Analysis of effects on SWP (activities deconstructed for MVP)

orange row- edited subactivity	red row- delete subactivity (not in MVP)	yellow row- awaiting info from MVP

Project Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA or LAA	Comments
New Disturbance - Construction	Vehicle Operation and Foot Traffic	physical impacts to individuals, habitat degradation	crushing, competition, collection, chemical contaminants	introduction of invasive species, poaching, exposure to chemicals from surface water runoff					NLAA	AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Cleared ROW may increase chances of poaching and attract ORV traffic due to increased ease of public access, potentially causing collection, crushing, and death. AMM of installing barriers such as signs, fences, gates, vegetation, or boulders along the ROW to discourage use of ORVs on ROW to avoid illegal access will minimize ORV effects.
New Disturbance - Construction	Clearing - herbaceous vegetation and ground cover	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial, competition	removal of vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals.
New Disturbance - Construction	Clearing - trees and shrubs	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan [SWPCP], Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, thereby affecting SWP as described above. ERM (2017) conducted qualitative analyses of the potential changes to light regime near each colony as a result of tree removal in the pipeline construction ROW using 3D computer modeling. For the Seneca colony, the simulations indicated significant increases in ambient and direct light on the ground and surrounding area during summer, spring, and fall days, although not quantified. For the MNF colony, the simulations indicated changes in ambient light on the ground and surrounding area during early morning on summer and fall days. This light analysis was conducted before the proposed pipeline route was moved 108 ft further from the MNF colony, but we continue to anticipate changes in light in surrounding area due to close proximity (221 ft) of the pipeline construction ROW. The NNIPSMP will not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success. The SWPCP includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of population monitoring efforts beyond 1 year post-construction. For the Seneca SWP colony, the SWPCP also includes planting native tree seedlings for 200 ft along the construction ROW edge to the west of the pipeline (e.g., farther from the colony) to ameliorate for changes in sunlight regime and monitoring light levels in the colony for 3 years (e.g., before, during, and 1 year after construction). Approximately 20-30 years after planting, canopy trees (e.g., white oak and eastern white pine found at the Seneca colony) are expected to provide some mid-story shade (Burns et al. 1990), which would contribute to partially restoring the SWP habitat. Based on the evaluation of ERM's (2017) wind analysis of potential changes to wind patterns and speed within a 1 km radius around each of the SWP colonies, we anticipate that changes in wind pattern and speed will be minimal, and are likely to be discountable or insignificant.
New Disturbance - Construction	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
New Disturbance - Construction	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	
New Disturbance - Construction	Vegetation Clearing - tree side trimming by bucket truck or helicopter	physical impacts to individuals, habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The Small Whorled Pogonia Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (VHB 2017).
New Disturbance - Construction	Grading, erosion control devices	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	grading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Soil compaction and ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals.
New Disturbance - Construction	Trenching (digging, blasting, dewatering, open trench, sedimentation)	physical impacts to individuals, habitat degradation	crushing, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	trenching in upslope drainage area, erosion, movement of soil and larger material (e.g. boulders) when blasting	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Blasting may also loosen large rocks, which could fall and crush SWP.
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, padding and backfilling	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), existing line	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), new line	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial, competition, increased nutrients, chemical contaminants	regrading in upslope drainage area, erosion, spread of herbaceous and invasive plant species, exposure to nutrients from storm water runoff (fertilizers, decomposed vegetation), exposure to chemicals from surface water runoff and wind	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff, soil compaction, and competition from invasive plants in ROW. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. For controlling invasive plants, hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides.
New Disturbance - Construction	Facilities - noise, lights	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Telecommunications equipment - ~~guy lines,~~ noise, lights??	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - grading, graveling	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - culvert installation	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent- tree trimming and tree removal	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Stream Crossings, wet open cut ditch	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, flume	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, dam & pump	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, cofferdam	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, Horizontal Directional Drill (HDD)	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, conventional bore	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.

New Disturbance - Construction	Stream Crossings, direct pipe	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Equipment Crossing Structures	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - clearing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - tree side trimming	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - grading, trenching, regrading	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - pipe stringing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - HDD	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - Horizontal bore	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - mowing	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, burial, competition	removal of vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Management - chainsaw and tree clearing	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may be degraded and individual stems may be buried. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individual SWP. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years post-construction and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of population monitoring efforts beyond 1 year post-construction.
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	physical impacts to individuals, habitat alteration	chemical contaminants	exposure to chemicals from surface water runoff and wind					NLAA	Hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides. The SWP Conservation Plan also includes AMMs to minimize herbicide exposure by prohibiting herbicide use within 60 ft of SWP colonies and only using handpulling within this area (VHB 2017).
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - tree side trimming by bucket truck or helicopter	habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017).
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, burial, sedimentation	regrading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and ground disturbance will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may be degraded and individual stems may be buried.
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - hand, mechanical	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	ROW repair, regrading, revegetation - instream stabilization and/or fill	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	Access Road Maintenance - grading, graveling	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	Access Road Maintenance - culvert replacement	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - Off ROW Clearing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Inspection Activities - ground and aerial	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.