

SPECIES: Scientific [common]	<i>Marsilea vestita var. oligospora</i> [Pepperwort] also known as <i>Marsilea oligospora</i>
Forest:	Bridger-Teton National Forest
Forest Reviewer:	R.Lehman
Date of Review:	5/5/20; 4/2/2021
Forest concurrence (or recommendation if new) for inclusion of species on list of potential SCC: (Enter Yes or No)	No

FOREST REVIEW RESULTS:

1. The Forest concurs or recommends the species for inclusion on the list of potential SCC:
Yes___ No__X_
2. 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 __X____
Species persistence in the plan area is not of substantial concern _____

FOREST REVIEW INFORMATION:

1. Is the Species Native to the Plan Area? Yes_X___ No___
If no, provide explanation and stop assessment.
2. Is the Species Known to Occur within the Planning Area? Yes___ No___ Unknown_X___
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
8/5/1922	Unknown	U.S.A., Wyoming, Sublette County: Kendall. 43.2491° N, 110.0209° W; NAD 83, uncertainty 1 mi., Digital Map	Elev. 7600 ft. Dry meadow. Phenology: spores.	Edwin B. Payson, 2920. with Lois B. Payson. EO #2. (Rocky Mountain Herbarium 2020; SEINet 2020)
7/24/1925	Unknown	U.S.A., Wyoming, Sublette County: Near the lower end of New Fork Lakes.	Elev. 7700 ft.	Edwin B. Payson, 4437. 7/24/1925.

		43.0765° N, 109.9627° W; NAD 83, uncertainty 0.5 mi., Digital Map	In pond and on dry banks. Phenology: spores.	with Lois B. Payson. Element Occurrence 2. (Rocky Mountain Herbarium 2020; SEINet 2020)
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The Consortium of Pacific Northwest Herbaria and Wyoming Natural Diversity Database were also searched, and no additional occurrences were found (Consortium of Pacific Northwest Herbaria 2020; WYNDD GIS 2019).

- 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 ___ No X

If no, provide explanation and stop assessment

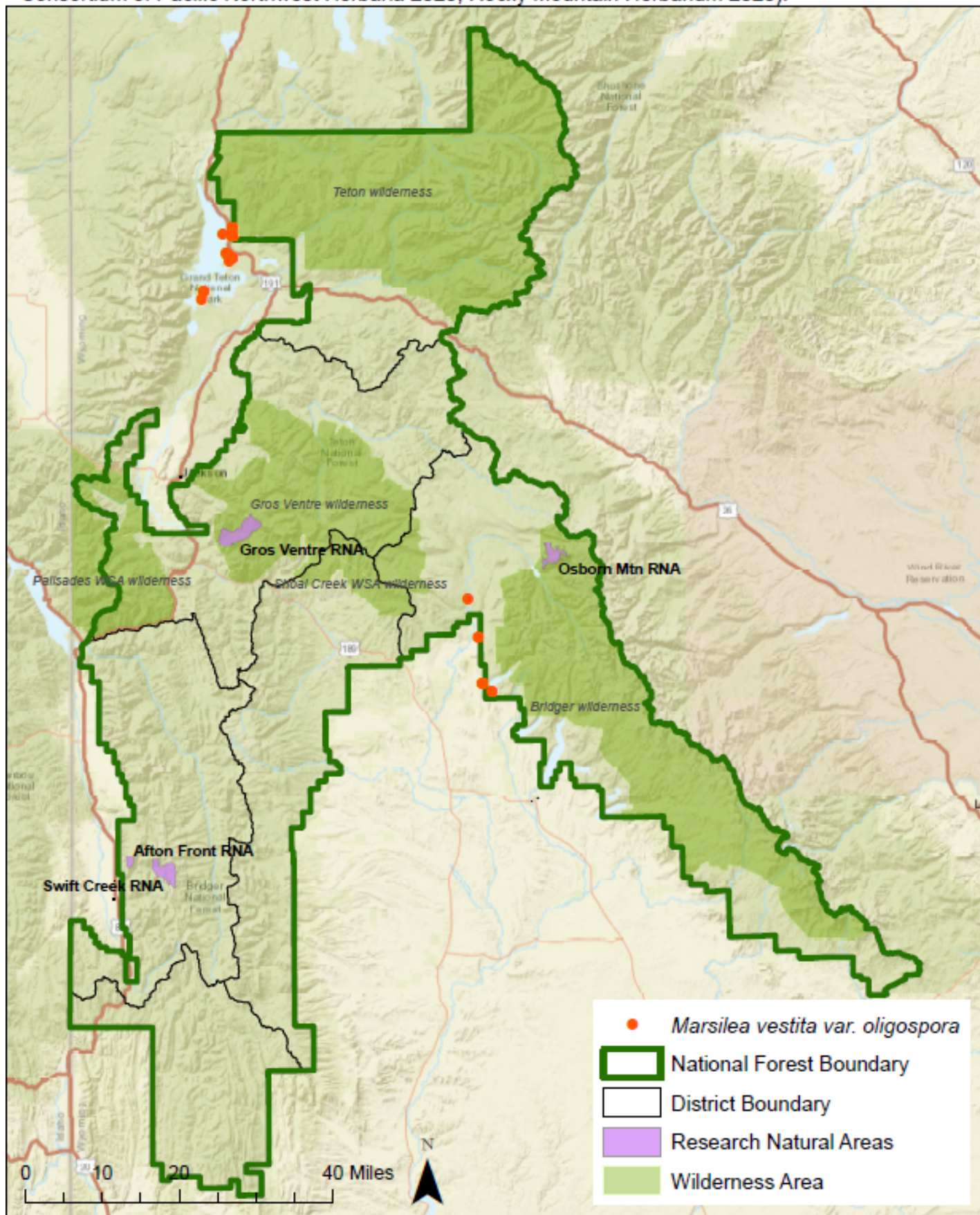
- c. For species with known occurrences on the Forest predating 1990, does the weight of evidence suggest the species still occurs in the plan area?

Yes ___ No ___ Unknown X

Provide explanation for determination

If determination is no, stop assessment

Map 2. *M. vestita* var. *oligospora* occurrences in Bridger-Teton National Forest vicinity (SEINet 2020; Consortium of Pacific Northwest Herbaria 2020; Rocky Mountain Herbarium 2020).



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

Entity	Status/Rank (include definition)
NatureServe Global Status	G5— Secure <i>Common; widespread and abundant.</i>
NatureServe State Status	S1— Critically Imperiled <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>
WYNDD	Plant Species of Concern <i>Species vulnerable to extirpation at the global or state level due to:</i> <ul style="list-style-type: none"> <i>a. their rarity (e.g., restricted distribution, small population size, low population density)</i> <i>b. inherent vulnerability (e.g., specialized habitat requirements, restrictive life history)</i> <i>c. threats (e.g., significant loss of habitat, sensitivity to disturbances)</i> (Wyoming Natural Diversity Database - Species of Concern)
USDA Forest Service	Not Region 4 Sensitive
USDOI FWS	Not listed
USDOI BLM	Not listed
IUCN	Not listed

Sources: WYNDD 2020; Heidel 2018; USDA Forest Service Regions 2 and 4 Sensitive Species Lists; NatureServe 2020

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

Criteria	Rationale
Distribution on the Bridger-Teton National Forest	<i>Marsilea vestita</i> var. <i>oligospora</i> is known from two historical records on the Bridger-Teton National Forest. These records are from the central part of the Forest, in the foothills of the Wind River Range (Table 1, Map 1). However, it may be extirpated at these sites (Heidel and Fertig 2001). There are several other occurrences near the Forest boundary on Grand Teton National Park (Map 1).
Distribution outside the Bridger-Teton National Forest	<i>Marsilea vestita</i> var. <i>oligospora</i> occurs from Washington to California, extending east to Montana, Wyoming and Utah. In Wyoming, it known from Jackson Hole and historically from the flanks of the Wind River Range bordering the upper Green River basin (Sublette and Teton counties) (Heidel and Fertig 2001; WYNDD 2020).
Abundance on the Bridger-Teton National Forest	This taxon is reported as locally common at one site in Grand Teton National Park by Richard Shaw and as abundant at the type locality by Nelson and Nelson in 1899 (WYNDD 2020). Abundance on the Bridger-Teton National Forest cannot be assessed due to lack of data.
Population Trend on the Bridger-Teton National Forest	One population, likely on Grand Teton National Park, was possibly flooded by construction of Jackson Lake Dam (WYNDD 2020). It may be extirpated at sites in the foothills of the Wind River Range (Heidel and Fertig 2001), which would mean it no longer exists on the Bridger-Teton National Forest, but a site visit is needed to confirm.
Habitat Trend on the Bridger-Teton National Forest	<p><i>Marsilea vestita</i> var. <i>oligospora</i> grows in shallow water and mud in marshes, along the shores of lakes and streams, and in vernal ponds, tolerant of alkali, in the foothills, valleys, and lowlands. Wyoming populations are on shores of small lakes and ponds that often dry during summer, and in wet swales in sagebrush grasslands at elevations of 6,600 - 7,800 ft (Heidel and Fertig 2001; WYNDD 2020).</p> <p>To analyze trends in occupied habitat, aerial imagery and a USFS GIS database of invasive plant populations, historical wildfires, trails, roads, Wilderness Areas, and Research Natural Areas was assessed at each contemporary occurrence on the Forest (USFS GIS 2019, Google Earth Pro 2020).</p> <ul style="list-style-type: none"> • Element Occurrence #2 (2920, 4437): Both records of this occurrence are historic (1922, 1927), and to our knowledge, have not been revisited. It is therefore unclear if populations still exist. They do not occur within perimeter of major fire event or RMU; not within wilderness or RNA; both collections are near or along motorized roads and near or along mapped non-native plant invasions (<i>Cirsium arvense</i>, <i>Cirsium vulgare</i>, <i>Carduus nutans</i>). <p>The above analysis suggests that habitat for <i>M. vestita</i> var. <i>oligospora</i> has likely experienced moderate effects from natural and anthropogenic disturbances, and trends may be declining on the forest. Climate change effects could exacerbate declining conditions, as described below. Due to the lack of recent observations, it is unknown if <i>M. vestita</i> var. <i>oligospora</i> still exists on the BTNF.</p>

Criteria	Rationale
<p>Threats to the Species and its Habitat on the Bridger-Teton National Forest</p>	<p>This taxon is potentially threatened by impoundment and recreation (Heidel and Fertig 2001; WYNDD 2020). Riparian habitat and wetlands receive additional considerations and protections from disturbances through forest management direction and water regulations. These considerations and protections would avoid or minimize adverse effects to special status riparian and wetland plants, such as <i>Marsilea vestita</i> var. <i>oligospora</i>, where they occur.</p> <p>Grazing can impact wetlands by altering water quality, trampling herbaceous vegetation, increasing bare ground, and facilitating noxious weed expansion in riparian areas. Rangelands form a major component of ecosystems in the Bridger-Teton National Forest, and there are open rangelands throughout the Forest. While adherence to rangeland management plans will limit the chance of overgrazing, there is potential for impacts to <i>Marsilea oligospora</i> and its habitat to occur.</p> <p>Riparian and wetland habitat may be threatened by climate change effects and disturbance or loss of wetland habitat. 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 cottonwoods and 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>Rare plant populations that may be small, isolated, tied to snowpack abundance and distribution timing changes of spring thaw and fall frost cycles, and/or have limited dispersal capacity, are highly vulnerable to impacts from environmental change (Ellstrand and Diane 1993, Halofsky et al. 2018).</p>
<p>Life history and demographic characteristics of the species</p>	<p><i>Marsilea vestita</i> var. <i>oligospora</i> is an aquatic perennial rhizomatous herb with leaves that float on water or stand upright. Leaves resemble a fourleaf clover, are hairy or not, and are on a slender stalk up to 15 cm tall. Spore-containing receptacles are on short stalks at the leaf base or along the rhizomes. Each has a small, blunt tooth off to one side, sometimes with a second smaller bump-like tooth above it. Flowering/fruitletting</p>

Criteria	Rationale
	period is from July to early September (WYNDD 2020).
Date: April 17, 2020 Reviewer: L. Chipman	

Summary and Recommendations

Summary and Recommendations
Species (Scientific and Common Name): <i>Marsilea vestita</i> var. <i>oligospora</i> [Pepperwort] also known as <i>Marsilea oligospora</i>
This taxon is reported as locally common at one site in Grand Teton National Park by Richard Shaw and as abundant at the type locality by Nelson and Nelson in 1899 (WYNDD 2020). Abundance on the Bridger-Teton National Forest cannot be assessed due to lack of data. There is good indication that the two known historical collection from the early 1920s are extirpated on the BTNF (Heidel and Fertig 2001). Given the above consideration, it is recommended that <i>M. vestita</i> var. <i>oligospora</i> not be added as a SCC list.
Evaluator: Rose Lehman Date: 4/2/2021

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