

# Updated Rank Assessment for *Solidago houghtonii* (Houghton's goldenrod): Individual Element Occurrences and Subnational Rank



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Cover photo: Inflorescence of *Solidago houghtonii*

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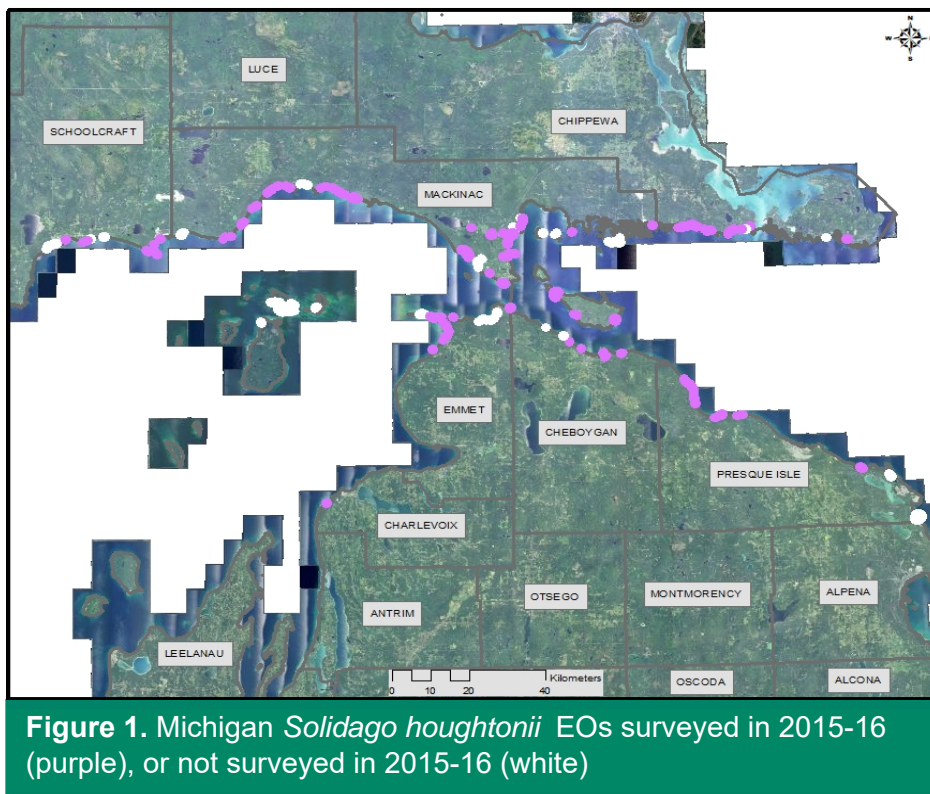
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# Rank Assessment

## Introduction

*Solidago houghtonii* A. Gray (Houghton's goldenrod; Asteraceae) is a perennial forb endemic to the northern Great Lakes region of the U.S.A. It is listed as Threatened under the Federal Endangered Species Act, and Threatened under the Endangered Species act of the State of Michigan (U.S. Fish and Wildlife Service 1997). This report summarizes work done by the Michigan Natural Features Inventory (MNFI) under subcontract to The Research Foundation of the State University of New York, in partial fulfillment of a project entitled, "Range Wide Status Assessment of Houghton's Goldenrod, with a Special Emphasis on Niche Limit Demographic Transitions, and Population Stability." Here, we summarize the results of three tasks: 1) updates to the spatial and tabular data in the 'Biotics 5' Natural Heritage Database for all *S. houghtonii* element occurrences (EOs) data in Michigan provided by Justine Weber, PhD Candidate at the State University of New York College of Environmental Science and Forestry (SUNY-ESF), based on surveys completed during 2015 and 2016 field seasons, 2) changes in the rank for each EO for which J. Weber provided data, and 3) an update to the subnational rank (S-rank) for *S. houghtonii* based on the new data, and using the NatureServe Element Rank Calculator. Previously, MNFI has provided technical assistance and occasional communications with SUNY-ESF, including location and site access information for *S. houghtonii* EOs within Michigan.



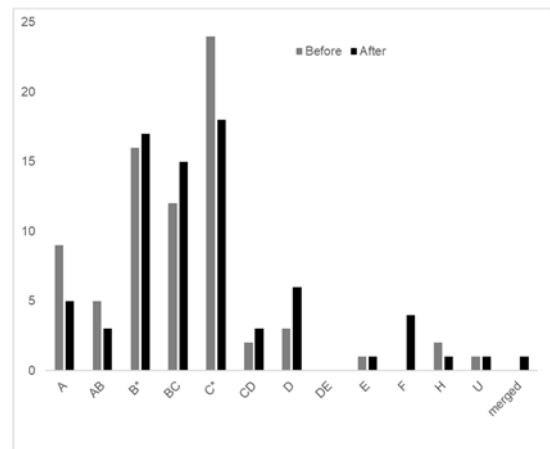
## Individual EO Ranks

We received updated information from J. Weber for a total of 46 out of 75 *S. houghtonii* EOs (61%) currently tracked in the BIOTICS 5 database (Figure 1). First, we assessed the additional spatial data we received to consider merging existing EOs, using a standard separation distance of one kilometer across good habitat (assuming the lack of a dispersal barrier such as a large body of water, large tract of forest, or a major road) for delineating individual EOs. As a result, we merged two previously separate EOs (# 46, EOID 628 was merged into # 21, EOID 9093).

Therefore, we assessed ranks for a total of 45 EOs. We used the generalized “Key for Ranking Species Element Occurrences Using the Generic Approach” developed by NatureServe (Tomaino et al. 2008), in conjunction with Global Ranking criteria for *S. houghtonii* (U.S. Fish and Wildlife Service 1997). Generally, ranks combine data on population and habitat size and condition, and the likelihood of population persistence for 20-30 years (e.g., a large, population in excellent, protected habitat is ranked ‘A’; a small population in limited habitat with high invasive species densities and nearby residential development is ranked ‘E’). Prior to this assessment, the majority (52 of 75; 69%) of EOs were either ranked B, BC, or C (Table 1, Figure 2). Despite rank changes for roughly half (23; 51%) of assessed EOs (Table 2), the majority (50 of 74; 67%) are still ranked B, BC, or C (Table 1; Figure 2,3). Among the 45 assessed EOs, 6 (13%) were upranked, 17 (38%) were downranked, and 22 (49%) maintained their current rank (Table 2). Of particular note, one historical EO, last observed in 1938, was upranked to C based on current data; four EOs were downranked to F (Failed to find; previously ranked AB to C; last observed between 1994 and 2007) based on repeated surveys during an optimal survey time. Of the 29 EOs not surveyed, 10 (34%) were inaccessible due to private property, 9 (31%) were inaccessible because they occurred on small islands or were otherwise difficult to access on foot, 4 (14%) were not located due to missing spatial data or vague directions, 3 (10%) were not surveyed because of time constraints, and 3 EOs (10%) were

**Table 1.** Change in rank distribution of Michigan element occurrences (EOs) of *Solidago houghtonii*. (\*includes ranks B? and C?)

RANK	Before	After	Difference
A	9	5	-4
AB	5	3	-2
B*	16	17	1
BC	12	15	3
C*	24	18	-6
CD	2	3	1
D	3	6	3
DE	0	0	0
E	1	1	0
F	0	4	4
H	2	1	-1
Un-ranked	1	1	0
merged	0	1	1
<b>TOTAL:</b>	<b>75</b>	<b>75</b>	



**Figure 2.** Number of Michigan EOs of *Solidago houghtonii* assigned each rank before and after 2015-16 surveys. (\*includes ranks B? and C?; there were no DE-ranked EOs)

intentionally omitted from surveys because they represent populations of the newly described species, *Solidago vossii* Pringle & Laureto (Laureto and Pringle 2010) (Figure 1, Table 2).

### **Subnational (State) Rank**

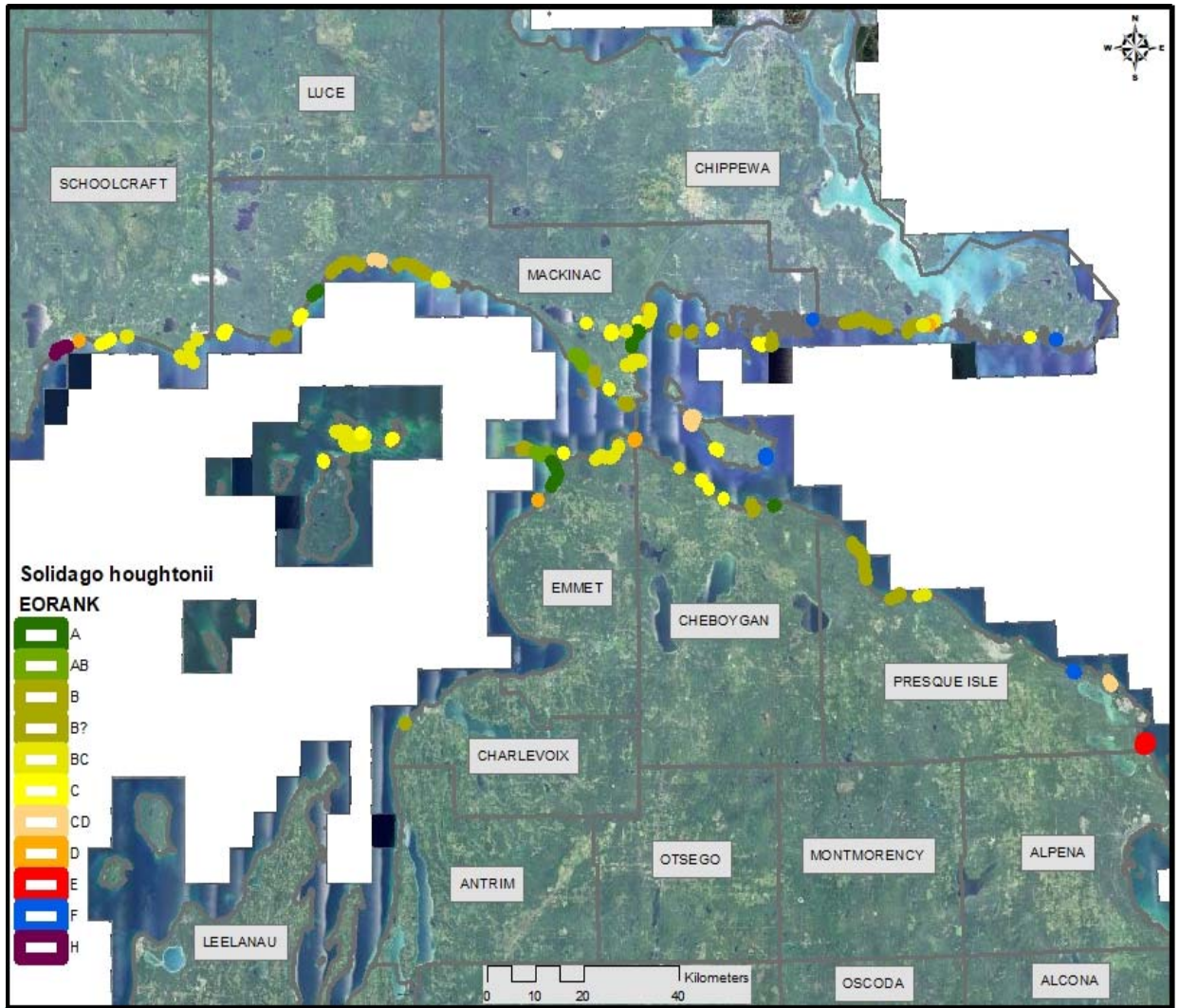
We used the NatureServe Rank Calculator (V. 3.185) (NatureServe 2015) to assess the subnational rank (S-rank) for *S. houghtonii*, or the status of *S. houghtonii* within the State of Michigan). Prior to 2015, *S. houghtonii* was considered “vulnerable” both globally and in the State of Michigan, justifying a global rank of G3 and a subnational rank of S3. The Rank Calculator determines S-Ranks based on a species’ distribution (range extent and area of occupancy), condition (number of occurrences, population sizes, number or spatial extent of occurrences with good viability), threats (both long- and short-term threats, and forecasted population trends). Upon considering additional data received from the 2015 and 2016 field seasons, we determined that an S3 rank is still appropriate.

The distribution and condition of, and threats to, *S. houghtonii* in Michigan were all moderate, overall. Some occurrences were large, protected, and likely to persist in that condition for at least 30 years (i.e., A- and AB-ranks in Table 1), while others were small, threatened and may not persist (i.e., D- and E-ranks in Table 1). The majority were at some, but not great risk, and were moderate in size and in good or moderate habitat (i.e, B-, BC-, and C-ranks in Table 2). Great Lakes levels have been high over the past decade, reducing potential habitat for *S. houghtonii*. If high lake levels persist, there is some uncertainty with regards to the persistence of all populations occurring at least in part along Great Lakes shorelines. Dense development, particularly of residential housing, is a potential threat. Invasive species also threaten some populations, especially *Phragmites australis* (common reed) and *Typha* spp. (cattails).

### **Recommendations for Protection and Surveys**

Priority areas for *S. houghtonii* surveys and monitoring over the next 2-3 years should include the 29 EOs that were not surveyed by J. Weber during 2015 and 2016, and those facing immediate threats. Populations threatened by residential development and invasive species (see Table 2) are of particular concern. Threats from residential development appear to be particularly acute along the shores of Lake Huron in Cheboygan and Presque Isle counties. These populations would benefit from more frequent monitoring. Where invasive plants such as *P. australis* and *Typha* spp. threaten populations of *S. houghtonii*, immediate controls should be undertaken, in combination with regular monitoring of both *S. houghtonii* and invasive species populations. Rising lake levels possibly threaten the majority of populations (or portions thereof). However, some populations occur in very narrow bands of shoreline and are especially susceptible to rising lake levels (e.g., EO# 38 and 76), and would benefit from regular monitoring.





**Figure 3.** Current rank of each Michigan *Solidago houghtonii* EO, reflecting results of 2015-16 surveys.

**Table 2. Rank Assessments for Michigan Element Occurrences (EOs) of *Solidago houghtonii* (Houghton's goldenrod) (\*date observed prior to 2015-16 survey)**

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
2	10193	2010-08-14	B	AB	up	Changed from B to AB because population larger than previously reported, but not A because patches discontinuous and presence of exotics (Phragmites).
3	8229	1999-07-07	A	A	none	Retained A rank. Population still large, with a large percent flowering (~33%) and occupies a large proportion of habitat, which is still high quality.
5	6316	2002-08-20	B	B	none	Retained B rank. Persistence may be in question because large proportion of population occurs on private land, so lacks sufficient buffer (and also lack recent survey data), but population likely still large and occurring over large area.
6	2464	2005-10-03	A	B	down	Changed from A to B, likely persists over large area, but persistence may be in question because large proportion of population occurs on private land, so uncertain habitat quality, and lacks sufficient buffer (and also lack recent survey data).
7	10503	1993-05-27	BC	CD	down	Changed from BC to CD. Small population on private (not protected) land but with minimally sufficient buffer; due to small population size, persistence seems likely only if lake remains at or below current levels.
10	3703	2001-08-21	B	B	none	Retained B rank. Population still large and occupies good proportion of large habitat area; but still insufficient buffer due to proximity of US-2.
12	790	2012-08-29	BC	BC	none	not enough new data - not assessed



EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
15	819	1981	B	B	none	Retained B rank. Good sized population distributed in patches within good but patchy habitat, with some protection (state land), but buffer minimally sufficient due to impact of adjacent road ROW.
17	4808	2005-08-19	A	AB	down	Changed from A to AB. Occurs over large area in quality habitat, but suitable habitat patches small and fragmented, or within US-2 ROW.
19	1424	1938-08-28	H	C	up	Changed from H to C based on 2015 data. Small population persists in good habitat with sufficient buffer. Persistence uncertain due to small population size and occurrence on private land.
20	1427	2005-08-25	C	C	none	Retained at C. Small population in quality habitat with sufficient buffer, on protected land.
21	9093	2005-08-18	A	AB	none	Changed from A to AB. EOR #21 (EOID #628) merged with this EO. Moderately large to large population, continuous to patchy for 3-4 kilometers; with localized disturbance at heavily used beach at Lakeview Rd and portions of population on private land.
22	8007	1996-08-21	B	B	none	Retained B rank. Large population, often scattered within moderate-sized, high quality habitat with sufficient buffer in some portions, and insufficient in others (development and campground).
24	6618	1996-08-20	C	C	none	not enough new data - not assessed
28	3926	2006-08-23	BC	D	down	Changed from BC to D. Small population in limited habitat with insufficient buffer (surrounded by development).

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
29	7584	1996-08-29	BC	BC	none	Retained BC. Moderate population in good habitat. Ongoing medium-density residential development in area, but much of forest cover remains.
30	7582	2011-06-08	A	B	down	Changed from A to B. Large population over several large habitat patches. Landscape context poor - crisscrossed by gravel roads, station for Enbridge Line 5 oil pipeline adjacent - planned work on pipeline reduces certainty of persistence.
31	417	1999-07-30	BC	B	up	Changed from BC to B. Moderately large population distributed among several patches over large area, often adjacent to M-134 and in limited area between M-134 and shoreline.
32	11785	2004-08-14	AB	B	down	Changed from AB to B. Moderate population in large area, concentrated in M-134 right of way, potentially declining population.
34	2940	1981	B?	BC	down	Moderate population in good, but limited habitat sensitive to lake level rise and adjacent road ROW. Typha adjacent.
35	8105	1981	B?	BC	down	Moderate population in good, but limited habitat sensitive to lake level rise and adjacent road ROW.
36	1118	1996-08-20	C	C	none	Retained C rank. Moderate population, but in very limited habitat surrounded by development, with evidence of occasional mowing.
38	3397	1981-08-04	BC	BC	none	Retained BC rank: Moderate to large population distributed patchily along long stretch of narrow shore. Habitat very limited by combination of high lake levels and dense deposition of zebra mussel shells. Buffered inland in some stretches, not in others.

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
39	9490	1981-07-09	B	F	down	Changed from B to F. Last observed 1981. Failed to find in two consecutive searches (1997, 2015), including one comprehensive search in appropriate season (2015-08-06).
41	8589	1994-08-10	B	B	none	Retained B rank. Large population in good habitat, but buffered with sparse development and evidence of ongoing ORV use.
42	1204	2001-08-21	A	A	none	Retained A rank. A very large, thriving population, (mostly) continuously distributed throughout high quality, protected habitat.
46	628	1990	AB	N/A	N/A	merged with #21
47	5319	2010-08-16	BC	BC	none	Retained BC rank. Moderate-sized population in limited but good habitat excellent buffer, but very sensitive to lake levels.
49	12920	2012-08-30	A	A	none	not enough new data
52	12540	1989	C	C	none	Retained C rank. Small population in excellent, but limited habitat within high quality fen.
53	11161	2001-08-22	B	BC	down	Changed rank from B to BC. Moderate population, some in high quality, buffered habitat, some in limited, lightly disturbed beach with homes and adjacent US-2.

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
55	677	2002-07-29	AB	F	down	Changed from AB to F. Failed to find in two consecutive surveys during optimal survey period (Early August 2015, 2016). Should survey during lower lake levels.
57	4758	2010-08-26	C?	D	down	Very small population in recovering and highly disturbed habitat. Landscape context includes I-75 and Mackinaw City (including train yard), <i>Typha angustifolia</i> and <i>Phragmites australis</i> .
59	8084	1992-09-13	C	F	down	Changed from C to F. Failed to find in two consecutive years during optimal survey time (early August 2015, 2016). Survey during lower lake levels to determine if extant.
61	1390	2001-08-23	C	C	none	Retain C rank. Moderate population in small patch of good habitat within developed landscape, including highway R.O.W.
62	12229	1996	AB	B	down	Changed from AB to B. Moderately large population in good but limited habitat - could rank BC due to small habitat area, but population size seems stable over past 20 years.
68	3601	2000-08-30	C	C	none	Retained C rank. Moderate to small population in limited (but quality) habitat along lightly developed shoreline (adjacent to private homes).
69	11741	2006-08-23	C	C	none	Retained C rank. Moderate to small population in limited, but good habitat, near private homes and largely within a township park.
71	96	2001-08-20	C	BC	up	Changed from C to BC: Large population (larger than previously reported) growing densely in moderately large habitat patches, but <i>Phragmites</i> occurs in significant patches interspersed throughout this EO, could be B or AB with control of <i>Phragmites</i> .

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
73	8064	2001-08-22	C	B	up	Changed from C to B. Large population (larger than previously reported) in moderately large patches within available habitat. Exotics present but apparently sparse; some historical ORV use and occasional human trampling.
74	13198	1996-09-16	C	D	down	Changed from C to D because small population, and ongoing development in previously documented area, with no additional plants observed to east and west.
75	13208	1998-06-12	C	C	none	Retained C rank. Moderately small population in good but vulnerable habitat (mowing/grading/runoff from road ROW).
76	13556	2012-08-31	AB	BC	down	Changed from AB to BC. Moderate to large population of uncertain size, in good, protected, but limited habitat - narrow band of shoreline between lake Horseshoe Bay and adjacent dense forest. Particularly sensitive to high lake levels, so may continue to decline.
78	14675	2012-08-29	C	BC	up	Changed from C to BC. Moderate population in good quality, intact habitat, but habitat poorly buffered: I-75 corridor and Typha ang/Phragmites.
82	16047	2005-08-17	A	A	none	Retained A rank. Large population in intact, high quality habitat with good buffer of well-managed habitats.
84	16821	2007-07-10	C	F	down	Changed from C to F. 2015 survey reports continued high lake levels in area where previously reported. Likely extirpated - survey in low lake level conditions.

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
1	1769	1996-09-14	BC	not assessed	none	No survey. Private property.
4	3267	1995-09-09	BC	not assessed	none	No survey. Private property.
8	2735	1994-07-13	C	not assessed	none	No survey. Private property.
9	3704	1994-08-10	CD	not assessed	none	No survey. Private property.
11	7761	1996-09-11	B	not assessed	none	No survey. Inaccessible (require canoe/kayak).
23	4894	1915-09-17	H	not assessed	none	No survey. Private property.
26	11054	2012	A	not assessed	none	No survey. This populations recently segregated as <i>Solidago vossii</i> .
27	5927	1979	C	not assessed	none	No survey. Private property.
33	5196	1981-07-29	D	not assessed	none	No survey. Inaccessible (require canoe/kayak).
43	7534	1982	E	not assessed	none	No survey. Inaccessible.
44	4039	1993-05-27	BC	not assessed	none	No survey. Private property.



EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
45	11122	1990	BC	not assessed	none	No survey. Inaccessible (require canoe/kayak).
48	6086	2001-08-23	B	not assessed	none	No survey. Private property.
50	12919	1996-08-20	C	not assessed	none	No survey. Private property.
51	11481	1986-07-16	C	not assessed	none	No survey. Inaccessible (require canoe/kayak).
54	7037	2012-08-30	C	not assessed	none	No survey. Time constraints.
56	6350	1988-08-12	D	not assessed	none	No survey. Vague directions.
58	10185	2002-08-06	C	not assessed	none	No survey. Inaccessible (require canoe/kayak.)
63	5738	1999-08-20	C	not assessed	none	No survey. Inaccessible (require canoe/kayak).
64	9104	1993-09-01	D	not assessed	none	No survey. This population recently segregated as <i>Solidago vossii</i> .
65	491	2010-08-31	BC	not assessed	none	No survey. This population recently segregated as <i>Solidago vossii</i> .
66	2613	2011-08-05	C	not assessed	none	No survey. Vague directions (missing spatial data).
67	7510	2000-08-10	C	not assessed	none	No survey. Private property.

EO#	EOID	Last Observed*	Old Rank	New Rank	Change	Notes - justification for rank assessment or reason for no 2015-2016 survey
77	13799	1993-08-12	B	not assessed	none	No survey. Inaccessible (require canoe/kayak).
79	15824	1993-08-12	B	not assessed	none	No survey. Inaccessible (require canoe/kayak).
80	15827	1993-08-10	B	not assessed	none	No survey. Inaccessible (require canoe/kayak).
81	15919	1998-06-10	CD	not assessed	none	No survey. Time constraints.
83	16051	2002-08-06	B?	not assessed	none	No survey. Inaccessible (require canoe/kayak).
85	19958	2014?	U	not assessed	none	No survey. Vague directions.

39%	29	Not assessed (total)
61%	45	Assessed (total, excluding #46, which was merged with #21)
38%	17	Assessed and downranked
13%	6	Assessed and upranked
49%	22	Assessed and unchanged

## Acknowledgements

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