

to live in extremely salty soils. Although *Frankenia johnstonii* is found in arid, saline, gypseous (relatively high gypsum content) habitat in open areas with high light intensities, it is not found in adjacent, less saline soils. The patchy occurrence of these high-salinity soil pockets or inclusions (units too small to be mapped within a soil series) within larger areas of less saline soils results in the characteristic clumped pattern of *Frankenia johnstonii*'s distribution. Relatively few other plant species occur within the *Frankenia johnstonii* populations, but this species assemblage is consistently found at all *Frankenia johnstonii* sites. Janssen (1999) suggests that this species successfully competes within, but not outside, these saline pockets of soil.

Since nearly all of the known populations of *Frankenia johnstonii* occur on private land, the TPWD's voluntary landowner conservation agreements were designed to help conserve the species using recommendations concerning certain land management practices. These recommendations included avoiding root plowing, bulldozing, disking, roller chopping and herbicide applications in *Frankenia johnstonii* sites, as well as relieving areas containing populations from grazing pressure associated with overstocking of animal units. The agreements also provided TPWD personnel access for purposes of monitoring populations at least once annually. For the 13 populations that contain greater than 10,000 individual plants, 12 are covered under signed voluntary conservation agreements. For the 14 populations that contain between 2,000 and 10,000 plants, 7 populations are covered by signed voluntary conservation agreements. The earliest signatures were obtained in June 1996, and the most recent was signed in July 1998.

The impacts of construction projects on *Frankenia johnstonii* populations, especially highway improvements and/or commercial or residential building that is stimulated by highway construction or improvements, may be limited to the footprint of the project. Twelve of the known U.S. populations of *Frankenia johnstonii* occur within 1 mile of Highways 83, 16, or 359, three of the largest roads crossing the Texas range of this species. These highways are also among the roads most likely to undergo expansions as trade from Mexico, and commercial and residential development, increases.

Human population growth in Webb, Zapata, and Starr Counties has more than doubled since 1970 and is projected to double or triple again by

2030; however, this growth is not uniformly distributed across the three counties. Instead, people are concentrating residential development in a few geographic areas, with the highest level of growth in and around the City of Laredo in Webb County. Major areas of growth follow the primary transportation corridors including Interstate 35 and Highway 83, and along the Rio Grande downstream of the Falcon Lake Reservoir (Shelley and Pulich 2000). According to Shelley and Pulich (2000), relatively few people are living far from the cities and highways. If the current trend in population growth holds, this growth is unlikely to impact those individual populations or subpopulations of *Frankenia johnstonii* that are distant from centers of residential development or transportation corridors. The fact that much of the land within these three counties is away from the well-established transportation corridors should have the effect of discouraging explosive growth. Additionally, the high salinity of the soils supporting *Frankenia johnstonii*, in conjunction with the arid climate of the area, results in highly erodible soils that will not support plant communities desired by most real estate developers (Shelley and Pulich 2000). Existing *Frankenia johnstonii* populations that are distant from current development are likely to thrive in their unique environment (Shelley and Pulich 2000).

The development of colonias, or low-income, unincorporated settlements that lack running water, wastewater treatment, or other services, has generally occurred outside of incorporated communities. The largest concentrations of colonias are found near the transportation corridors and near the cities at the international boundary along the Rio Grande (Shelley and Pulich 2000). The majority of colonias in Starr County are found along Highway 83 and the Rio Grande. One population of *Frankenia johnstonii* that faces potential impacts from developing colonias also extends onto a national wildlife refuge tract and would therefore be partially protected.

In Zapata County, there are fewer recorded colonias, with the majority located near the northern end of Falcon Reservoir along Highway 83. Two *Frankenia johnstonii* populations appear to be most at risk from colonias in this geographic area. One of these is found within a subdivision, and its future is unclear because it consists of three "neighborhood" subpopulations that extend onto property with multiple ownerships and existing homes, suggesting that further development

may be forthcoming. The plants were described as being in excellent-to-good condition when the population was surveyed (Janssen 1999). The second population, although close to Highway 83, has remained in good shape over the 30 years since it was first reported (Janssen 1999). This population extends partially on TDOT's roadway right-of-way. The TDOT and TPWD have enacted a verbal agreement providing for reflector posts around the population to protect it from mowing and Border Patrol maintenance activities (Janssen, pers. comm. 2001).

In Webb County, the majority of colonias are south, east, and north of Laredo, concentrated along Highway 83 and the Rio Grande, Farm to Market Road 1472 and the Rio Grande, and to the east along Highway 359 (Shelley and Pulich 2000). In these areas, the *Frankenia johnstonii* population appearing to be most vulnerable occurs within a colonia, and future prospects for its long-term survival are described as "grim" (Janssen 1999).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

There is no evidence to indicate that this species is collected for commercial, recreational, scientific, or educational purposes.

C. Disease or Predation

Turner's 1980 status report and the species' recovery plan allude to *Frankenia johnstonii* plants under heavy grazing pressure having a "hedged or clipped appearance common in plants grazed by cattle." The detrimental effects referred to in the recovery plan (USFWS 1988) were browsing of tender, new growth that might contribute to lowered reproductive success and direct trampling of young plants or seedlings, as well as soil compaction, which may negatively affect germination. Janssen (Janssen and Williamson 1993) observed that the population showing the most harmful effects of grazing was one where the fenced area was inadequate to support the number of cattle being stocked and the animals were not receiving any type of supplemental feed. R. Cobb observed cottontail rabbits and jackrabbits nibbling on *Frankenia johnstonii*, and she surmises that other mammals may also browse on it. Janssen (1999) summarized anecdotally that she had seen little difference in the appearance of *Frankenia johnstonii* populations between ranches with and without cattle in 6 years of field observations and concluded that grazing is not a direct threat, except possibly to