FWS National Wildlife Refuge System Wilderness Fellows

Report on Wilderness Character Monitoring

Okefenokee Wilderness

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Refuge Background

The Okefenokee Swamp, located in southeast Georgia and northeast Florida, has a long history of human manipulation of the landscape and its resources. In the 1890s attempts were made to drain the swamp to facilitate logging operations, including the digging of the Suwannee Canal, which enters 11.5 miles into the swamp. Timber removal began in 1909, using a network of tram roads extending deep into the major timbered areas. By the time logging operations had ceased in 1927, more than 423 million board feet of timber, mostly cypress, had been removed from the swamp.

The Okefenokee Preservation Society formed in 1918 to pursue the purpose of promoting nationwide interest in the swamp. Their efforts gained the support of state and local interests as well as conservation and scientific organizations. This culminated in the establishment of Okefenokee National Wildlife Refuge (NWR) in 1936. The swamp is considered the headwaters of the Suwannee and St. Mary's Rivers. Habitats provide for threatened and endangered species, such as red-cockaded woodpeckers, wood storks, indigo snakes, and a wide variety of other wildlife species. More than 600 plant species have been identified on refuge lands.

Ecological Setting

The Okefenokee Swamp is a vast peat bog filling a large saucer-shaped sandy depression that was once part of the ocean floor. The upper margin of the swamp, or the "swamp line", ranges in elevation from 128 feet above sea level on the northeast side to 103 feet on the southwest side. Water flows slowly across the swamp towards the Suwannee River on the southwest side and the St. Mary's River on the southeast. Swamp forests of mainly pond cypress (*Taxodium ascendens*), black gum (*Nyssa sylvatica*), loblolly bay (*Gordonia lasianthus*), red bay (*Persea palustris*), and sweet bay (*Magnolia virginiana*) covers about 80 percent of Okefenokee. A rich variety of shrubs, vines, and trees are interspersed with the principal dominants. Located primarily on the east side of the swamp, prairies form vast expanses of marsh and water. These open areas were once forested, and subsequently formed during periods of severe drought when fires burned out the surface layers of peat. Characteristic plants of the prairie include white water lily (*Nymphaea odorata*), bladderworts (*Utricularia spp.*) spatterdock (*Nuphar luteum*), sedges (*Carex spp.*) chain ferns (*Woodwardia spp.*), and aquatic grasses (*Lacnanthes,*

Andropogen, Panicum spp.). Scattered throughout the prairies are various sized islands of trees and shrubs known locally as "houses".

Upland islands are found throughout the swamp. These areas are dominated by longleaf pine (*Pinus palustris*) and slash pine (*Pinus elliottii*). These upland islands are an important part of the swamp's wildlife habitat. Upland fires play critical roles in the community. Fire determines the overstory and ground cover species dominating the uplands, as well as the wildlife species. An important pair of species that benefit from these fire events are longleaf pine and wiregrass (*Aristida beyrichiana*). Associated with these species are the endangered red-cockaded woodpecker (*Picoides borealis*), Florida black bear (*Ursus americanus floridanus*), white-tailed deer (*Odocoileus virginianus*), brown-headed nuthatch (*Sitta pusilla*), and various reptiles.

Wiregrass promotes the spread of frequent, low-intensity fires, killing seedlings of competing pine species as they attempt to invade the uplands from the edges of swamps, ponds, and river bottoms. Longleaf pine is a fire-adapted species and therefore the seedlings and mature pines survive these fire events. Growing season fires stimulate the seeding of new clones of wire grass and other community plants, while setting back growth of tall shrub species.

Fire also plays an important role in maintaining the numerous isolated wetlands that are interspersed throughout the uplands. Allowing fire to pass through these areas contributes to the overall health of the ecosystem by re-establishing the natural hydrology. As a result, conditions for the reproduction of amphibians are enhanced. Prescribed fire is utilized in wilderness areas for the enrichment of the upland habitat.

Okefenokee Wilderness

In 1967, a wilderness study review was conducted for the Okefenokee NWR, which at the time measured 368,950. In 1971, 353,981 acres were proposed for wilderness designation, and in 1974, Congress designated this area as Okefenokee Wilderness Area. Today the refuge measures 402,098 acres, making about 88% of the refuge lands a National Wilderness area. The law that established the Okefenokee Wilderness Area stipulates that a minimum of 120 miles of existing trail be maintained for management and public enjoyment. The bill also permits motorboats of 10 horsepower or less to be used inside the wilderness, as this had been the traditional method of accessing the swamp for many years.

Wilderness areas are accessible to the public from four entrances, Suwannee Canal Recreation Area from the east, Kingfisher Landing from the northeast, and Stephen C. Foster State Park from the west, and the Suwannee River Sill on the west. Kingfisher Landing, Suwannee Canal Recreation Area, and the Sill are refuge owned lands, while Stephen C. Foster State Park is refuge land that is leased by the state of Georgia. The public may access refuge wilderness at all four entrances by means of personal canoes and kayaks, personal motorboats of 10 horsepower or less. Additionally, at Suwannee Canal Recreation Area and Stephen C. Foster State Park, canoes, kayaks, and motorboats of 10 horsepower or less can be rented by a concession service.

The refuge is bound by the wilderness legislature to maintain up to 120 miles of canoe and kayak trails. At the moment 114.9 miles of canoe and kayak trails are maintained, 99.3 of which occur in wilderness areas. These trails serve day use areas as well as the eight wilderness shelters and campsites. There are eight overnight sites in refuge wilderness. Campsites and shelters may be reserved up to two months in advance. One party may stay at a campsite at a time, and a party must consist of twenty persons or less. The refuge stresses that these restrictions are integral in enhancing the wilderness experience of the visitors by ensuring solitude. For overnight use, all overnight shelters and campsites must be accessed only by canoe and kayak. For day use, Bluff Lake, Monkey Lake, and Canal Run shelters may be accessed by motorboats.

Wilderness Character Monitoring at Okefenokee

Wilderness character monitoring occurred at Okefenokee National Wildlife Refuge between the dates of 27 June 2011 and 20 August 2011. Wilderness character monitoring was developed in order to provide a standardized approach to monitoring trends and changes in the wilderness. As each federally designated wilderness is fundamentally disparate, what is monitored and how it is monitored will be unique for each wilderness. At Okefenokee National Wildlife Refuge, we have compiled a list of twenty-three measures that will be used in subsequent years to observe how the wilderness character has changed over time.

The Honey-Prairie Complex Fire began on 28 April 2011, caused by a lightning strike. At the time that this report was completed, it had burned 302,859 acres (Appendix D). This event created a few unforeseen challenges to the process of wilderness character monitoring. The refuge was completely closed to visitors from late April to late July. Access to wilderness areas remains restricted partly because of the fire, but mainly from low water levels making the vast majority of the trails inaccessible to any boat traffic. Several structures were destroyed during the fire. The shelters and recreational structures burned are accounted for, however the amount and severity of damages to signage and other non recreational structures cannot be assessed at this time.

Some measure values are not included in this report, as data must be compiled at the end of the calendar year. These data will be obtained from the refuge in December 2011 and entered into the database system.

Documents Consulted

Table 1. Documents Consulted and Data Gathered for Wilderness Character Monitoring at Okefenokee National Wildlife Refuge

Document Consulted	Data Gathered
Comprehensive Conservation Plan	General refuge information
Okefenokee NWR Wilderness Log	Motorized equipment and vehicles used in wilderness
Trail Maintenance Record	Instances of trail cutter use
Signage Plan	Number and type of signs within wilderness
Public Use Reports	
Refuge Wildfire Record	Number of wilderness wildfire
Prescribed Fire Record	Number and acreage of prescribed fires
Red-cockaded woodpecker wilderness cluster data	Number of active clusters within wilderness
Refuge Boundary Map	Inholdings, locations of shelters end entrances
Trail and shelter map	Number of shelters, day use shelters, recreational structures
Overnight shelter reservation database	Number of overnight shelter reservations
GIS database	Area of inholdings, % boundary adjacent to private lands, miles of trails and roads, maps included in report

Staff Consulted

Table 2. Staff Member Consulted and Data Gathered for Okefenokee Wilderness Character Monitoring

Staff Member	Data Gathered
Sara Aicher – Refuge Biologist	Recreational and non-recreational structures, all GIS data, included maps, roads and trails in wilderness, fire damage, surveys conducted within wilderness, # non-indigenous species, area of herbicide application, area of inholdings, airplane survey protocol
Dean Easton – Refuge Biologist	Red-cockaded woodpecker cluster numbers, surveys conducted within wilderness
Judy Drury – Administrative Assistant	Information on overnight shelter reservation system
Gracie Gooch – Volunteer Coordinator	Public use records, refuge signage plan
Brantley Boatright – Dispatch	# Prescribed fires, wilderness wildfires, refuge wilderness log, dispatch records
Jim Burkhart	Refuge historical information
Ron Phernetton	Weather monitoring sampling techniques and data collection

Process Used to Identify Measures

The measures that appear in Keeping It Wild were consulted to give refuge staff a general overview of wilderness character monitoring and examples of possible measures. These discussions occurred during one-on-one conversations mainly with refuge biologist, Sara Aicher. From there we discussed the measures and how they related to the refuge wilderness and the purposes of the refuge. To obtain measures under the Untrammeled quality, we discussed various surveys and manipulations the refuge conducts, their purpose, and importance. Refuge staff were integral in determining which measures applied to the refuge and what new measures should be added. It took about a month to become familiar with the activities occurring on the refuge.

Taking part in various refuge activities made me aware of what the staff valued as important, and from there an initial list of potential measures was constructed. This list was refined and manipulated after discussing the priority of each measure. An important factor used to determine the final set of measures was the feasibility of data collection. Many measures that were included in the final set include data that are already collected by the refuge in public use reports, trail maintenance records, and various biological data sets. This will increase the probability of repetition by not greatly increasing the amount of additional time and resources to conduct wilderness character monitoring.

Significant change was determined once the final set of measures was complete. This was done by discussing the implications of change in a measure, what change means for the ecological system and for wilderness character.

Measures Used

Table 3. Untrammeled Quality Measures, Okefenokee NWR Wilderness Character Monitoring

Untrammeled quality **Wilderness is essentially unhindered and free from modern human control or manipulation**				
Indicator	**Measure**	**Data Source(s)**	**Baseline Condition and Year**	**Notes**
Actions authorized by the federal land manager that manipulate the biophysical environment	Instances of trail cutter use	Trail maintenance records	2011	Will be compiled at the end of the calendar year
	Percent of natural fire starts that received a suppression response	Wildfire data obtained from refuge dispatch officer	2011	Will be compiled at the end of the calendar year
	Number of prescribed fires in wilderness	Obtained from refuge dispatch officer	2011	Will be compiled at the end of the calendar year
	Acres of herbicide application within wilderness boundaries	Refuge GIS database	0 acres (2011)	
Actions not authorized by the federal land manager that manipulate the biophysical environment	Number unauthorized actions within wilderness	Refuge Staff	2011	Will be compiled at the end of the calendar year

Justification

Instances of trail cutter use
Priority: Medium
Significant Change: 5 Days

Data will be determined from trail maintenance records obtained by refuge volunteer coordinator, Gracie Gooch. Each time a trail cutting event occurs it is catalogued in the trail maintenance record. Data were inconsistent on how many miles of trail the cutter was used on as well as hours of operations. Data management should be standardized to include both miles of trail cut and hours of operation to better indicate biological impact of trail cutting. Wilderness

character will be improved if the number of instances of usage decreases. Trail cutter use was placed under the untrammeled quality as it manipulates the vegetation along the trails. This measure could have also been placed under the undeveloped quality, under the motorized equipment measure, however it was determined that the impact to the wilderness vegetation was more significant. Number of days in which the trail cutter is used do not vary greatly from year to year, therefore it was determined that five days would indicate a significant change in trail cutter use.

Percentage of natural fire starts that received a suppression response
Priority: High
Significant Change: Any

Out of natural fire starts that occurred in the wilderness up to August, 2011, one received a suppression response. Natural fire starts are most often ignited by a lightning strike. It is the refuge's standard operating procedure to allow wilderness fire starts to burn without the use of suppression responses. The Honey Prairie Complex fire ignited on 28 April 2010 from a lightning strike. The fire was suppressed inside the edge of the wilderness boundary when it threatened to destroy private property. Any change in this measure is significant because ideally no wilderness fires should be suppressed. The extent of the Honey Prairie Complex fire was significantly greater than what has occurred in previous years, and the decision to suppress the fire in wilderness areas was made to protect firefighter and public safety. The decision to suppress fire within wilderness is determined by many factors including distance to the edge of the swamp, weather predictions, and fuels and resources available. These data were acquired from refuge dispatch operator Brantley Boatright who keeps the fire start logs.

Number of prescribed fires in wilderness
Priority: Medium
Significant Change: 3 fires

Prescribed fire is used in the wilderness uplands to maintain habitat, especially for red-cockaded woodpeckers. Through the Endangered Species Act and the Recovery Plan, the refuge is required to maintain suitable habitat for RCW. The use of frequent fires provides open forest structures by reducing hardwoods and the density of midstory pines. Fire suppression over the past century has disrupted the historic conditions that sent frequent fires around RCW cavity trees and has shifted the landscape to more woody vegetation in the understory. This brings more exposure to intense fire when an island is burned. As the landscape is restored back to more historic conditions, prescribed fire fires protect RCW cavity trees ensures minimal damage to the RCW population. These burns degrade the untrammeled quality by manipulating the natural process. Three less fires per year would increase the wilderness character for this measure.

Acres of herbicide application within wilderness boundary
Priority: Low
Significant Change: Any

As of August 2011, zero acres of herbicide have been used in wilderness areas. Herbicide has not been used on refuge wilderness for several years. It has been included as a measure because the action has been conducted in the past and the possibility of future applications. This depends on the spread of invasive species into the wilderness. At the moment invasive plant species are not a major factor in wilderness areas, however there are several invasive species on the edges of wilderness areas that may become an issue in the future. Refuge biologist Sara Aicher would have a record of any herbicide use and the acreage of the application. As there has been no herbicide used in recent years, any change would be considered significant.

Number of unauthorized actions
Priority: Medium
Significant Change: 5 actions

This measure includes any unauthorized action such as poaching, permit and fee violations, trespassing, and vandalisms. As of August 2011 there have been no records of such activities. Data is available through refuge law enforcement officer Jim Shelton. Poaching, trespassing, and permit and fee violations do not appear to be a major issue at the refuge, but should continue to be monitored for any changes. Five violations will be considered significant. This was chosen so that one small violation, such as vandalism would not degrade the trend. At first, this measure can only remain stable or degrade, as the refuge is beginning with zero violations.

Table 4. Natural Quality Measures, Okefenokee NWR Wilderness Character Monitoring

Natural Quality **Wilderness ecological systems are substantially free from the effects of modern civilization**				
Indicator	**Measure**	**Data Source(s)**	**Baseline Condition and Year**	**Notes**
Plant and animal species and communities	Number of active red-cockaded woodpecker clusters within wilderness	RCW survey data	23 clusters (2011)	Data from wilderness clusters kept separately from non-wilderness clusters
	Number non-indigenous species	Speaking with refuge biologist	2 species(2011)	
Physical Resources	Acid deposition based on concentration of sulfur and nitrogen in wet deposition	I&M	n/a	Data will be entered by I&M
Biophysical processes	Number of personal boats that enter wilderness as a measure of possibility for movement of non-indigenous species	Public use report	2011	Data will be compiled at the end of the calendar year

Justification

1. Number of active red-cockaded woodpecker clusters within wilderness
Priority: Low
Significant Change: 3 clusters

Red-cockaded woodpeckers (RCW) are an endangered species that is heavily managed for on the refuge. The refuge contains four separate sub-populations, the Northwest and East sub-populations occurring in non-wilderness uplands, and the Central subpopulation occurring on wilderness islands. The South sub-population occurs in non-wilderness and wilderness islands (Appendix C). The wilderness populations are managed differently from the non-wilderness populations. In the non-wilderness uplands, artificial nest cavities are built into trees to create

recruitment clusters, which have been effective in expanding RCW use of these habitats. Habitat in wilderness areas is not supplemented by artificial nest cavities. Prescribed burning is conducted to maintain RCW habitat. Vegetation is cut around high priority trees to prevent a fire event from damaging these trees. This action occurs in both wilderness and non-wilderness clusters. The number of active clusters is a good measure of species recovery. The number of active wilderness clusters has remained relatively consistent in recent years and will continue to be monitored. The current number of active clusters in the wilderness subpopulation is 23. These data were obtained from RCW data sheets located on the refuge's shared drive. Refuge biologist Dean Easton was a very knowledgeable source for data concerning RCW populations on the refuge. Data is collected every other year in the wilderness. As the number of active clusters are relatively stable, a change of three would indicate a significant change.

2. Number of Non-indigenous Species
Priority: Medium
Significant Change: Any

As of 2011, two non-indigenous species can be found in refuge wilderness, feral hog (*Sus scrofa*), and the redbay ambrosia beetle (*Xyleborus glabratus*). The redbay ambrosia beetle can be found wherever redbay (*Persea borbonia*) are found, which is throughout the wilderness and non-wilderness areas. Several other exotics, including Chinese tallow (*Triadica sebifera*), Japanese climbing fern (*Lygodium japonicum*), and others have been found in non-wilderness areas and areas surrounding the refuge and should continue to be monitored. Data came from speaking with refuge staff including Sara Aicher and Dean Easton. This measure is very important to maintain the natural qualities of the wilderness. This measure also has the potential to alter other measures, possibly including herbicide use and motorized vehicle use. The significance of finding a new non-indigenous species in refuge wilderness caused the refuge to deem any change significant.

3. Acid deposition based on concentration of sulfur and nitrogen in wet deposition
Priority: Medium
Significant Change: 15%

These data are obtained through water quality tests that occur weekly on the refuge by Ron Phernetton.

4. Number of personal boats that enter wilderness as a measure of possibility for movement of non-indigenous species
Priority: High
Significant Change: 10%

Each of the four entrances allows access into wilderness areas by personal motorboats, canoes, and kayaks. Personal boats provide a vector for the movement of exotic species into the wilderness as well as from the wilderness to other areas in the region. A significantly less number of personal boats that enter wilderness will improve the trend for this measure. Data from public use reports are an accurate means to monitor this measure. The data are already

collected on a daily basis and are compiled neatly in public use reports, which can be found on the shared drive. This was determined to be a high priority measure and therefore a relatively small amount, 10 percent would cause a significant change in the trend for this measure.

Table 5. Undeveloped Quality Measures, Okefenokee NWR Wilderness Character Monitoring

Undeveloped Quality Wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern human occupation				
Indicator	**Measure**	**Data Source(s)**	**Baseline Condition and Year**	**Notes**
Non-recreational structures, installations, and developments	Number of authorized non-recreational structures	Refuge Biologist	110 (2011)	Water monitoring stations (5), helispots (11), elevation posts (73), Vegetation transects (21).
Inholdings	Area of inholdings	GIS	980 acres (2011)	Two 490 acre inholdings, both owned by Toledo Manufacturing
Use of motor vehicles, motorized equipment, or mechanical transport	Instances of motorized vehicles used in wilderness for refuge purposes	Public use report	Data not used	See below
	Number of helicopter flights that land on refuge helispots	Data from refuge dispatch officer	Data not used	See below
	Number of days power tools and equipment	From refuge wilderness log	Data not used	See below
Loss of statutorily protected cultural resources	Number of disturbances to cultural resources	Refuge Staff	2011	Data will be compiled at the end of the calendar year

Justification

Number of unauthorized non-recreational structures
Priority: Medium
Significant Change: Any

There are 110 non recreational structures within the wilderness boundary. Included are five water quality monitoring stations (Gannett Lake, Chase Prairie, Durdin Prairie, Floyds Prairie, Chesser Prairie). The stations on Floyds Prairie and Chesser Prairie are to be removed, however at this time they are still in the wilderness. There are also eleven helispots (two on Billy's Island, two on Honey Island, 2 on Blackjack, Mitchell, Bugaboo, Floyds, Number One, Minnies Island), which are concrete squares where a helicopter can land. There are seventy-three permanent elevation posts that are galvanized posts with caps and a bolt on top. Prior to the Honey Prairie Complex fire there were thirty-one PVC vegetation survey transect markers. An estimated ten markers have been destroyed by the fire, however the total number is uncertain. Data for this measure are complete besides the number of vegetation survey markers. The estimation was made by comparing burned areas to the location of the survey markers. Installing or removing a non-recreational structure is a significant event, therefore any change will be judged significant.

Area of inholdings
Priority: Low
Significant Change: Any

There are two inholdings located on the southeast side of the wilderness. Both are 490 acres and owned by the Toledo Manufacturing company. The area is not developed and there is no great threat of development, as the area is not easily accessible and the company has shown no interest in development. This information was gathered from the refuge's GIS database. I consulted refuge staff to learn more about the owners of the inholding and probability of development of the land.

Instances of motorized vehicles used in wilderness for refuge purposes
Priority: High
Significant Change: 10%

The legislation when the Okefenokee Wilderness was designated allows the use of motorboats of ten horsepower or less to be used in the wilderness. The refuge operates motorboats and Prodrives in wilderness areas to maintain trails and shelters, and to conduct various surveys. Minimum Requirement Decision Guides (MRDGs) were used for all the surveys and trail maintenance that require the use of motorized vehicles. The refuge keeps a Wilderness Log where all trips into refuge wilderness, their purpose, the tools, and vehicles used are recorded. For the purpose of wilderness character monitoring, I have decided not to use these data in my report. I do not believe they are complete enough to accurately evaluate the amount of motorized vehicle use in wilderness. These data are important in monitoring motorized vehicle use and should be accurately recorded in the future. A ten percent change in this measure will be considered significant.

Number of helicopter flights that land on refuge helispots

Priority: Low
Significant Change: 15%

Helicopters are used to access wilderness areas in order to conduct surveys, maintenance, and prescribed burns. Similar to the previous measure, I have not included the current data set as they are not complete. Until recording wilderness trips is standard practice, these data should not be used.

Number of days of power tool and equipment use
Priority: High
Significant Change: 20%
Power tools and equipment such as brush clearers, chain saws and peepers are used in refuge wilderness to maintain trails and shelters, and to conduct wildlife surveys. The number of days these tools are used is a good measure of how often power tools are used as opposed to hand tools. Similar to the previous two measures I have chosen not to include the current data.

Number of disturbances to cultural resources
Priority: Low
Significant Change: Any

There are several cultural resources within wilderness areas including Floyd's Island Homestead and Indian mounds. Floyd's Island Homestead is a cabin located on Floyd's Island and was constructed using wood with a tin roof. The cabin may be reserved for overnight use by the public through the refuge's reservation system. It is accessible to the public by canoe and kayak. There is a helispot on the island that is used to access the homestead for maintenance. Disturbances may include vandalisms, unintentional damage by the public, fire damage, or any other type of damage to any cultural resource. Neither the homestead nor any other resource was damaged during the Honey Prairie Complex Fire. This information was derived from speaking with refuge staff and consulting the refuge maintenance logs. Any change to this measure will be significant. This was decided due to the fact that it is a cultural resource and significant to the history of the swamp.

Table 6. Solitude or Primitive and Unconfined Recreation Quality Measures, Okefenokee NWR Wilderness Character Monitoring

Solitude or Primitive and Unconfined Recreation Quality Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation				
Indicator	**Measure**	**Data Source(s)**	**Baseline Condition and Year**	**Notes**
Remoteness from sights and sounds of people inside	Number of motorboats operated within	Public use reports	2011	Will be compiled at the end of the calendar year

the wilderness	wilderness for recreational purposes			
	Number of guided motorboat tours of refuge wilderness	Public use reports	2011	Will be compiled at the end of the calendar year
	Number of visitors to wilderness areas	Public use reports	2011	Will be compiled at the end of the calendar year
	Number of overnight platform reservations made	Public use report	598 (2010)	Data from 2010 due to Honey Prairie Fire
Remoteness from occupied and modified areas outside the wilderness	Percent of wilderness boundary adjacent to private land	Refuge GIS database	27%	
	Number of airplane overflights that can be seen and heard	Field work	n/a	Survey not conducted. See report for protocol
Facilities that decrease self-reliant recreation	Type and number of agency-provided recreation facilities	Speaking with refuge staff, BLM Implementation guide	898.5 (2011)	Figure derived from protocol following BLM Implementation guide
Management restrictions on visitor behavior	Type and extent of management restrictions	Speaking with refuge staff, BLM Implementation guide	21 (2011)	Figure derived from following BLM protocol

Justification

Number of motorboats operated within wilderness for recreational purposes
Priority: High
Significant Change: 10%

The public use record made available by Gracie Gooch, volunteer coordinator contained numbers for guided motorboat tours, motorboat rentals, and personal motorboats from the four refuge entrances. These data were compiled to arrive at the final public use numbers. Motorboats significantly reduce the solitude quality which made us conclude that only a ten percent change would be significant.

Number of guided motorboat tours of refuge wilderness
Priority: Medium
Significant Change: 15%

Stephen Foster State Park and Okefenokee Adventures, the concessionaire located at the Suwannee Canal Recreation Area provide guided motorboat tours of refuge wilderness. Okefenokee Adventures offer one hour and two our tours. The one hour tour enters about one mile into designated wilderness and the two hour tour, about two miles. A significantly less number of guided tours in subsequent years will improve the trend for this measure. A reduction in number of tours is obviously not ideal for the concessionaires. This trend may degrade as more people come to visit the refuge over time, as guided tours are very popular with the recreating public.

Number of visitors to wilderness areas
Priority: High
Significant Change: 10%

These data were compiled from the public use reports. They include the number of visitors to the refuge from all four entrances, Kingfisher Landing, Stephen Foster State Park, Suwannee Canal Recreation Area, and the Sill. They include use of personal boats, rented motorboats and canoes, and guided boat tours, and camping. In 2010, 36,074 people visited wilderness areas within the refuge over the course of a calendar year. The vast majority of visitors took guided motorboat tours of the refuge. The chances for a solitude experience decline with greater numbers of visitors. This was determined to be a high priority measure, as the refuge puts a strong emphasis on the quality of solitude. This is also the reason why the use of motorboats by the public is included under this quality rather than the Undeveloped Quality.

Number of overnight platform reservations made
Priority: High
Significant Change: 15%

The data for this measure can also be found in the public use reports under the heading “camping by canoe days”. This is the total number of overnight campsite reservations made throughout the year. This is a high priority measure because it contributes to the solitude experience for visitors to the refuge and may contribute to the degradation of the shelters and campsites

Percent of wilderness boundary adjacent to private land
Priority: Low
Significant Change: Any

Sights and sounds from outside the wilderness boundary may degrade the solitude quality. In order to quantify the amount that the Okefenokee wilderness was affected by outside sights and sounds, the percentage of wilderness boundary adjacent to private lands was calculated. This was done using the refuge's GIS database, first by determining which adjacent areas were private lands, refuge lands, and non-refuge state and federal lands, which was then used to find the total mileage of wilderness boundary for each category. From these data the percentage of wilderness boundary adjacent to private land was determined (Table 7).

Table 7. Land Owners Adjacent to Wilderness Boundary of Okefenokee Wilderness

Land Owner	Miles adjacent to wilderness boundary	Percent of boundary
Refuge	145.9	67.9
Private	57.2	26.6
GA Forestry Commission	5.9	2.7
Osceola National Forest	3.5	1.6
FL Forest Service	2.5	1.2
Total	**215.0**	**100**

Private land accounted for 26.6 percent of the adjacent lands. This measure will be reviewed every five years for changes in land ownership. Any change will be judged to be significant.

Number of airplane overflights that can be seen and heard
Priority: Medium
Significant Change: 15%

Airplane overflights can be seen and heard often from areas within wilderness, with many airplanes travelling between Atlanta, Georgia and major cities in Florida. Military flights are also common from Moody Air Force Base, located in Valdosta, Georgia. These flights will degrade from a wilderness experience increasing noise pollution and obstruction from viewing the natural sky. A protocol was developed by working with Sara Aicher to monitor the number of airplanes that can be seen and heard from various points within wilderness.

The survey will consist of three, one hour surveys. During each survey the observer will record each airplane observed and mark whether it was seen or heard, or both. The observer will also record if the airplane appeared to be commercial, private, or military. The surveys will be conducted over three days, each day from 1100 to 1200. The three locations will be 1) three miles on the green trail from Kingfisher Landing towards Bluff Lake (northeast), 2) Chase Prairie (east), and 3) Billy's Lake (west). These areas were chosen because they monitor different areas of the wilderness and contain open habitat that will enable more accurate results. This survey was not conducted in 2011, but will be in subsequent years.

Type and number of agency provided recreation facilities
Priority: Medium
Significant Change: Any

The approach to quantify the type and number of agency provided recreation facilities used in the BLM Implementation Guide was used for this measure. The following tables show the values obtained for the Okefenokee Wilderness by utilizing this method. The total value for the agency provided recreation facilities was 898.5 (Table 9).

Table 8. Values for Okefenokee Trail Segments and Wilderness Signage

For each **SYSTEM TRAIL SEGMENT**, if:	Assign that segment its miles (to nearest tenth) in length multiplied by the value:	Value at Okefenokee		For each trail segment, if the **TRAIL MARKERS** or **SIGNS** are:	Multiply the Trail Segment value generated to the left by the value:	**Total value for one segment**
Single-track	1	99.3		None (trail segment is unmarked)	1	
Double track (e.g., old wagon route)	2	0		**Blazes or stone cairns; no signs** **(Wooden stakes with white tip to mark trail)**	**99.3 *2**	198.6
				signs made of native materials **(Informational Signs)**	**99.3*3**	297.7 **496.5**
Former road: (i.e., retains evidence of past construction)	3	0		Trail markers of nonnative materials	5	

Table 9. Values for Okefenokee Trail Features, Campsite Development, and Amenities

For each **MAJOR TRAIL FEATURE**, if the feature construction is:	Assign that feature the value:	Value at Okefenokee	Multiplied Total
Primitive: built with raw, native materials, e.g., log bridge; notched log ladder.	1	0	0
Constructed with native materials: built with native materials that have been processed to form dimensional materials, e.g. a log stringer bridge with decking; wooden ladder.	3	0	0
Constructed with nonnative materials: for major trail features built using nonnative materials as a primary building component, e.g. a bridge using steel supports; metal ladder.	5	0	0
For each **CAMPSITE DEVELOPMENT**, if it is:	Assign that site (for each pad or shelter) the value:	# of sites at Okefenokee	Multiplied Total
Constructed tent pads: camping area has at least cleared and leveled areas for pitching tents, with or without rock or log boarders	2	1	2
Shelters: camping areas with roofed structures, with or without walls	10	7	70
For each **AMENITY**, if it is:	Assign that amenity the value:	# of amenities	Multiplied Total

Developed water source	20	0	0
Toilet, primitive	5	0	0
Toilet, non-primitive (i.e., walled)	20	12	240
Permanent fire grate (metal, concrete, or cemented stone)	5	2	10
Food storage structure (e.g., bear box, rodent pole)	5	0	0
Hitching post, permanent highline	5	0	0
Corral	10	0	0
Picnic table or bench	20	4	80
The final value of **Type and Number of Recreation Facilities** is calculated as follows: (Sum of (each SYSTEM TRAIL SEGMENT * its TRAIL MARKER or SIGN value)) + (Sum of MAJOR TRAIL FEATURE assigned values) + (Sum of CAMPSITE DEVELOPMENT assigned values) + (Sum of AMENITY assigned values) = **Value of Recreation Facilities (Measure 4-4)**			**898.5**

There are 114.3 maintained trails of which 99.3 are within wilderness. These trails are accessible to the public throughout the refuge (Appendix C). The trails are marked by a series of informational signs constructed of wood. There are also wooden stakes marked with white blazes to denote trails, therefore both categories were used in this assessment. There is one campsite within the wilderness boundary, Cravens Hammock. Located at the sight is a fire ring and an area to pitch tents. There are seven overnight shelters within the wilderness. Floyd's Island cabin is used as an overnight shelter and has a fire grate. There are six other overnight platforms, Monkey Lake, Bluff Lake, Maul Hammock, Round Top, Canal Run, and Big Water. Big Water shelter was burned in the Honey Prairie Fire, but will be replaced and therefore tallied in this assessment.

There are twelve walled, composting toilets one at Floyd's Island, Cravens Hammock, Canal Run, Round Top, Big Water, Maul Hammock, Bluff Lake, Monkey Lake, Cedar Hammock, Minnies Lake, Coffee Bay, and Canal Forks. The toilet at the Big Water day use shelter (not the overnight shelter) was damaged by fire and may not be replaced; therefore it was not tallied in this assessment. The Minnies Lake toilet was also damaged during the fire, but will be replaced and is subsequently tallied in this assessment.

There are currently four day use shelters within the wilderness boundaries, Canal Forks, Coffee Bay, Minnies Lake, and Cedar Hammock. Dinner Pond and Big Water day use shelters were burned by fires. It is undecided whether they will be replaced. They were not included in this assessment for that reason. As adding or removing a recreational structure is a large undertaking, any change to this measure will be considered significant.

Type and extent of management restrictions
Priority: Medium
Significant Change: Any

Similar to the previous measure, the approach utilized by the BLM was adapted to the Okefenokee Wilderness to evaluate the type and extent of management restrictions. Management restrictions have been implemented on the refuge in order to provide an outstanding solitude experience for visitors. As management restrictions benefit the experience of solitude for visitors, they also may degrade the opportunity for unconfined recreation.

The following table is taken directly from the BLM Implementation Guide. It shows the assigned scores for each use restriction based on the severity of the restriction. The scores are assigned weights, one if the restriction applies to a sub-area of the wilderness or the entire wilderness for only a part of the year, or two if the restriction applies to the entire wilderness.

Table 10. BLM use restriction scores

Category	Type of restriction	Score
Campfires	No regulation	0
	Designated site; or (non-emergency) seasonal restrictions; or prohibited above (or below) designated elevation; or mandatory setback	1
	Total prohibition	2
Camping	No restriction	0
	Any mandatory setback	1
	Designated sites	2

	Assigned sites	3
	Overnight use prohibited	4
Group size limits	No restriction	0
	Group size limits in place	1
Area closure	No restriction	0
	Area closed to use	5
Fees	No fees	0
	Fees charged of selected user type	1
	Fees charged of all visitors	2
Permits	No permit or registration	0
	Voluntary self-registration	1
	Mandatory, non-limiting permit or registration	2
	Mandatory, use limited	3
Human waste	No regulation	0
	Pack out required	3
Length of stay	No restrictions on length of stay (other than standard agency-wide restrictions)	0
	Length of stay limited (in excess of standard agency-wide restrictions)	1
Stock use	No restrictions	0
	Grazing by stock prohibited	1
	No off-trail stock use	2
	No camping with stock	3
	Stock use prohibited	4
Other activity-	No restriction	0

specific regulations	Limited (other than by area)	1
	Prohibited	2

The restrictions that are in place at Okefenokee were compiled and assigned a score according to the BLM Implementation guide. Using this method the score for use restrictions at Okefenokee National Wildlife Refuge is 26 (Table 11).

Table 11. Okefenokee Wilderness Use Restriction Scores

Category	Type of Restriction at Okefenokee	Score	Weight	Total	Description of restriction
Campfires	Designated site	1	1	1	Prohibited at all sites with exception to
Camping	Assigned sites	3	1	3	Assigned sites
Group size limits	Group size limits in place	1	2	2	20
Area closure	Area closed to use	5	1	5	
Fees	Fees charged of all visitors	2	2	4	
Permits	Mandatory for overnights, use limited	2	1	2	Permits for camping, day use no permit needed
Length of stay	Length of stay limited	1	2	2	2 nights
Type of boat	Motorboat 10 hp or less	1	2	2	
Time at platform	Limited	1	1	1	Must be off by 10 am
Swimming	Prohibited	2	2	4	Swimming in swamp prohibited
			TOTAL	**26**	

Measures Not Used

Table 12. Measures Considered but Not Used for Wilderness Character Monitoring, Okefenokee Wilderness

Measure	Priority	Reason for Omission
Number of Special Use Permits	Low	It was determined that the number of SUPs would overlap with public use data because people who have permits are also accounted for as visitors to refuge wilderness.
Number of extirpated species	Low	This was determined to be of low priority because it is very unlikely that a species would become extirpated.
Number of indigenous species that are listed as threatened and endangered, sensitive, or of concern	Low	Although monitoring endangered and threatened species are important we felt that this is measure would not impact wilderness character as much as others. The endangered species found on the refuge are not unique to wilderness areas.
Number of human caused fire starts in wilderness	Medium	This measure was included under the Untrammeled Quality, however it was determined that this would account for unintentional fire starts, which is not an intentional manipulation.

Conclusions

Measures that monitor refuge use of motorized vehicles and equipment were determined to be of high priority, however data could not be collected for 2011. Although wilderness logs exist, they do not provide an accurate record of motorized use for refuge purposes. The refuge recognizes the need to maintain quality records of motorized equipment and vehicles within wilderness. These measures are important to Wilderness Character Monitoring and the refuge and should be monitored once proper protocols for reporting motorized use are in place. We decided that using the current available data would not provide an accurate figure to serve as the baseline condition. For this reason 2012 will serve as the baseline year for these measures.

The effect that the Honey Prairie Fire and low water levels will have on trends in Wilderness Character must also be addressed. Recently, the Okefenokee Swamp has experienced very low water levels causing sections of the swamp to be closed to overnight use. In October 2010 low water levels caused the closure of some trails and overnight shelters. This closure remained in place until early May 2011 when the entire refuge trail system and overnight use was closed due to fire and low water levels. Although the refuge reopened to the public on 23 July 2011 overnight trails and shelters remain closed, the trails being inaccessible due to low water levels. A major tropical storm will be needed to restore water levels to their normal state.

All measures that relate to public use will most likely show a negative significant change in trend once water levels return to a more typical state and the refuge resumes normal operations. Public use numbers will register very low for the 2011 calendar year as the refuge was closed to all public visitation for nearly three months. Motorized use and equipment use for refuge purposes may also show a degrading trend in Wilderness Character once water levels increase and the trails are prepared for public use. The fire has created many obstructions to the refuge's navigable waterways. This may cause an irregular increase in the amount of motorized use of equipment and vehicles within wilderness.

Low water is a factor influencing many of the Wilderness Character measures and should be described on each evaluation. Fire events and other natural events of any substantial magnitude have the capability of impacting trends in Wilderness Character Monitoring in any wilderness. It may be difficult to assess a refuge's immediate impact on Wilderness Character without accounting for such natural events. If a major event occurs during the same year as Wilderness Character Monitoring assessments, the resulting trend may be skewed and not accurately portray the general trend in Wilderness Character for that measure.

Appendix A: Worksheet to Prioritize Measures

Table 13. Worksheet to Prioritize Measure, Okefenokee NWR

	Criteria for Prioritizing Potential Measures				
Potential Measure	**A. Importance**	**B. Vulnerability**	**C. Reliability**	**D. Reasonableness**	**OVERALL SCORE**
Indicator: Authorized Actions Measure: # of prescribed fire	2	1	3	1	7
Indicator: Authorized Actions Measure: % natural fire starts that received suppression response	3	2	3	1	9
Indicator: Authorized Actions Measure: Instances of trail cutter use	2	3	2	1	8
Indicator: Authorized Actions Measure: # Special Use Permits	1	1			
Indicator: Authorized Actions Measure: Area of herbicide Application	1	2	3	0	6
Indicator: Unauthorized Actions Measure: Any Unauthorized action	2	1	1	0	4
Indicator: Plant	2	1	3	1	7

Potential Measure	Criteria for Prioritizing Potential Measures				OVERALL SCORE
	A. Importance	B. Vulnerability	C. Reliability	D. Reasonableness	
and animal species Measure: # of active RCW cavities					
Indicator: Plant and animal Measure: # of extirpated species	1	1			
Indicator: Plant and animal Measure: # of non-indigenous species	2	3	2	0	7
Indicator: Plant and animal Measure: Threatened, endangered species	1	1			
Indicator: Physical Resources Measure: Acid deposition	2	2	2	0	6
Indicator: Biophysical Resources Measure: # Personal Boats	3	3	2	1	9
Indicator: Non-rec structures Measure: Authorized non-rec structures	2	2	2	1	7
Indicator: Inholdings Measure: Area of inholdings	2	1	3	1	7
Indicator: Motor	3	3	2	1	9

Potential Measure	Criteria for Prioritizing Potential Measures				OVERALL SCORE
	A. Importance	B. Vulnerability	C. Reliability	D. Reasonableness	
vehicle use Measure: Motor vehicle use for refuge purposes					
Indicator: Motor vehicle use Measure: Power tool and equipment	3	3	1	0	7
Indicator: Motor vehicle use Measure: Motorboat by public	3	3	1	1	8
Indicator: Motor vehicle use Measure: Helicopter flights	2	1	2	0	5
Indicator: Cultural Resources Measure: Disturbances to C.R.	2	1	1	0	4
Indicator: Remoteness Inside Measure: # wilderness visitors	3	2	1	1	7
Indicator: Remoteness Inside Measure: # Guided boat tours	2	2	2	1	7
Indicator: Remoteness Inside Measure: # overnight platform	3	3	3	1	10

Potential Measure	Criteria for Prioritizing Potential Measures				OVERALL SCORE
	A. Importance	B. Vulnerability	C. Reliability	D. Reasonableness	
reservations					
Indicator: Remoteness Outside Measure: % boundary adjacent to private land	2	1	3	1	7
Indicator: Remoteness Outside Measure: # airplanes seen	2	2	2	0	6
Indicator: Self reliant rec Measure: Type&extent of rec facilities	2	2	3	1	8
Indicator: Management restrict. Indicator: Management restrict.	2	2	2	1	7

Appendix B. Effort per Measure, Data Source and How Data Were Gathered, Refuge Staff Effort, and Wilderness Fellow Effort

Table 14. Effort per Measure, Okefenokee NWR

Quality	**Indicator**	**Measure**	**Were data gathered from office paper files, computer files, or field work (professional judgment is an option)?**	**Time spent figuring out where the data are**	**Time you spent gathering data for each measure (in whole hours)**	**Data Source and How Data Were Gathered**
Untrammeled	Authorized actions	Number of prescribed fires in wilderness	Record of Prescribed fire (paper)	1	1	Refuge staff maintains detailed records on prescribed fire. It was only a matter of asking Sara Aicher who to talk to. In this case, Brantley Boatright, Refuge dispatch officer keeps the files.
Untrammeled	Authorized actions	Percent of wilderness natural fire starts that received a suppression response	Wildfire log (paper)	1	1	Data came from speaking with Brantley Boatright. He keeps a record of fire starts. It is important to speak with him to determine how each fire started, if it received a suppression response, and if it occurred in wilderness. Fires in wilderness that received a suppression response were divided by the total number of naturally started fires in wilderness areas to arrive at the percent

						value
Untrammeled	Authorized actions	Instances of trail cutter use	Trail maintenance log	1	1	These data came from the trail maintenance records, also kept by Brantley Boatright.
Untrammeled	Authorized actions	Area of herbicide application		0	0	These data were not collected because at this moment no herbicide is used in wilderness areas. It was determined that this action could factor into the wilderness management plan in the future, and therefore included in the list of measures
Untrammeled	Unauthorized actions	Any Unauthorized Action	professional judgment	5	1	This is a catch all for any unauthorized actions that occur in wilderness areas. This could include poaching, vandalizing, unauthorized entry, permit/fee violations, or others
Natural	Plant and animal species	Number of active red-cockaded woodpecker clusters within wilderness	paper	1	1	These data came from records kept by refuge Wildlife Biologist, Dean Easton. Records of clusters in wilderness are kept separate from those outside of wilderness because management techniques differ
Natural	Plant and animal species	Number of non-indigenous species	professional judgment	1	1	Data from speaking with Sara Aicher and Dean Easton.
Natural	Physical resources	Acid deposition based on concentration of sulfur	computer	10	0	Data will come from I&M

		and nitrogen in wet deposition				
Natural	Biophysical processes	Number of personal boats that enter wilderness as a measure of possibility for movement of non-indigenous species into the wilderness	Public use reports (computer)	1	4	These data were compiled from public use reports, located on the shared drive and from Gracie Gooch, volunteer coordinator. The public use reports include all the entrances to the refuge. To get a value for this measure, values from the "fishing by boat" category were summed. Fishing by boats provides the number of personal boats brought to the refuge by using a sign in/ sign out sheet at the boat ramp.
Undeveloped	Non-recreational structures, installations, and developments	Number of authorized non-recreational structures	professional judgment	1	5	This is the total number of non-rec structures, installations, and developments. See report for a listing of structures. These numbers came from speaking with Sara Aicher and her knowledge of the structures within the refuge. Going over the list and refining it took some time to ensure completeness
Undeveloped	Inholdings	Area of inholdings	GIS	1	2	GIS was used to total the area of the two inholdings within the refuge
Undeveloped	Use of motorized or mechanical	Instances of motorized vehicles used in wilderness	Wilderness log	2	3	Data were compiled from the refuge's wilderness log. This came from refuge dispatch officer

		for refuge purposes				Brantley Boatright. This record keeps instances of motorized use. The number of instances of motorboats used was recorded.
Undeveloped	Use of motorized or mechanical	Number of helicopter flights that land on refuge helispots	Wilderness logs	1	1	Wilderness logs kept by Brantley Boatright. I spoke with refuge staff to determine where these data were located
Undeveloped	Use of motorized or mechanical	Number of days power tool and equipment were used in wilderness for refuge purposes	Wilderness log	2	2	Data were compiled from the refuge's wilderness log. This came from refuge dispatch officer Brantley Boatright. This record keeps instances of equipment and tool use.
Undeveloped	Loss of cultural resources	Number of disturbances to cultural resources	professional judgment	1	2	From speaking with refuge staff. Disturbances could include vandalizing, fire damage, maintenance, etc. The one cultural resource on the refuge is Floyd's Island Homestead, which serves as an overnight stop for campers.
Solitude +	Remotenes s from inside	Number of motorboats operated within wilderness for recreational purposes	Public use reports	2	3	Also from public use reports. These are the total number of motorboats operated in wilderness, including guided boat tours and personal boat use.
Solitude +	Remotenes s from inside	Number of guided motorboat tours of refuge wilderness	Public use reports	1	1	Data came from public use reports, made available be Gracie Gooch. This is the sum of people on guided boat tours, and visitors who bring

						their own boat, from the two entrances that offer this service (Suwannee Canal Rec Area, and Stephen Foster State Park).
Solitude +	Remoteness from inside	Number of visitors to wilderness areas	Public use reports	1	2	Data came from public use reports, made available be Gracie Gooch. This is the sum of people on guided boat tours, and visitors who bring their own boat, from all four entrances
Solitude +	Remoteness from inside	Number of overnight platform reservations made	Public use reports	1	1	The public use reports have a section for camping days. This is the number of days spent on the overnight platforms and shelter on the refuge
Solitude +	Remoteness from outside	Percent of wilderness boundary adjacent to private land	GIS	1	3	These data was derived from the GIS database. The total mileage of wilderness boundary was calculated (215 miles). This was broken down to how many miles border non-wilderness refuge, state and other federal land, and private land.
Solitude +	Remoteness from outside	Number of airplane overflights that can be seen from inside wilderness boundaries	field	2	0	A protocol was developed under the guidance of Sara Aicher to monitor the number of airplanes that can be heard from wilderness areas. Data will come from three one hour surveys conducted at Duck Lake, Chase Prairie, and Billy's Lake. Each survey will occur from 11 am to 12 pm. Each airplane or jet stream

						observed will be recorded. Whether the flight is military or civilian (commercial/private plane) will be recorded.
Solitude +	Facilities that decrease self-reliant recreation	Type and number of agency-provided recreation facilities	Refuge signage plan, refuge maps, speaking with refuge staff	14	5	Data came from speaking with refuge staff including refuge biologist, administrative assistant, and volunteer coordinator. Data were compiled using the BLM implementation guide. Number and type of campsites/shelters/toilets came from refuge biologist and administration assistant. Number of signs and type of signs came from the sign plan made available by the volunteer coordinator.
Solitude +	Management restrictions on visitor behavior	Type and extent of management restrictions	professional judgment, refuge staff	10	6	Data came from speaking with refuge staff regarding the management restrictions currently in place. The BLM Implementation Guide strategy for monitoring management restriction was employed to consolidate the data.

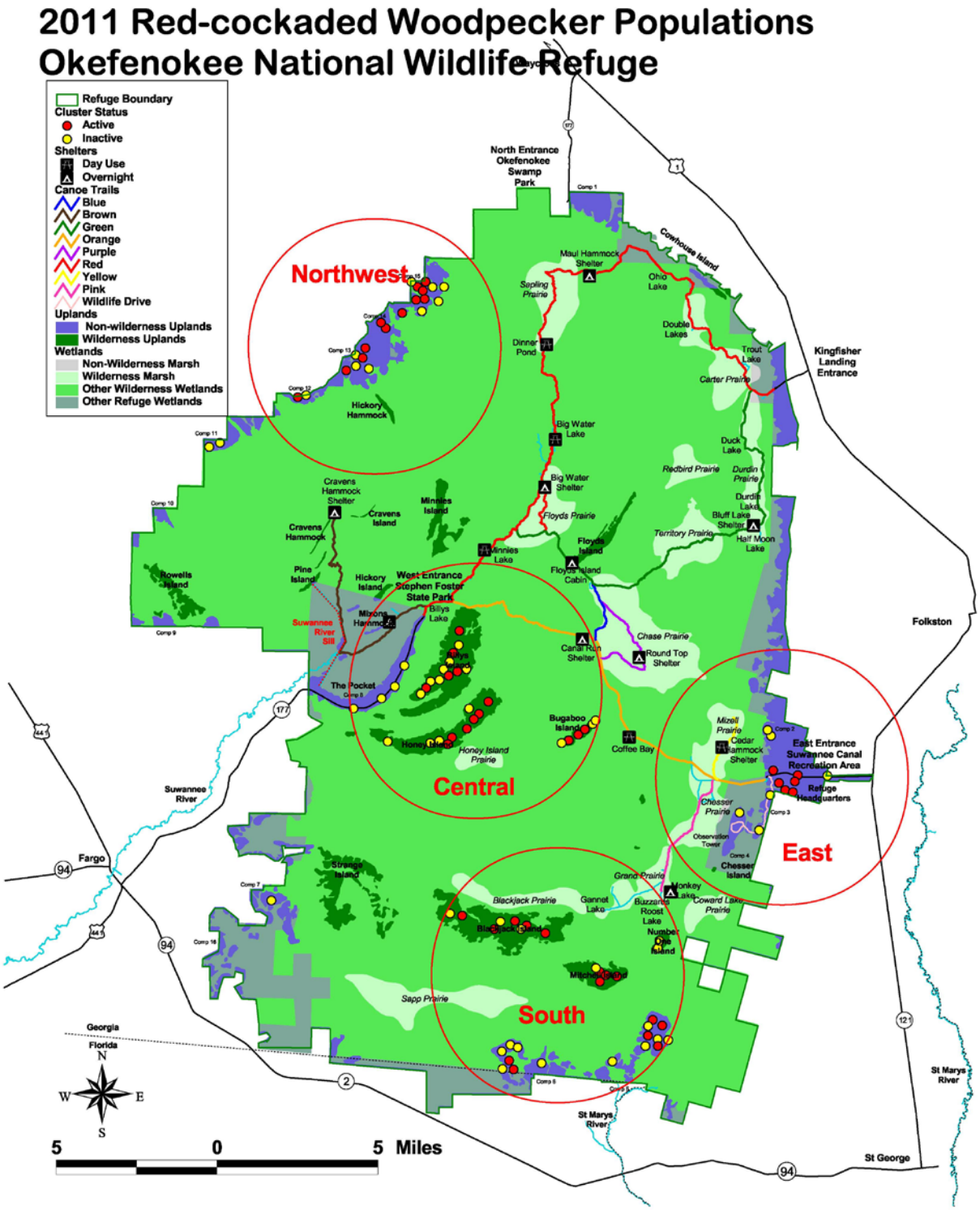
Table 15. Staff Involved and Time Spent on WCM, Okefenokee NWR

Title of staff involved in identifying, prioritizing, and selecting measures	**Staff time to identify, prioritize, and select measures (in whole hrs)**	**Comments**
Biologist	35	Sara Aicher was my supervisor and integral in supporting my efforts and aiding in finding information including recreational and non-recreational structures, all GIS data, included maps, roads and trails in wilderness, fire damage, surveys conducted within wilderness, # non-indigenous species, area of herbicide application, area of inholdings, airplane survey protocol. Prioritizing measures and setting significant change.
Wildlife Biologist	15	Red-cockaded woodpecker cluster numbers, surveys conducted within wilderness
Volunteer Coordinator	10	Public use records, refuge signage plan
Dispatch Officer	8	# Prescribed fires, wilderness wildfires, refuge wilderness log, dispatch records
Administrative Assistant	4	Information on overnight shelter reservation system

Table 16. Time Spent by Wilderness Fellow on WCM, Okefenokee NWR

Time you spent to identify, prioritize, and select all the measures (in whole hours)	**Time you spent to learn how to enter data into the WCM database application (in whole hours)**	**Time you spent to enter all data into the WCM database application (in whole hours)**	**Time you spent on other tasks directly related to WCM (e.g., reading CCP, giving presentations, talking with staff) (in whole hours)**	**Time you spent doing <u>other</u> Refuge tasks not directly related to WCM (in whole hours)**
108	2	8	120	80

Appendix C: Map of 2011 Red-cockaded Woodpecker Populations, Trails, Overnight Shelters, and Entrances, Okefenokee National Wildlife Refuge



Appendix D: Map of Areas Burned and Start Locations of Honey Prairie and Racepond Fires, Okefenokee NWR