Neyraudia reynaudiana

INTRODUCTORY

Photo by Dan Clark, USDI National Park Service, Bugwood.org

AUTHORSHIP AND CITATION:
Stone, Katharine R. 2010. Neyraudia reynaudiana. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2010, August 19].

FEIS ABBREVIATION:
NEYREY

NRCS PLANT CODE [34]:

NERE

COMMON NAMES:
silk reed
silk-reed
silkreed
Burma reed
Burmareed
cane grass

TAXONOMY:
The scientific name of silk reed (Kart) is *Neyraudia reynaudiana* (Kunth) Keng ex A.S. Hitchc. (Poaceae) [14,40].

SYNONYMS:
None

LIFE FORM:
Graminoid

DISTRIBUTION AND OCCURRENCE

SPECIES: Neyraudia reynaudiana

- GENERAL DISTRIBUTION
- HABITAT TYPES AND PLANT COMMUNITIES

GENERAL DISTRIBUTION:
Silk reed is native to southeastern Asia. In the early 1920s silk reed was planted at the USDA Plant Introduction Station in Coconut Grove, Florida, and it subsequently escaped from there [10]. As of this writing (2010) the distribution of silk reed in North America is limited to a few counties in Florida. Plants Database provides a distributional map of silk reed.

HABITAT TYPES AND PLANT COMMUNITIES:
Silk reed is most common in pine rockland plant communities in southern Florida [19,25,37]. Pine rocklands are characterized by an open-canopy forest of South Florida slash pine (*Pinus elliottii* var. *densa*) with a patchy understory of tropical and temperate shrubs and palms, and variable ground cover of grasses and herbs. Typical canopy trees include South Florida slash pine, saw-palmetto (*Serenoa repens*), cabbage palmetto (*Sabal palmetto*), and Florida silver palm (*Coccothrinax argentata*). Scattered outcrops of weathered oolitic limestone are common in this plant community [7].

On North Key Largo, Florida, silk reed occurs in West Indian tropical hardwood hammocks. It has established mostly in disturbed and ruderal areas (e.g., roadsides), but has also spread into undisturbed hammocks [16]. Silk reed is also common on disturbed rocky outcrops in the Big Cypress Natural Preserve, Florida. The area is dominated by bald cypress (*Taxodium distichum*) and pond cypress (*T. ascendens*) wetlands, but also contains hydric South Florida slash pine flatwoods and treeless wet prairies and marshes [23]. Silk reed occurred both before and after Hurricane Andrew (1992) on Chicken Key, Florida, an island dominated by red mangrove (*Rhizophora mangle*) [9].

In its native range, silk reed occurs in bogs, open savannas, upland cliffs, and along road edges [26].

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: Neyraudia reynaudiana

GENERAL BOTANICAL CHARACTERISTICS:

Botanical description: This description covers characteristics that may be relevant to fire ecology and is not meant for identification. References to aid in the identification of silk reed include the following: [10,20].

Silk reed is a tall, perennial, large-plumed grass [26] that grows in dense clumps from a woody rhizome [20,39]. Stems and flowering stalks may reach a height of 3 to 15 feet (1-5 m) depending on soil and moisture conditions. Each clump produces an average of 40 stalks with 12 to 20 terminal panicles that may be up to 3 feet (1 m) long, each bearing hundreds of flowers [26]. It is not clear how deep silk reed roots penetrate in the soil, though one source reports that roots are "deep" [25].

Photo by Dan Clark, USDI National Park Service, Bugwood.org

Raunkiaer [27] **life form:**
Geophyte

SEASONAL DEVELOPMENT:
In Florida, silk reed may flower throughout the year [20,25].

REGENERATION PROCESSES:

Silk reed reproduces vegetatively via rhizomes and by seed [16,26].

Vegetative regeneration: A weed identification guide [20] and a flora [39] report that silk reed has a short, woody rhizome, while one source describes rhizomes as "extensive and robust" [10]. New clumps of silk reed may emerge from rhizomes embedded in sand, soil, or rubble [26]. Silk reed may sprout from rhizomes following frost [10], fire [25,26], and mechanical or chemical treatments [10].

Pollination and breeding system: No information is available on this topic.

Seed production: A single silk reed plant may produce hundreds of thousands of seeds in a growing season [26]. However, one source reports that many of the seeds are not viable because most plants are sterile (Noltie 1999 cited in [25]).

Seed dispersal: Silk reed seeds are dispersed by wind [20,26]. Seeds and rhizomes may also be spread when limestone rock is removed from quarries with established silk reed populations [26].

Seed banking: In Florida, one manager observed supposedly extirpated populations of silk reed sprout after 2 years, though it was unclear whether emerging plants sprouted from rhizomes or from the soil seed bank (Gann-Matzen personal observation cited in [10]).

Germination: No information is available on this topic.

Seedling establishment and plant growth: Descriptions of silk reed establishing from seed were lacking in the available literature as of this writing (2010). One source reports that silk reed is most likely to establish in disturbed areas and establishes best in dry, disturbed areas [10]. Once established, silk reed is able to spread to marginally disturbed and undisturbed habitats [10,16,26].

SITE CHARACTERISTICS:
A weed identification guide suggests silk reed tolerates a wide range of soil, light, and water regimes [20]. Several sources report that it prefers open, sunny, dry sites with some disturbance [10,19,20]. In its native range, silk reed is found in bogs and disturbed sites, often growing on infertile soils [36]. In Florida, silk reed establishes in disturbed areas [10,20,25,40] including the edges of roadways, fields, and forests [26], vacant lots [19], and limestone spoil piles [25].

Soils: As of this writing (2010) it is not clear what soil characteristics silk reed prefers. One manager described silk reed as a colonizer of sandy soils [22]. Soils of the pine rocklands where silk reed is invasive are usually moderately well drained, with limestone bedrock at or very near the surface. Soils generally consist of small accumulations of sand, marl, and organic material in depressions and crevices in the rock surface [7].

Silk reed is tolerant of extreme soil conditions. In Hong Kong, it was a dominant of the few plants established on the peripheries of treatment lagoons 2 years after the deposition of a coal ash-seawater slurry. Substrate conditions were alkaline (pH 8.4), saline (2.18 dS/m), contained high levels of heavy metals, and surface temperatures reached 113 °F (45 °C) in summer [6]. One source suggests that silk reed may occur in areas with brackish water in Florida [10].

Elevation: In its native range, silk reed grows from 0 to 6,500 feet (0-1,900 m) [26].

Climate: Silk reed generally occurs in a warm, subtropical climate in its native range, similar to the climate where it occurs in North America. Its ability to survive at high elevations (6,500 feet (1,900 m)) in its native range suggests that it may possess some level of cold tolerance, potentially facilitating its spread farther north in North America [26]. Guala [10] observed that a transplanted silk reed rhizome fragment sprouted, grew rapidly, and set fruit after exposure to a series of light spring frosts followed by a hard frost. After a severe freeze the following December, the aboveground vegetation died but the plant sprouted "vigorously" within 2 months [10].

SUCCESSIONAL STATUS:
In Florida, silk reed establishes in early succession, but may spread into and persist in some later successional plant communities [10,16,26]. On North Key Largo, silk reed established in disturbed and ruderal areas (e.g., roadsides) and spread into undisturbed tropical hardwood hammocks [16]. However, silk reed did not spread into undisturbed areas in the Big Cypress Natural Preserve. After establishing on stone outcrops in areas where limestone had been dredged for canals, its spread was limited to other disturbed areas [23].

One source reports that silk reed populations increased in the pine rocklands of Miami-Dade County, Florida, following Hurricane Andrew in 1992 [25]. Other disturbances reported to facilitate silk reed establishment include bulldozing [10] and fire [10,25,26]. See Plant response to fire for more information.

Silk reed has the potential to alter successional pathways in plant communities where it establishes. Its growth form physically blocks light to other plants [26] and it produces of a heavy mat of leaf litter [25] that may prevent the establishment of other plants (e.g., see [2,24]). Silk reed may also alter fire regimes where it establishes. See Impacts and Fuels and fire regimes for more information on this topic.

FIRE EFFECTS AND MANAGEMENT

SPECIES: Neyraudia reynaudiana

FIRE EFFECTS:
Immediate fire effect on plant: Silk reed is top-killed by fire, but roots and rhizomes likely survive [25]. As of this writing (2010), it is not known whether silk reed seeds survive fire.

Postfire regeneration strategy[30]:
Tussock graminoid
Geophyte, growing points deep in soil
Initial off-site colonizer (off site, initial community)

Fire adaptations and plant response to fire:
Fire adaptations: Silk reed exhibits several characteristics that make it well-adapted to surviving fire and/or establishing after fire. Silk reed has rhizomes that survive and sprout following fire [25]. It establishes best on open, sunny, dry sites with some disturbance [10,19,20], conditions that may exist following fire. Silk reed may flower at any time of year [20,25], producing abundant seeds [26] that are wind-dispersed [20,26], traits that may facilitate establishment in burned areas. However, as of this writing (2010) there are no descriptions in the available literature of silk reed establishing by seed, and one source suggests that silk reed seeds are largely sterile (Noltie 1999 cited in [25]).

Plant response to fire: Rasha's M.S. thesis [25] provides the most detailed information available regarding silk reed's response to fire. However, it must be noted that this study investigated silk reed's response to fire in only one plant community (pine rocklands) for only 1 year. It is possible that silk reed's response to fire varies by plant community or over longer time periods.

At the time of Rasha's study (1995), silk reed occurred in approximately 67 acres (27 ha) of a 200-acre (81-ha) pine rockland park in southern Miami-Dade County, Florida. Approximately 22 acres (9 ha) of the park were covered in dense stands of silk reed. Manager observations suggested that silk reed established and spread in burned areas in the park following arson fires. It also increased in abundance after Hurricane Andrew in 1992, 3 years prior to this study. Silk reed establishment and spread following both fire and hurricane disturbance was attributed to vegetative spread via rhizomes [25].

Managers conducted a prescribed fire in February of 1995 over a 300 × 1,000 foot (100 × 300 m) treatment area. Prior to the fire, the area was characterized as having a heavy layer of duff and fine fuels, and a sparse understory of South Florida slash pine seedlings and some nonnative species. Silk reed dominated the mid-story, though a few South Florida slash pine saplings and nonnative hardwood species were present. The treatment area lacked an overstory tree canopy. The author sampled pre- and postfire conditions in areas with 2 levels of silk reed establishment: 1) dense silk reed, or >90% silk reed cover, disturbed soil, and few or no native pine rockland understory species, and 2) sparse silk reed, or 30% to 90% silk reed cover with minimal soil disturbance and some native pine rockland understory species. Both burned and unburned control areas were sampled [25].

The fire prescription included a slow backing fire set to spread against the prevailing wind. Flame lengths up to 5.2 feet (1.6 m) were observed. Weather conditions included a wind speed of 6 miles/hr (10 km/hr), temperatures of 75 °F to 77 °F (24 °C-25 °C), and relative humidity of 42%. Fire severity varied throughout the treatment area due to variability in fine fuel loading. The fire consumed the majority of leaf litter, reducing litter depth from 3 inches (8 cm) to 1 inch (3.5 cm) in most areas, though litter was completely consumed in some areas. Observers reported that the areas with dense silk reed cover burned "hotter" than areas with sparse silk reed cover [25].

Immediately following the fire, the majority of silk reed stems appeared to be dead, but the upper leaves and inflorescences were not consumed by the fire and remained largely intact. Within 2 weeks of the fire, more than 90% of the silk reed stems were dried and dead. The author suggested that root systems were likely not killed by fire, though they were not examined. Sprouts emerged from rhizomes and were up to 8 inches (20 cm) tall within 2 weeks of the fire. One month after the fire, silk reed stem density was 30% higher than prefire density in both dense and sparse silk reed study areas. Four to 6 months after sprouting, silk reed plants flowered. Within a year of the fire, stems approached their mature height, averaging approximately 5 feet (1.5 m) tall. One year after the fire, the author observed more silk reed stems in the burned area compared to both the same sites prior to fire and compared to unburned areas, though these results were not statistically significant. The author attributed rapid and dense silk reed growth in burned areas to a documented increase in available soil nutrients (e.g., phosphorus, calcium, and sulfate) following fire [25].

The results of this study suggest that silk reed is well-adapted to surviving fire and may increase following fire, at least temporarily. The author concluded that fire is not an appropriate tool for controlling silk reed [25].

FUELS AND FIRE REGIMES:

Fuels: Silk reed has the potential to alter the amount and type of fuels in plant communities where it occurs. It establishes in dense, tall clumps [26] and produces a heavy mat of leaf litter from shed stems and inflorescences [25]. In South Florida slash pine savannas, silk reed grew 3 to 7 feet (1-2 m) above surrounding vegetation. Total plant biomass in areas dominated by silk reed was more than 4 times the biomass of areas lacking silk reed (P=0.01). Litter depth was almost double in areas with silk reed compared to areas without it (P=0.01) [24].

Silk reed also alters the type of fuels available. Silk reed litter facilitates fire spread and movement at the ground's surface. Inflorescences may act as a ladder fuel, allowing fire to spread into tree canopies; one manager reports silk reed ignition during wildfire creating flames >30 feet (9 m) high, threatening nearby tree canopies. Wind may transport flaming silk reed inflorescences, increasing the potential for fire spread [26].

The alteration in quantity and type of fuels in areas with silk reed has led to concern that silk reed establishment leads to uncharacteristically severe fires in pine rocklands [22,26].

Fire regimes: Though it is not known what fire regime silk reed evolved in, it appears to be favored by frequent fire [22,25,26].

Fire exclusion and silk reed establishment have both altered the typical fire regime of pine rocklands. Fire is integral to maintaining pine rocklands; historically, low-severity fires occurred every 3 to 10 years [7], consuming litter and understory vegetation. Fire exclusion has led to the lengthening of fire-return intervals, facilitating hardwood species establishment and litter accumulation. In some areas, pine rocklands are replaced by a tropical hammock plant community within 2 to 3 decades of fire exclusion [37]. In pine rocklands where silk reed establishes, the alteration of fuel characteristics by silk reed has promoted an increase in the frequency and intensity of fires, leading to abnormally high South Florida slash pine mortality [22]. Managers observed 75% mortality of mid-canopy South Florida slash pine following a mixed-severity prescribed fire in a park with dense stands of silk reed [25]. There is also concern that silk reed establishment may alter fire-return intervals and plant community composition in Florida scrub plant communities, ecosystems with longer fire-return intervals than pine rocklands [22]. See the Fire Regime Table for more information on fire regimes of vegetation communities in which silk reed may occur.

FIRE MANAGEMENT CONSIDERATIONS:

Potential for postfire establishment and spread: Where it occurs in Florida, silk reed has a high likelihood of establishing after fire. It reportedly established in one park in Miami-Dade County following arson fires and sprouted and grew at high densities in the same park following prescribed fire [25].

Preventing postfire establishment and spread: Because fire appears to favor silk reed establishment [22,25,26], it is suggested that managers monitor burned areas within or adjacent to known silk reed populations for several years after fire. Preventing invasive plants from establishing in weed-free burned areas is the most effective and least costly management method. This may be accomplished through early detection and eradication, careful monitoring and follow-up, and limiting dispersal of invasive plant propagules into burned areas. General recommendations for preventing postfire establishment and spread of invasive plants include:

- Incorporate cost of weed prevention and management into fire rehabilitation plans
- Acquire restoration funding
- Include weed prevention education in fire training
- Minimize soil disturbance and vegetation removal during fire suppression and rehabilitation activities
- Minimize the use of retardants that may alter soil nutrient availability, such as those containing nitrogen and phosphorus
- Avoid areas dominated by high priority invasive plants when locating firelines, monitoring camps, staging areas, and helibases
- Clean equipment and vehicles prior to entering burned areas
- Regulate or prevent human and livestock entry into burned areas until desirable site vegetation has recovered sufficiently to resist invasion by undesirable vegetation
- Monitor burned areas and areas of significant disturbance or traffic from management activity
- Detect weeds early and eradicate before vegetative spread and/or seed dispersal
- Eradicate small patches and contain or control large infestations within or adjacent to the burned area
- Reestablish vegetation on bare ground as soon as possible
- Avoid use of fertilizers in postfire rehabilitation and restoration
- Use only certified weed-free seed mixes when revegetation is necessary

For more detailed information on these topics see the following publications: [1,3,8,33].

Use of prescribed fire as a control agent: Due to the flammability of silk reed vegetation, a special permit may be required in Florida to burn in areas with silk reed [26]. One manager does not recommend fire to control silk reed and instead suggests integrated management techniques that combine mechanical, chemical, and cultural methods [25,26]. If prescribed fire is used, it is recommended that the fire be severe enough to consume all aboveground vegetation, eliminating the cost of mechanical vegetation removal. Prescribed fire must be quickly followed by chemical or mechanical control of emerging sprouts [26]; silk reed sprouts were up to 8 inches (20 cm) tall within 2 weeks of prescribed fire and flowered within 4 to 6 months of sprouting [25]. When silk reed is the first plant to sprout following fire, herbicides can be applied with less concern for non-target plant mortality [26].

Altered fuel characteristics: Silk reed has the potential to alter the amount and type of fuels in plant communities where it occurs, facilitating a departure from historical fire regimes and associated fire intensities and/or severities. Observers of a prescribed fire in the pine rocklands of Florida reported that areas with dense silk reed cover burned "hotter" than areas with sparse silk reed cover [25]. In pine rockland plant communities, the altered fuel characteristics of areas with silk reed may promote high South Florida slash pine mortality [22,25]. See Fuels and Fire Regimes for more information on this topic.

MANAGEMENT CONSIDERATIONS

SPECIES: Neyraudia reynaudiana

- FEDERAL LEGAL STATUS
- OTHER STATUS
- IMPORTANCE TO WILDLIFE AND LIVESTOCK
- OTHER USES
- IMPACTS AND CONTROL

FEDERAL LEGAL STATUS:
None

OTHER STATUS:
Silk reed is listed as a noxious weed in Florida. Information on state-level noxious weed status of plants in the United States is available at Plants Database.

IMPORTANCE TO WILDLIFE AND LIVESTOCK:
As of this writing (2010) no information is available regarding the importance of silk reed to wildlife and livestock in North America.

Palatability and/or nutritional value: Silk reed is reported as poisonous to buffalo in Bhutan [26].

Cover value: No information is available on this topic.

OTHER USES:
One manager reports that silk reed has no known economic value [26], though it was evaluated and deemed suitable for pulping and paper making in India [28]. It may have been originally planted at a USDA test garden in Florida to evaluate its potential as an ornamental plant [26].

IMPACTS AND CONTROL:
Impacts: Silk reed has major impacts on the plant communities where it occurs. Its growth form physically blocks light to other plants [26], and it produces a heavy mat of leaf litter [25] that prevents the establishment of other species

(e.g., see [2,24]). Both of these characteristics may also alter fuel characteristics, and consequently fire regimes, of plant communities where it invades.

Photo by Tony Pernas, USDI National Park Service, Bugwood.org

Silk reed establishment is considered a major threat to pine rockland plant communities in southern Florida. Pine rocklands contain more than 1,000 indigenous plant species, 30 of which are endemic [37]. By 1993, silk reed was established in nearly 75% of Dade County pine rocklands outside of Everglades National Park [20]. In 1999, managers observed several square miles of pine rocklands in Miami-Dade County where the native shrub and herbaceous layer was replaced by silk reed [2]. In one South Florida slash pine savanna, native plant biomass was significantly lower in areas with silk reed compared to areas without it ($P<0.01$), which the authors attributed to the impacts of both silk reed growth and fire exclusion [24]. High mortality of South Florida slash pine, the dominant canopy tree of pine rocklands, has been linked to fires fueled by silk reed [22,25].

Silk reed occurs in areas of the pine rocklands that contain the federally endangered crenulate leadplant (*Amorpha herbacea* var. *crenulata*). Field experiments demonstrated that crenulate leadplant establishment and persistence were inhibited by litter accumulation >1 inch (3 cm); litter accumulation smothered adult crenulate leadplants, limited pollinator habitat which reduced crenulate leadplant reproduction, and inhibited crenulate leadplant seedling establishment. The authors did not explicitly link the litter of silk reed to the demise of crenulate leadplant, but did link the exclusion of fire in the area with accumulations of litter from plants like silk reed [37].

Silk reed also occurs in the "globally imperiled" West Indian tropical hardwood hammocks on North Key Largo, Florida. Though silk reed's impacts on this plant community have not been documented in the literature as of 2010, it reportedly spreads from disturbed areas into undisturbed hammocks [16].

Control: Control of silk reed requires a long-term commitment to treatment and monitoring [26] and often the use of integrated management techniques [10,25,26,37]. One manager observed supposedly extirpated populations of silk reed sprout after 2 years, though it was unclear whether emerging plants sprouted from rhizomes or from the soil seed bank (Gann-Matzen personal observation cited in [10]). Control efforts that involve soil disturbance (e.g., bulldozing) may favor silk reed [10].

In all cases where invasive species are targeted for control, no matter what method is employed, the potential for other invasive species to fill their void must be considered [4]. Control of biotic invasions is most effective when it employs a long-term, ecosystem-wide strategy rather than a tactical approach focused on battling individual invaders [21].

Fire: For information on the use of prescribed fire to control silk reed, see Fire Management Considerations.

Prevention: As of this writing (2010) there was little information available about preventing the establishment of silk reed. Based on silk reed's establishment patterns, it is likely that limiting disturbance in areas close to known silk reed populations would limit silk reed spread, though it has been documented spreading vegetatively from disturbed into undisturbed areas [10,16,26].

It is commonly argued that the most cost-efficient and effective method of managing invasive species is to prevent their establishment and spread by maintaining "healthy" natural communities [21,29] (e.g., avoid road building in wildlands [32]) and by monitoring several times each year [13]. Managing to maintain the integrity of the native plant community and mitigate the factors enhancing ecosystem invasibility is likely to be more effective than managing solely to control the invader [12].

Weed prevention and control can be incorporated into many types of management plans, including those for logging and site preparation, grazing allotments, recreation management, research projects, road building and maintenance, and fire management [33]. See the Guide to noxious weed prevention practices [33] for specific guidelines in preventing the spread of weed seeds and propagules under different management conditions.

Cultural control: A comprehensive fact sheet suggests a number of native plants as alternatives to silk reed, including eastern gamagrass (*Tripsacum dactyloides*), switchgrass (*Panicum virgatum*), and hairawn muhly (*Muhlenbergia capillaris*). In pine rocklands, suitable replacements include Florida little bluestem (*Schizachyrium rhizomatum*), wire bluestem (*Andropogon gracilis*), pineland threeawn (*Aristica stricta*), and Florida gamagrass (*Tripsacum floridanum*). In coastal uplands or disturbed sites, an appropriate alternative plant is pinewoods fingergrass (*Eustachys petraea*) [26].

Physical or mechanical control: Physical or mechanical control of silk reed is difficult because it has deep roots and their removal causes extensive soil disturbance, which favors additional silk reed establishment [26]. One source reports that plants can be removed by hand, but cutting or mowing alone is not effective [10]. Some sources suggest first cutting silk reed stems and then applying herbicide to sprouts [10,25,37].

Biological control: As of this writing (2010) no biological control agent has been identified to control silk reed. Biological control of invasive species has a long history that indicates many factors must be considered before using biological controls. Refer to these sources: [35,38] and the Weed control methods handbook [31] for background information and important considerations for developing and implementing biological control programs.

Chemical control: Herbicide application may effectively control silk reed, particularly in conjunction with cutting. Repeated application of herbicides for several years may be necessary because silk reed sprouts from rhizomes following top-kill [26]. For recommendations on chemical control of silk reed, see the following sources: [15,16,19,26].

Herbicides are effective in gaining initial control of a new invasion or a severe infestation, but they are rarely a complete or long-term solution to weed management [5]. See the Weed control methods handbook [31] for considerations on the use of herbicides in natural areas and detailed information on specific chemicals.

Integrated management: Management strategies that combine cutting and herbicide are recommended for controlling silk reed [10,25,26,37]. In areas where silk reed is integrated with desirable native vegetation, individual plants can be cut at the base and remaining portions sprayed with herbicide. If sprouting occurs, additional herbicide applications may be needed [26]. Cutting and herbicide treatments should be followed by planting of native grasses and herbaceous plants [25]. For examples of integrated management strategies to control silk reed, see: [10].

APPENDIX: FIRE REGIME TABLE

SPECIES: Neyraudia reynaudiana

The following table provides fire regime information that may be relevant to silk reed habitats. Follow the links in the table to documents that provide more detailed information on these fire regimes.

Fire regime information on vegetation communities in which silk reed may occur. This information is taken from the LANDFIRE Rapid Assessment Vegetation Models [18], which were developed by local experts using available literature, local data, and/or expert opinion. This table summarizes

fire regime characteristics for each plant community listed. The PDF file linked from each plant community name describes the model and synthesizes the knowledge available on vegetation composition, structure, and dynamics in that community. Cells are blank where information is not available in the Rapid Assessment Vegetation Model.

Southeast

- Southeast Grassland
- Southeast Woodland

Vegetation Community (Potential Natural Vegetation Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Southeast Grassland					
Pond cypress savanna	Replacement	17%	120		
	Mixed	27%	75		
	Surface or low	57%	35		
Southeast Woodland					
Pine rocklands	Mixed	1%	330		
	Surface or low	99%	3	1	5
South Florida slash pine flatwoods	Replacement	6%	50	50	90
	Surface or low	94%	3	1	6

*Fire Severities—
Replacement: Any fire that causes greater than 75% top removal of a vegetation-fuel type, resulting in general replacement of existing vegetation; may or may not cause a lethal effect on the plants.
Mixed: Any fire burning more than 5% of an area that does not qualify as a replacement, surface, or low-severity fire; includes mosaic and other fires that are intermediate in effects.
Surface or low: Any fire that causes less than 25% upper layer replacement and/or removal in a vegetation-fuel class but burns 5% or more of the area [11,17].

Neyraudia reynaudiana: REFERENCES

1. Asher, Jerry; Dewey, Steven; Olivarez, Jim; Johnson, Curt. 1998. Minimizing weed spread following wildland fires. Proceedings, Western Society of Weed Science. 51: 49. Abstract. [40409]

2. Austin, Daniel F. 1999. Displacement of native ecosystems by invasive alien plants--the Florida experience, or how to destroy an ecosystem. In: Jones, David T.; Gamble, Brandon W., eds. Florida's garden of good and evil: Proceedings of the 1998 joint symposium of the Florida Exotic Pest Plant Council and the Florida Native Plant Society; 1998 June 3-7; Palm Beach Gardens, FL. West Palm Beach, FL: South Florida Water Management District: 1-21. [53996]

3. Brooks, Matthew L. 2008. Effects of fire suppression and postfire management activities on plant invasions. In: Zouhar, Kristin; Smith, Jane Kapler; Sutherland, Steve; Brooks, Matthew L., eds. Wildland fire in ecosystems: Fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 269-280. [70909]

4. Brooks, Matthew L.; Pyke, David A. 2001. Invasive plants and fire in the deserts of North America. In: Galley, Krista E. M.; Wilson, Tyrone P., eds. Proceedings of the invasive species workshop: The role of fire in the control and spread of invasive species; Fire conference 2000: 1st national congress on fire ecology, prevention, and management; 2000 November 27 - December 1; San Diego, CA. Misc. Publ. No. 11. Tallahassee, FL: Tall Timbers Research Station: 1-14. [40491]

5. Bussan, Alvin J.; Dyer, William E. 1999. Herbicides and rangeland. In: Sheley, Roger L.; Petroff, Janet K., eds. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press: 116-132. [35716]

6. Chu, L. M. 2008. Natural revegetation of coal fly ash in a highly saline disposal lagoon in Hong Kong. Applied Vegetation Science. 11: 297-306. [79752]

7. Florida Natural Areas Inventory. 1990. Guide to the natural communities of Florida, [Online]. In: Species and communities. Tallahassee, FL: Florida Natural Areas Inventory; Florida State University (Producer). Available: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf [2009, June 2]. [74325]

8. Goodwin, Kim; Sheley, Roger; Clark, Janet. 2002. Integrated noxious weed management after wildfires. EB-160. Bozeman, MT: Montana State University, Extension Service. 46 p. Available online: http://www.montana.edu/wwwpb/pubs/eb160.html [2003, October 1]. [45303]

9. Guala, Gerald F., II. 1993. The flora of Chicken Key, Dade County, Florida: before and after Hurricane Andrew. Sida. 15(3): 519-526. [79755]

10. Guala, Gerald F., II. 1995. Element stewardship abstract: Neyraudia reynaudiana--silk reed, [Online]. In: Control methods--Plant management resources. In: Invasives on the web: The global invasive species team (GIST). Arlington, VA: The Nature Conservancy (Producer). Available: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/neyrrey.pdf [2010, July 30]. [75514]

11. Hann, Wendel; Havlina, Doug; Shlisky, Ayn; [and others]. 2008. Interagency fire regime condition class guidebook. Version 1.3, [Online]. In: Interagency fire regime condition class website. U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior; The Nature Conservancy; Systems for Environmental Management (Producer). 119 p. Available: http://frames.nbii.gov/frcc/documents/FRCC_Guidebook_2008.07.10.pdf [2010, 3 May]. [70966]

12. Hobbs, Richard J.; Humphries, Stella E. 1995. An integrated approach to the ecology and management of plant invasions. Conservation Biology. 9(4): 761-770. [44463]

13. Johnson, Douglas E. 1999. Surveying, mapping, and monitoring noxious weeds on rangelands. In: Sheley, Roger L.; Petroff, Janet K., eds. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press: 19-36. [35707]

14. Kartesz, John T. 1999. A synonymized checklist and atlas with biological attributes for the vascular flora of the United States, Canada, and Greenland. 1st ed. In: Kartesz, John T.; Meacham, Christopher A. Synthesis of the North American flora (Windows Version 1.0), [CD-ROM]. Chapel Hill, NC: North Carolina Botanical Garden (Producer). In cooperation with: The Nature Conservancy; U.S. Department of Agriculture, Natural Resources Conservation Service; U.S. Department of the Interior, Fish and Wildlife Service. [36715]

15. Kline, W. N.; Duquesnel, J. G. 1996. Management of invasive exotic plants with herbicides in Florida.

Down to Earth. 51(2): 22-28. [75556]

16. Kruer, Curtis R.; Taylor, Jennifer E. 1999. North Key Largo invasive exotic vegetation mapping and assessment. In: Jones, David T.; Gamble, Brandon W., eds. Florida's garden of good and evil: Proceedings of the 1998 joint symposium of the Florida Exotic Pest Plant Council and the Florida Native Plant Society; 1998 June 3-7; Palm Beach Gardens, FL. West Palm Beach, FL: South Florida Water Management District: 67-80. [54001]

17. LANDFIRE Rapid Assessment. 2005. Reference condition modeling manual (Version 2.1), [Online]. In: LANDFIRE. Cooperative Agreement 04-CA-11132543-189. Boulder, CO: The Nature Conservancy; U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior (Producers). 72 p. Available: http://www.landfire.gov/downloadfile.php?file=RA_Modeling_Manual_v2_1.pdf [2007, May 24]. [66741]

18. LANDFIRE Rapid Assessment. 2007. Rapid assessment reference condition models, [Online]. In: LANDFIRE. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Lab; U.S. Geological Survey; The Nature Conservancy (Producers). Available: http://www.landfire.gov/models_EW.php [2008, April 18] [66533]

19. Langeland, K. A.; Ferrell, J. A.; Sellers, B.; Macdonald, G. E.; Stocker, R. K. 2009. Control of nonnative plants in natural areas of Florida, [Online]. In: Electronic Data Information Source (EDIS) database--Publication #SP 242. Gainesville, FL: University of Florida, Institute of Food and Agricultural Sciences Extension (Producer). Available: http://edis.ifas.ufl.edu/pdffiles/WG/WG20900.pdf [2009, October 20]. [75659]

20. Langeland, Kenneth A.; Burks, K. Craddock, eds. 1998. Identification and biology of non-native plants in Florida's natural areas. Gainesville, FL: University of Florida. 165 p. [72429]

21. Mack, Richard N.; Simberloff, Daniel; Lonsdale, W. Mark; Evans, Harry; Clout, Michael; Bazzaz, Fakhri A. 2000. Biotic invasions: causes, epidemiology, global consequences, and control. Ecological Applications. 10(3): 689-710. [48324]

22. Maguire, Joe. 1993. Status of Burma reed in Dade County pine rocklands. Florida Exotic Pest Plant Council Newsletter. Fort Lauderdale, FL: Florida Exotic Pest Plant Council. 3(3): 3. [79758]

23. Muss, Jordan D.; Austin, Daniel F.; Snyder, James R. 2003. Plants of the Big Cypress National Preserve. Journal of the Torrey Botanical Society. 130(2): 119-142. [74679]

24. Platt, William J.; Gottschalk, Robert M. 2001. Effects of exotic grasses on potential fine fuel loads in the groundcover of south Florida slash pine savannas. International Journal of Wildland Fire. 10: 155-159. [40879]

25. Rasha, Renee L'Hoste. 2000. The effects of fire on the demographics of Neyraudia reynaudiana in the pine rocklands. Boca Raton, FL: Florida Atlantic University. 31 p. Thesis. [79710]

26. Rasha, Renee. 2005. Fact sheet: Burma reed--Neyraudia reyanudiana, [Online]. In: Weeds gone wild: Alien plant invaders of natural areas. Plant Conservation Alliance's Alien Plant Working Group (Producer). Available: http://www.nps.gov/plants/alien/fact/nere1.htm [2010, July 6]. [79978]

27. Raunkiaer, C. 1934. The life forms of plants and statistical plant geography. Oxford: Clarendon Press. 632 p. [2843]

28. Saikia, C. N.; Goswami, T.; Ali, F. 1997. Evaluation of pulp and paper making characteristics of certain fast growing plants. Wood Science and Technology. 31(6): 467-475. [79756]

29. Sheley, Roger; Manoukian, Mark; Marks, Gerald. 1999. Preventing noxious weed invasion. In: Sheley, Roger L.; Petroff, Janet K., eds. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press: 69-72. [35711]

30. Stickney, Peter F. 1989. Seral origin of species comprising secondary plant succession in Northern Rocky Mountain forests. FEIS workshop: Postfire regeneration. Unpublished draft on file at: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT. 10 p. [20090]

31. Tu, Mandy; Hurd, Callie; Randall, John M., eds. 2001. Weed control methods handbook: tools and techniques for use in natural areas. Davis, CA: The Nature Conservancy. 194 p. [37787]

32. Tyser, Robin W.; Worley, Christopher A. 1992. Alien flora in grasslands adjacent to road and trail corridors in Glacier National Park, Montana (U.S.A.). Conservation Biology. 6(2): 253-262. [19435]

33. U.S. Department of Agriculture, Forest Service. 2001. Guide to noxious weed prevention practices. Washington, DC: U.S. Department of Agriculture, Forest Service. 25 p. Available online: http://www.fs.fed.us/invasivespecies/documents/FS_WeedBMP_2001.pdf [2009, November 19]. [37889]

34. U.S. Department of Agriculture, Natural Resources Conservation Service. 2010. PLANTS Database, [Online]. Available: http://plants.usda.gov/. [34262]

35. Van Driesche, Roy; Lyon, Suzanne; Blossey, Bernd; Hoddle, Mark; Reardon, Richard, tech. coords. 2002. Biological control of invasive plants in the eastern United States. Publication FHTET-2002-04. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Forest Health Technology Enterprise Team. 413 p. Available online: http://www.invasive.org/eastern/biocontrol/index.html [2009, November 19]. [54194]

36. Weber, Ewald. 2003. Invasive plant species of the world: a reference guide to environmental weeds. Cambridge, MA: CABI Publishing. 548 p. [71904]

37. Wendelberger, Kristie S.; Maschinski, Joyce. 2009. Linking geographical information systems and observational and experimental studies to determine optimal seedling microsites of an endangered plant in a subtropical urban fire-adapted ecosystem. Restoration Ecology. 17(6): 845-853. [79757]

38. Wilson, Linda M.; McCaffrey, Joseph P. 1999. Biological control of noxious rangeland weeds. In: Sheley, Roger L.; Petroff, Janet K., eds. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press: 97-115. [35715]

39. Wu, Z. Y.; Raven, P. H.; Hong, D. Y., eds. 2010. Flora of China, [Online]. Volumes 1-25. Beijing: Science Press; St. Louis, MO: Missouri Botanical Garden Press. In: eFloras. St. Louis, MO: Missouri Botanical Garden; Cambridge, MA: Harvard University Herbaria (Producers). Available: http://www.efloras.org/flora_page.aspx?flora_id=2 and http://flora.huh.harvard.edu/china. [72954]

40. Wunderlin, Richard P.; Hansen, Bruce F. 2003. Guide to the vascular plants of Florida. 2nd edition. Gainesville, FL: The University of Florida Press. 787 p. [69433]

FEIS Home Page