

<b>SPECIES: Scientific [common]</b>	<i>Spirodela polyrhiza</i> [Greater duckweed]
<b>Forest:</b>	Bridger-Teton National Forest
<b>Forest Reviewer:</b>	<b>J.Irwin 10/03/20; R.Lehman 10/05/20</b>
<b>Date of Review:</b>	<b>10/05/20</b>
<b>Forest concurrence (or recommendation if new) for inclusion of species on list of potential SCC: (Enter Yes or No)</b>	<b>No</b>

**FOREST REVIEW RESULTS:**

- The Forest concurs or recommends the species for inclusion on the list of potential SCC:  
Yes \_\_\_ No X
- Rationale for not concurring is based on (check all that apply):  
 Species is not native to the plan area \_\_\_\_\_  
 Species is not known to occur in the plan area \_\_\_\_\_  
 Species persistence in the plan area is not of substantial concern \_\_\_\_\_

**FOREST REVIEW INFORMATION:**

- Is the Species Native to the Plan Area? Yes X No \_\_\_  
 If no, provide explanation and stop assessment.
- Is the Species Known to Occur within the Planning Area? Yes X No \_\_\_  
 If no, stop assessment.

**Table 1.** All Known Occurrences, Years, and Frequency within the Planning Area

Year Observed	Number of Individuals	Location of Observations (USFS District, Town, River, Road Intersection, HUC etc.)	Habitat Description	Source of Information <sup>1</sup>
1947	Unknown	Outside Bridger-Teton National Forest: Jackson Hole: small pond near Moose.	In pond. 1193a <i>Lemna minor</i> and 1193b <i>L. trisulca</i> on same sheet. Elevation 6400 ft.	Collector John F. Reed #1193c (Rocky Mountain Herbarium 2019)
1961	Abundant	Outside Bridger-Teton National Forest: Ponds 1 mi SW of Moose.	Elevation 6400 ft. With <i>Nuphar</i> , abundant, floating on surface.	Collector C. L. Porter (Rocky Mountain Herbarium 2019)

1963	Unknown	Outside Bridger-Teton National Forest: Grand Teton National Park: Moose Pond.	Elevation 6400 ft. Quiet open water in ponds and back waters.	Collector C. W. Lahser, Jr. #508 (Rocky Mountain Herbarium 2019)
1987	Unknown	Southwestern Absarokas: Teton Wilderness: Gravel Lake, 7 air mi S of Yellowstone National Park, 42.3 air mi NNE of Jackson.	Elevation 8000 ft. In the lake.	Collector B. E. Nelson #14741 (Rocky Mountain Herbarium 2019)
2006	1 Collection	Outside Bridger-Teton National Forest: Grand Teton National Park and Vicinity: Jackson Hole: near Two Ocean Lake, 6 air mi N of Moran; 21.5 air mi NE of Moose.	Pond with stagnant water and shallow areas dominated by <i>Carex</i> spp.	Collector David Scott #2380 (Rocky Mountain Herbarium 2019)
2007	1 Collection	Bridger-Teton National Forest: Teton Wilderness: near Gravel Creek, 13 air mi NE of Moran; 30 air mi NE of Moose.	Elevation 7440 ft. Floating in montane pond.	Collector David Scott #3818 (Rocky Mountain Herbarium 2019)
2007	1 Collection	Bridger-Teton National Forest: Teton Wilderness: near East Fork Pilgrim Creek, 8.5 air mi N of Moran; 23 air mi NNE of Moose.	Elevation 7740 ft. Floating aquatic on surface of montane lake.	Collector David Scott #4098 (Rocky Mountain Herbarium 2019)
2007	1 Collection	Bridger-Teton National Forest: Teton Wilderness: near head of Gravel Creek, 17 air mi NE of Moran; 33 air mi NE of Moose.	Elevation 8320 ft. Floating on surface of pond.	Collector David Scott #4412 (Rocky Mountain Herbarium 2019)
2012	1 Collection	Wyoming Range: 0.5 mi SE of Little Greys River mouth, 8 mi E of Alpine.	Elevation 6840 ft. Small pool in a midslope trough, partial shade, on silt-textured parent material, with fallen logs and little emergent vegetation.	Collector Bonnie Heidel #3753 (Rocky Mountain Herbarium 2019)

<sup>1</sup>The Consortium of Pacific Northwest Herbaria (Consortium of Pacific Northwest Herbaria 2019) and the SEINet data portal (SEINet 2019) were also searched, and no additional occurrences on the Bridger-Teton National Forest were found.

- a. Are all Species Occurrences Only Accidental or Transient?

Yes \_\_\_ No X

If yes, document source for determination and stop assessment.

- b. For species with known occurrences on the Forest since 1990, based on the number of observations and/or year of last observation, can the species be presumed to be established or becoming established in the plan area?

Yes X No \_\_\_

If no, provide explanation and stop assessment

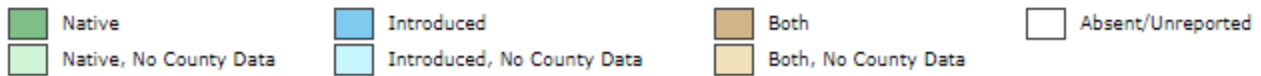
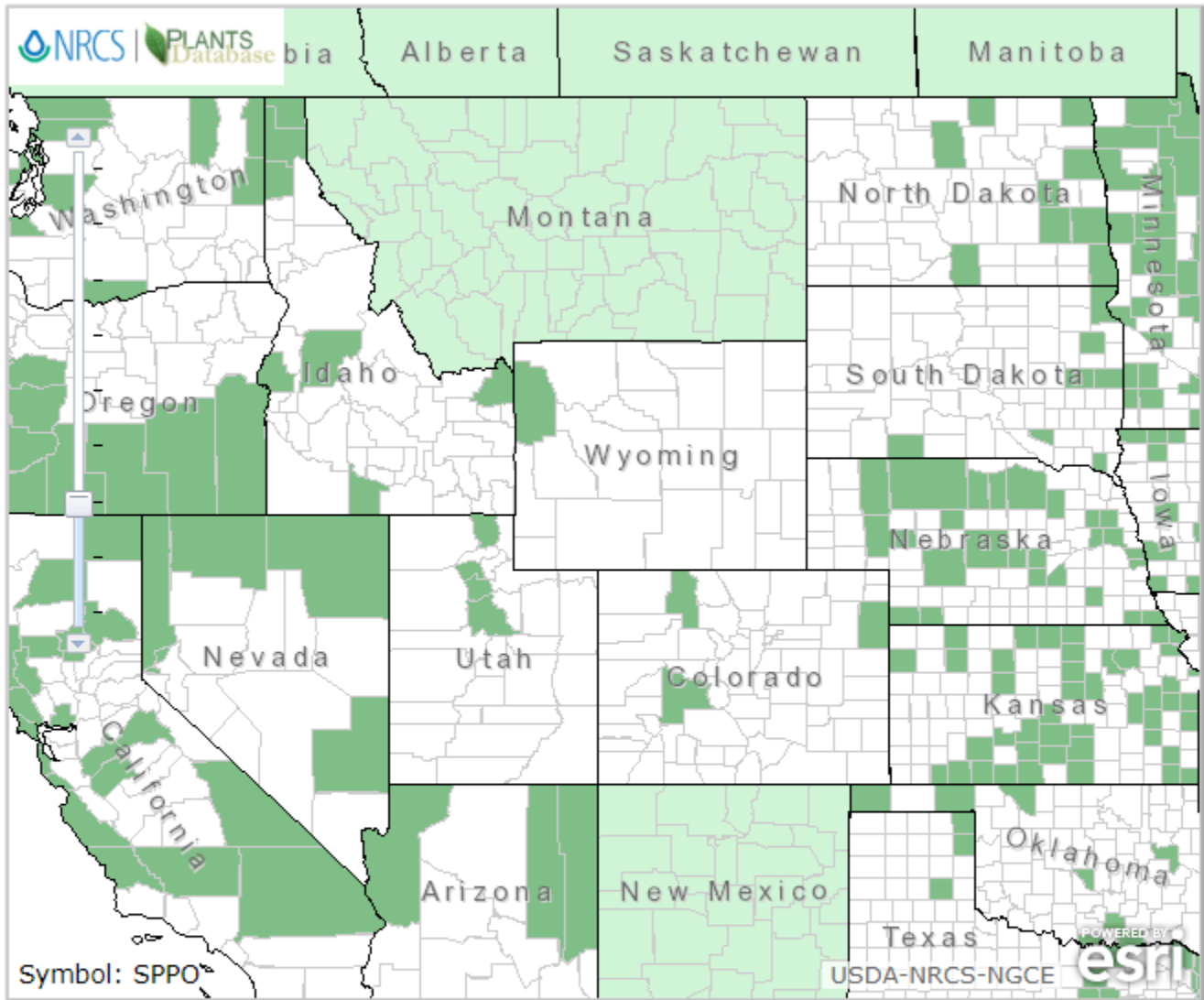
- c. For species with known occurrences on the Forest predating 1990, does the weight of evidence suggest the species still occurs in the plan area?

Yes \_\_\_ No \_\_\_

Provide explanation for determination

If determination is no, stop assessment

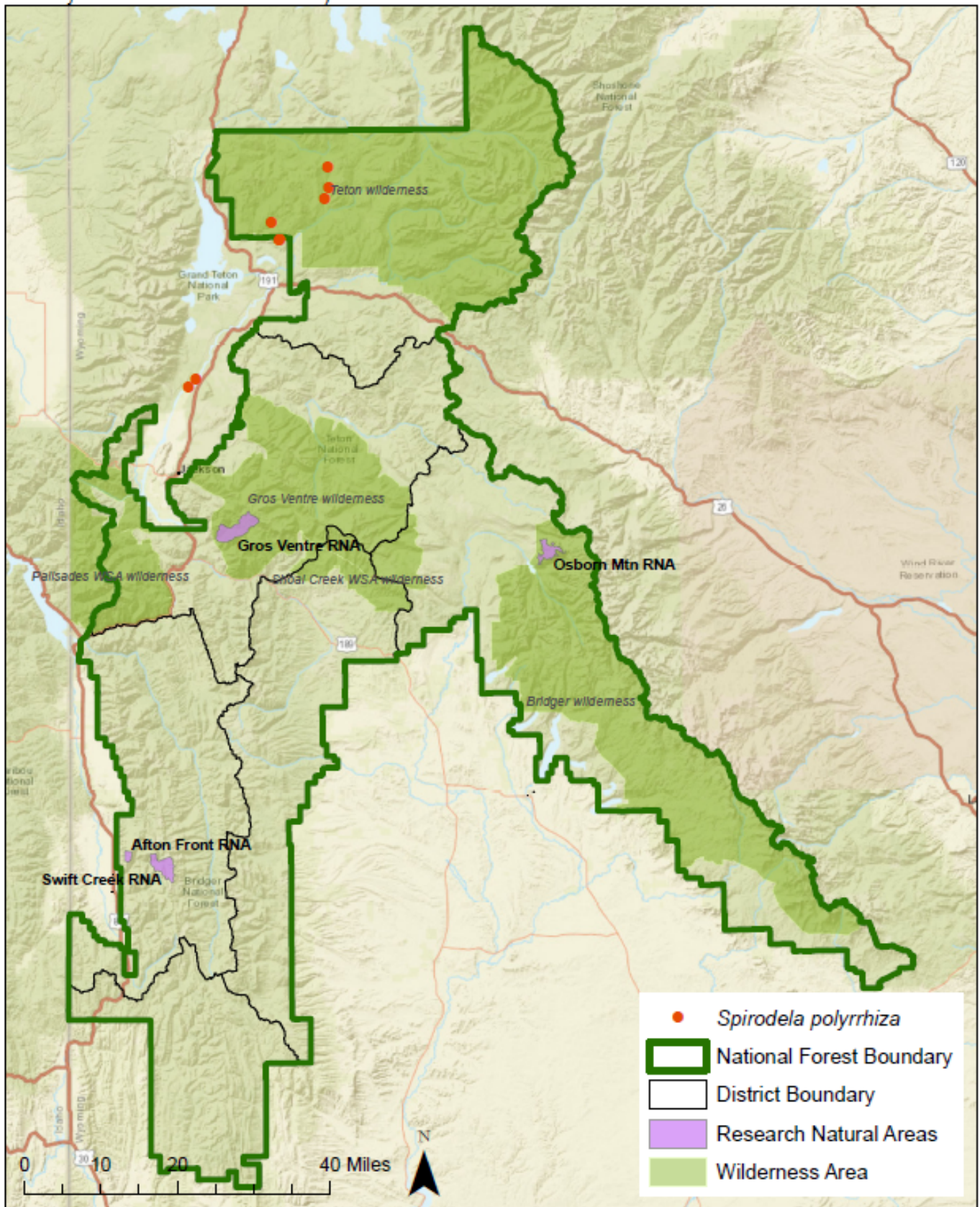
d. **Map 1, *Spirodela polyrhiza* range in Wyoming and surrounding states (NRCS 2019).**



**Native Status:**



**Map 2, *Spirodela polyrhiza* occurrences in Bridger-Teton National Forest vicinity (WYNDD 2019, Rocky Mountain Herbarium 2019)**



3. Is There Substantial Concern for the Species' Capability to persist Over the Long-term in the Plan Area Based on Best Available Scientific Information?

**Table 2.** Status summary based on existing conservation assessments

<b>Entity</b>	<b>Status/Rank (include definition)</b>
<b>NatureServe Global Status</b>	<b>G5—Secure</b>  <i>Common; widespread and abundant.</i>
<b>NatureServe State Status</b>	<b>S1—Critically Imperiled</b>  <i>At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.</i>
<b>WYNDD</b>	Not listed
<b>USDA Forest Service</b>	Not listed in R4
<b>USDOI FWS</b>	Not listed
<b>USDOI BLM</b>	Not listed
<b>IUCN</b>	<b>LC – Least Concern</b>  <i>A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.</i>  (IUCN – Red List Categories and Criteria)

Sources: WYNDD 2019; Heidel 2018; USDA Forest Service Regions 2 and 4 Sensitive Species Lists; NatureServe 2019

**Table 3.** Status summary based on best available scientific information.

<b>Criteria</b>	<b>Rationale</b>
Distribution on the Bridger-Teton National Forest	Table 1 and Map 2 show occurrence on Bridger-Teton National Forest. All Bridger-Teton National Forest occurrences are documented in the Teton Wilderness.
Distribution outside the Bridger-Teton National Forest	<i>Spirodela polyrhiza</i> has a world-wide distribution, occurring in North America, South America, Eurasia, and other parts of the world and is considered globally secure. Map 1 shows the range of <i>Spirodela polyrhiza</i> in Wyoming and the surrounding states. <i>Spirodela polyrhiza</i> was collected in the Pinyon Peaks Highlands and in northeastern portions of the Yellowstone National Park. Most small populations do not overwinter, but must be established or reestablished at other sites through introductions on the feet of waterfowl, therefore, they are difficult to track over time (Kesonie and Hartman 2011).

Criteria	Rationale
Abundance on the Bridger-Teton National Forest	<p>It is difficult to track this water-dependent species, but occurrences in the Teton Wilderness suggest this aquatic plant persists on the forest in low abundance. Some populations do not overwinter well and require wildlife for reestablishment.</p> <p>Although the entirety of Bridger-Teton National Forest has not been floristically inventoried, some areas within and adjacent to Bridger-Teton National Forest have been surveyed over the years. This species was not documented during these survey efforts:</p> <ul style="list-style-type: none"> <li>• Afton Front Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994a)</li> <li>• Horse Creek Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994b)</li> <li>• Swift Creek Research Natural Area Bridger-Teton National Forest (Fertig and Jones 1994c)</li> <li>• Sensitive plant surveys and status of rare plant species on Bridger-Teton National Forest, 1997-1998 (Fertig 1999)</li> <li>• Rare Species and Riparian Vegetation of the Snake River Basin in Wyoming (Jones et al. 2001)</li> <li>• Survey for <i>Stephanomeria fluminea</i> on the Bridger-Teton National Forest (Markow 2004)</li> <li>• Wyoming Plant Species of Concern on Caribou-Targhee National Forest: 2007 Survey Results Teton and Lincoln counties, Wyoming (Mancuso and Heidel 2008)</li> <li>• Blackrock Creek Wild and Scenic River Botany Survey (Johnson 2011)</li> <li>• Sensitive and rare plant species inventory in the Salt River and Wyoming Ranges, Bridger-Teton National Forest (Heidel 2012)</li> <li>• Teton to Snake Fuels Management Project Botany Report and Biological Evaluation (Englebert 2013)</li> <li>• Botany inventories in select fens of the Caribou-Targhee and Bridger-Teton National Forests (Heidel 2019).</li> </ul>
Population Trend on the Bridger-Teton National Forest	Comprehensive surveys have not been conducted for this species. Most occurrences are from incidental observations or collections that lack population information. Population determinations are not possible without more inventory information.
Habitat Trend on the Bridger-Teton National Forest	<i>Spirodela polyrhiza</i> is an aquatic plant and can occupy lakes, pools, and other calm water throughout the forest. Open water habitat is currently stable on the forest and riparian and wetland communities receive conservation consideration as ecosystems due to their vulnerability and scarcity. Effects of climate change may reduce the amount and quality of pools, ponds, and lakes.

Criteria	Rationale
<p>Threats to the Species and its Habitat on the Bridger-Teton National Forest</p>	<p>This widespread and fast-growing species has no major threats to global persistence, but individual populations can be threatened by changes in hydrology, degradation of open water habitat, and climate change effects.</p> <p>Forest activities such as grazing can degrade riparian and wetland habitat by altering water quality, trampling herbaceous vegetation, increasing bare ground, and facilitating noxious weed expansion. Rangelands form a major component of ecosystems in the Bridger-Teton National Forest, and there are open rangelands throughout the Forest, which likely overlap willow communities (USFS 2017). While adherence to rangeland management plans will limit the chance of overgrazing, there is potential for impacts to riparian habitat to occur.</p> <p>Changes in flow regimes, such as those from water diversions and dams, impact the amount, season, and timing of flows. This can substantially alter associated riparian and wetland species because of their dependence on fluvial geomorphic process, surface water, and groundwater. Floods are responsible for erosion, transport, and deposition of sediments, as well as the amounts and location of vegetation and debris. Many dominant riparian species, such as willows, are pioneer species that depend on these events to provide bare, moist substrates necessary for seed germination and plant establishment (Halofsky et al. 2018).</p> <p>Mid-elevation riparian and wetland communities are rated as having a moderate to high sensitivity to climate change, moderate adaptive capacity, and moderate to high vulnerability (Halofsky et al. 2018). Mid-elevation riparian plant species may have the ability to move upward in elevation, but where resilience has been compromised by human uses, these systems may not be able to easily adjust to changes in their environment. Invasive species that already dominate many mid-elevation sites are likely to expand their dominance. As riparian areas become drier, upland species will continue to expand into these sites (Halofsky et al. 2018).</p> <p>To analyze trends in habitat and potential disturbances aerial imagery and a USFS GIS database of existing grazing allotments, invasive plant populations, historical wildfires, trails, roads, Wilderness Areas, and Research Natural Areas (RNAs) were assessed at each occurrence (USFS GIS 2019, Google Earth Pro 2019). Most populations are in designated wilderness and removed from nearby disturbances. The following summarizes identified disturbances for each occurrence in Bridger-Teton National Forest:</p> <ul style="list-style-type: none"> <li>• 1987 Collection #14741: In Bridger Wilderness. In the 1988 Huck Fire burn area. Canada thistle infestations approximately 0.25 mile west. No livestock allotment identified.</li> <li>• 2007 Collection #4412: In Bridger Wilderness. In the 1988 Huck Fire burn area. Adjacent to Wolverine cutoff trail. No other disturbances documented nearby. No livestock allotment identified.</li> <li>• 2007 Collection #3818: In Bridger Wilderness. In the 1988 Huck Fire burn area. Approximately 0.21 mile</li> </ul>

Criteria	Rationale
	<p>from Gravel Creek trail. Approximately 0.34 mile from Canada thistle infestation along trail. No livestock allotment identified.</p> <ul style="list-style-type: none"> <li>• 2007 Collection #4098: In Bridger Wilderness. No livestock allotment identified. No other disturbances nearby.</li> <li>• 2012 Collection #3753: Location not mapped. In or adjacent to 2007 Middle Fire burn area. In Big Greys River allotment. Near Greys River Labarge road and nodding plumeless thistle (<i>Carduus nutans</i>) infestation.</li> </ul>
<p>Life history and demographic characteristics of the species</p>	<p><i>Spirodela polyrhiza</i> is a rapidly growing, perennial floating aquatic plant in the Lemnoideae family (Duckweeds). Duckweeds are the smallest, fastest growing, and morphologically simplest of flowering plants and can form large, dense masses under certain conditions (e.g., stagnant water bodies). Doubling time of the fastest growing duckweeds under optimal growth conditions is &lt;30 h, nearly twice as fast as other 'fast-growing' flowering plants (Wang et al. 2014).</p> <p><i>Spirodela polyrhiza</i> is dependent on waterfowl and aquatic wildlife for distribution. The species is monoecious whereas individual flowers are either male or female, but both sexes can be found on the same plant. The blooming period can occur from early summer to early fall. The female flower is replaced by a tiny fruit. This fruit contains 1-2 ribbed seeds. In addition to seed spread, the lateral pouches more often produce vegetative buds that are connected to the mother plant by short slender stipes that soon break away into separate plants.</p> <p>The plant consists of a single body that combines the functions of leaf and stem with tiny pockets of air allowing it to float on the surface of calm water. When the weather becomes cooler during the autumn, a winter turion (a starchy bud-like offset) is produced on the underside of the thallus near the node of the rootlets. This turion is smaller in size than the thallus and either olive green or brown. The turion breaks free from the mother plant and sinks to the bottom of the water body, where it remains throughout the winter. During the warmer weather of spring, it rises to the surface of the water to begin the growth process again.</p>
<p>Date: September 16, 2019 Reviewer: Julie Remp</p>	

## Summary and Recommendations

Species (Scientific and Common Name): *Spirodela polyrhiza* (Greater duckweed)

*Spirodela polyrhiza* is listed as S1 (critically imperiled) and G5 (secure) globally. It is a floating aquatic species with a worldwide distribution, growing in lakes, pools, and other calm water. Duckweeds are the smallest, fastest growing, and morphologically simplest of flowering plants and can form large, dense masses in stagnant water. Indeed, duckweed populations may double in size in as little as 30 hours.

Comprehensive surveys have not been conducted for this species and therefore determination of population trends is not possible. Most small populations do not overwinter but must be established or reestablished at other sites through introductions on the feet of waterfowl, therefore, they are difficult to track over time (Kesonie and Hartman 2011). Efforts to establish population trends would require a better understanding of inter-population dynamics; identifying the degree to which populations overwinter and disperse.

There are five documented occurrences on the Forest, with four of these in the Teton Wilderness and one near the Greys River, eight miles east of Alpine, WY. Assessment of habitats and potential habitats must be utilized in determining local conservation status. Open water habitat is currently stable on the forest and riparian and wetland communities receive conservation consideration as ecosystems due to their vulnerability and scarcity. Of the documented occurrences, only the Greys River population falls within an active grazing allotment. Several populations occur within the Huck Fire and Middle Fire burn areas and several have terrestrial invasive plant populations nearby.

Effects of climate change may reduce the amount and quality of pools, ponds, and lakes and the ability for species to migrate upward into suitable habitat is important for their long-term persistence. Presently, the highest elevation reported for *S. polyrhiza* occurs at 8,329'. Prior analysis of aerial photography has revealed extensive fen and potential fen wetlands on the Forest, mostly between 8,000' and 11,000' elevation.

Given the wilderness character of existing populations, and potential for migration upward in elevation, it is not recommended that *Spirodela polyrhiza* be added as a SCC.

Evaluator: Jessica Irwin Date: 10/3/2020

## References

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