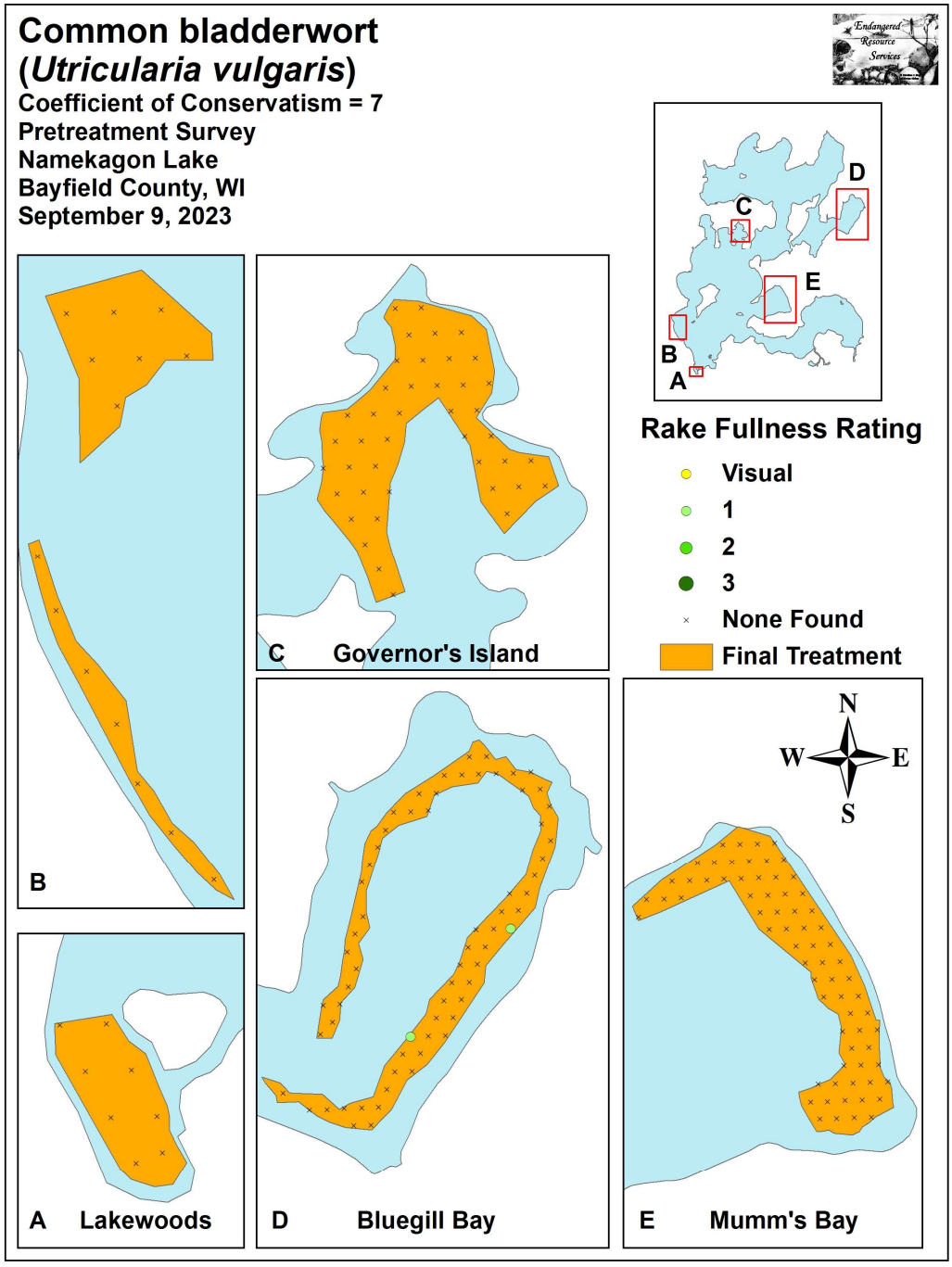
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Common bladderwort
(Utricularia vulgaris)
Coefficient of Conservatism = 7
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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C Governor's Island
A Lakewoods
D Bluegill Bay
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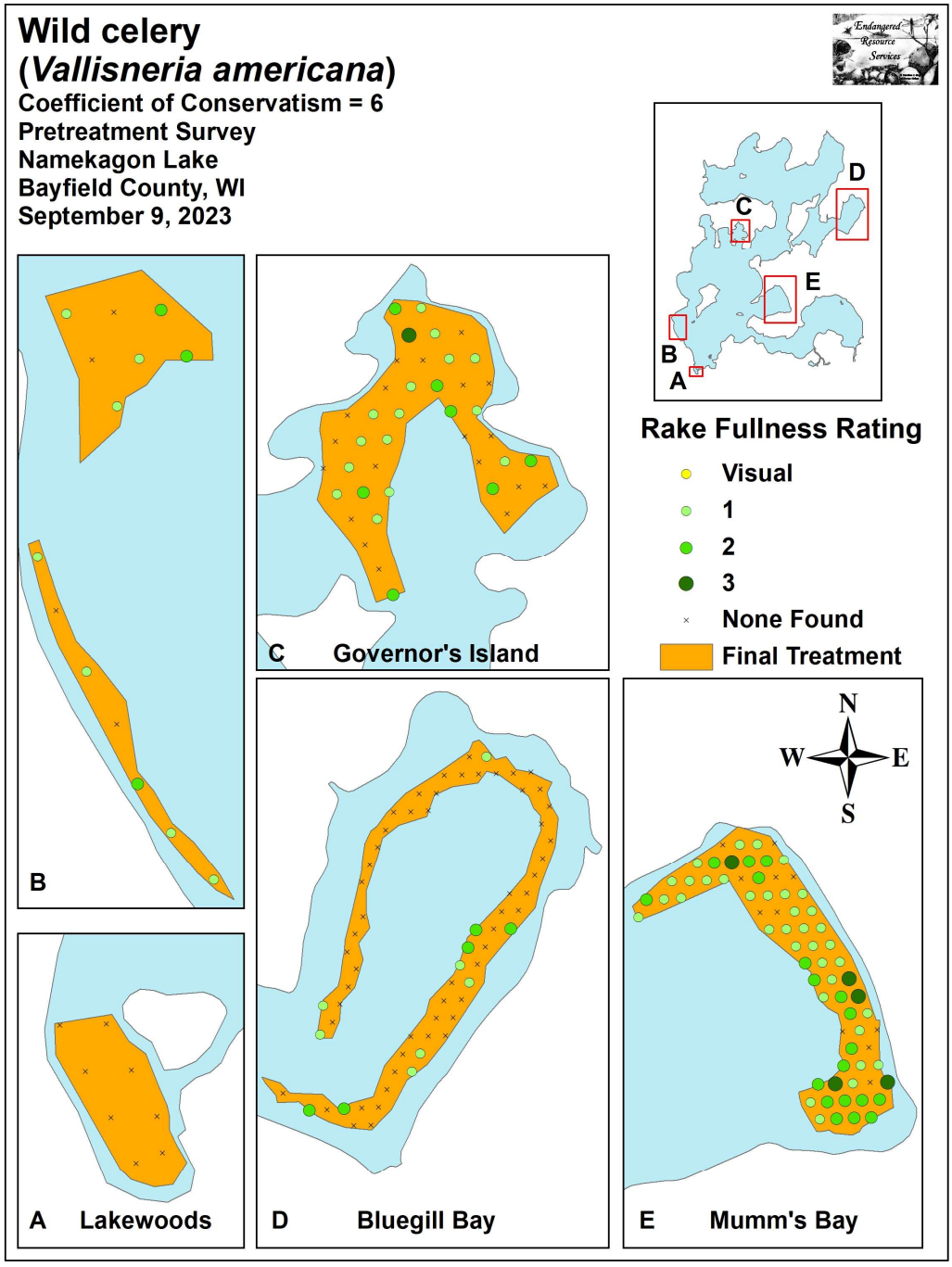
E Mumm's Bay


Wild celery
(Vallisneria americana)
Coefficient of Conservatism = 6
Pretreatment Survey
Namekagon Lake
Bayfield County, WI
September 9, 2023
Endangered Resource Services
D
C
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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C Governor's Island
A Lakewoods
D Bluegill Bay
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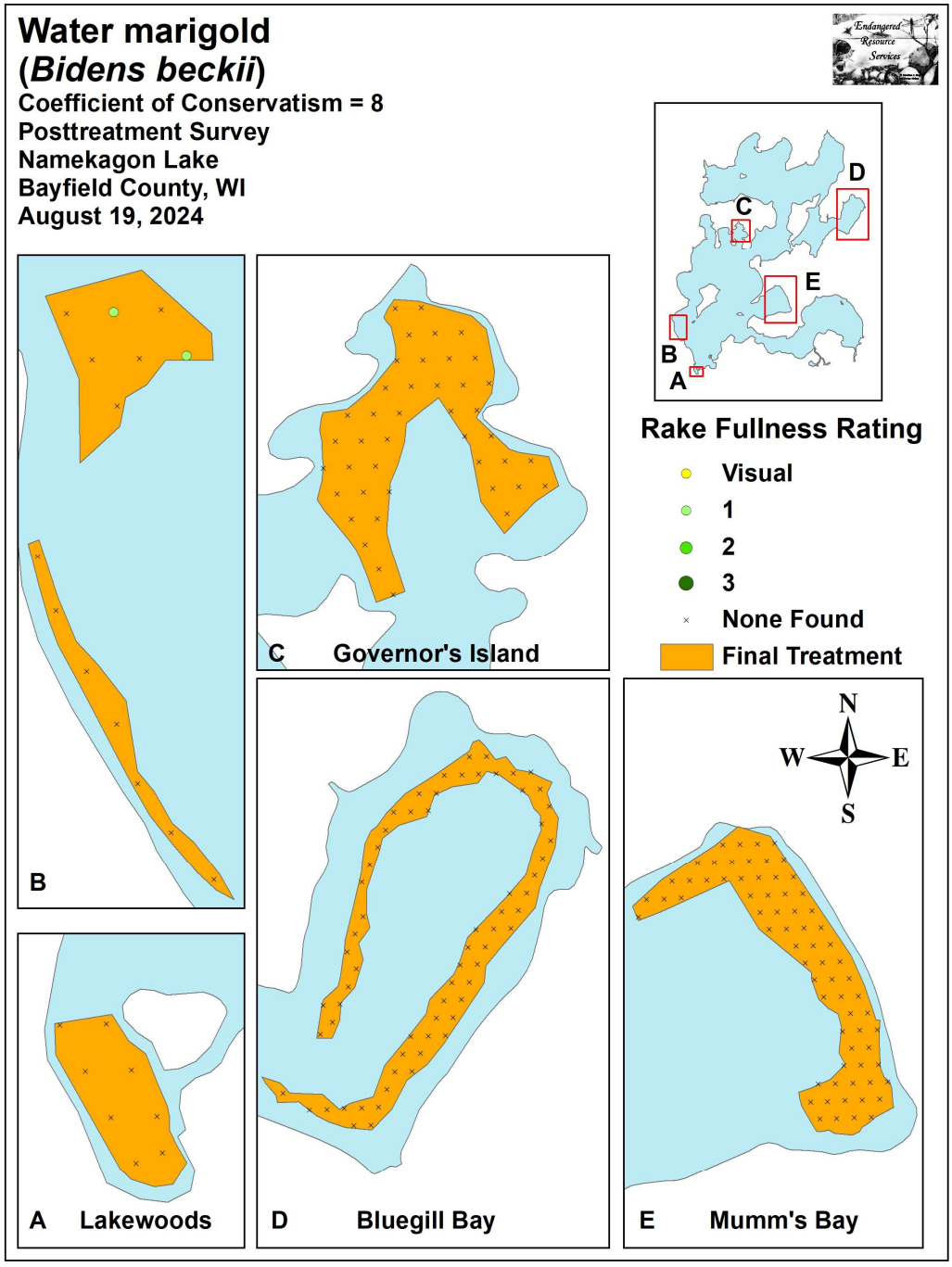
E Mumm's Bay

Appendix VII: Posttreatment Native Species Density and Distribution


Water marigold
(Bidens beckii)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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A Lakewoods
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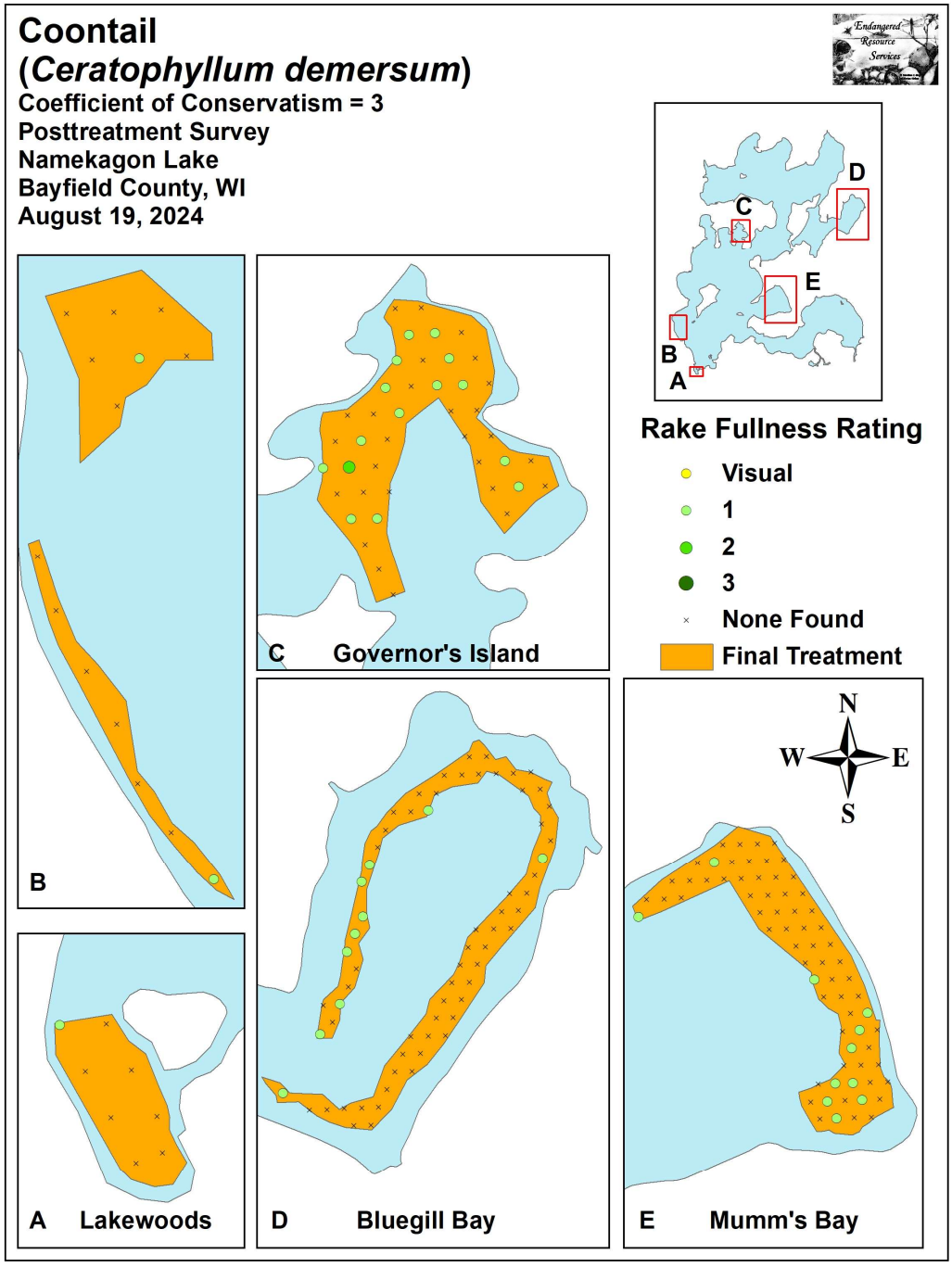
E Mumm's Bay


Coontail
(Ceratophyllum demersum)
Coefficient of Conservatism = 3
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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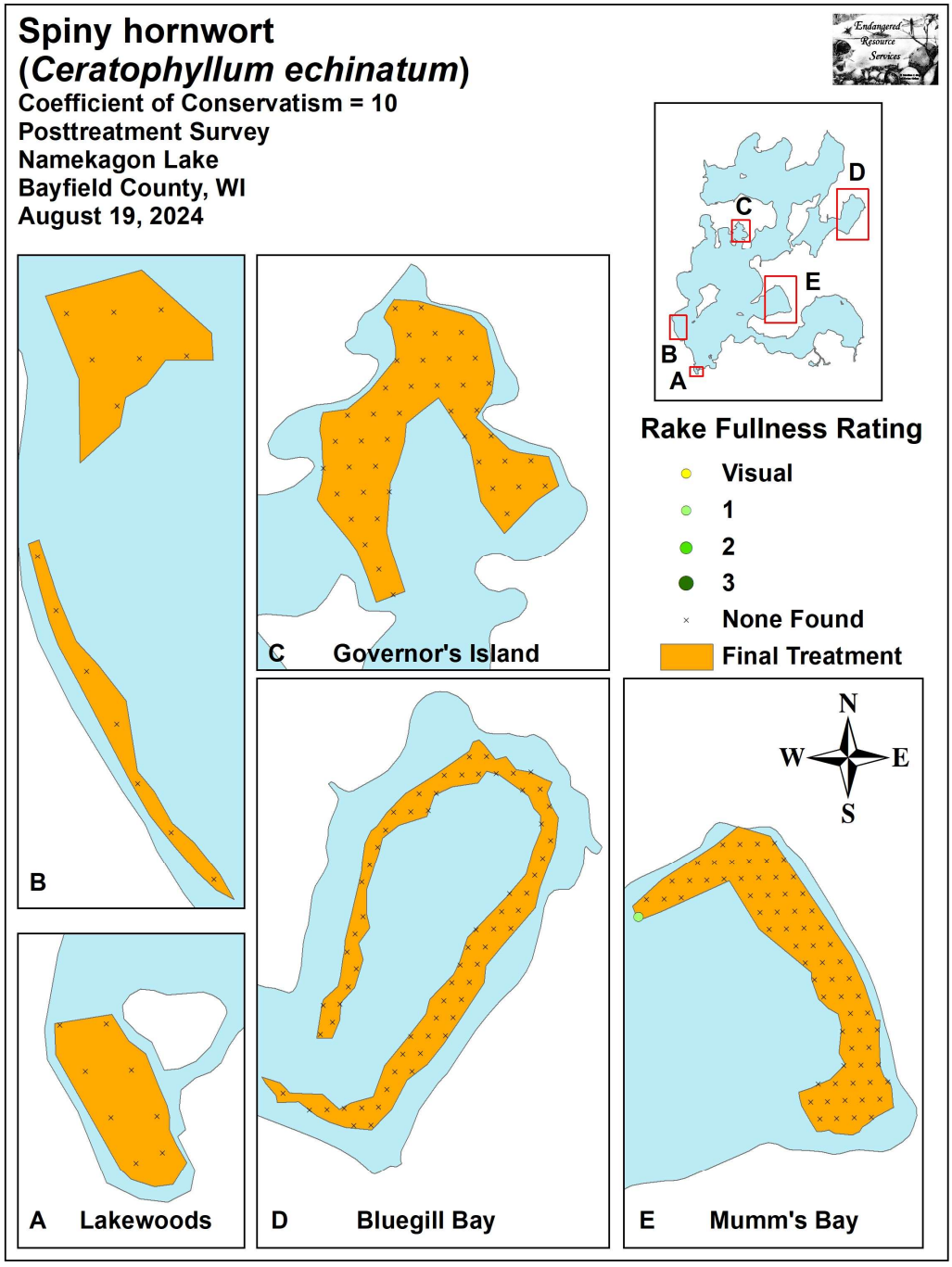
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Spiny hornwort
(Ceratophyllum echinatum)
Coefficient of Conservatism = 10
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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C Governor's Island
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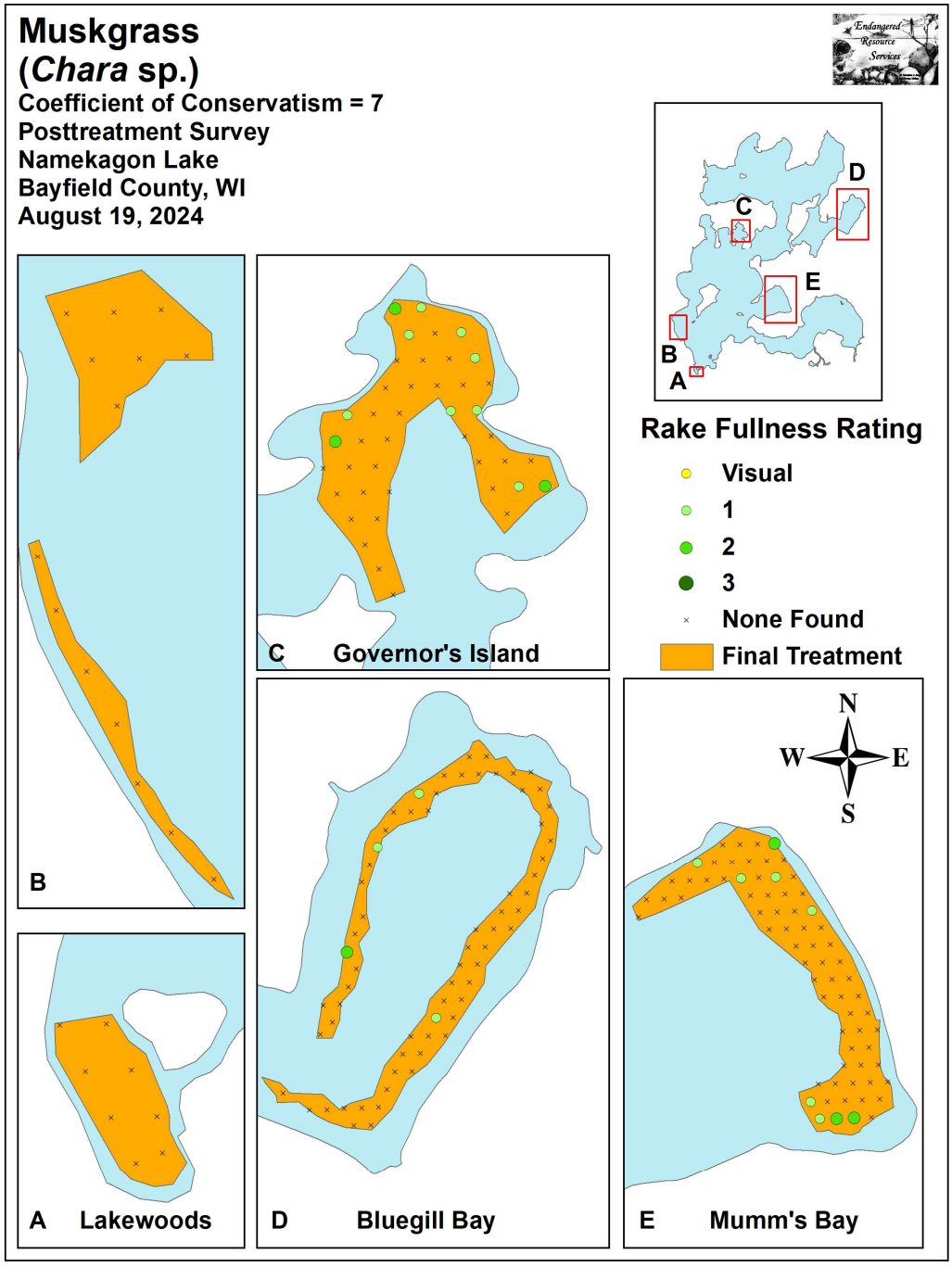
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Muskgrass
(Chara sp.)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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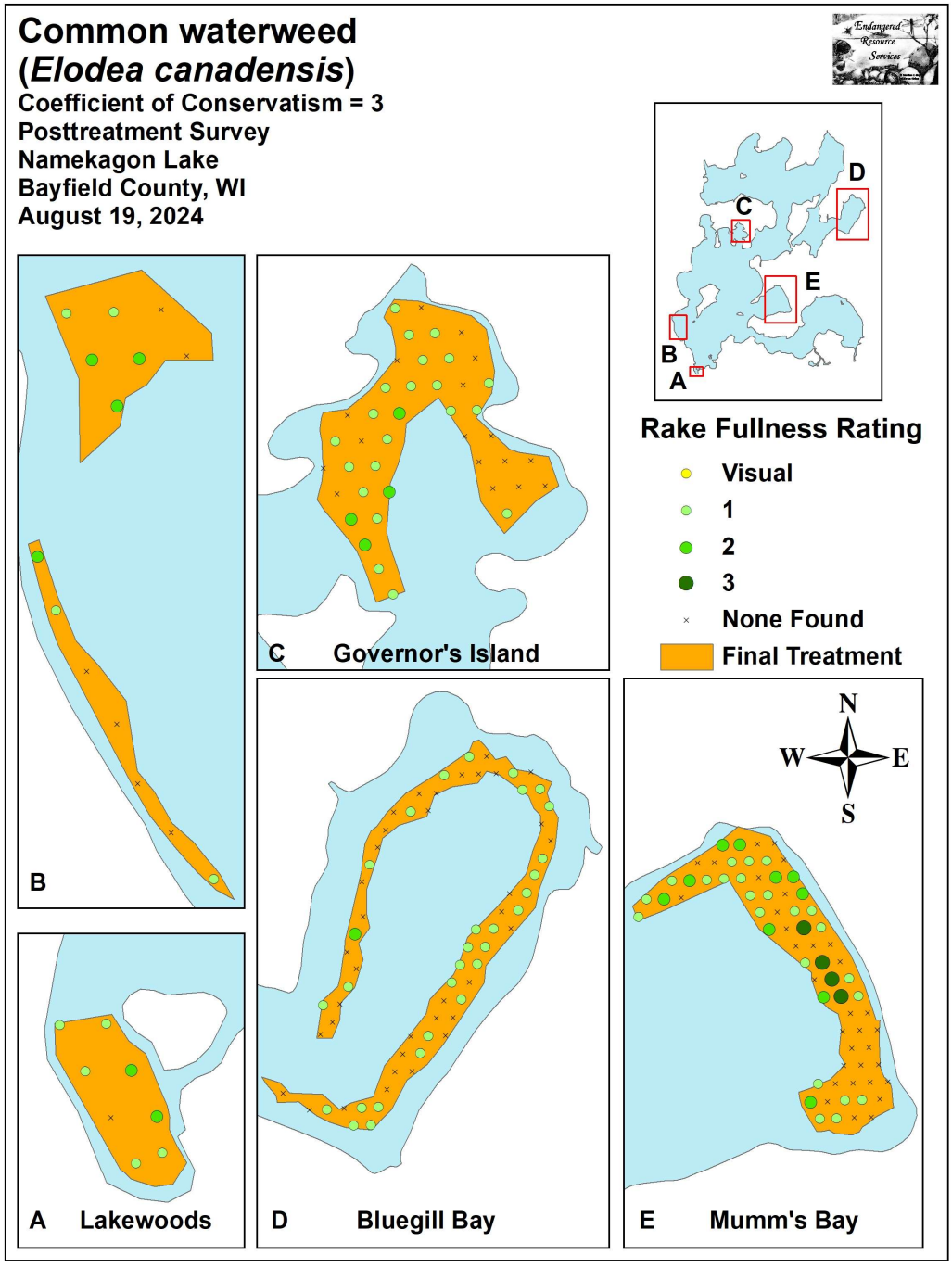
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Common waterweed
(Elodea canadensis)
Coefficient of Conservatism = 3
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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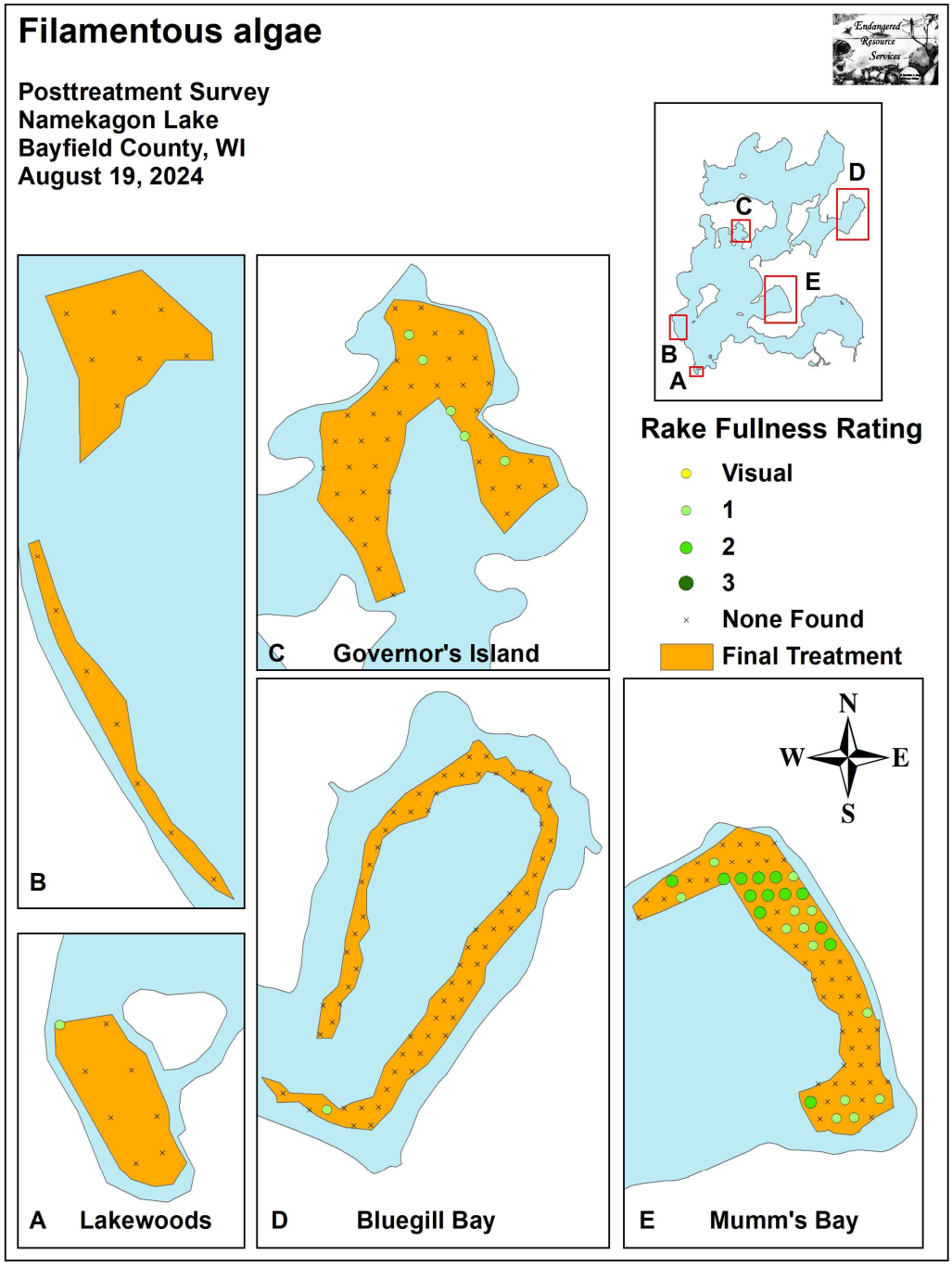
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Filamentous algae
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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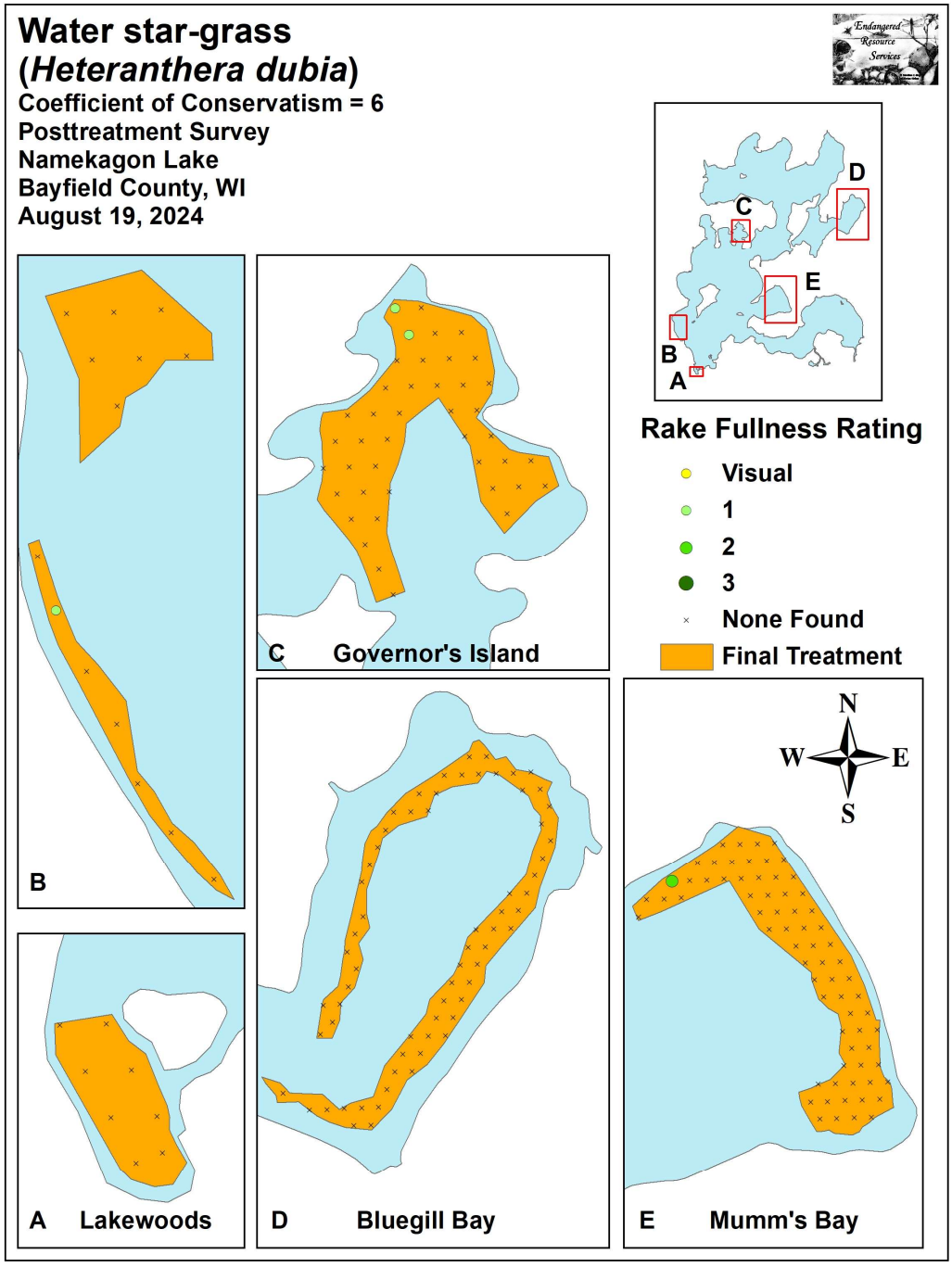
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Water star-grass
(Heteranthera dubia)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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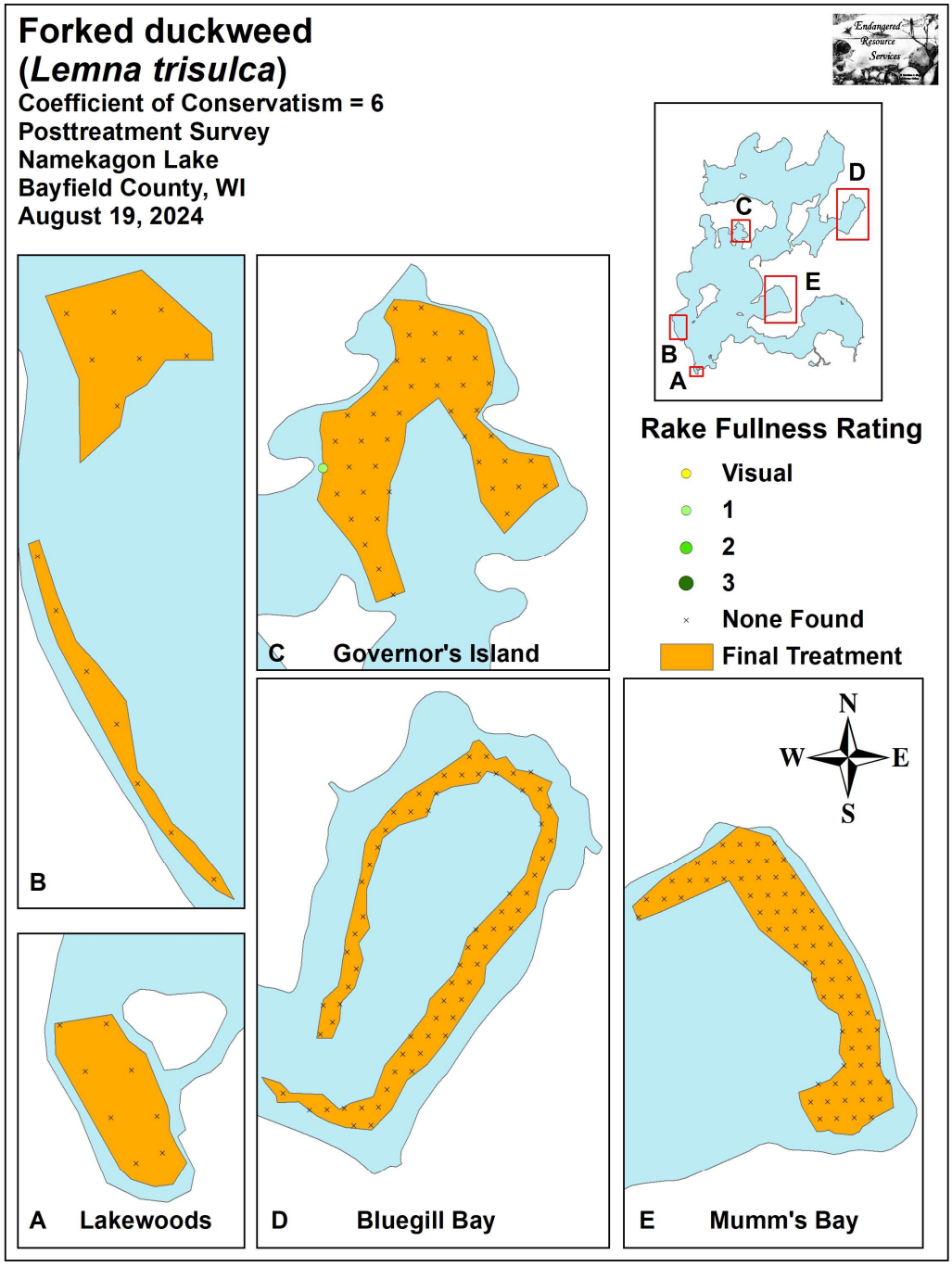
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Forked duckweed
(Lemna trisulca)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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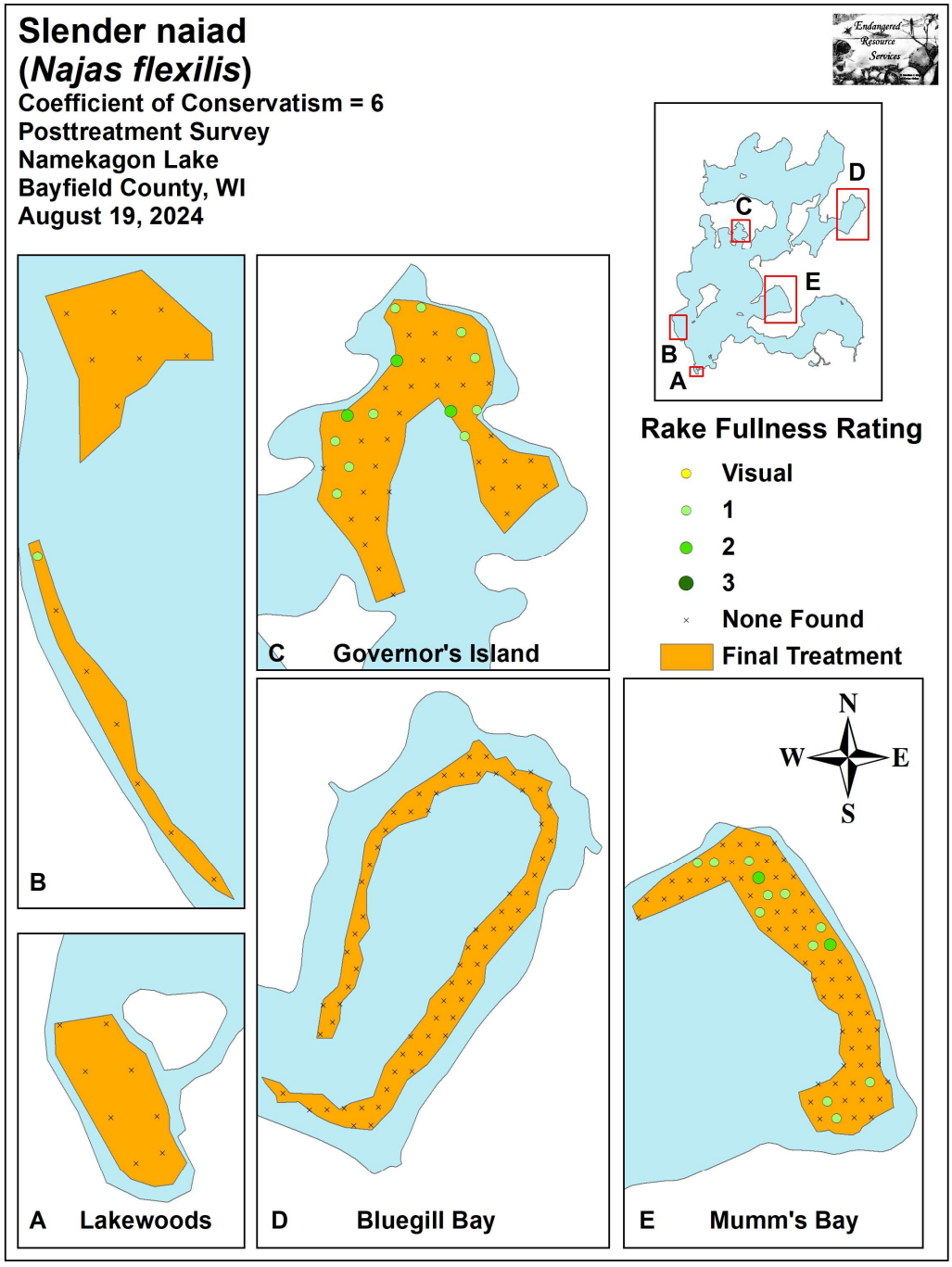
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Slender naiad
(Najas flexilis)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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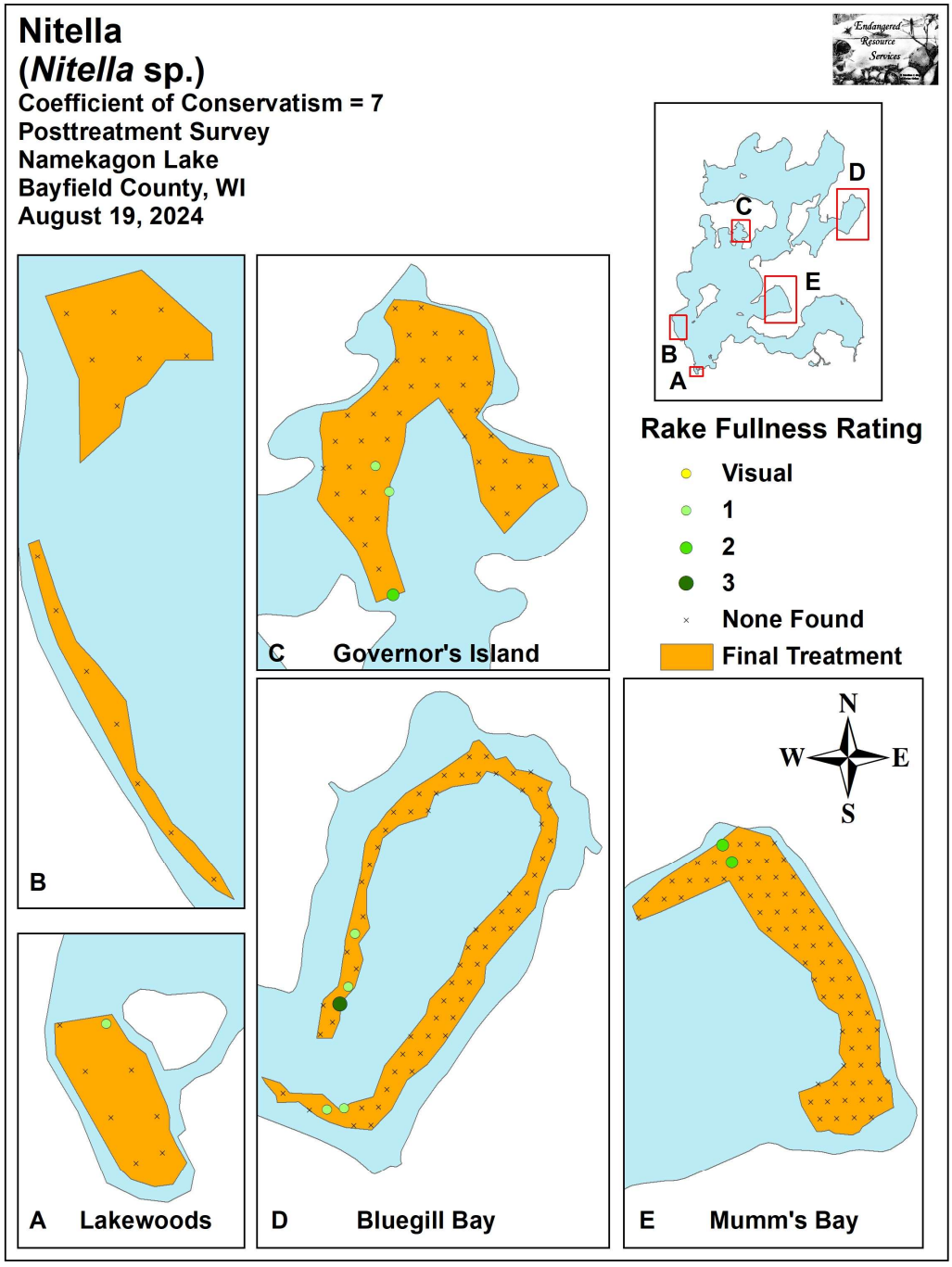
E Mumm's Bay


Nitella
(Nitella sp.)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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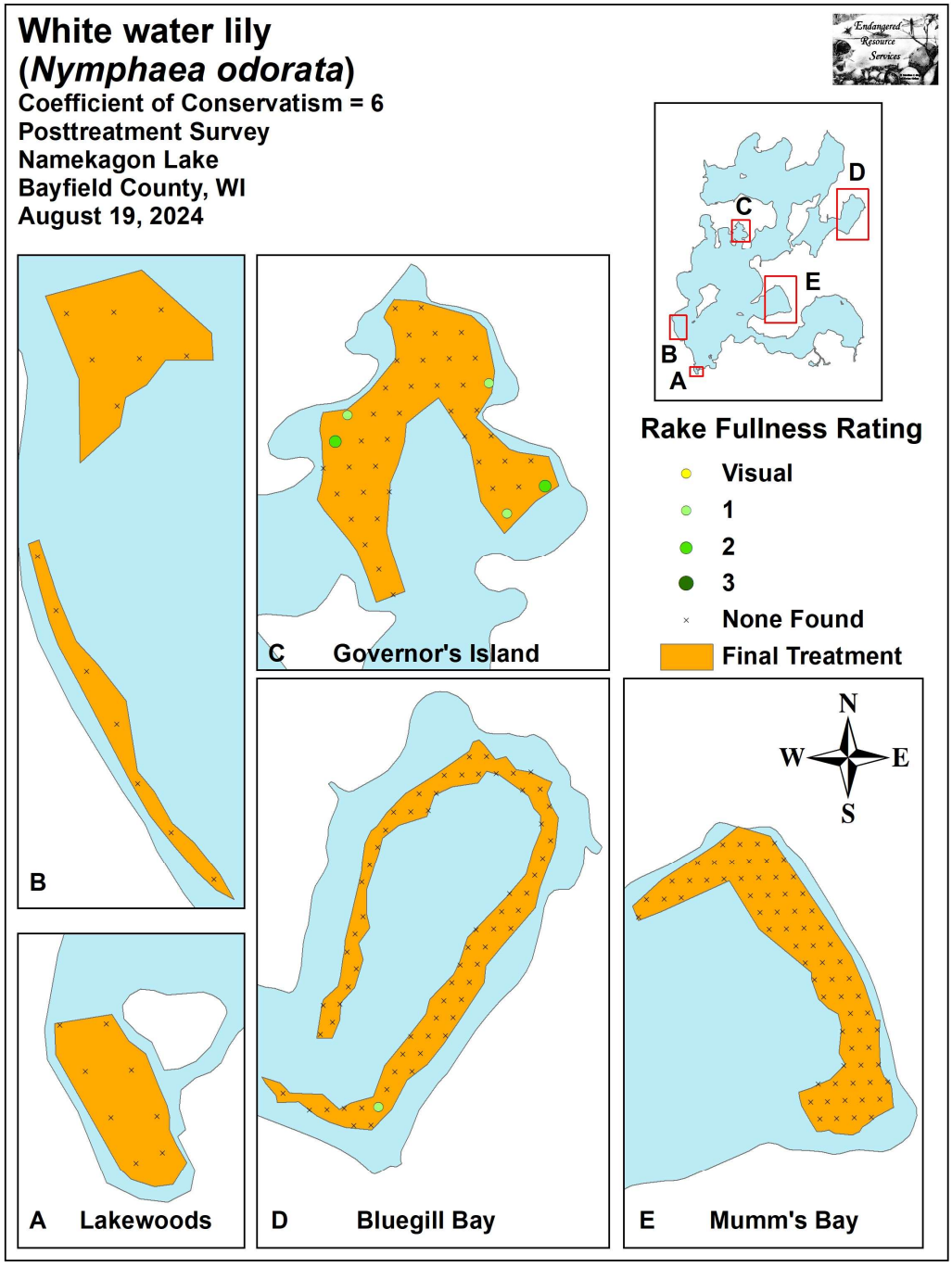
A Lakewoods
D Bluegill Bay
E Mumm's Bay


White water lily
(Nymphaea odorata)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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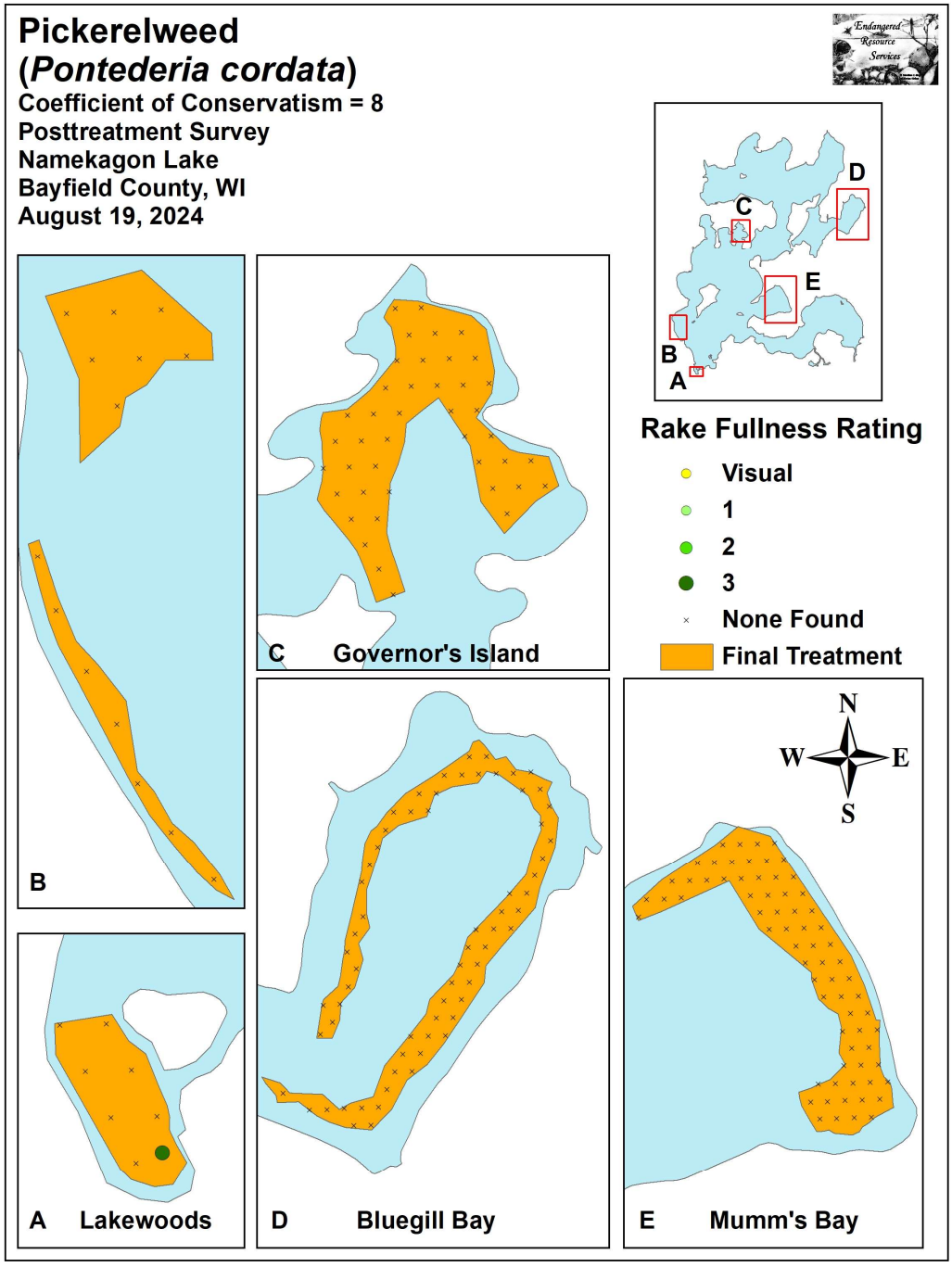
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Pickerelweed
(Pontederia cordata)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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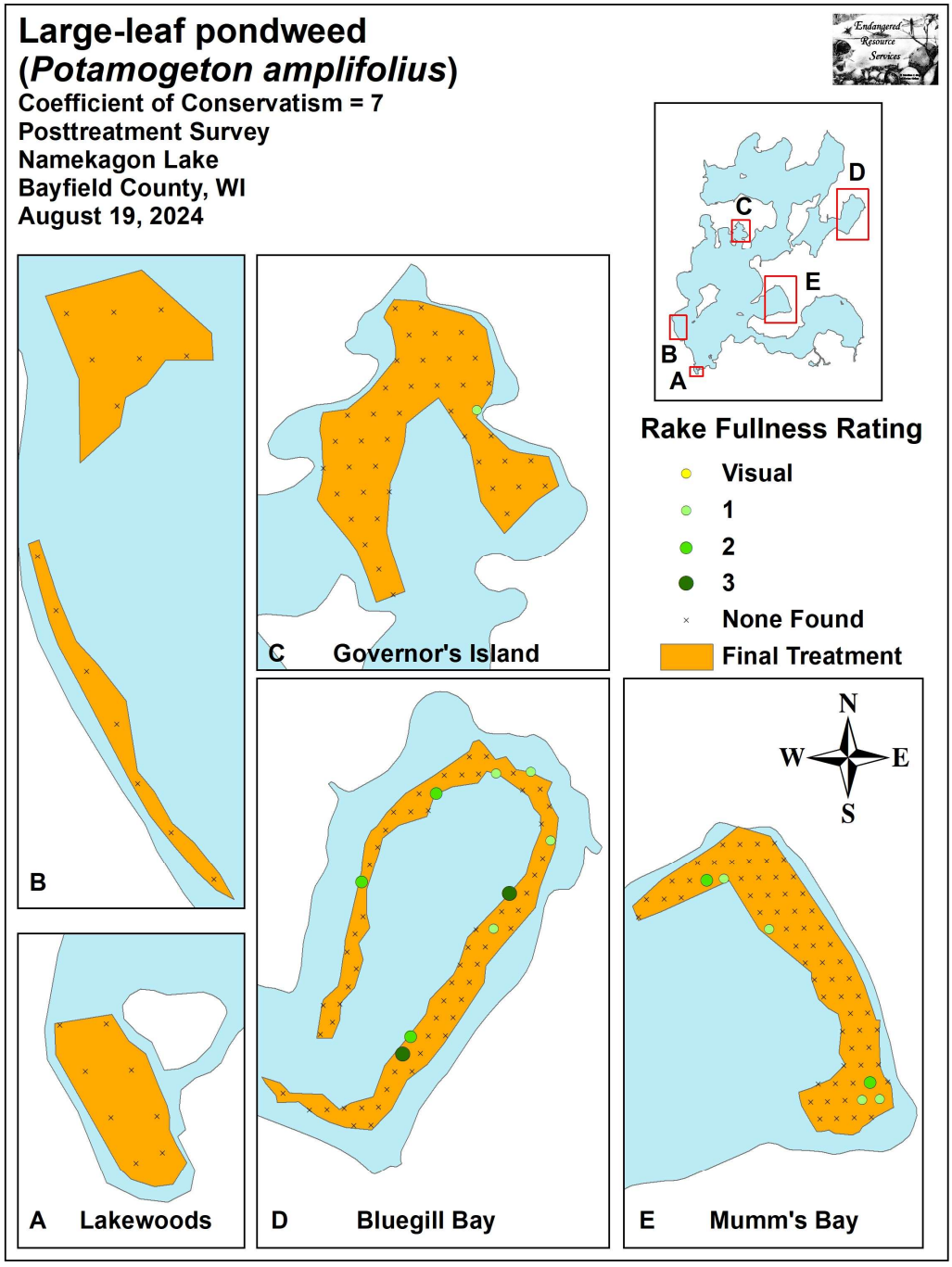
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Large-leaf pondweed
(Potamogeton amplifolius)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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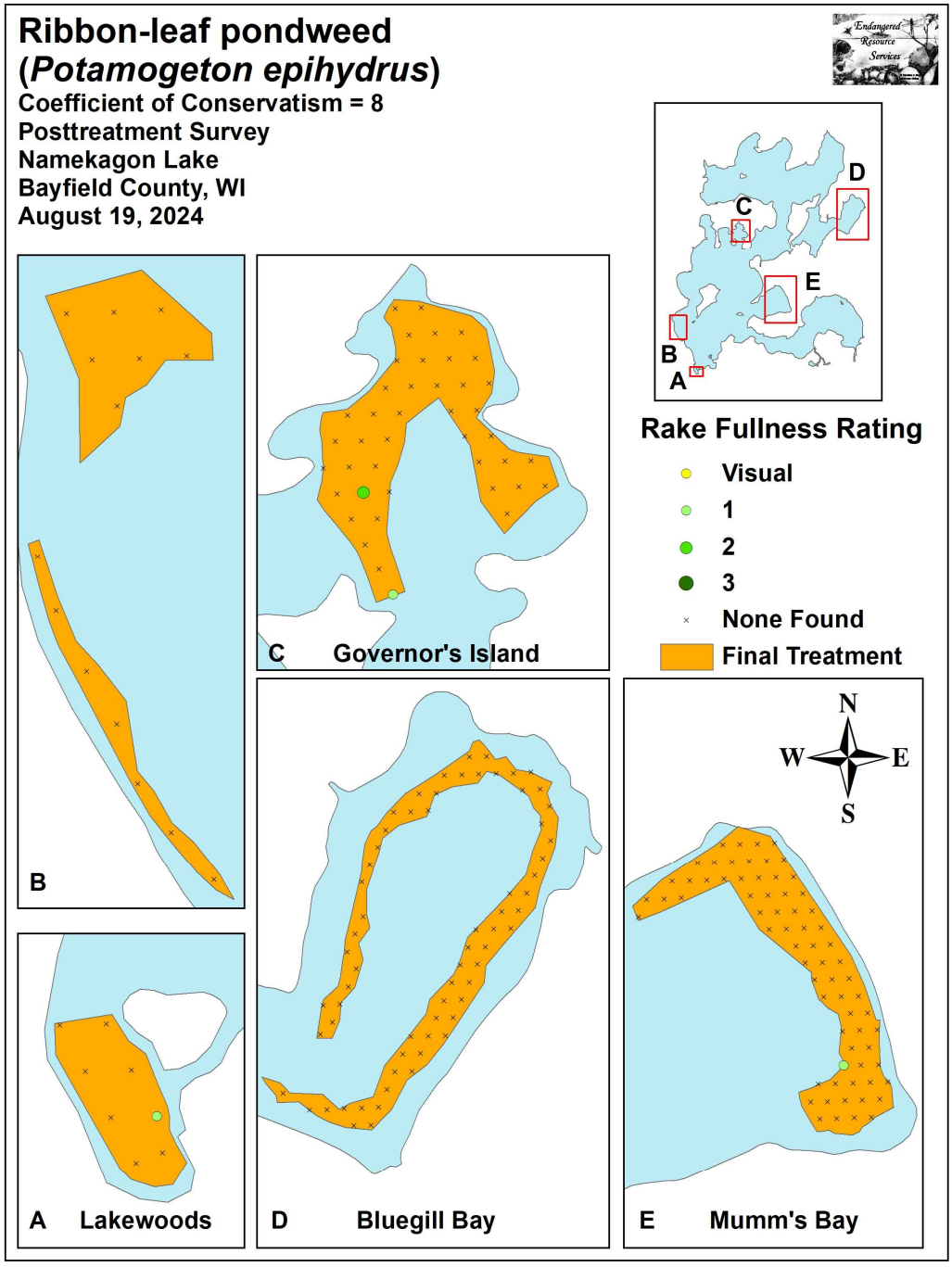
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Ribbon-leaf pondweed
(Potamogeton epihydrus)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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E
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A
Rake Fullness Rating
Visual
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None Found
Final Treatment
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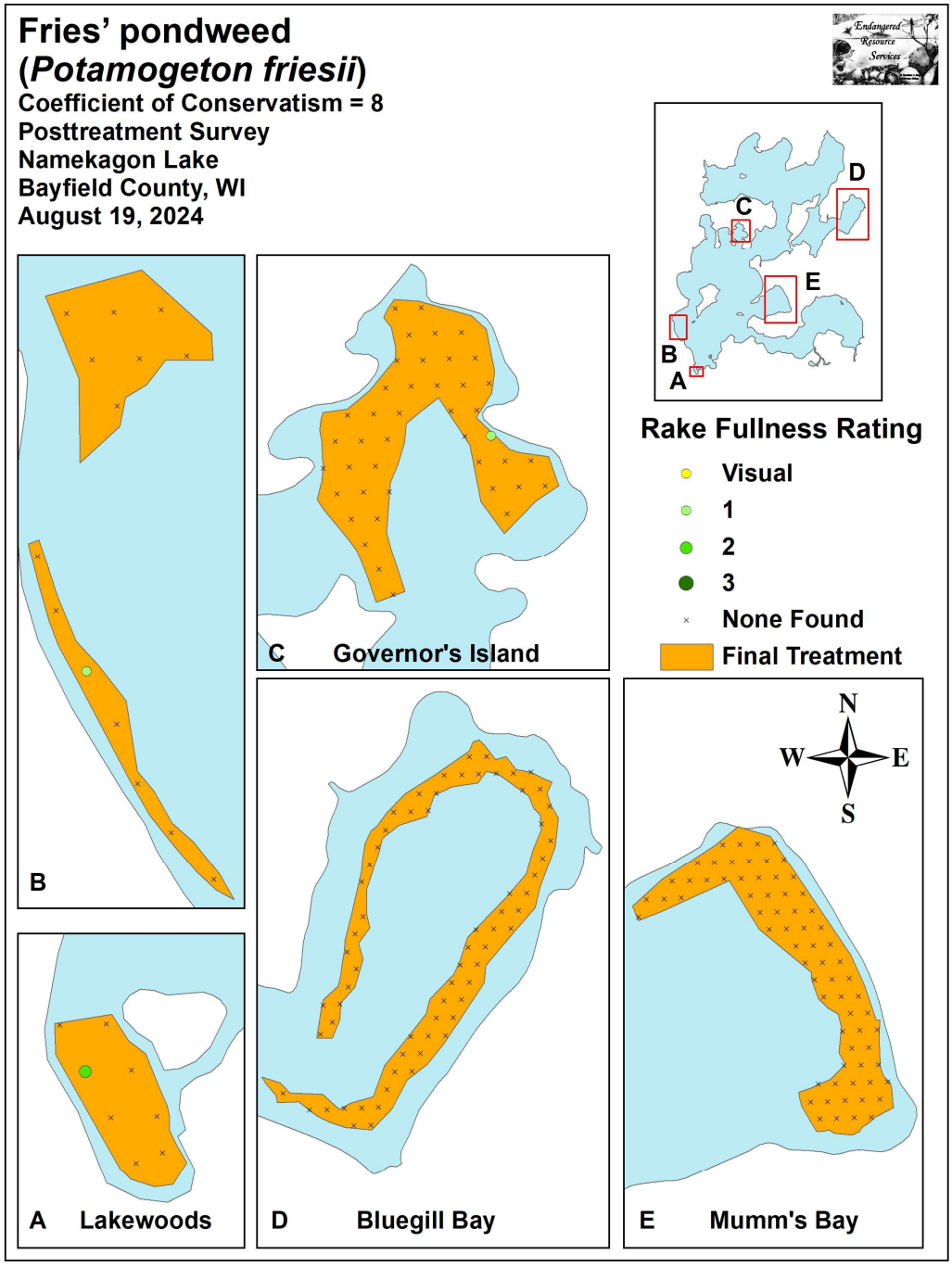
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Fries' pondweed
(Potamogeton friesii)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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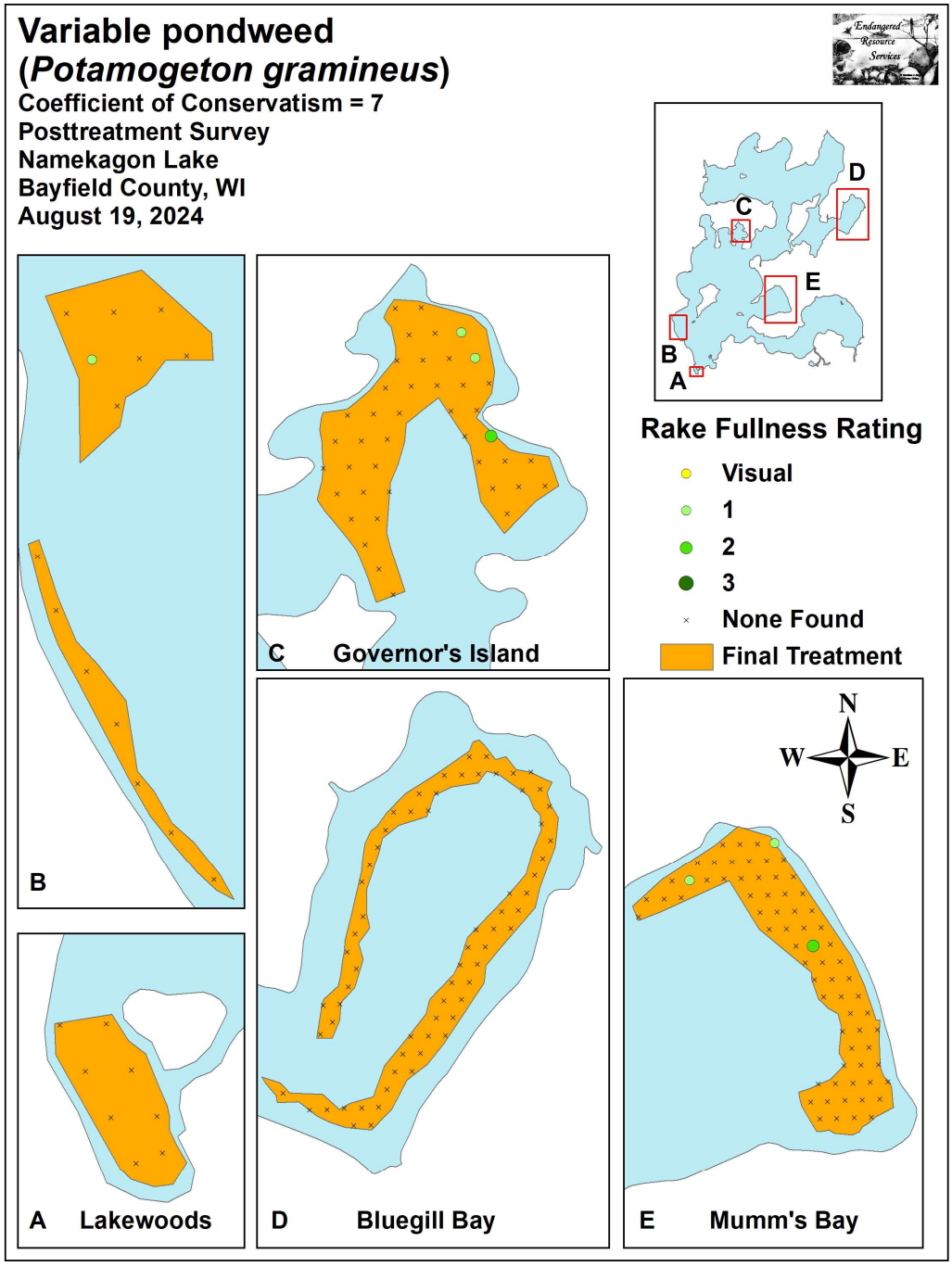
A Lakewoods
D Bluegill Bay
E Mumm's Bay


Variable pondweed
(Potamogeton gramineus)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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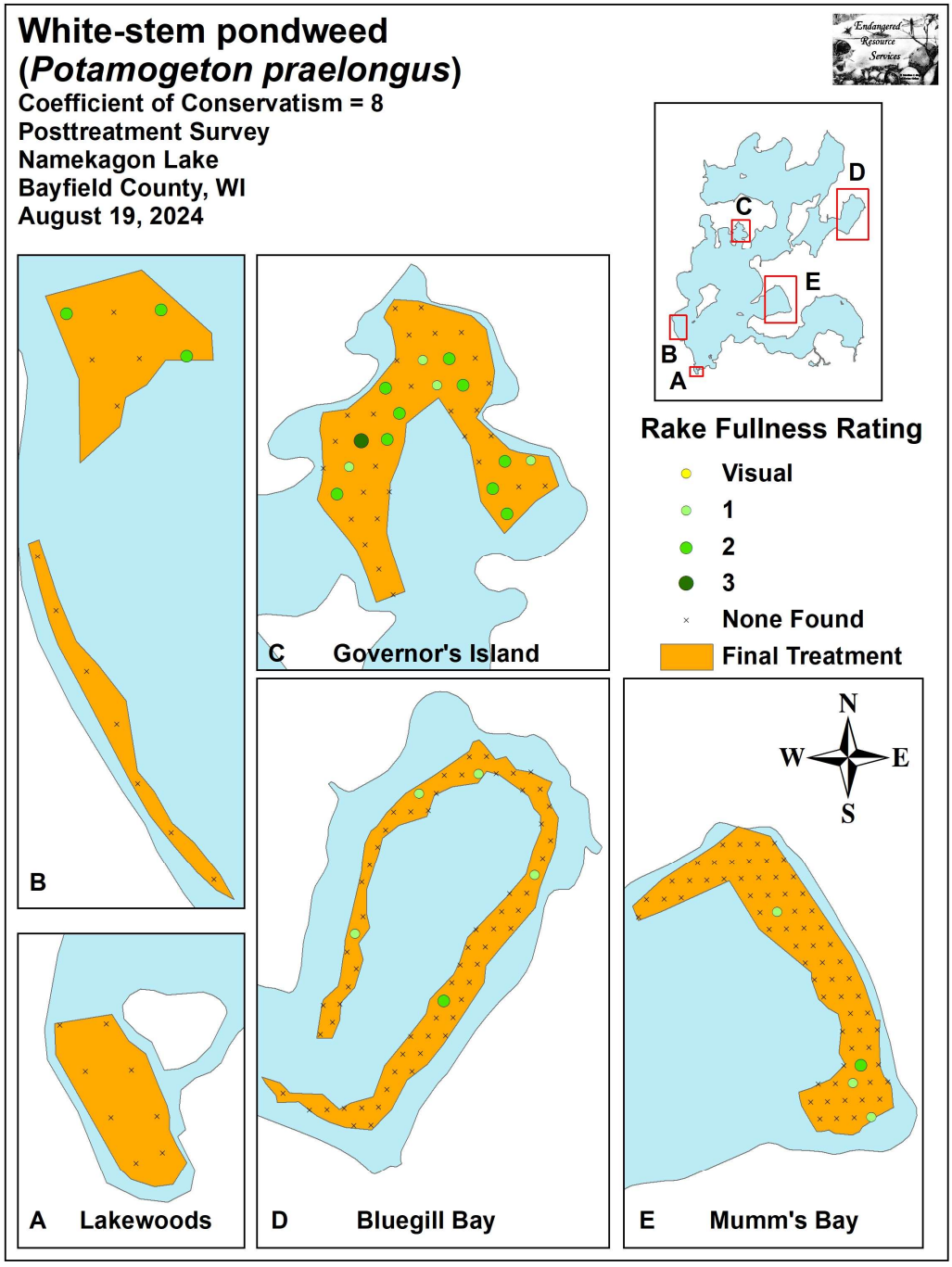
A Lakewoods
D Bluegill Bay
E Mumm's Bay


White-stem pondweed
(Potamogeton praelongus)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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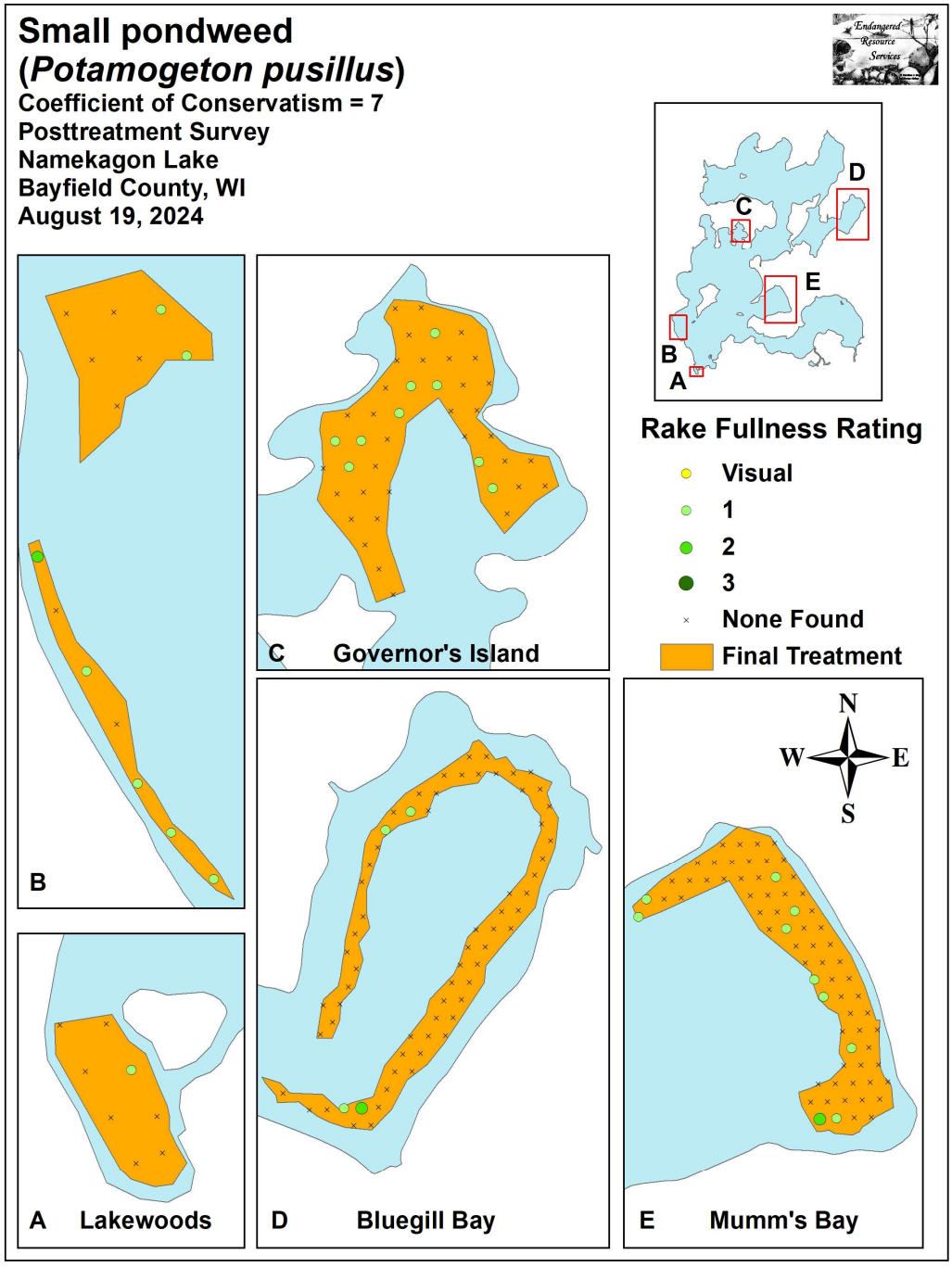
E Mumm's Bay


Small pondweed
(Potamogeton pusillus)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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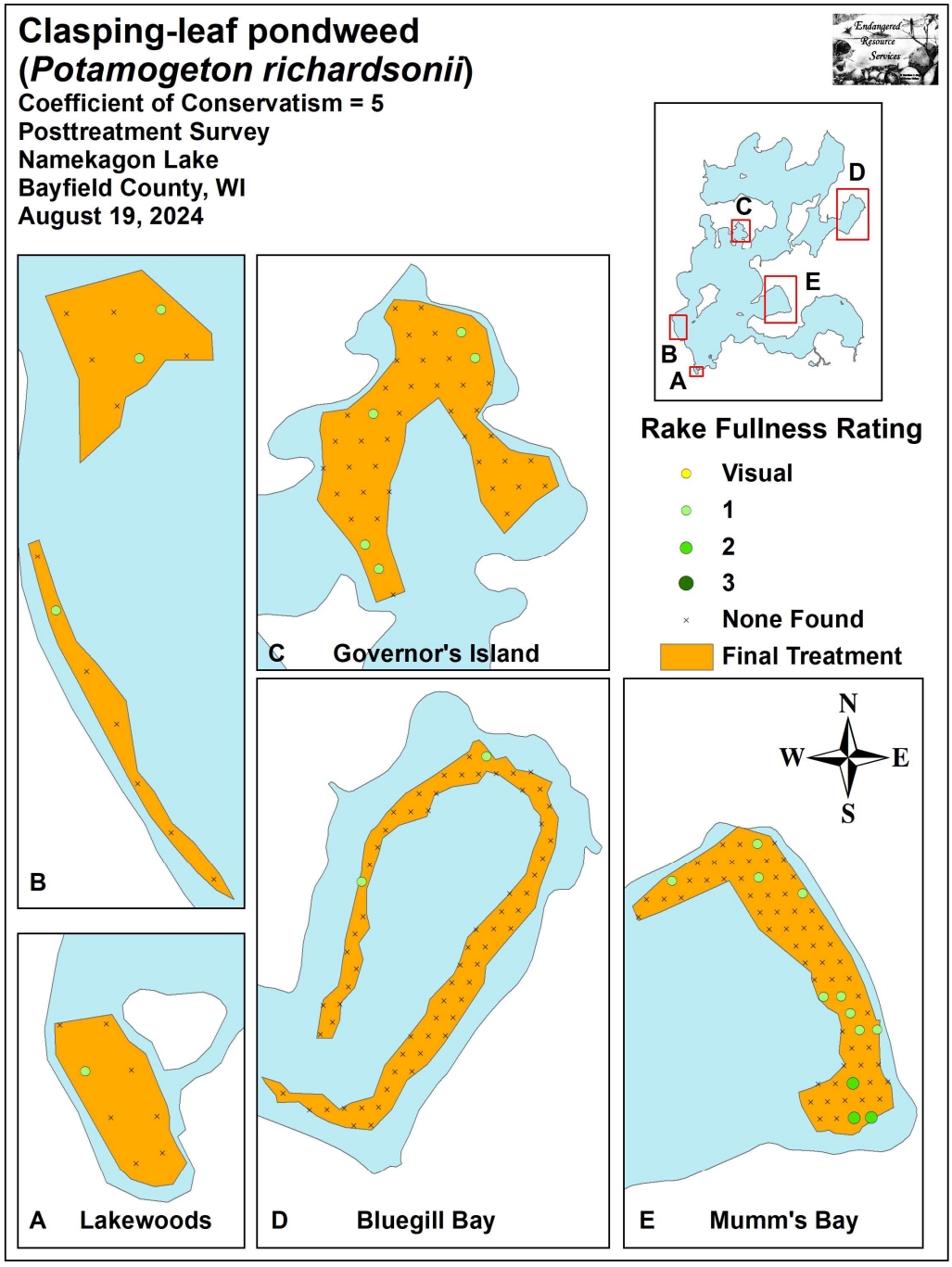
Clasping-leaf pondweed
(Potamogeton richardsonii)
Coefficient of Conservatism = 5
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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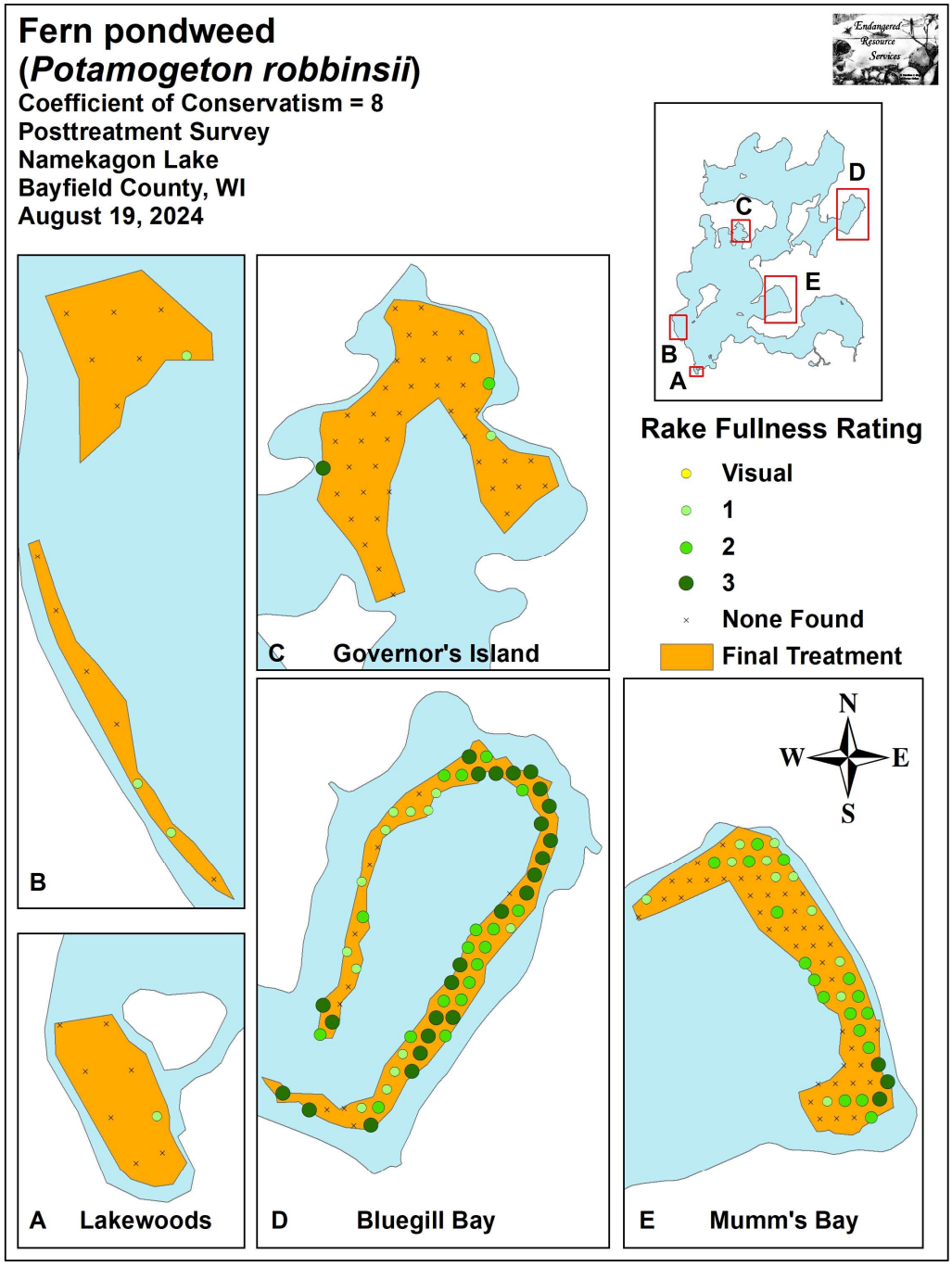
Fern pondweed
(Potamogeton robbinsii)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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A Lakewoods
D Bluegill Bay
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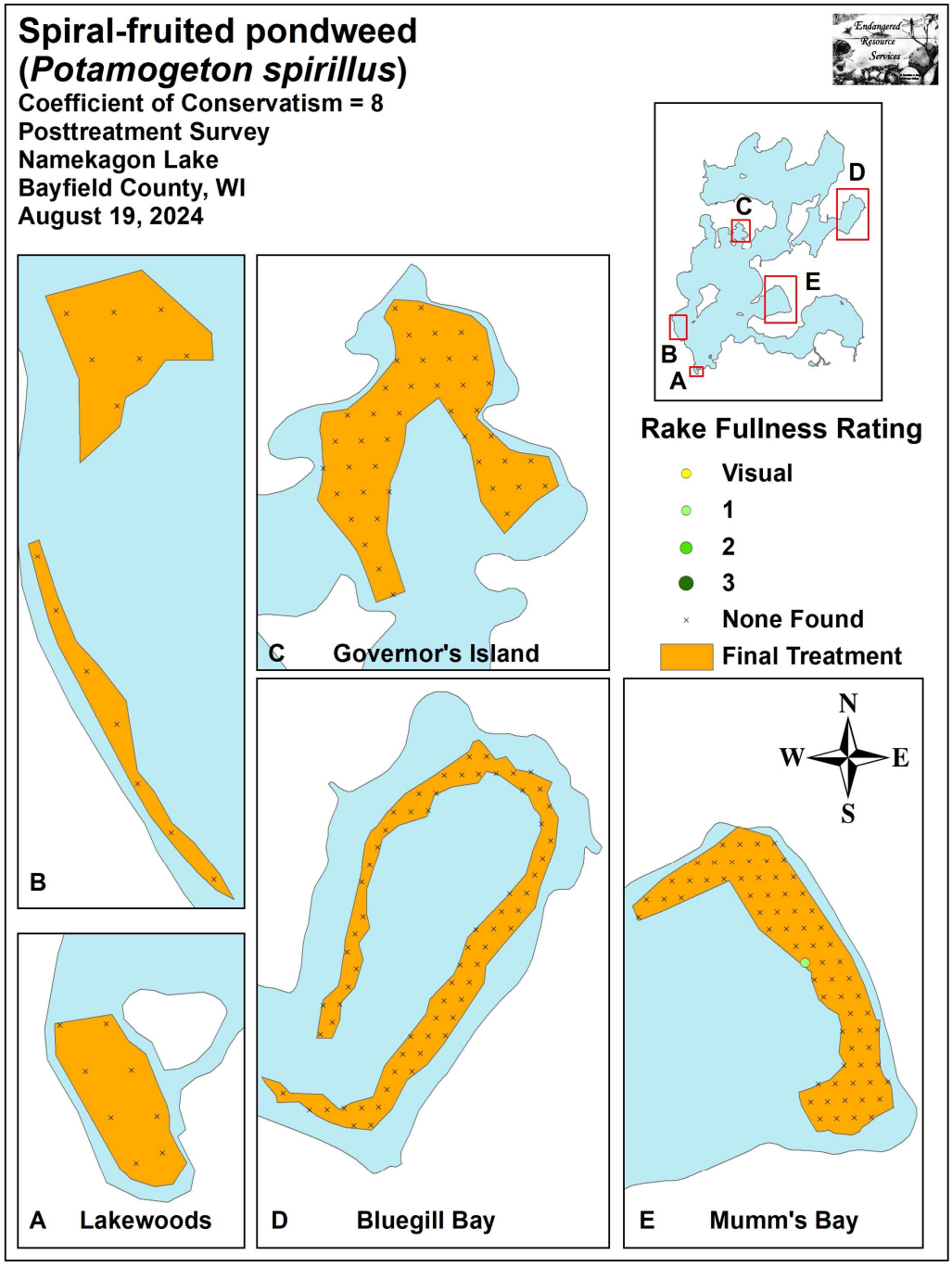
E Mumm's Bay


Spiral-fruited pondweed
(Potamogeton spirillus)
Coefficient of Conservatism = 8
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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A Lakewoods
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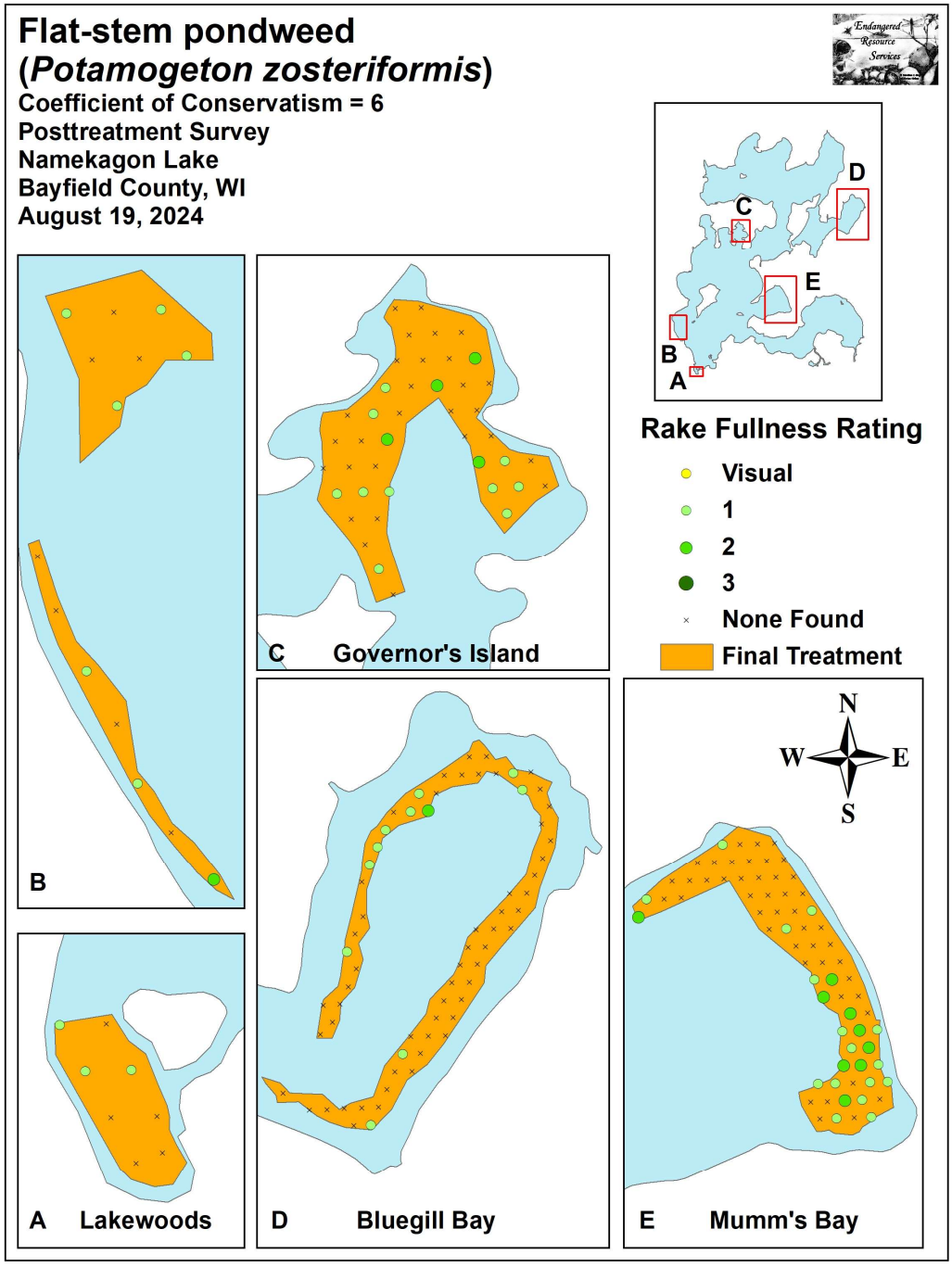
E Mumm's Bay


Flat-stem pondweed
(Potamogeton zosteriformis)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
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Rake Fullness Rating
Visual
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None Found
Final Treatment
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C Governor's Island
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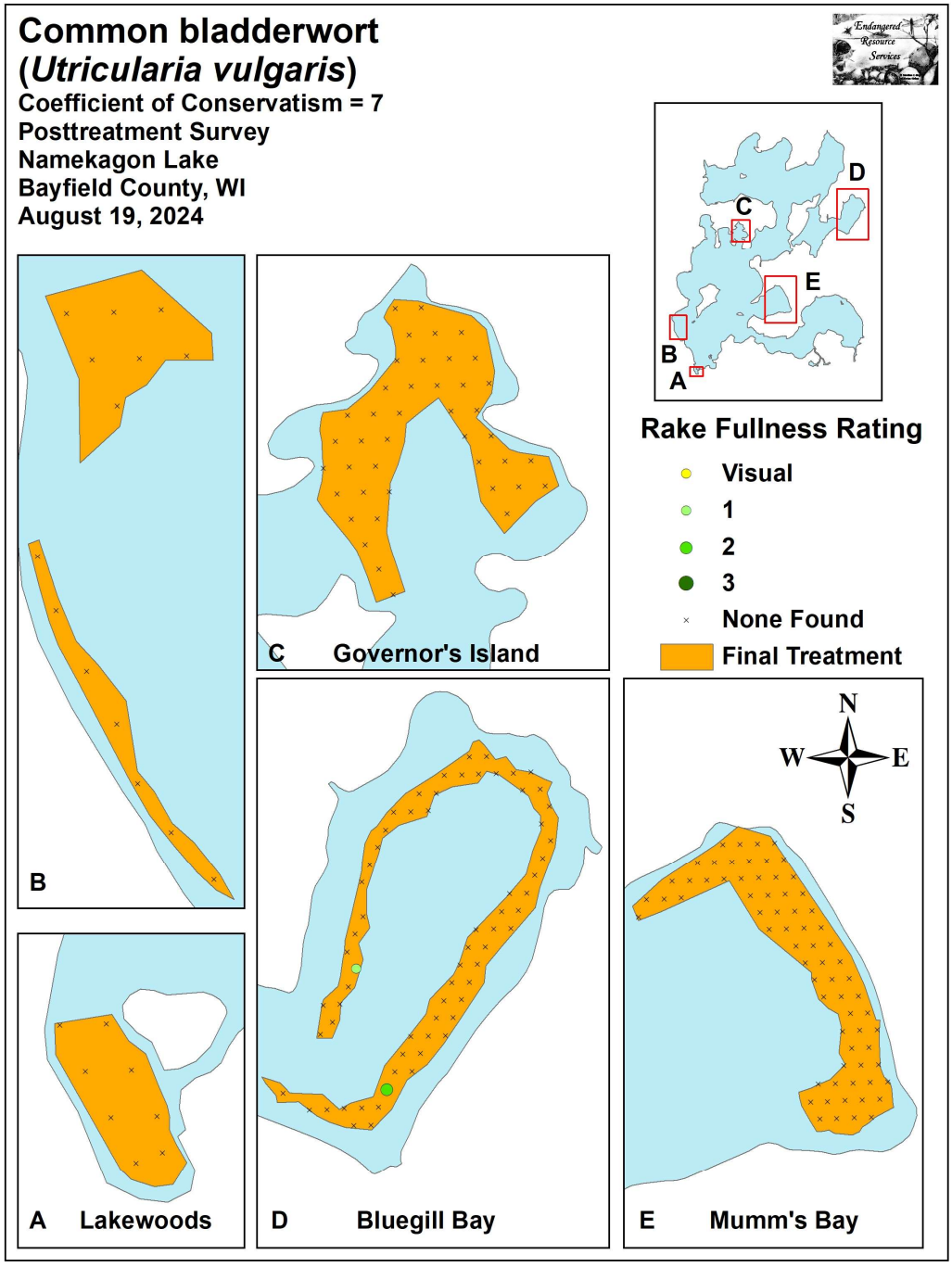
Common bladderwort
(Utricularia vulgaris)
Coefficient of Conservatism = 7
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
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Rake Fullness Rating
Visual
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None Found
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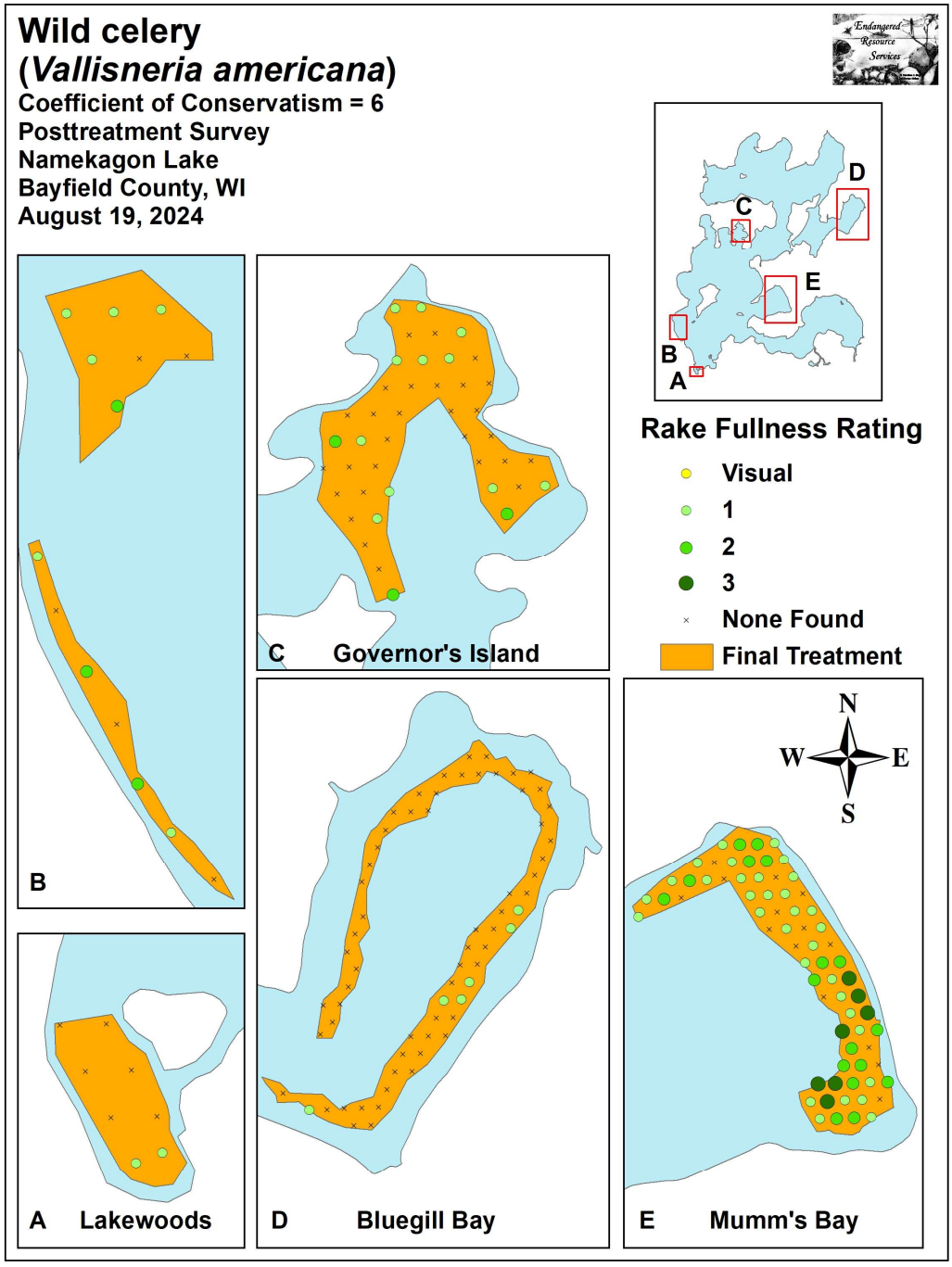
S
E Mumm's Bay


Wild celery
(Vallisneria americana)
Coefficient of Conservatism = 6
Posttreatment Survey
Namekagon Lake
Bayfield County, WI
August 19, 2024
Endangered Resource Services
D
C
E
B
A
Rake Fullness Rating
Visual
1
2
3
None Found
Final Treatment
B
C Governor's Island
N
W
E
S
A Lakewoods
D Bluegill Bay
E Mumm's Bay