

SOUTH ONE FIRE BURNED AREA REHABILITATION PLAN



Wildfire actively consuming peat, South One Fire (L. Mitchell).

UNIT: *Great Dismal Swamp National Wildlife Refuge*

LOCATION: *Cities of Suffolk and Chesapeake, Virginia, and Camden County, North Carolina*

DATE: *September 15, 2008*

PREPARED BY: *South One Fire Rehabilitation Team*

Submitted By: _____ Date: _____
Laura Mitchell, Regional Fire Wildlife Biologist

_____ Date: _____
Bryan Poovey, Refuge Forester

EXECUTIVE SUMMARY

Introduction

This Burned Area Rehabilitation Plan has been prepared in accordance with Department of the Interior and Fish and Wildlife Service policy (US DOI 2004, 2006). This plan provides rehabilitation recommendations for all lands burned within the South One Fire perimeter (See Vicinity Map 1). This plan addresses rehabilitation treatments. The primary objectives of the South One Fire Burned Area Rehabilitation Plan are:

- To repair or improve lands unlikely to recover naturally from severe wildland fire damage by emulating both historic and pre-fire ecosystem structure, function, diversity, and dynamics according to approved land management plans.
- Reestablish Atlantic white cedar (*Chamaecyparis thyoides*) as a dominant component in the fire-damaged peatlands where it occurred (pre-fire), and promote the re-establishment of the species' colonization processes.

A Burned Area Response (BAR) team conducted an analysis of fire damages throughout the lands impacted by the fire. The multi-disciplinary team, consisting of the Refuge Forester, Refuge Wildlife Biologist, Region 5 Fire Program Staff, and consulted experts conducted ground surveys, made burn severity estimates, evaluated and assessed fire damages and suppression impacts to vegetative communities, and identified values at risk associated with vegetative losses, as part of the damage assessment. The GIS specialist organized ground-truth data sets, raster data sets, and other data layers, and coordinated GPS activities.

Of particular importance is the *Rehabilitation Assessment* in Part C, and the *Fire Damage Assessment Report* in Appendix I, which: 1) summarize the damages of the South One fire to a priority forest resource on the Refuge; 2) describe the established techniques that can help repair this damage; and 3) outline the best rehabilitation objectives and strategy for this resource. The individual rehabilitation treatments specifications, including effectiveness monitoring, can be found in Part F. The report in Appendix I includes expert opinions by Refuge staff, regional staff, a local wetlands scientist, a soil scientist and two fire ecology specialists. Appendix II contains the National Environmental Policy Act (NEPA) compliance documentation summary. Appendix III contains the Burned Area Rehabilitation Plan maps. Appendix IV contains photograph documentation. Appendix V contains Literature Cited.

Fire Background

The South One Fire was started by logging equipment on June 9, 2008, in an area which had recently been salvage logged as part of an Atlantic white cedar (AWC) restoration project. Fuels near the origin were primarily post-salvage slash and blown down timber from Hurricane Isabel (2003). The fire spread quickly and into adjacent peatland forests, largely comprised of red maple (*Acer rubrum*) and gum (*Nyssa* spp.) species, with scattered pine (*Pinus serotina*), cypress (*Taxodium distichum*), and AWC. Fire impacts, e.g. peat soil losses and tree mortality, were quite severe in portions of both the AWC restoration areas, and the peatland forests, due to drought conditions and heavy fuel loads. The fire escalated quickly into a Type 2 extended attack situation and interagency resources were ordered in to

assist the suppression effort. The fire was managed by the Southeastern Type 2 Incident Management Team (Wilder) from June 11th until June 26th. The Type 2 Team decided to contain the fire by burning out around the perimeter, using existing roads and ditches. Burnout operations, a combination of aerial and ground ignition, resulted in hundreds of acres of fire-damaged peatland forests along Interior, South, and Riddick Ditches. On June 26th, command was transferred to a Type 3 IMT (Ripley). On 27th, the fire escaped northern containment lines along Interior Ditch; the Florida Interagency Incident Management Gold Team (Hill) took command on June 30th. The Gold Team worked to contain the fire by flooding it with pumping operations along Interior Ditch. The ditch was dammed and used as a reservoir to supply a commercial, heavy-duty, irrigation system. The Gold Team transferred command back to a Type 3 IMT on July 12th (Koenig). On July 30th, management of the fire was transferred another Type 3 IMT (Counts), followed by Seabright (IMT 3) on August 9th, and a Type 4 IMT on August 23rd. The fire was declared contained on August 20, 2008, and transferred back to the Great Dismal Swamp NWR Fire Management Program on September 2nd. The fire is expected to burn through the fall months until a season-ending rain event occurs (see Fire Progression Map 2).

GPS recon by helicopter determined the current fire size is approximately 4,844 acres. The total amount of fire-damaged peatland forest from the fire and suppression operations is approximately as follows (see South One Fire Perimeter, Map 3):

- Wildfire and suppression operations resulted in about 368 acres of fire-damaged peatland forests north of Interior Ditch.
- Wildfire and burnout operations resulted in about 3,372 acres of fire-damaged peatland forests enclosed by Interior, West, South, and Riddick Ditches. This area contains about **190** acres of damaged AWC stands.
- Wildfire resulted in about 1,472 acres of fire-damaged peatland forests between South and Corapeake Ditches. This area contains about **591** acres of damaged AWC stands.

This Rehabilitation Plan will focus on addressing fire impacts to regeneration of a rare, pre-existing natural community of particular importance to the Refuge: Peatland AWC Forests. Without intervention, this forest community will not regenerate on the South One burn site.

Fire Damages and Threats to Human Safety and Natural and Cultural Resources

There are significant impacts to forest and wildlife resources as a result of the South One Fire, including **781** acres of Atlantic white cedar (AWC) stands that were in the process of being restored from previous hurricane damage. Ground surveys have revealed that there were moderate to severe fire impacts to at least 70% (proportionally) of the surface area of AWC restoration areas. The smoldering peat fire burned away the majority of the litter and duff layers, and into the underlying peat (AWC Stands Impacted, Map 4; Severity of South One Fire, Map 5). Therefore, it is likely that the seed bank for cedar re-establishment had been destroyed across much of the AWC restoration areas. Ground surveys have also revealed that the remaining, mature AWC seed trees, reserved from harvest during post-hurricane salvage and critical to natural regeneration, have also been lost in these units.

Ground surveys have also demonstrated that in a small proportion of the AWC restoration areas (approximately 30%), fire effects were so severe that a significant amount of the peat in the soil column

had been consumed, with 40-60 cm of elevation lost, resulting in a broken, pothole-landscape (Photographs 1-4, Appendix IV). However, consultations with local soils and hydrology experts, a local AWC expert, and 2 fire ecologists, have revealed that although the AWC restoration areas have been damaged with varying levels of peat consumption, the resulting mound-pool topography likely still provides suitable topography for AWC re-establishment from plantings (see Appendix I – Burned Area Assessment Reports).

Great Dismal Swamp National Wildlife Refuge (GDSNWR) Management Requirements

The Great Dismal Swamp historically contained the largest known stand of AWC in its range, at an estimated 112,000 acres (Frost 1995). Since European colonization, a combination of factors has almost completely decimated this ecosystem, including unsustainable logging practices, fire suppression, and changes to the swamp's water regime. In GDSNWR, prior to Hurricane Isabel in 2003, Atlantic white cedar was present in pure stands covering approximately 3,600 acres, primarily in the south central portion of the swamp, the region of the South One fire.

The 111,203 acre GDSNWR was established in 1974. The Dismal Swamp Act of 1974 directed the U.S. Fish and Wildlife Service to “*Manage the area for the primary purpose of protecting and preserving a unique and outstanding ecosystem, as well as protecting and perpetuating the diversity of animal and plant life therein.*” This is also Goal One of the Refuge Comprehensive Conservation Plan (USFWS 2006).

Under this goal, the CCP outlines specific Objectives for restoring and protecting the AWC forests on the Refuge:

- **Objective:** Restoration of 2,000 acres of AWC forests by 2006 using helicopters or other specialized equipment to remove trees that were destroyed or severely damaged by Hurricane Isabel
- **Objective:** Restoration of 8,000 acres of AWC forest by 2019.

The purpose of this Burned Area Rehabilitation Plan is to repair previously existing AWC forests unlikely to recover naturally from the severe damage inflicted by the South One fire.

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PART A - FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	South One
Fire Number	D7U0
Agency Unit	VA-GDR Great Dismal Swamp NWR
Region	Northeast (5)
State	Virginia and North Carolina
County(s)	Cities of Suffolk and Chesapeake, Virginia, and Camden County, North Carolina
Ignition Date/Cause	June 9, 2008/Logging equipment
Jurisdiction	FWS
Total Acres	4,844
Date Contained	August 20, 2008

PART B - NATURE OF PLAN

Type of Action (check one box below)

<input checked="" type="checkbox"/>	Initial Submission
<input type="checkbox"/>	Amendment to the Initial Submission

PART C - REHABILITATION ASSESSMENT

Atlantic White Cedar Importance

AWC is an obligate wetland species that historically occurred in dense, nearly monotypic stands in the outer coastal plain from Maine to Mississippi. Approximately 98% of the area once populated by AWC has disappeared since European colonization. The ecosystem that cedar dominates is considered globally threatened by The Nature Conservancy and critically endangered by Noss et al. (1995). It is classified as an S1 community (critically imperiled) by the Virginia Department of Conservation and Recreation (Fleming 2006). The tree is listed as S3 (vulnerable, at moderate risk of extirpation from the state) in Virginia (Townsend 2005).

Atlantic white cedar stands represent unique ecosystems, often containing associations of rare plants, such as spreading pogonia (*Cleistis bifaria*) and Walter's sedge (*Carex striata*). Atlantic white cedar is the larval host of the rare butterfly, Hessel's hairstreak (*Mitoura hesseli*), classified as S1 by the Virginia Department of Conservation and Recreation, Natural Heritage Program, and recorded at the Great Dismal Swamp (Fleming 2006). At the Great Dismal Swamp, AWC communities have been demonstrated to support much higher densities of breeding bird species than deciduous forests on the Refuge (Terwillinger and Rose 1984). The following Neotropical migrants comprise 74-78% of breeding birds in AWC forests on the Refuge: Prairie Warbler, Prothonotary Warbler, Hooded Warbler, Worm-eating Warbler, Ovenbird, and Common Yellowthroat. Prothonotary and Worm-eating warblers are listed as requiring attention under the Partners in Flight South Atlantic Coastal Plain Bird Conservation Plan. Prairie, Prothonotary, and Worm-eating warblers are listed as Species of Regional Importance by PIF (Hunter et al. 2001). The Worm-eating, Prairie, and Prothonotary warblers are each listed in the North American Land Bird Conservation Plan as having management needs (Rich 2004).

All the ditches and subsurface waters within the GDSNWR drain into two water bodies, Dismal Swamp Canal and Pasquotank River, which drain into the Chesapeake Bay to the north and Albemarle Sound to the south. Both of these larger water bodies are identified as impaired by the Environmental Protection Agency. Mature Atlantic white cedar bogs provide a unique habitat that is cooler than surrounding hardwood swamps or pinelands, and are generally considered natural water filters. The AWC stands of GDSNWR will eventually develop into important, protected water filters for the Albemarle Sound and Chesapeake Bay watersheds.

Storm Damage and Recovery of AWC

Until the twentieth century, the largest remaining stands of AWC in the entire world occurred in the Dismal Swamp of Virginia and North Carolina. Human alterations to the landscape have caused most of this peatland ecosystem to convert to hardwood (maple/gum) forest. An estimated 3,000 acres of the purest AWC stands remaining on the Refuge were felled on September 18, 2003 by Hurricane Isabel (see Photograph 5, of a typical AWC stand felled by the storm, in Appendix IV). After contracting for NEPA project work and helicopter logging engineering, a Request for Proposals was issued for salvage of the cedar timber. Objectives of the work were: 1) fuel reduction to lessen wildfire hazard and 2) clearing dead and down trees so that the seedbed could be prepared for natural cedar regeneration. The expectation was that there would be enough residual AWC seed in the litter and duff to facilitate dense

seedling establishment. There were also residual, mature trees to be left as seed trees. A contract was issued in 2004 and by the spring of 2008, most of the salvage work had been accomplished.

Prior to the South One fire, the Refuge had promising evidence that the restoration objectives of the salvage treatment were being met, and management actions were assisting in the recovery of the storm-damaged stands to nascent, Atlantic white cedar-dominated forests. According to refuge seedling surveys conducted in salvaged units north of Corapeake Ditch, the AWC restoration areas were regenerating at an average of 3,595 AWC seedlings per acre. While the majority of the seedlings were <.5' tall, size classes of .5-1', 1-2' , and >2' tall were also well-represented. See Photograph 6, in Appendix IV, of an AWC restoration area north of Corapeake Ditch, taken in the spring of 2008. Photograph 7 shows the South One fire burning through the same area, June, 2008. Photograph 8 shows another AWC restoration area, north of Corapeake Road, in the aftermath of the fire. The dead saplings are AWC that were repopulating the site.

Photograph 9 in Appendix IV (taken August, 2008), shows an AWC restoration area, salvage cut in 2004, south of Corapeake Road, and spared the effects of the South One fire. The site is regenerating well, with high stocking levels of AWC in seedling and larger size classes. This reflects the site conditions, and the development trajectory, of many of the salvaged AWC stands, that was halted by the South One fire.

Wildfire Damage

The South One fire originated in a central AWC stand being cleared by the timber salvage operation. It is crucial to note that AWC stands have often been created by “catastrophic fire that kills all existing vegetation without burning deeply into peat”, and that “for regeneration it is critical that...fire must take place at a time when peat substrate is saturated so that the seed bank is not destroyed” (Frost 1989). This is because most viable seeds for AWC occur within the top 2.5 cm (1 inch) of soil (Frost 1987, Little and Garrett 1990). According to Frost (1987), “Cedar would regenerate in a dense stand if a fire were hot enough to kill the canopy, but failed to burn deeply enough to destroy the seed bank...a deep peat burn...would prevent reestablishment of white cedar.”

Southeast Virginia had been experiencing a long-term precipitation deficit at the time of the South One Fire. During the spring of 2008, the region had been classified as being in Severe Drought by the U. S. Drought Monitor. At the time of the fire, regional conditions were in the Abnormally Dry Category. The combination of heavy fuels and drought conditions resulted in prolonged combustion of the surface and ground fuels across much of the South One burn area. The smoldering peat fire burned away the surface tier of these histosols (including litter layer and duff layers), and well into the subsurface tier (below 30 cm) in many areas. It is likely that nearly the entire seed bank has been consumed over a large proportion of the salvaged AWC units (AWC Stands Impacted, Map 4; Severity of South One Fire, Map 5).

Without significant intervention by the Refuge, the 781 acres of burned AWC restoration areas will not recover to Atlantic white cedar forest, for the following reasons:

1. The wildfire has nearly eradicated the seed bank, especially in the moderately to severely burned

areas (which include 70% of the AWC sites), because of a significant loss of the upper peat horizons

2. The seed bank in the 30% of the AWC restoration areas that have not burned as severely is not likely to have a substantial, viable pool of AWC seeds; these areas had been released prior to the fire (by storm damage and salvage operations), and the majority of the AWC seed bank had already germinated; this seed bank is likely to be exhausted
3. Third, the seed trees that were left in the AWC restoration units, as part of the salvage operation, have been killed by the fire, and were killed prior to seed production for the 2008 season.

Without these contributions to the massive seed bank that cedar depends upon to repopulate a site, post-disturbance, AWC will not likely re-colonize the burn site significantly. Instead, the restoration areas will become dominated by low shrubs (e.g. *Ilex* spp., *Lyonia lucida*, *Clethra alnifolia*) and vines, such as Laurel greenbrier (*Smilax laurifolia*), competitive, woody species of the deep peatlands. Eventually, these areas will succeed to dominance by red maple (*Acer rubrum*) – gum (*Nyssa sylvatica*) forest, a historically, proportionally minor forest type of the Great Dismal Swamp, which competes well on the present-day, artificially drained soils of the region. This would represent a net loss of AWC forest to the Refuge, which has already lost a massive proportion of this rare natural community.

See Appendix I, “South One Fire Resource Damage Assessment Report”, for expert support for this assessment of the wildfire damage to the AWC restoration areas at the Refuge.

Atlantic White Cedar Restoration Requirements

The Refuge will need to replant the AWC restoration units that were damaged by the South One fire. The purpose of this treatment is to create a regeneration of seed-producing cedar trees, as rapidly as possible, thus substituting for the flush of seedlings that has been eliminated by the severity of this fire. While this will probably not result in even-aged AWC stands in the long term, it will, in all likelihood, assist each stand in developing into a forest dominated by AWC.

In addition to planting rooted cuttings of AWC trees, rehabilitation efforts will also require that the restoration areas be treated with a helicopter boom application of Habitat®, an imazapyr-based herbicide approved for wetland use, to control competing deciduous vegetation (i.e. perennial shrubs, vines, and invading hardwoods), one year post-planting. Past studies at the Refuge (Moore 1996) have demonstrated that competition with young age classes of AWC by woody shrubs and vines is formidable at the Great Dismal Swamp. These studies clearly showed that herbicide release treatments significantly boost AWC survival in young age classes.

See Appendix I, South One Fire Resource Damage Assessment Report, for expert support for this determination that planting AWC is an appropriate treatment for the AWC restoration areas at the Refuge.

Evidence that Intervention Techniques Are Necessary and Will Succeed

In 2006, a lightning strike resulted in the 40-acre Crosscut Fire at Great Dismal Swamp NWR. The fire burned one of the storm damaged, AWC stands which had recently been partially salvaged via

helicopter. Refuge staff determined that the fire had consumed the entire litter layer and some of the upper duff layers to an average depth of two inches, and much more deeply in some places. There were no remaining seed trees, and it was assumed that nearly the entire seed bank for cedar re-establishment had been destroyed.

To rehabilitate the site, the Refuge treated the burned area with 1 quart/acre Habitat® during the fall of 2007. In spring of 2008, the Refuge planted containerized rooted cuttings of AWC, grown from Great Dismal Swamp seed sources, at a rate of 200 trees/acre. Ground surveys performed during the summer, 2008, determined that virtually no AWC seedlings have repopulated the burn area; therefore the seed bank was, indeed, largely destroyed by the fire (Photograph 10, Appendix IV). Atlantic white cedar plantings have shown 75% survival thus far (Photograph 11 Appendix IV), and the chemical treatment has significantly reduced woody competition (Photograph 12, Appendix IV), as compared with adjacent areas which were salvaged, and did not receive an herbicide treatment (Photograph 13, Appendix IV).

Future Stewardship Beyond BAR

The Great Dismal Swamp NWR is focused on restoring and enhancing the natural habitat diversity of the refuge. Restoration of AWC forests is a priority objective of the CCP; the refuge is committed to the long-term stewardship of all AWC restoration areas. Once the burned areas have been planted, the refuge forester and a temporary forestry technician will conduct planting survival surveys, and will collect other AWC demographic information (summer, 2010 and summer, 2011), to evaluate planting success, as well as competition, and subsequent natural regeneration of AWC. Following spray release treatments in 2011, refuge staff will continue to monitor AWC survival, age class structure, reproductive success, and competition with shrub and hardwood species. The refuge will enact additional management actions, as necessary (e.g. additional spray release treatments), to ensure that AWC succeeds in developing into a dominant, overstory species on these stands.

Rehabilitation Objectives

AWC

- Assess 781 acres of damaged AWC restoration areas: conduct seedling surveys, determine final fire severity estimates, project areas of greatest depletions of AWC seed bank
- Use this information to guide AWC planting efforts more precisely; proportionally greater planting will take place in more severely damaged areas
- Contract with private nursery to begin production of AWC planting material in 2009 and 2010
- Plant AWC rooted cuttings in half of target AWC restoration areas in spring 2010, at an approximate density of 300 trees per acre; trees will be derived from plant material native to the Great Dismal Swamp NWR; continue to evaluate regeneration and planting success
- Plant AWC rooted cuttings in the remaining target AWC restoration areas in spring 2011, at an approximate density of 300 trees per acre, trees will be derived from plant material native to the Great Dismal Swamp NWR
- Establish a regeneration of AWC, which will start to add to the seed bank within 2-3 years
- Monitor AWC survival during summer, 2010 and summer, 2011; a 70% survival rate will be considered a successful planting effort
- Apply an herbicide release treatment in late summer, 2011, to control competition with woody

shrubs, vines, and hardwood trees

- Monitor rooted cutting survival beyond 2011

PART D - TEAM ORGANIZATION

I. Burned Area Emergency Response Team Members: *(List of technical specialists used to develop the plan)*

Position	Team Member (Agency)
Team Leader	<i>Laura Mitchell, Northeast Region Fire Wildlife Biologist</i>
Forester/Vegetation Specialist	<i>Bryan Poovey, Great Dismal Swamp NWR</i>
Soil Scientist	<i>Al Rizzo, Chesapeake Bay Field Office</i>
Fire Management Officer	<i>Tim Craig, Great Dismal Swamp NWR</i>
Wildlife Biologist	<i>Don Schwab, Great Dismal Swamp NWR</i>
Refuge Manager	<i>Chris Lowie, Great Dismal Swamp NWR</i>
GIS Specialist	<i>Laura Mitchell, Northeast Region Fire Wildlife Biologist</i>
Photographer(s)	<i>Laura Mitchell, Northeast Region Fire Wildlife Biologist, Bryan Poovey, Great Dismal Swamp NWR</i>

II. Additional Resource Advisors

Steve Martin, U.S. Army Corps of Engineers, Norfolk, VA

Steven Hubner, USFWS Region 5 Fuels Coordinator

Dr. Cecil Frost, NC Fire Ecologist

Dave Brownlie, USFWS, Fire Ecologist, Region 4 (and former Forester, GDSNWR)

Robert Belcher, Malcom Pirnie, Inc., Wetlands Ecologist

Al Rizzo, Soil Scientist, USFWS Chesapeake Bay Field Office

PART F - INDIVIDUAL SPECIFICATION, Specification #1

TREATMENT/ACTIVITY NAME	Purchase AWC Rooted Cuttings	PART E SPECIFICATION #	1
NFPORS TREATMENT CATEGORY*	Reforestation	FISCAL YEAR(S) (list each year):	2009-2010
NFPORS TREATMENT TYPE *	Nursery Stock	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	Neotropical Migrants, S1 Community, S1 and S3 species

E. See NFPORS Restoration & Rehabilitation module – Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>Number and Describe Each Task:</p> <p>A. General Description: Contract with commercial tree nursery to produce containerized, Atlantic white cedar rooted cuttings, originally sourced from AWC seeds from the Great Dismal Swamp NWR.</p> <p>B. Location/(Suitable) Sites: 781 acres of moderately to severely burned, former AWC restoration sites, in the South One burned area, Great Dismal Swamp NWR.</p> <p>C. Design/Construction Specifications:</p> <ol style="list-style-type: none"> All rooted cuttings will be derived from Dismal Swamp seed source to ensure genetic conformity All rooted cuttings shall be in good condition and in appropriate growth stage for planting; trees will extend 14" above the ground, and will have a minimum root collar diameter of 4 mm 234,300 rooted cuttings will be required to plant 781 acres at 300 trees/acre Plantings will occur in two installments – 117,150 rooted cuttings will be planted in 2010; 117,150 rooted cuttings planted in 2011 (this is because the nursery can only supply a maximum of 117,150 rooted cuttings per year) Therefore, contracts will occur in two installments – in 2009, and in 2010 <p>D. Purpose of Treatment Specifications: Restore AWC ecosystem that has been severely impaired by the South One Fire, in accordance with objectives as stated in CCP</p> <p>E. Treatment Effectiveness Monitoring Proposed: N/A</p>

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$0.00
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$0.00
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
234,300 seedlings (AWC) X \$550/thousand	
TOTAL MATERIALS AND SUPPLY COST	\$128,865
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM

TOTAL TRAVEL COST	\$0.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
	\$0.00
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY09	01/15/2009	06/30/2009	S	tree	\$.55	117,150	\$64,432.50
FY10	01/15/2010	06/30/2010	S	tree	\$.55	117,150	\$64,432.50
FY__							
FY__							
TOTAL							\$128,865

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	M
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required – cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.
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TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Great Dismal Swamp NWR	781 acres	\$128,865
	TOTAL COST	\$128,865

PART F - INDIVIDUAL SPECIFICATION, Specification #2

TREATMENT/ACTIVITY NAME	Evaluate Restoration Site	PART E SPECIFICATION #	2
NFPORS TREATMENT CATEGORY*	Reforestation	FISCAL YEAR(S) (list each year):	2009-2011
NFPORS TREATMENT TYPE *	Assessment and Monitoring	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	Neotropical Migrants, S1 Community, S1 and S3 species

E. See NFPORS Restoration & Rehabilitation module – Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Evaluate burned AWC restoration areas for seed bank integrity (2009, 2010); evaluate survival of planted, rooted cuttings (2010, 2011).

B. Location/(Suitable) Sites: Entire 781 acres of burned AWC restoration areas.

C. Design/Construction Specifications:

1. Regional Fire Ecologist and Refuge Forester will develop protocols for evaluating seed bank integrity
2. Protocols will involve sampling sub-units of burned, salvaged AWC stands for seedling density, during the mid-growing season, 2009 (prior to 2010 spring planting), and 2010 (prior to 2011 spring planting)
3. Sampling will involve density measurements along transects, which will be georeferenced, and entered into a geodatabase for mapping and analysis
4. Regional Fire Ecologist and Refuge Forester will also develop protocols for evaluating survival of planted AWC trees
5. Sampling will be accomplished during the mid-to-late growing season, 2010 (after first spring planting); and 2011 (after second spring planting)

D. Purpose of Treatment Specifications: Seed bank integrity information will guide precise AWC planting operations in 2010 and 2011, possibly emphasizing greater planting densities in areas with the severest impacts to the seed bank; information on planted tree survival for 2010 will inform restoration efforts in 2011; information collected in 2011 will serve as treatment effectiveness monitoring

E. Treatment Effectiveness Monitoring Proposed: Seedling density transects; planting survival estimates

Data to be collected within AWC restoration areas will include the following:

1. % Survival of planted trees
2. Height of planted trees by (10 cm) size class
3. Natural cedar recruitment
4. Assessment of competition
5. Evidence of browsing
6. General plot characterization

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
1 GS-4 forestry technician, 9 months total (3 months per year, for 3 years, @ \$6,642.25 per 3 month period) + \$750 hiring costs, per year (\$2,250 total)	
TOTAL PERSONNEL SERVICE COST	\$22,177
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$0.00
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$0.00
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$0.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	\$22,177

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY09	05/01/2009	07/31/2009	S	3 months	\$6,642.25 + \$750 hiring costs	Seed bank survey	\$7,392.25
FY10	05/01/2010	07/31/2010	S	3 months	\$6,642.25 + \$750 hiring costs	Seed bank survey, survival estimates	\$7,392.25
FY11	05/01/2011	07/31/2011	S	3 months	\$6,642.25 + \$750 hiring costs	Seed bank survey, survival estimates	\$7,392.25
FY__							
TOTAL							\$22,177

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.
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TOTAL COST BY JURSDICTION

JURSDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Great Dismal Swamp NWR	781 acres	\$22,177
	TOTAL COST	\$22,177

Part F - INDIVIDUAL SPECIFICATION, Specification #3

TREATMENT/ACTIVITY NAME	Plant Rooted Cuttings	PART E SPECIFICATION #	3
NFPORS TREATMENT CATEGORY*	Reforestation	FISCAL YEAR(S) (list each year):	2010-2011
NFPORS TREATMENT TYPE *	Planting	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	Neotropical Migrants, S1 Community, S1 and S3 species

F. See NFPORS Restoration & Rehabilitation module – Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>Number and Describe Each Task:</p> <p>A. General Description: Plant AWC rooted cuttings</p> <p>B. Location/(Suitable) Sites: Entire 781 acres of burned AWC restoration areas.</p> <p>C. Design/Construction Specifications: Planting density to be 300 seedlings per acre; density will be adjusted on a sub-unit basis according to on-the-ground information gathered on seed bank integrity (in summer, 2009, and summer, 2010)</p> <p>D. Purpose of Treatment Specifications: Restore AWC ecosystem that has been severely impaired by the South One Fire, in accordance with objectives as stated in CCP</p> <p>E. Treatment Effectiveness Monitoring Proposed: Planting survival estimates, and other AWC demographic information, to be collected and analyzed, summer, 2010 and summer, 2011 (as stated in Specification 2).</p>

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	\$0.00
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$0.00
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	\$0.00
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	\$0.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Seedling Planting Contract (estimate from prior-used contractor) = 234,400 seedlings @ \$.25 per tree planted = \$58,575	

TOTAL CONTRACT COST	\$58,575
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SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY10	03/01/2010	04/30/2010	S	tree	\$.25	117,150 trees	\$29,287.50
FY__	03/01/2011	04/30/2011	S	tree	\$.25	117,150 trees	\$29,287.50
FY__							
FY__							
TOTAL							\$58,575

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	C
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.
--

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Great Dismal Swamp NWR	781 acres	
	TOTAL COST	\$58,575

PART F - INDIVIDUAL SPECIFICATION, Specification #4

TREATMENT/ACTIVITY NAME	Control Competition	PART E SPECIFICATION #	4
NFPORS TREATMENT CATEGORY*	Reforestation	FISCAL YEAR(S) (list each year):	2011
NFPORS TREATMENT TYPE *	Plantation Maintenance	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	None	IMPACTED T&E SPECIES	Neotropical Migrants, S1 Community, S1 and S3 species

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>Number and Describe Each Task:</p> <p>A. General Description: Helicopter boom application of herbicide (Habitat) to control competing vegetation prior to planting</p> <p>B. Location/(Suitable) Sites: Entire 781 acre burned AWC restoration area</p> <p>C. Design/Construction Specifications:</p> <ol style="list-style-type: none"> 1. Application rate of 1 quart/acre imazapyr 2. Application to be done in late summer of 2011 3. Treatment subject to approval of Pesticide Use Proposal <p>D. Purpose of Treatment Specifications: Ensure effective control of competing woody vegetation based on prior Refuge experience and manufacturer recommendation.</p> <p>E. Treatment Effectiveness Monitoring Proposed: Long-term monitoring of survival of planted AWC trees and seedling development in treated areas to be conducted by the Refuge beyond the time period specified in this Plan (post 2011)</p>

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONNEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
\$115/acre X 781 acres	
TOTAL CONTRACT COST	\$89,815

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY11	08/01/2011	09/30/2011	S	acres	\$115	781	\$
FY__							
FY__							
FY__							
TOTAL							\$89,815

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	C
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.
--

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Great Dismal Swamp NWR	781 acres	\$
	TOTAL COST	\$89,815

PART G - RESTORATION REQUIREMENT

The GDSNWR staff is committed to the continued stewardship and monitoring of the treatment areas well beyond the three-year period funded under this Plan. A second monitoring survey will be conducted by Refuge staff in 2012 to evaluate live percent of AWC plantings. A survey of competing vegetation will also be conducted by Refuge staff to determine if a subsequent herbicide treatment is needed within the 2013-2016 time period, to further release developing, young AWC trees from excessive competition. Extra precautions will be considered to protect the trees from wildfire or herbivore browsing.

PART H – CONSULTATIONS

The following individuals were consulted during the development of this plan. Each was given the opportunity to visit the AWC restoration areas impacted by the South One Fire, and was provided the opportunity to comment upon a draft version of this plan:

Steve Martin, Wetlands Ecologist, U.S. Army Corps of Engineers, Norfolk, VA

Steven Hubner, USFWS Region 5 Fuels Coordinator

Dr. Cecil Frost, NC Fire Ecologist

Dave Brownlie, USFWS, Fire Ecologist, Region 4

Robert Belcher, Malcom Pirnie, Inc., Wetlands Ecologist and AWC specialist

Al Rizzo, Soil Scientist, USFWS Chesapeake Bay Field Office

APPENDIX I – SOUTH ONE FIRE RESOURCE DAMAGE ASSESSMENT REPORT

1. Severity Assessment

Laura Mitchell, Region 5 Fire Wildlife Biologist

Post-fire vegetation and burn severity assessments were conducted throughout the AWC restoration units that were burned by the South One fire, in the vicinities of South Ditch and Coreapeake Ditch. Several on-the-ground reconnaissance visits of the burned areas were conducted throughout late July, August, and into September, 2008 prior to the fire being declared out. Refuge and Regional fire staff conducted evaluations using standard FIREMON Composite Burn Index methods (Key and Benson, 2006). Staff distributed CBI plots throughout the 781 acres of burned AWC stands, recording severity estimates and GPS information per plot. Ground-truth severity information was subsequently used to adjust the USGS Severity map for the South One fire (produced by USGS EROS) by correcting Burned Area Reflectance Classification (BARC) values with on-the-ground information (Severity Map of South One Fire, Map 4).

Ground surveys indicated there were moderate to severe fire impacts to at least 70% (proportionally) of the surface area of Atlantic white cedar (AWC) stands that were in the process of being restored from previous hurricane damage. These areas have sustained significant impacts to the underlying histosols; the smoldering peat fire burned away the majority of the litter and duff layers. Investigators have subsequently concluded that the seed bank for cedar re-establishment was likely destroyed by fire across most of the AWC restoration units within the burned area. Investigators also noted that mature AWC, reserved from harvest during post-hurricane salvage that could have served as seed trees for natural regeneration have also been lost in these units. In a few (highest) severity areas (e.g. immediately adjacent to Corapeake Ditch, at the southern end of the fire) the fire reduced surface elevations to where they may no longer support the pre-fire AWC forest, but may instead convert to cypress-gum swamp forest, an ecosystem that naturally occurs at a lower elevation on the deep histosols of the Great Dismal Swamp. However, it will take one or more growing seasons to determine if this is the case. The Refuge will need to monitor water levels (i.e. duration of pooling) into the spring to help clarify this issue.

2. Soils Assessment

Albert Rizzo, Soils Scientist, USFWS Chesapeake Bay Field Office

Mr. Rizzo examined severely burned and moderately burned areas of the AWC restoration sites impacted by the South One Fire. He reports:

1. In the most severely burned areas, the peat has been converted to a hydrophobic state; it will not rewet quickly and could possibly take a decade or longer. In addition, the deeper “pits” created by severe peat loss (e.g. >20 cm peat lost) contain a layer, which is primarily a highly oxidized ferric compound, formed when the carbon of the organic soil was completely combusted leaving behind the mineral residue. Both the hardened, hydrophobic peat lying on the surface of the severely burned areas, and the highly oxidized ferric material, will resist wetting, and will increase surface ponding during the wetter months (i.e. winter, early spring).

2. In addition, the deeper burns have removed the upper, fibric peat horizons. The result is that the deeper pits consist mainly of muck material. This structural alteration will also increase surface ponding in the pits. However, it is widely recognized that much of the Great Dismal Swamp has been artificially drained for decades by a system of drainage ditches. It is possible that some of these elevation changes will merely move the soil surface closer to the water table, and actually expose these areas to something approximating a more natural hydrologic regime.
3. Nevertheless, the burned peat soils do not pose any significant chemical or physical impediments to planted AWC seedlings. It will be important to monitor the sites for a year, to determine the duration and extent of flooding in the units, but it is likely that there are plenty of micro-sites, appropriate for AWC planting, around the edges of the most severely burned "pits." In addition, the moderately burned areas have fewer constraints for AWC re-establishment.

Mr. Rizzo cautioned that vine resurgence on AWC salvage units might be significant during 2009. He would monitor this factor to determine if a spray release might be warranted earlier than the fall of 2011, as planned. Mr. Rizzo also stated that there is a much larger issue to be tackled over time at the Refuge: there is tremendous potential and need to rehydrate the swamp, to stem the desiccation of the AWC forest and other forest types, and in doing so, reduce the fire threat. He recognizes that the Refuge is working to address this issue in the long-term.

3. AWC Regeneration Assessment

Bryan Poovey, Refuge Forester, Great Dismal Swamp NWR
Dave Brownlie, Region 4 Fire Ecologist
Bob Belcher, AWC Specialist, Wetlands Ecologist

In AWC restoration units, the seed banks are likely exhausted. The post-salvage and pre-fire seedling regeneration that the refuge had determined for many of the AWC areas was actually somewhat low for AWC (3,500 seedlings per acre), but more than adequate to assure fully stocked, closed-canopy AWC forest. AWC seeds are not viable in the seed bank for long periods; germination rates decline rapidly post-disturbance. Most of the post-hurricane Isabel AWC seed bank had already germinated prior to the South One Fire. Even in places where the burn was not severe, it is likely that there is very little left to germinate. The South One Fire subsequently killed virtually 100% of residual, mature, seed bearing AWC left following salvage harvesting, and so the prospects for natural AWC regeneration within the burn area is approaching zero. The proposal by the Refuge to establish AWC rooted cuttings at 300/trees per acre may actually be a little on the low side, but the strategy to establish a regeneration of seed-producing trees is a sound one.

APPENDIX II - ENVIRONMENTAL COMPLIANCE

Federal, State, and Private Lands Environmental Compliance Responsibilities

All projects proposed in the South One Fire Burned Area Rehabilitation Plan that are prescribed, funded, or implemented by Federal agencies on Federal, State, or private lands are subject to compliance with the National Environmental Policy Act (NEPA) in accordance with the guidelines provided by the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508), Department of the Interior and Fish and Wildlife Service. This Appendix documents the burned area emergency response team considerations of NEPA compliance requirements for prescribed rehabilitation and monitoring actions described in this plan for all jurisdictions affected by the South One Fire.

The *Environmental Assessment for the Atlantic white cedar Salvage and Restoration at the Great Dismal Swamp National Wildlife Refuge (September 2004)* includes supplemental planting of nursery stock as well as herbicide application to control competing vegetation under the Proposed Action. An Environmental Action Statement issued in December 2004 indicated that the Proposed Action did not have significant environmental effects as determined by the environmental assessment and finding of no significant impact.

Related Plans and Cumulative Impact Analysis

Comprehensive Conservation Plan. It was determined that actions proposed in the South One Fire Burned Area Rehabilitation Plan are consistent with the management objectives established in the Comprehensive Conservation Plan. The Comprehensive Conservation Plan NEPA compliance process (Environmental Action Memorandum approved July 2006) specifically addresses:

- *Restoration of 2,000 acres of Atlantic white cedar forests by 2006 using helicopters or other specialized equipment to remove trees that were destroyed or severely damaged by Hurricane Isabel*
- *Restoration of 8,000 acres of Atlantic white cedar forest by 2019*

Cumulative Impact Analysis

Cumulative effects are the environmental impacts resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, both Federal and non-Federal. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. The rehabilitation treatments for areas affected by the South One Fire, as proposed in the South One Fire Burned Area Rehabilitation Plan, do not result in an intensity of impact (i.e. major ground disturbance, etc.) that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with the above jurisdictional management plans and associated environmental compliance documents and categorical exclusions listed below.

Statement of Compliance for the South One Fire Burned Area Rehabilitation Plan.

This section documents consideration given to the requirements of specific environmental laws in the development of the South One Fire Burned Area Rehabilitation Plan. Specific consultations initiated or

completed during development and implementation of this plan are also documented. The following executive orders and legislative acts have been reviewed as they apply to the South One Fire Burned Area Rehabilitation Plan:

- National Historic Preservation Act (NAPA).
- Executive Order 11988. Flood plain Management.
- Executive Order 11990. Protection of Wetlands.
- Executive Order 12372. Intergovernmental Review.
- Executive Order 12892. Federal Actions to Address Environmental Justice in Minority and Low-income Populations.
- Endangered Species Act.
- Secretarial Order 3127. Federal Contaminated
- Clean Water Act.
- Clean Air Act.

CONSULTATIONS

See above sections for expert consultations.

NEPA Checklist: If any of the following exception applies, the Burned Area Rehabilitation Plan cannot be Categorically Excluded and an Environmental Assessment (EA) is required.

(Yes) (No)

- Adversely affect Public Health and Safety
- Adversely affect historic or cultural resources, wilderness, wild and scenic rivers aquifers, prime farmlands, wetlands, floodplains, ecologically critical areas, or Natural Landmarks.
- Have highly controversial environmental effects.
- Have highly uncertain environmental effects or involve unique or unknown environmental risks.
- Establish a precedent resulting in significant environmental effects.
- Relates to other actions with individually insignificant but cumulatively significant environmental effects.
- Adversely effects properties listed or eligible for listing in the National Register of Historic Places
- Adversely affect a species listed or proposed to be listed as Threatened or Endangered.
- Threaten to violate any laws or requirements imposed for the "protection of the environment" such as Executive Order 11 988 (Floodplain Management) or Executive Order 11 990 (Protection of Wetlands).

National Historic Preservation Act

Ground Disturbance:

- None
- Ground disturbance did occur and an archeologist survey, required under section 110 of the NHPA will be prepared. A report will be prepared under contract as specified by the Burned Area Rehabilitation Plan.

A NHPA Clearance Form:

- Is required because the project may have affected a site that is eligible or on the national register. The clearance form is attached. SHPO has been consulted under Section 106 (see Cultural Resource Assessment, Appendix I).
- Is not required because the Burned Area Rehabilitation Plan has no potential to affect cultural resources (initial of cultural resource specialist).

Other Requirements

(Yes) (No)

- Does the Burned Area Rehabilitation Plan have potential to affect any Native American uses? If so, consultation with affiliated tribes is needed.
- Are any toxic chemicals, including pesticides or treated wood, proposed for use? If so,

local agency integrated pest management specialists must be consulted. *Limited herbicide application is anticipated to release seedlings from hardwood competition. All herbicide applications will be subject to full Service review under FWS Pesticide Use Proposal.*

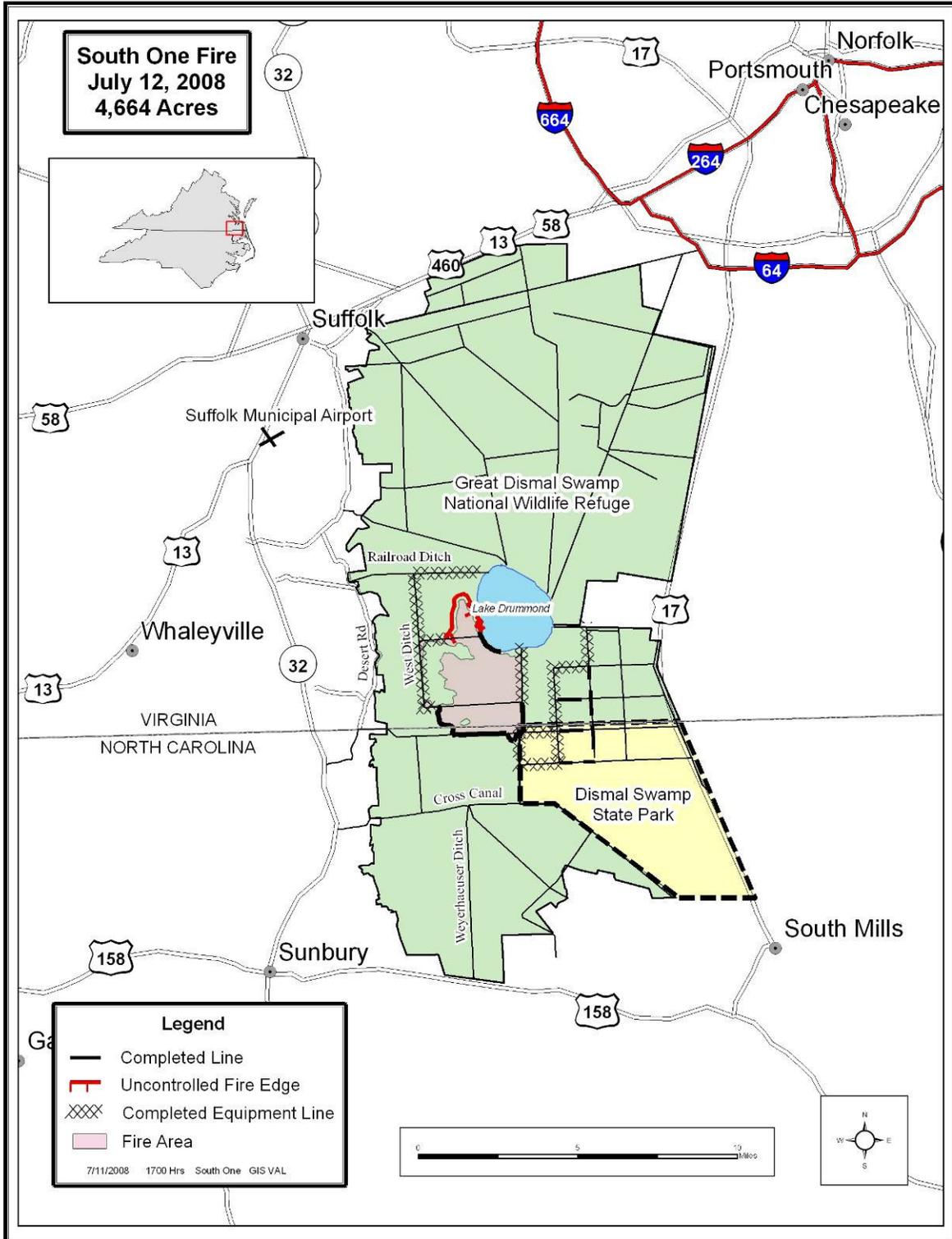
I have reviewed the proposals in the South One Fire Burned Area Rehabilitation Plan in accordance with the criteria above and have determined that the proposed actions would not involve any significant environmental effect. Therefore it is categorically excluded from further environmental (NEPA) review and documentation. Burned area emergency response team technical specialists have completed necessary coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act and other Federal, State and local environment review requirements.

Project Leader, Great Dismal Swamp NWR

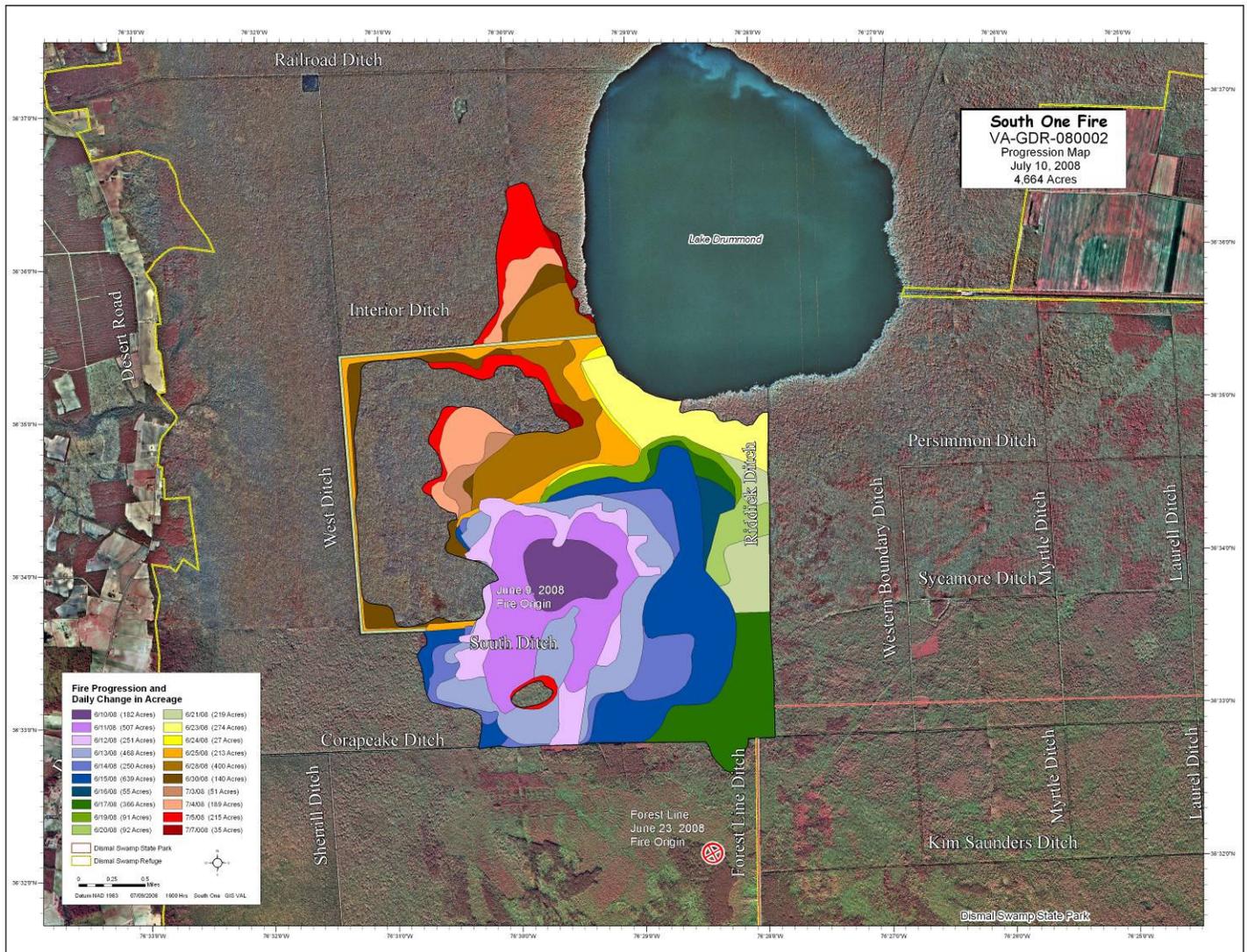
Date

APPENDIX III – MAPS

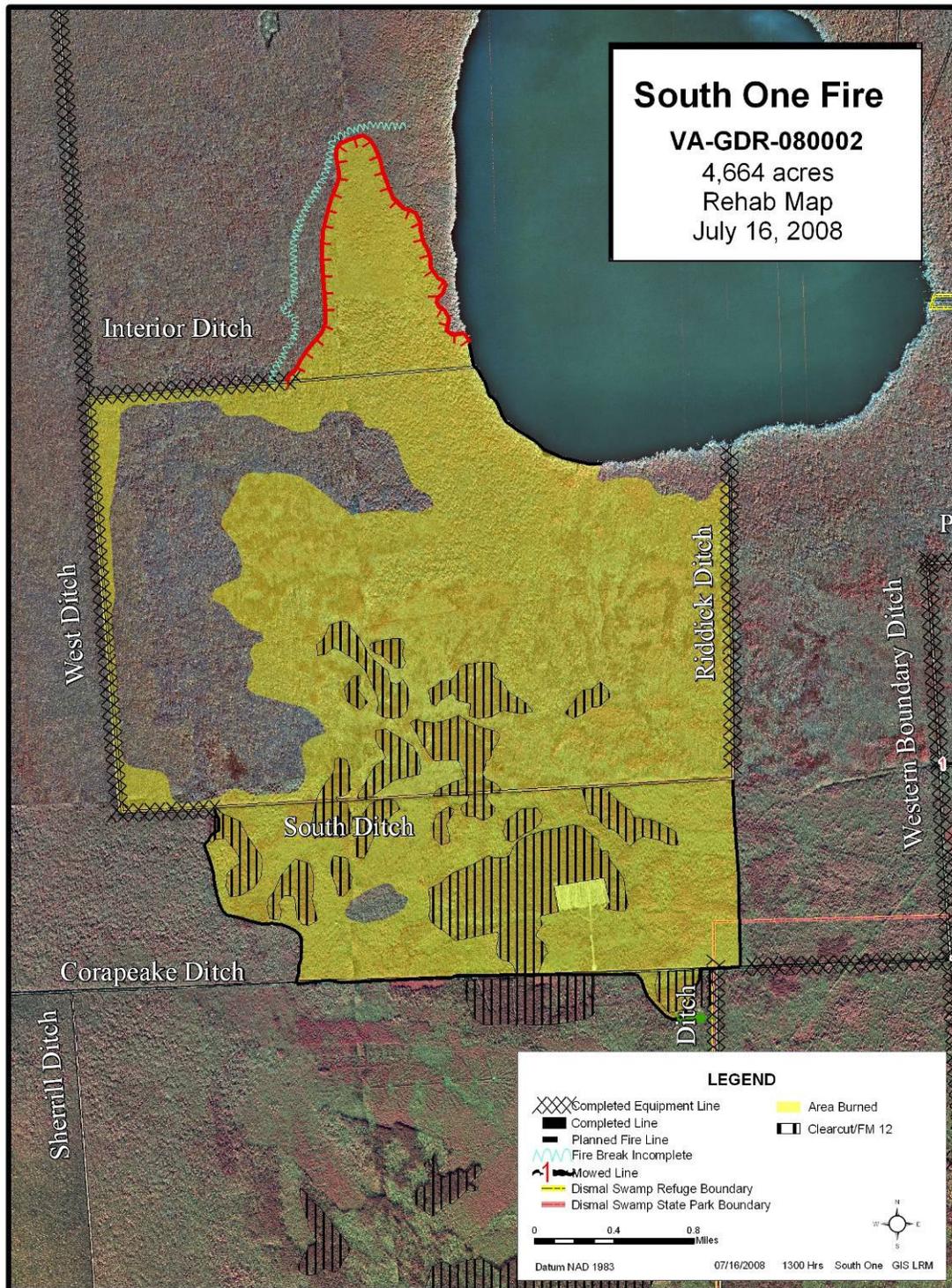
Map 1. Vicinity map of South One fire and GDSNWR.



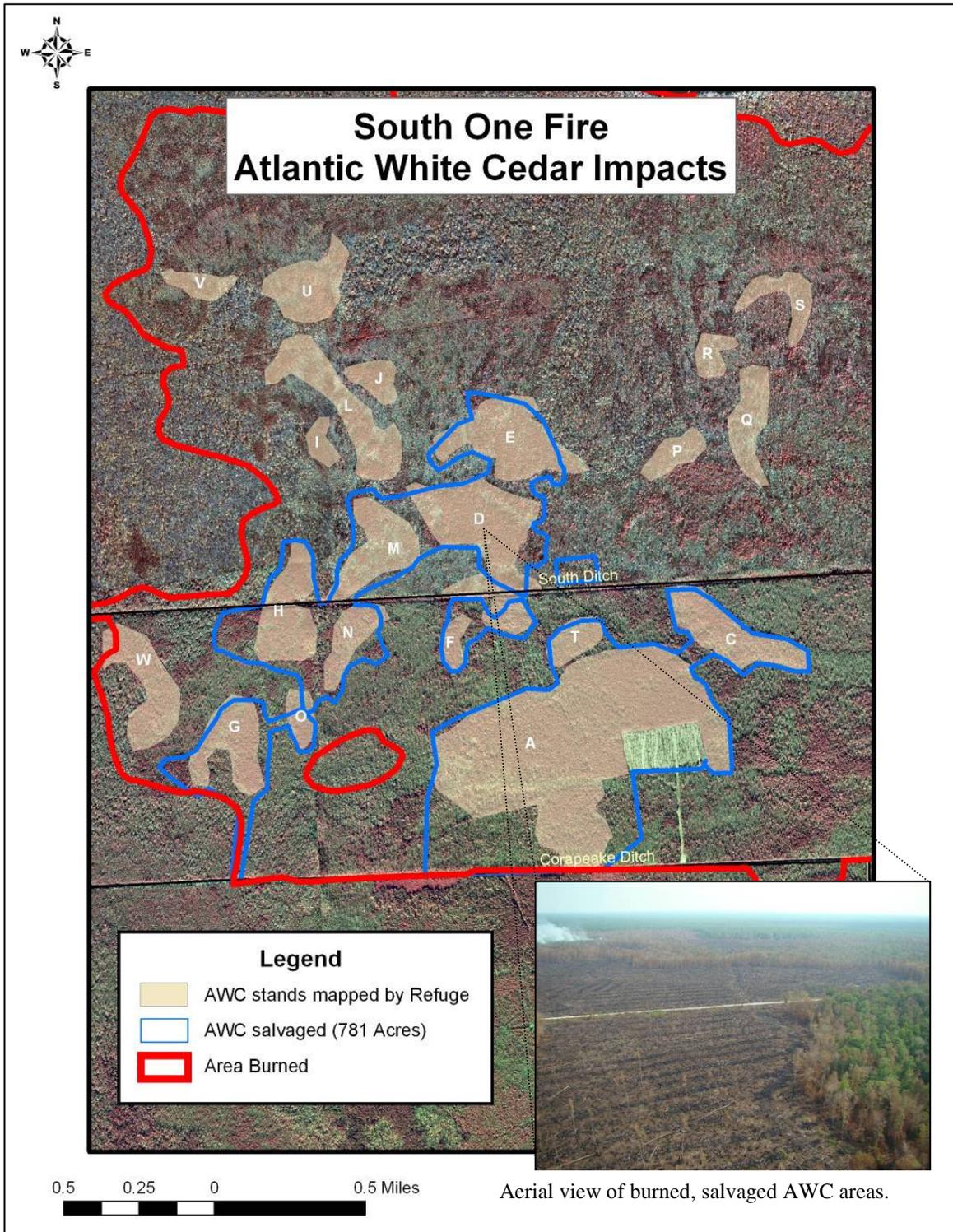
Map 2. South One fire progression.



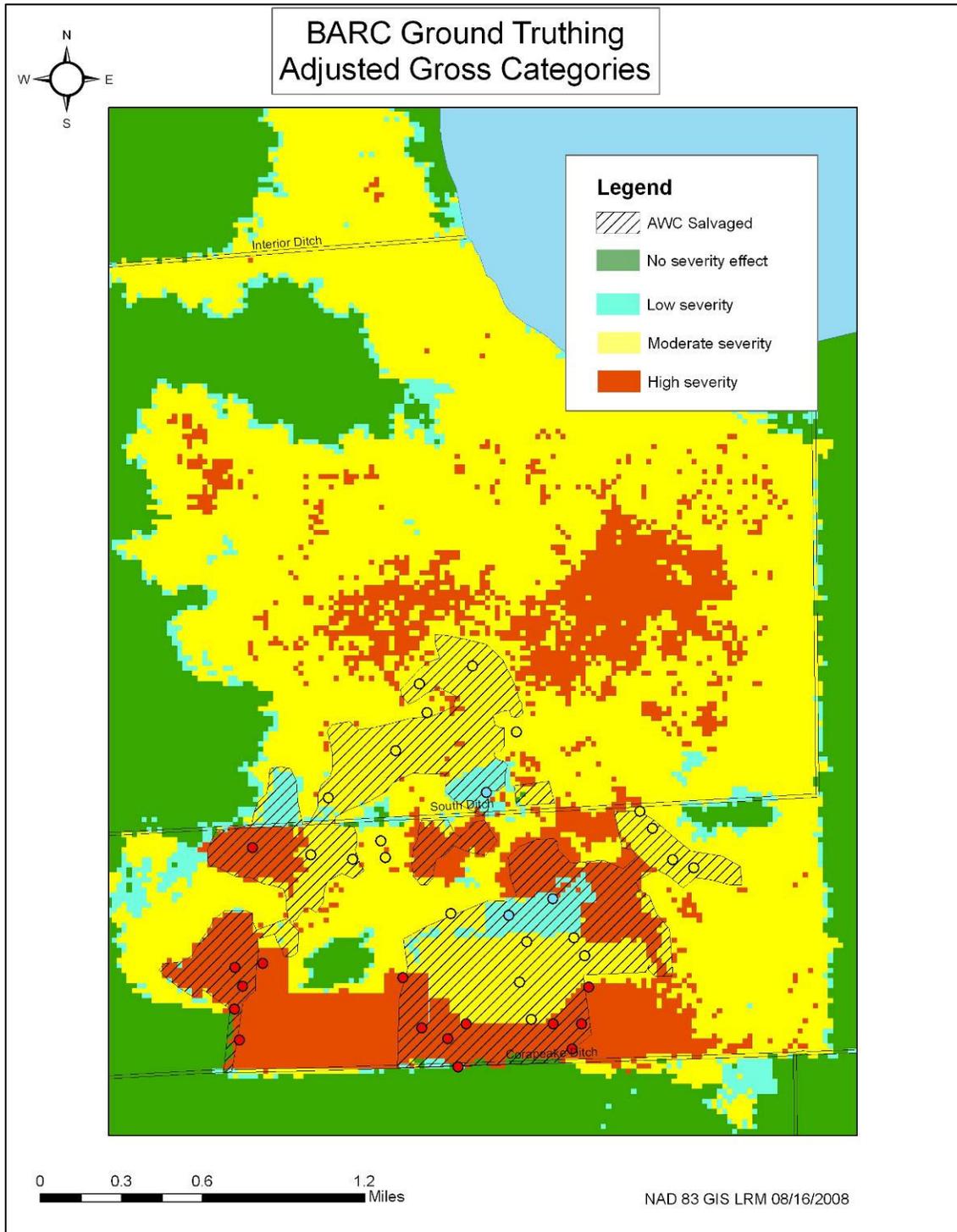
Map 3. South One fire perimeter.



Map 4. AWC stands impacted – 781 acres of salvaged/restoration areas that burned are highlighted in blue.



Map 5. Severity of South One Fire, (including AWC stands). Small circles represent areas ground-truthed for severity.



APPENDIX IV - PHOTOGRAPH DOCUMENTATION

Photographs 1-4. Severely burned areas of AWC salvage/restoration units (South One fire).



1



2



3



4

Photograph 5. Typical AWC stand at GDSNWR, immediately following Hurricane Isabel in 2003.



Photograph 6. AWC restoration area north of Corapeake Ditch, spring 2008 (storm-damaged, salvage logged, and regenerating).



Photograph 7. The South One fire burning through the same AWC restoration area, summer 2008.



Photograph 8. AWC restoration area, north of Corapeake Road, burned by the fire. Dead saplings are AWC that were repopulating the site.



Photograph 9. AWC restoration area, south Corapeake Road, spared the South One fire. The site is regenerating well; reflects prior site conditions of AWC restoration areas burned by the South One fire.



Photograph 10. Crosscut fire site obviously lacking AWC seedling emergence, 2 years post-fire.



Photograph 11. AWC plantings in Crosscut fire site, demonstrating 75% survival during 2008.



Photograph 12. Imazapyr has significantly reduced woody competition for AWC on Crosscut fire site.



Photograph 13. Salvaged areas adjacent to Crosscut fire site, not treated with imazapyr, show significantly greater cover of competing shrubs and vines.



APPENDIX V – Literature Cited

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