Table 1. **Recommended Bare Hills Barrens (BHB) stewardship priorities, 2023–2025**.

BHB-RMP = forthcoming Bare Hills Barrens Restoration and Maintenance Plan. Symbols on the lists of species of greatest conservation need:

S2: Imperiled in Maryland — At high risk of extirpation from the state due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3: Vulnerable in Maryland — At moderate risk of extirpation from the state due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

ME: Legal status is Endangered in Maryland.

MT: Legal status is Threatened in Maryland.

Category	**Project Name**	**Details**	**Priority level***	**Resources** (funding, time, expertise, equipment, materials)	**Hurdles** (regulatory, infrastructure, availability/ capacity of cooperators/contractors, weather conditions)
Restoration	Removal of Chinese silver grass (*Miscanthus sinensis*)	Target during active growth, by pulling or spot-spraying with glyphosate (herbiciding only where not intermingled with species of greatest conservation need): 1. In late winter or early spring before new growth starts, remove previous year's growth by cutting or burning the entire plant back to the ground. This ensures vigorous new growth and the lack of any dead leaves or culms improves conditions for chemical control. 2. When new growth is about 1 foot tall in mid-spring or early summer, spray all green tissue with glyphosate. Allow plant to die, and when completely brown, cut the dead foliage back to the ground. (If it is not feasible to remove the previous year's growth as indicated in step 1, wait until plants are 1–2 feet tall, usually in early to mid-summer, to proceed with spraying. Coverage is hampered if standing dead culms remain from the previous year.) 3. If necessary, spray regrowth again in late summer or early fall when growth is about 1 foot tall.	1	Low cost	Weather conditions referenced on herbicide label.

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Restoration	Expansion of grassland area	1. Incrementally expand area where common greenbrier (*Smilax rotundifolia*) is mowed. 2. Survey cleared areas in spring/summer for newly emerged vegetation. 3. If species of greatest conservation need or other species of high conservation value (listed below) that are known to be highly palatable to deer are found, consider protecting individuals/patches with metal caging.	1	Low cost Expertise: expert/advanced field botanists for item #2 Low/moderate cost for item #3	
Restoration	Removal of undesired tree species from areas within and adjacent to grasslands	1. Cut down Virginia pine (*Pinus virginiana*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*) and selected eastern red-cedar (*Juniperus virginiana*) in manageable-size patches (½-1 acre) 2. Burn cut trees and greenbrier in burn piles placed where heat will not harm grassland species or oaks and greenbrier has been mowed to ground level. 3. Use basal bark treatment with a triclopyr + penetrant solution on black locust (*Robinia pseudoacacia*) and ailanthus (*Ailanthus altissima*). Do not cut! These species root-sprout prolifically if cut or girdled.	1	High cost	Burn pile burning requires permit from DEPS and Fire Marshall and bulldozer must be present during the fire.†

† baltimorecountymd.gov/departments/fire/fire-marshal/open-burning: "Agricultural burning—the burning of agricultural debris such as brush, stumps, and limbs not associated with building construction—requires approval by the Baltimore County Department of Environmental Protection and Sustainability (DEPS). The material to be burned must have originated on the property where the burning will take place. DEPS inspects the site to ensure that it meets the criteria for an agricultural burn and, if those criteria are met, authorizes the Fire Marshal's Office to issue a permit. The Fire Code requires permit holders to keep the permit at the site of the fire until the burning is complete. The Code also requires a bulldozer with a competent operator at large bonfires; the bulldozer may be used to control the fire by covering it with earth or by some other means, if the need arises."

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Category	Project Name	Details	Priority level*	Resources (funding, time, expertise, equipment, materials)	Hurdles (regulatory, infrastructure, availability/ capacity of cooperators/contractors, weather conditions)
Restoration	Removal of nonnative plants (woody and herbaceous) from grassland areas	Target during active growth, by pulling or spot-spraying with glyphosate or triclopyr (herbiciding only where not intermingled with species of greatest conservation need): • small carpetgrass (*Arthraxon hispidus*) • spotted knapweed (*Centaurea stoebe* ssp. *micranthos*) • spreading thistle, Canada thistle (*Cirsium arvense*) • European alder-buckthorn (*Frangula alnus*) • Japanese honeysuckle (*Lonicera japonica*) • Morrow's honeysuckle (*Lonicera morrowii*) • Japanese stilt-grass (*Microstegium vimineum*) • Japanese wisteria (*Wisteria floribunda*)	2	Moderate cost	Weather conditions referenced on herbicide label.
Stewardship Planning	Plant Conservation Program planning	1. Develop justification and strategy for conservation seed collection and propagation as an outgrowth of the upcoming BHB-RMP. 2. Develop support through contacts at Maryland-based agencies and environmental NGOs, including the Maryland Natural Heritage Program, Maryland Native Plant Society, and nonprofit conservation plant propagators such as the Mt. Cuba Center, Hockessin, DE.	2		Availability of funding to support seed preparation and propagation work by cooperators

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Category	Project Name	Details	Priority level*	Resources (funding, time, expertise, equipment, materials)	Hurdles (regulatory, infrastructure, availability/ capacity of cooperators/contractors, weather conditions)
Restoration	Plant propagation and population augmentation from BHB	Gather seeds on-site of selected species of greatest conservation need; propagate in greenhouse; plant plugs in suitable habitat in selected restoration areas not yet occupied by species of greatest conservation need. • whorled milkweed (*Asclepias verticillata*) S3 • Scribner's witchgrass (*Dichanthelium scribnerianum*) S2 • tall thoroughwort (*Eupatorium altissimum*) S3 • annual fimbry (*Fimbristylis annua*) S3 • woodland panic grass (*Panicum philadelphicum* ssp. *philadelphicum*) SU • quill fameflower (*Phemeranthus teretifolius*) S2, MT	2	Moderate cost	Requires cooperator with the means and expertise to propagate species with a variety of needs.
Stewardship Planning	Prescribed Fire Management Program planning	1. Begin developing justification and strategy for the use of prescribed fire as an outgrowth of the upcoming BHB-RMP. 2. Consult with experienced ecological prescribed fire practitioners on the feasibility and logistics of prescribed fire at BHB. **The Nature Conservancy, Maryland/DC office contacts:** • Deborah Landau, Ph.D., Director of Ecological Management • Gabe Cahalan, Fire Manager **Maryland DNR contacts:** • Chris Robertson, State Fire Supervisor • Chris Smith, Eastern and Central Regional Fire Manager 3. After receiving advice from the above, develop a relationship with the Baltimore County Fire Department, in support of building a strong case for development of a Prescribed Fire Program.	2	High cost Expertise: qualified fire boss(es) and crews to develop fire prescriptions, obtain permits, and conduct burns	Gauging the political climate and educating regulators and policy makers on the importance of burning to reestablish and maintain native grasslands Need for prescribed fire permits and coordination with state and county fire officials Weather conditions within prescription

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Category	Project Name	Details	Priority level*	Resources (funding, time, expertise, equipment, materials)	Hurdles (regulatory, infrastructure, availability/ capacity of cooperators/contractors, weather conditions)
Monitoring	Site-wide vegetation monitoring	Make plans to engage with ecological restoration consultants to complete follow-up monitoring of the entire barrens for the 2025 field season, 5 years following the initial survey. Monitoring will include a repeat survey of all permanent quadrats, data analysis of trends between 2020 and 2025, interpretation of results, and any needed adjustment of short-term and long-term stewardship actions and priorities.	2	Funding: roughly $5,000 Time: 4 field days in spring, 4 field days in late summer, 1 day data management Expertise: expert/advanced field botanists with experience in quantitative surveys and data analysis	

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Restoration	Plant propagation and population augmentation from BHB	Gather seeds on-site of selected other species of high conservation value; propagate in greenhouse; plant plugs in suitable habitat in selected restoration areas not yet occupied by species of high conservation value. • lyreleaf rockcress (*Arabidopsis lyrata* ssp. *lyrata*) • arrowfeather three-awn (*Aristida purpurascens*) • glade milkweed (*Asclepias viridiflora*) • yellow wild indigo (*Baptisia tinctoria*) • eastern narrowleaf sedge (*Carex amphibola*) • spreading sedge (*Carex laxiculmis*) • barrens chickweed (*Cerastium velutinum* var. *velutinum*) • glade knotweed (*Duravia* sp. 2) • lopsided rush (*Juncus secundus*) • early saxifrage (*Micranthes virginiensis*) • Appalachian ragwort (*Packera anonyma*) • Carolina rose (*Rosa carolina* ssp. *carolina*) • bitter-bloom (*Sabatia angularis*) • papillose nutrush (*Scleria pauciflora* var. *pauciflora*)	3	Moderate cost	Requires cooperator with the means and expertise to propagate species with a variety of needs.

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Restoration	Plant propagation and population augmentation from reference sites	Gather seeds at Soldiers Delight of selected species of greatest conservation need; propagate in greenhouse; plant plugs in suitable habitat in selected restoration areas not yet occupied by species of greatest conservation need. Candidate species include: • sandplain agalinis (*Agalinis decemloba*) S1, ME • porcupine sedge (*Carex hystericina*) S1, ME • Richardson's sedge (*Carex richardsonii*) S1, ME • hoary frostweed (*Crocanthemum bicknellii*) S1, ME • stiff tick-trefoil (*Desmodium obtusum*) S1, ME • southern dwarf huckleberry (*Gaylussacia dumosa*) S1, ME • eastern fringed-gentian (*Gentianopsis crinita*) S1, ME • northern blazing-star (*Liatris spicata*) S1 • grooved yellow flax (*Linum sulcatum*) S1, ME • fowl bluegrass (*Poa palustris*) S1 • bear oak (*Quercus ilicifolia*) • blackjack oak (*Quercus marilandica* var. *marilandica*) • post oak (*Quercus stellata*) • midwestern bold goldenrod (*Solidago rigida*) S1, ME • coppery St. John's-wort (*Hypericum denticulatum*) S2, MT • Canada burnet (*Sanguisorba canadensis*) S2, MT • swamp-oats (*Sphenopholis pensylvanica*) S2, MT	3	Moderate cost	Availability of funding to support seed preparation and propagation work by cooperators Receiving seed from Soldiers Delight will requires permission from and collaboration with DNR.

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Restoration/ Conservation	Deer herbivory monitoring and mitigation	1. Develop experimental design to assess effects of deer herbivory on grassland plant species of high conservation value. 2. Install temporary deer-exclusion cages on halves of stands of species of highest conservation need to assess actual deer impacts. 3. Consider deer management or deer exclusion options if monitoring shows substantial adverse effects on species of highest conservation need.	3		
Restoration	Pilot project to conduct soil organic matter reduction	See text on the following pages.	3		

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Soil organic matter reduction

Research at the Nottingham Barrens demonstrated that the desired effects of severe fire during severe drought, which include soil organic matter reduction and mortality of greenbrier rhizomes and part of the soil seedbank, can be simulated in part by mechanical soil organic matter removal with offsite disposal. Outstandingly positive results at several other Northern Piedmont serpentine barrens make this the method of choice where repeated burning fails to produce desired conditions within a reasonable period in a localized area, or where fire-tolerant species such as common greenbrier form monospecific stands and respond to fire by vigorous regrowth. Cost and other constraints, such as difficult terrain for access by large machinery, make this a method only to be applied judiciously in limited areas.

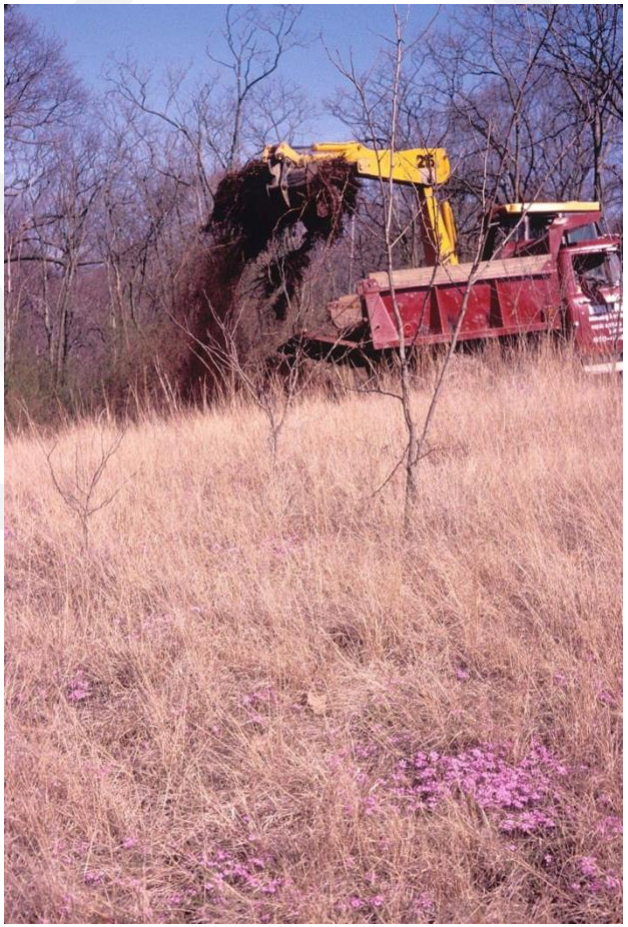

Figure 1 (above and right). **Soil organic matter reduction** in a dense stand of greenbrier and nonnative invasives at a serpentine barren.

It is essential that this method be applied only in patches where serpentine grassland plants are not present. The heavy machinery needs to stay away from stands of species of greatest conservation need and other species of high conservation value (see next page). The method is appropriate in areas of near-total cover by common greenbrier or nonnative invasive species with few or no grassland species in the understory and no plant species of high conservation value.

The method employs a front-end loader or a backhoe for lifting the upper-most layer of soil and a dump truck to haul it away (Fig. 1). **Take care to remove only the top few inches of the soil layer—the O and A horizons, which are generally black or dark brown in color. The B horizon, which is either light green, orange or light brown in serpentine soils, should be left intact as much as is feasible.** It is useful first to dig a

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few test holes in the area to be treated to get a sense of how thick the O and A horizons are and how much the thickness varies across the treatment area.

Areas selected for this treatment need to meet multiple criteria (plant technical names are given in Table 1):

1. **Dense cover of common greenbrier or nonnative invasive species**, especially:
    - Japanese stilt-grass, an indicator of soils that have been degraded by organic matter accumulation
    - woody invasives, especially nitrogen-fixing and allelopathic species, which greatly accelerate soil degradation:
        - European alder-buckthorn (allelopathic)
        - Japanese honeysuckle (allelopathic)
        - Morrow's honeysuckle (allelopathic)
        - Japanese wisteria (N-fixer)
        - black locust (N-fixer)
        - ailanthus (allelopathic)
2. **Absence of oaks**, mainly:
    - bear oak
    - blackjack oak
    - post oak
3. **Absence of species of greatest conservation need**:
    - whorled milkweed
    - Scribner's witchgrass
    - tall thoroughwort
    - annual fimbry
    - woodland panic grass
    - quill fameflower
4. **Absence of other species of high conservation value**, including:
    - lyreleaf rockcress
    - arrow-feather three-awn
    - glade milkweed
    - yellow wild indigo
    - eastern narrowleaf sedge
    - spreading sedge
    - barrens chickweed
    - glade knotweed
    - lopsided rush
    - early saxifrage
    - Appalachian ragwort
    - Carolina rose
    - bitter-bloom
    - papillose nutrush

All nearby stands of species of greatest conservation need must be marked temporarily with stakes and caution tape during the soil organic matter reduction process to prevent accidental mortality. Such stands need to be marked both around the excavation area perimeter and along the entire length of all access routes to be used by the heavy machinery across the grasslands from the road.

A disposal site needs to be identified for the removed soil organic matter. The material will consist of soil, roots and seeds, as well as stems of greenbrier and nonnative invasives if they are not mowed, burned, or cut beforehand. At other serpentine barrens where this procedure has been used, the material has been taken offsite and used as clean fill or stockpiled and the organic component allowed to decompose.

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