Occurrence, Composition and Formation of *Ruppia*, Widgeon Grass, balls in Saskatchewan Lakes

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Unusual balls of plant material were encountered at shores of two different lakes in northern and southern Saskatchewan. Judging from available literature, similar balls have been found in Europe, North America and New Zealand (Cannon 1979; Essig 1948; Gerbeaux and Ward 1986). While the actual formation of these balls has not been observed in nature, the combined action of waves on fragments of aquatic vegetation near shores is thought to be involved. Such balls have, however, been produced using *Posidonia* or Turtle Grass (Hydrocharitaceae) fibers under the wavelike action in a washing machine. Our samples are from a saline lake in southern Saskatchewan (49°N), and an over 40-year-old sample from an unknown lake north of the boreal transition zone (52°N). Comparisons of the plant material with herbarium specimens confirm that the balls are almost entirely comprised of *Ruppia maritima*, with minor items including invertebrate animal parts, sand pebbles and feathers. The context in which the material was found is consistent with the proposition that they are formed by *Ruppia* inflorescences breaking apart, drifting to near shore due to wind and being rolled into balls by wave action.

Key Words: *Ruppia maritima*, Widgeon Grass, plant balls, saline lake, Saskatchewan.

Results and Discussion

More than 50 plant balls were first found on 6 July 2001 by JKS along the southeastern shore of Sandoff Lake (Figure 1) where the prevailing winds are northwesterly. The balls were scattered in a band approximately 3 m wide and 100 m long, at the high water mark where the pebbly shore merges with short-grass prairie. The balls were still present, although more encrusted in salt, on 30 June 2003. Their position in a single layer, similarity in salt or algal coverage and slightly compressed form suggests that only one generation of such balls occurred during the three years. Their position at the upper reaches of the shore suggests that the balls may have been washed there during strong winds but not returned to the lake with the receding water during calmer weather. A walk around the lake revealed two sets of balls on the east but none on the west (primarily upwind) shore.

Analysis of the material in the two sets of balls showed that they were composed mainly (greater than 95%) of *Ruppia* inflorescence stems, peduncles, and...
fruits. The fruits were black, ca. 2 mm long, and beaked. These identifications were based on comparisons between the samples and specimens from the W. P. Fraser Herbarium, and descriptions from several floras (e.g., Haynes 2000). In three of the balls from Sandoff Lake, *Ruppia maritima* L. was identifiable. Small amounts of other material found included twigs, small pebbles, and a feather.

Saskatchewan has two species of *Ruppia*: *R. cirrhosa* (Petagna) Grande (synonym = *R. occidentalis* S. Wat.) and *R. maritima* L. (Harms 2003). *Ruppia maritima* is found in the southern third of Saskatchewan, and *Ruppia cirrhosa* is found in the southern half of the province (Hammer and Heseltine 1988; W. P. Fraser Herbarium). In North America, *Ruppia maritima* is found throughout eastern and western coastal regions (Haynes 2000). *Ruppia cirrhosa* is found from Alaska south to Texas and from California east to the Great Lakes (Haynes 2000).

The two species of *Ruppia* belong to Ruppiaceae, the Ditch-grass family, also known as Widgeon Grass (Haynes 2000). The one genus includes approximately 10 species worldwide, and two in North America. *Ruppia* is an annual, or rarely perennial, sessile herb submerged in brackish or saline water. Flowering occurs spring-fall.

The plant balls as shown by Essig (1948), and Swanson and Springer (1972) are highly similar to our material. Also, *R. maritima* L. seems to be the primary plant species involved, at least in North America (Table 1). This suggests that the conditions that favour ball formation are relatively specific. The involvement of saline

**FIGURE 1.** *Ruppia maritima* balls located at the southwest shore of Sandoff Lake in Saskatchewan, on 6 July 2001.

**FIGURE 2.** Two *Ruppia maritima* balls. One (left, 6.0 cm diametre) from Sandoff Lake, and the larger (right, 13.5 cm) from northern Saskatchewan.
lakes may not be crucial to ball formation but merely reflect that *Ruppia* is a saltwater species. The stems of *Ruppia* are delicate, relying on the surrounding water to support their mass (Kantrud 1991*). The stems are likely susceptible to breakage during periods of unusual turbulence. The stem bases also decay as the plants reach senescence (Kantrud 1991*). These two factors would leave large amounts of plant material in the water in late summer and/or fall, likely leading to the homogeneous content of the *Ruppia* balls.

*Table 1. Characteristics of plant balls as reported in the literature and found in our Saskatchewan samples.*

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Location</th>
<th>Lake Type</th>
<th>Plant Species</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>No name</td>
<td>NE North Dakota</td>
<td>Saline</td>
<td><em>Ruppia maritima</em></td>
<td>SS 1972</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>–</td>
<td>Sea shore</td>
<td><em>Posidonia oceanica</em></td>
<td>JFMC 1979</td>
</tr>
<tr>
<td>No name</td>
<td>Near Dawson, ND</td>
<td>Saline</td>
<td><em>Ruppia maritima</em></td>
<td>FPM</td>
</tr>
<tr>
<td>Miller Lake</td>
<td>Oregon</td>
<td>–</td>
<td>“similar” to FPM</td>
<td>GWF</td>
</tr>
<tr>
<td>Little Borax Lake</td>
<td>California</td>
<td>Saline</td>
<td><em>Ruppia maritima</em></td>
<td>EOE 1948</td>
</tr>
<tr>
<td>Sandoff Lake</td>
<td>S Saskatchewan</td>
<td>Saline</td>
<td><em>Ruppia maritima</em></td>
<td>This report</td>
</tr>
<tr>
<td>Unknown</td>
<td>N Saskatchewan</td>
<td>Unknown</td>
<td><em>Ruppia maritima</em></td>
<td>This report</td>
</tr>
</tbody>
</table>


The formation of balls by wave/wind action and friction is not limited to aquatic plants. Near Blaine Lake, Saskatchewan, wind combined with large and wet snowflakes led to snowball formation observed on the packed snow in a yard (Julie Hupé, personal communication). Pierce et al. (2004) compared amorphous, decomposed remains of large animals that washed up on a Chilean shore in 2003 (Chilean Blob), with other such “carcasses” variously reported as sea monsters for over a century. Such sightings occurred in Bermuda (n = 2), West Coast of Tasmania, and Northeast Coast of the United States in addition to Chile. The authors identified the material as decomposed remains of large whales. The material was held together by cross-hatched layers of collagen fibers. This flexible layering of collagen in a blob was different from the firm arrangement of the inflorescence stems in our *Ruppia* balls.

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**Documents Cited** (marked * in text)


**Literature Cited**


Harms, V. L. 2003. Checklist of the vascular plants of Saskatchewan, and the provincially and nationally rare native plants in Saskatchewan: Including important synonyms, authorities, common names, and various status indicators. University of Saskatchewan Extension Press, Saskatoon, Saskatchewan.


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